

SURVEY OF THE FLORA OF NEORA VALLEY NATIONAL PARK IN DARJEELING, WEST BENGAL (INDIA)

THESIS SUBMITTED FOR THE DEGREE OF DOCTORATE OF
PHILOSOPHY (SCIENCE) OF THE UNIVERSITY OF NORTH BENGAL,
RAJA RAM MOHANPUR, DARJEELING, WEST BENGAL (INDIA).

2001

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Professor

TO WHOM IT MAY CONCERN

This is to certify that **Prem Chandra Rai** has carried out this research work under my supervision in my laboratory. His thesis entitled **SURVEY OF THE FLORA OF NEORA VALLEY NATIONAL PARK IN DARJEELING, WEST BENGAL (INDIA)** is based on his original work and is being submitted for the award of **Doctor of Philosophy (Science)** degree in Botany in accordance with the rules and regulations of the **University of North Bengal**.

[A. P. DAS]

PROFESSOR

Department of Botany

North Bengal University

Dedicated

to

My beloved mother

Late (Mrs.) Sarmaya Rai

From whom I learnt

The first word

Of my Life

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(Prem Chandra Rai)

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Chapter-I

INTRODUCTION

1. INTRODUCTION

The flora of this country is more varied than that of any other country of an equal area in Eastern Hemisphere, if not in the globe (Hooker 1907). Darjeeling Himalaya is an integral part of the Eastern Himalaya, located in the northern side of Eastern India. The tertiary and quaternary have affected the Himalayan region and brought about many climatic changes and geographical variations. Many ancient elements have survived while some have differentiated to different races (Hara 1966). Darjeeling Himalaya is well known for its diverse range of vegetation and so is one of the richest in India (Yonzon 1976; Bhujel 1984; Das 1986, 1995).

The hilly regions of the State of West Bengal in the Federal Republic of India form an important part of Eastern Himalaya, which is recognised as a Biodiversity Hot-spot in recent times. Darjeeling is the northernmost district of the State. Excepting some parts of Siliguri Sub-Division, the entire district of Darjeeling is situated on the spurs of Singalila range of Eastern Himalaya and represents a great range of altitudinal variations, from 200m or less at Siliguri to 3660m at Phalut. The hills of Darjeeling serve as one of the richest and interesting botanical regions in the whole of Indian sub-continent, and thus, have been a central point of natural and floristic attraction for tourists and nature-lovers. It is especially famous for three 'T's, i.e. Tea, Timber and Tourism. More specifically, it is well known as ideal place for health, and nature bestowed pristine beauty on the unique background of the world's third highest snow peak Mt. Kanchanjungha (8580m). For the nature lovers and botanists, hills of the Darjeeling district are of paramount significance by virtue of the rich flora and fauna (including a number of endemics). The beautiful landscape in its domain attracted the eminent researchers like Buchanan-Hamilton (1820), Roxburgh (1820-1824, 1832), Wallich (1820-1832), Griffith (1848), Clarke (1876, 1885), Hooker (1872-97), Hara (1966, 1971), Hara *et al* (1978, 1979, 1982), Ohasi (1975), Das *et al* (1985), Das and Chanda (1986, 1987, 1990), Das and Lama (1992), Samanta and Das (1995), Das (1995, 1998), Das and Panda (1997) Polunin and Stainton (1987), Pradhan and Rai (1983-1985), Sharma and Ghosh (1970), Grierson and Long (1983, 1984, 1987), Noltie (1994, 2000) are among others who have made a lot of contributions to the flora of this hill station. However, a comprehensive flora is far ahead to come out in this line.

After the rise of the Himalayas, dense vegetation developed there almost in an undisturbed condition for hundreds of millions of years. Specially, the climate of Eastern Himalayas favors such development in a great way, which lead to the development of this richest floristic zone in the country. In the long drawn out process of migration of alien flora, their mixing, mutation, selection against different sets of climatic conditions, thousands of unique plant species evolved there, many of which, in turn, again migrated back to other floristic zones. Even today, the Eastern Himalayas sustaining over 30 % endemic higher plant species, is much-focussed region of plant diversity in the world.

After the *Rio de Genero Convention (1992)*, IUCN has identified very few Biodiversity Hot Spot Zones in the world. Western Ghat and Eastern Himalayas are such Hot Spots in the Indian sub-continent. Darjeeling district of West Bengal having an area of 3254 sq km and the State of Sikkim with its total area of 7299 sq km are the integral parts of this Biodiversity Hot Spot (Eastern Himalaya). The hills of Darjeeling are comparatively rich in biodiversity composition and thus, are the storehouse of rich biomass.

Darjeeling, more popularly known as *Queen of the Hills* as crowned by British during their 200 years rule in India, has presently four reserved areas i.e., two National Parks and two Wildlife sanctuaries. Neora Valley National Park is one of these, which is absolutely distinct and unique by its geographical features, virginity and species richness.

1.1 LOCATION OF THE PARK

Darjeeling district in the State of West Bengal has four sub-divisions, viz, Kalimpong, Darjeeling, Kurseong and Siliguri with its district administrative Headquarter at Darjeeling.

Neora Valley National Park is located in the Kalimpong sub-division of the Darjeeling district, and lies in the eastern side of the town of Kalimpong (**Fig. 1.1**). The geographical orientation of the Neora Valley falls between 26° 52' 3" - 27° 7' 3" North latitude and between 88° 45' - 88° 50' East longitude. The valley encompasses a total surface area of 88 sq km with many hill spurs, ridges and peaks ranging from 300m to 3100m.

Neora Valley National Park is situated on the flanks of Eastern Himalayas and has got common international boundary at one point, at an elevation of 2900m at Tinsimana. On the frontal North-Eastern side, it joins with the kingdom of Bhutan. The valley further stretches downward to join with the Doars area of West Bengal in the terai region in the foothills, and it also shares common boundary with the State of Sikkim in the Northern direction (**Fig. 1.1**). There is a common point where the parts of State of Sikkim, Darjeeling district of West Bengal and the Kingdom of Bhutan meet at a historical place called Tinsimana (meaning tri-junction, 2900m) where the stone pillars are raised demarcating the international boundaries (**Fig. 1.1 & Fig. 1.2**).

1.2. LEGISLATION

Neora Valley National Park with its total surface area of about 88 sq km was declared as National Park by the Government of West Bengal in the year 1986 vide Govt. Notification No. 1818 Forest, dated 17.4.1986. This was done in realization of the Govt. to protect the rich biotic zones by establishing the natural reserve. This legislation added one more such reserve area to the already existing two Wildlife Sanctuaries and one National Park within the district of Darjeeling. The Government of West Bengal took the decision to declare the entire area of the Neora Valley as National Park in view of its biodiversity richness, remoteness, virginity, diverse topography and varied climatic, edaphic, altitudinal and biotic conditions along with their complex inter-relationship and species composition.

1.3. IMPORTANCE OF THE PARK

The Neora Valley National Park is one of the most important biosphere reserves in India. The Valley has its unique distinction because its dense primeval forest cover and difficult

LOCATION MAP OF THE STUDY AREA

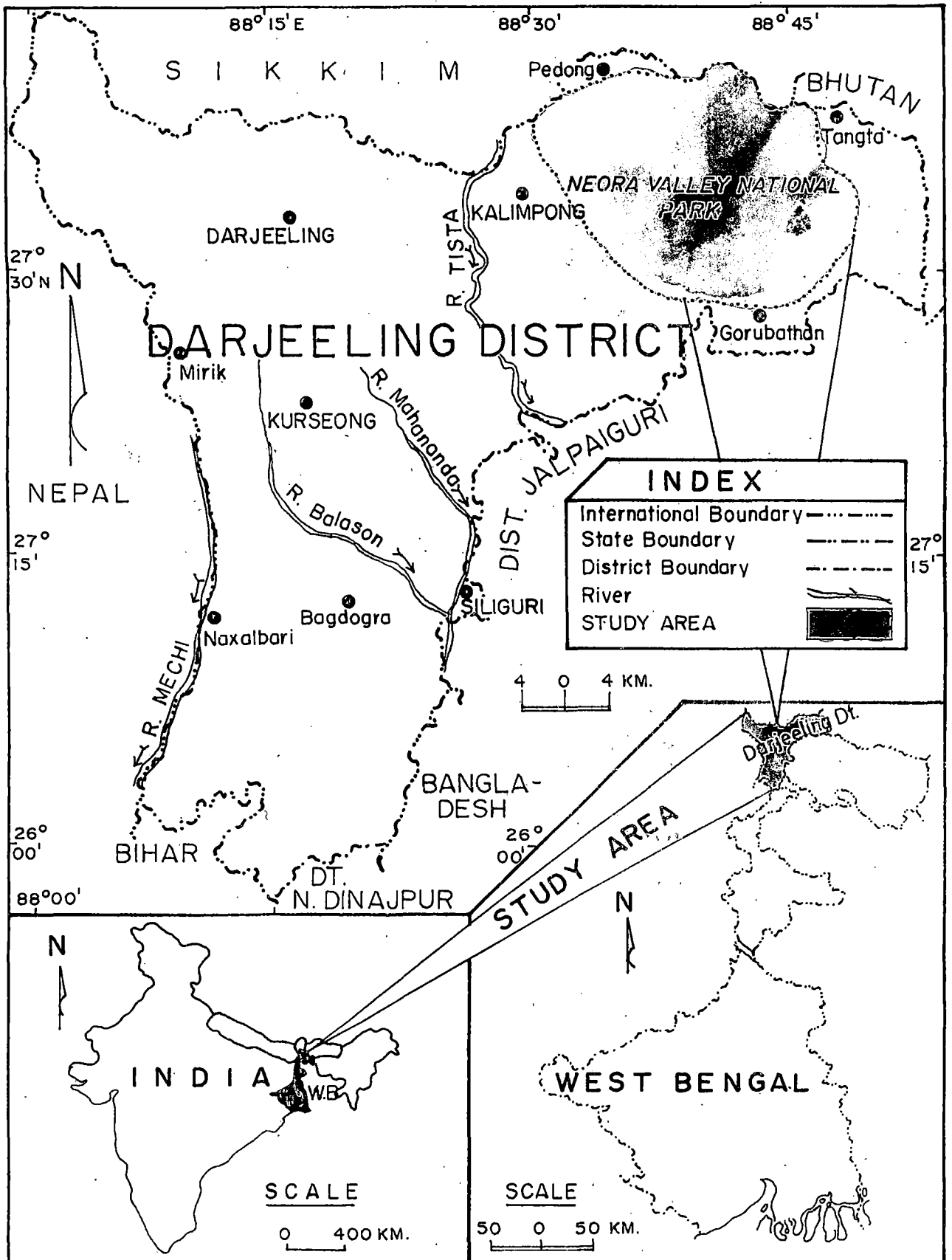


Fig. No. I.1

NEORA VALLEY NATIONAL PARK

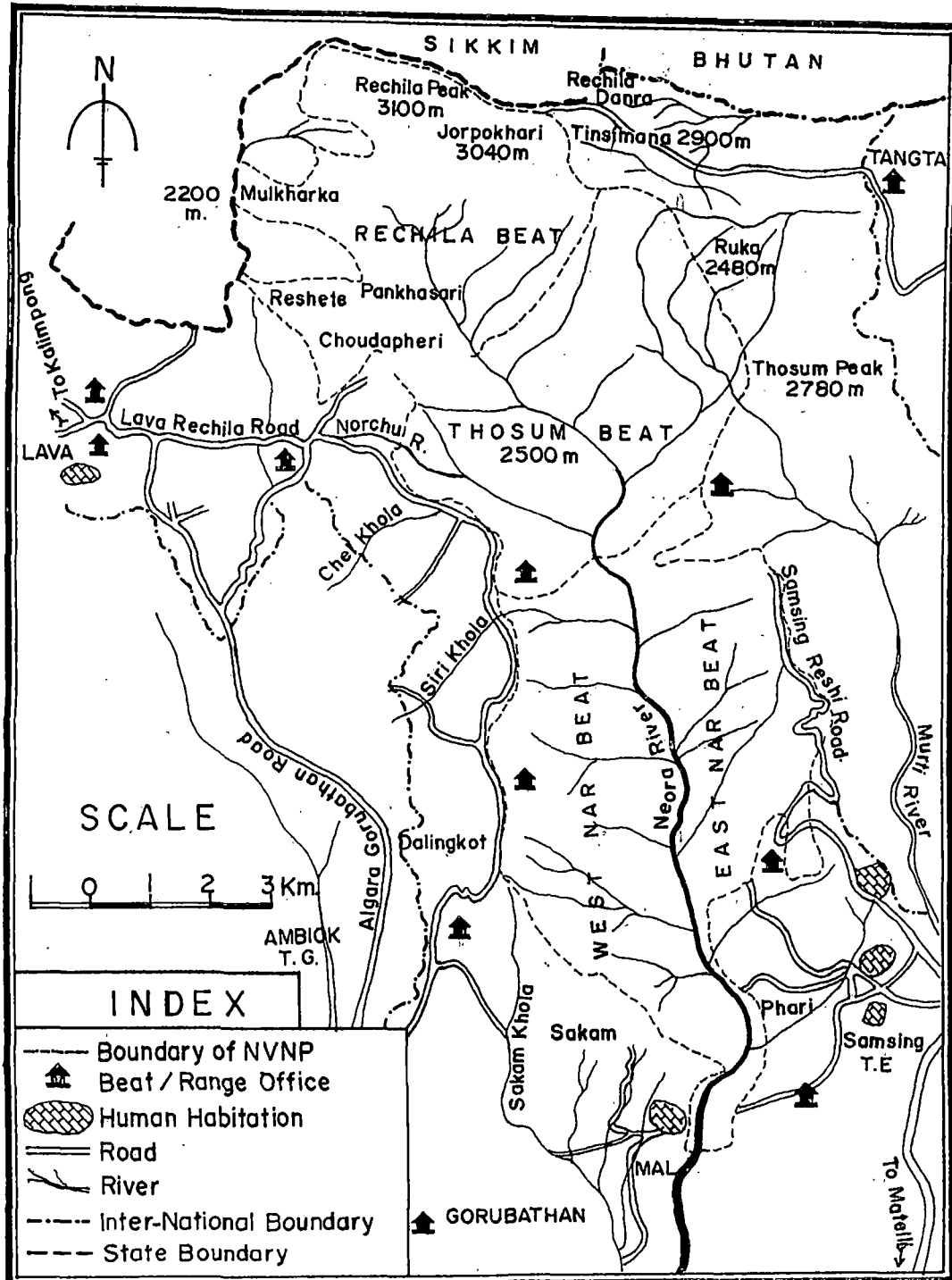


Fig. No.12

terrain have kept explorers away from traversing it. It is a compact patch of 8,800 hectares with an altitudinal range varying from 300 m (amsl) to 3100 m (amsl). The rich floristic and faunistic diversity is one of the salient features of this reserve area. The Park is of great ecological interest when about 60 % of its total area is being estimated to be primeval forest area making this valley one of the best preserved biomes in India (Guha, 1982-83). The park has been a crucial piece of landmass providing ideal habitats for a wide range of microbes, flora and fauna, and has formed a core part of Eastern Himalayan Biodiversity Hot Spot. Besides, Neora Valley also acts as the repository of economic plant wealth, mainly medicinal and other various ethnobotanically valued plant species. The Valley also represents diversity of habitats, and sets an excellent account of majestic Himalayan wild flowers. The economic value of non-timber forest products of the Neora Valley such as medicinal plants, dyes and resin producing plants and bamboos are in fact very high.

The pristine natural forest, dense bamboo breaks, Rhododendrons with brightly colored flowers in full bloom, green valley, meandering rivers and streams altogether form the breathtaking vast picturesque landscape of Neora Valley National Park against the background of beautiful snow-capped Mount Kanchanjungha. Postmonsoon greenery enhances the beauty of the misty Neora Valley for very humankind to feast their eyes open. The beautiful pictures of the deep blue sky during autumn, partially covered with patches of cottony clouds seem to be enticing everyone. From the top of the valley, one can have a glimpse of swift-flowing Teesta River crawling like a snake towards the plain. The beautiful waterfalls trickling down the valley with a musical sound of endless tune add excitement to the park visitor. The flowers in myriad of colors in the Valley with magnificent backdrop of Mount Kanchanjungha's picture bedazzle nature-lovers visiting the Neora Valley National Park. During winter, the snow-covered cap of the valley enhances a serene picture of the Neora Valley.

The Park also acts as a source of water and provides a wide range of shelter for the flora and fauna. It has an unpredictable unique landscape for both flora and fauna serving to conserve the valuable natural resources like plants, animals and water bodies. The steep himalayan slopes, abundant rainfalls, fog-hazed weather and high humidity are some features of its significance. The views of sunrise from Rechila Peak (3100m) would always leave visitors bewitched. The lush landscape of pristine forest of Rhododendrons, Oaks, Hemlock, Silver-fir, Pine, valleys of colorful flowers and rich faunal species, mainly avi-fauna have made Neora Valley National Park a veritable paradise for nature lovers beyond doubt. The intact vegetation cover and its rich forest composition ensure a secure habitat for a plethora of Himalayan Flora and Fauna. Huge colourful flowers adorned the top of trees in the vicinity creating a sharp contrast in the pre-dawn haze. The scent from the aromatic species and from the flowers of other plants fills the spring air in the Neora Valley adding uniqueness and charm. Besides, the colorful flowers of *Gentiana*, *Primula*, *Anemone*, *Ranunculus*, *Fragaria*, *Viola*, *Tripterospermum*, *Digitalis*, *Potentilla*, *Paris*, *Prunella* etc. have added chastity to the rich ground flora, and everyone will be easily gripped by enchanting sight of these flowers.

Apart from this, the Neora Valley National Park also represents a diversity of faunal species. The Park is unique and very important from this point of view that more than 79 species of birds belonging to 21 families have been reported alone from the upper reaches of Neora Valley which forms only the ¼ part of the total area of the Park. According to Zoological Survey of India (ZSI), there are some 60 families of birds in West Bengal (Majumdar *et al*, 1992) which means that a small hill patch of Neora Valley National

Park (i.e., 25 % of the total Park area) represents 41% of the total bird families of the vast State of West Bengal. Their gurgling, chirping and singing echo all over the dense forest of Neora Valley like a wild symphony. In the light of this fact, Neora Valley National Park is very important for avi-faunal study and thus prolonged and comprehensive study on the richness of avi-fauna of this region will be of great interest for further ornithological studies and to develop Neora Valley National Park as a special site of ecotourism (Mukhopadhyay *et al*, 1999). It is also more likely that a fair number of bird species await recording from the impenetrable thickets and deeply forested ridges of entire regions of Neora Valley. The most interesting point in the importance of avi-fauna species of Neora Valley is that the recorded species of birds also include most rare species like Buzzard (*Butea sp.*), Himalayan Redbreasted Falconet (*Microhierax caerulescens*), Spotted Seops Owl (*Otus spilocephalus*), Collared Pigmy Owllet (*Glaucidium brodiei*), Himalayan Owl (*Strix alueo*), Himalayan Goldenbreasted Tit-Babbler (*Aleippe chrysotis*), Golden Stadt's Redstart (*Phoenicurus erythrogaster*), Indian Collared Burhchat (*Sexicola torquata*), Eastern Brown Crested Tit (*Parus dichrosus*), Eastern Plaincolored Mountain Finch (*Leucostricta nemoricola*) etc.

Besides, 32 species of mammals belonging to 16 families have been reported from the upper reaches of the Neora Valley alone, out of which 9 are reported to be in schedule I of Indian Wildlife (Protection) Act, 1972. This figure when compared to the total mammalian species of India (410) (Nameer, in press) and the State of West Bengal represents 7.8 % and 17 %, respectively (Biswas *et al*, 1999). Very recently, the Department of Forest, Government of West Bengal and some Non-Govt. Organisations have communicated the presence of tiger population (*Panthera tigris*) in Neora Valley National Park. According to the report of Forest Department, Neora Valley National Park has the highest density of tiger in West Bengal at present. The valley is also the ideal home to one of the most cute but highly endangered animals of the world i.e., Red Panda (*Ailurus fulgens*).

Neora Valley has an amazing diversity of flora that supports a large population of herbivore species, and is extra-ordinarily rich in avi-fauna as mentioned. Nature has bestowed Neora forest with a large number of butterflies. Rich plethora of insects is represented by a mammoth diversity of spiders, bugs, dragonflies, leaf hoppers, lacewings, beetles, ants, bees and wasps. The rich flora and a much variable vegetation types of the Park thus, supply adequate foods and suitable habitats for all these animals. While the vegetation of the Park is supporting its great faunal population, it is also supporting the numerous vulnerable or endangered species of plants that can survive only in their natural habitats. So, one can expect that Neora Valley National Park, an immense storehouse of the rich biodiversity, would be one day the most prominent and important model Biodiversity Valley of the country.

Therefore, in true sense, Neora Valley National Park is a real conservatory which is not only housing a wide range of biological materials but is also working as an important link between other conservatories thereby providing an access to routes for the migration of the different species.

1.4. CLIMATE

Because of varied topographical and altitudinal conditions, the climate is much variable in different parts of Neora Valley National Park which varies from subtropical to cold-

temperate conditions. During summer and monsoon, the climate of the valley remains warm and humid whereas moderate coldness persists with the advent of winter (November-mid-December) at lower elevations. The coldness becomes very severe towards the highest parts of the valley during winter, and some of its high peaks like Rechila, Jorepokhari etc. receive snowfall and often remain snow-covered for a short period (2-3 months). Many areas of the park remain foggy for major periods of the year and the sun is hardly visible during monsoon days. The rainfall is more frequent and maximum during monsoon. The maximum average temperature of Neora Valley has been recorded up to 28.8° C during August whereas the minimum average temperature being 6.4° C during February as recorded from the Regional Sericulture Research Station, Kalimpong at 975m altitude. As regards the rainfall and other meteorological data, there is no such Meteorological Station within or in the immediate vicinity of the Neora Valley. Thus, the meteorological information computed here is collected from Regional Sericulture Research Station, 7th Mile, Kalimpong, which is at a considerable distance of about 40km by road from the location of the park.

A subtropical climate prevails in the lowermost parts (foothills) of the park whereas temperate and cold-temperate climate prevails in the places of higher elevations.

The average annual rainfall of the valley as recorded from the nearest Meteorological Station of the park at Kalimpong is 2246.8 mm. Rainfall is heavy during June-August, maximum rainfall taking place usually in the month of July (Table 1.1 & 1.2).

Table 1.1: Meteorological mean data (1990-1994) pertaining to rainfall, rainy days and temperature (maximum and minimum) as calculated from the obtained data

Months	Monthly Rainfall (mm)	No. of Rainy Days	Mean Temperature	
			Min. (°C)	Max. (°c)
JANUARY	51.6	2.4	6.6	18.8
FEBRUARY	23	3	6.4	19.8
MARCH	36.4	4.6	11.2	24
APRIL	87.4	8.2	14.4	27.2
MAY	150.6	12	16.4	27.6
JUNE	451.8	15.4	19.2	29
JULY	645.2	24.8	21.4	28.6
AUGUST	400.6	22.2	20	28.8
SEPTEMBER	340.4	18.4	18	27.8
OCTOBER	35.4	3.6	14.6	25.4
NOVEMBER	10	1.4	12.2	23.6
DECEMBER	14.4	0.4	8.8	19.4
Total	2246.8	116.4	169.2	300
Average	187.23	9.7	14.1	25

Source: Regional Sericulture Research Station, 7th Mile, Kalimpong. Altd. 975m.

The data of mean temperature, rainfall and no. of rainy days presented in the above table are based on tables nos. 1.2 & 1.4.

Table 1.2: Monthly Rainy Days and Rainfall during 1990-94 at Kalimpong

Year	1990		1991		1992		1993		1994		Average	
	Rainy Days	Rain-fall (mm)	Rainy Days	Rain-fall (mm)	Rainy Days	Rain-fall (mm)	Rainy Days	Rain-fall (mm)	Rainy Days	Rain-fall (mm)	Rainy Days	Rain-fall (mm)
Jan.	3	40	3	126	1	33	2	14	3	45	2.4	51.6
Feb.	3	24	1	22	3	24	3	19	5	26	3	23
Mar.	5	52	4	48	4	33	3	29	7	20	4.6	36.4
Apr.	7	96	6	42	11	107	13	170	4	22	8.2	87.4
May	11	170	12	193	4	216	20	123	13	51	12	150.6
Jun.	17	295	13	452	13	890	14	276	20	346	15.4	451.8
Jul.	31	557	31	529	19	1409	23	414	20	313	24.8	645.2
Aug.	31	319	27	406	14	468	21	527	18	283	22.2	400.6
Sep.	28	268	22	696	10	275	19	315	13	148	18.4	340.4
Oct.	7	52	4	34	1	4	6	87	Nil	Nil	3.6	35.4
Nov.	Nil	Nil	Nil	Nil	1	5	4	15	2	30	1.4	10
Dec.	Nil	Nil	2	72	Nil	Nil	Nil	Nil	Nil	Nil	0.4	14.4
Total	143	1873	125	2620	81	3464	128	1989	105	1284	106.4	2246
Mean	11.92	156.0	10.42	218	6.75	288	10.67	165	8.75	107	9.7	187.2

Source: Regional Sericulture Research Station, 7th Mile, Kalimpong. Altid: 975m.

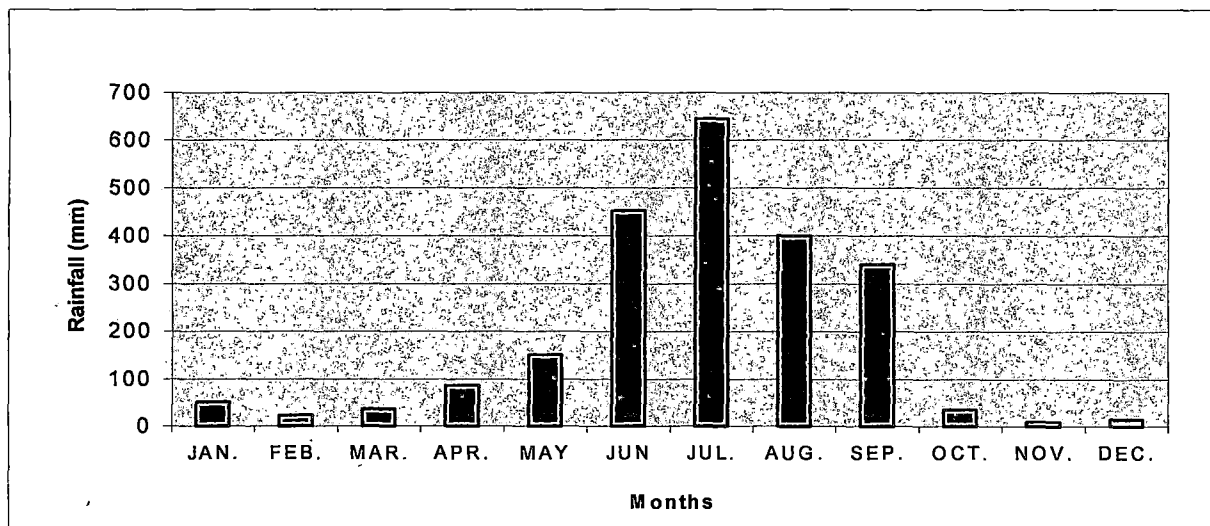


Fig. 1.3: Monthly mean rainfall (1990-94) at Kalimpong

1.4.1. PRECIPITATION

Varied amount of precipitation is prevailing altogether at different places of the Neora Valley. The mean highest monthly rainfall recorded at Regional Sericulture Research Station, 7th Mile, Kalimpong is 645.2 mm during July, while the mean lowest rainfall recorded is 10mm during November.

The frequency of rainfall during monsoon is maximum, where there is no barrier for penetration of monsoon clouds, e.g. Jorepokhari, at 3030m elevation (Chopra 1985). The average number of rainy days around Kalimpong areas near the National Park as found in the met-data is 116 days per annum (table 1.2). Considering the monthly average rainfall, Kalimpong area is most rainy area with average monthly rainfall of 187.23 mm compared to Gorubathan area with only 23.16mm at Sermali Agriculture Farm (table 1.3) located at the foothills of Neora Valley, and receives the lowest precipitation level in the area.

Table 1.3: Monthly Rainfall (1998-2000) at Gorubathan as recorded at Sermali

Year Month	1998		1999		2000		Average	
	No. of Rainy Days	Rainfall (mm)	No. of Rainy Days	Rainfall (mm)	No. of Rainy Days	Rainfall (mm)	No. of Rainy Days	Rainfall (mm)
Jan.	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Feb.	Nil	Nil	Nil	Nil	1	18.00	0.33	6
Mar.	4	38.25	Nil	Nil	Nil	Nil	1.33	12.75
Apr.	8	33.92	9	12.72	7.00	45.82	8	34.13
May	9	39.82	22	32.61	19.00	35.87	16	36.1
June	27	58.23	21	41.20	24.00	112.80	24	57.01
July	30	70.8	28	51.96	30.00	48.99	29.3	56.69
Aug.	29	68.34	26	51.68	28.00	47.60	27.66	55.87
Sep.	15	38.62	28	36.68	25.00	28.05	22.66	34.45
Oct.	12	42.13	12	35.30	7.00	66.50	10.33	47.97
Nov.	1	25.3	3	12.30	3.00	12.30	2.33	16.63
Dec.	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total	135	415.41	149	274.45	144	415.93	147	368.59
Average	11.25	34.62	12.42	22.87	12.00	34.66	11.89	30.71

Source: Sermali Agriculture Farm, Gorubathan. Altd. 270m.

1.4.2. TEMPERATURE

The average maximum temperature for the Neora Valley as recorded from its nearest meteorological station at Kalimpong over a period of five years (1990-94) has been found to be 28.8 °C during the month of August, and the average minimum temperature being recorded 6.4 °C during February. However, this data is taken in the generalized view, and does not necessarily imply to the exact temperature figures of the Neora Valley National Park as the temperature often hovers around -5° C during winter (our observation on Dec 12, 1994) at Rechila Peak of the valley. Data thus presented in the table is interpreted from the data procured from the Regional Sericulture Research Station at Kalimpong, which can be taken into consideration in the prevailing context, particularly this being not

so far from the Neora Valley. The table 1.2 depicts the collective figures of month-wise mean maximum and minimum temperature (1990-94) and the table 1.4 shows the individual year mean maximum and minimum temperature as recorded from the Regional Sericulture Research Station, Kalimpong for the past consecutive five years since January 1990 to 1994.

In the higher elevated areas of the Neora Valley, the occurrence of frost is a common feature, and the seasonal snowfall is also in the natural routine of the climate. In winter nights, the mercury goes down to the freezing point and often to an extent of (-) 5° C (our observation on Dec 12, 1994 at Rechila Peak).

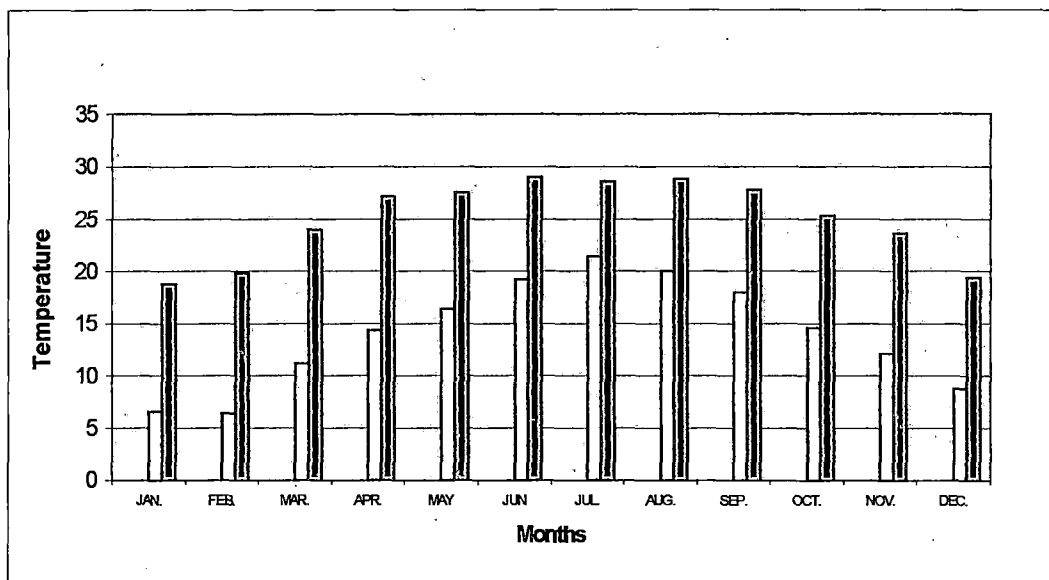


Fig. 1.4: Monthly mean (max. & min.) temperature (° C) during 1990-94 at Kalimpong

1.4.3. HUMIDITY AND SUNSHINE

The Neora Valley environment maintains a high humidity level round the year. The higher places of the valley towards north usually remain humid almost round the year. During rainy season, the trend of decrease in humidity being found towards lower and southern valley slopes. The drier months are March and April when the relative humidity continuously go down.

Sunshine is frequently disturbed due to formation of dense fog and clouds, usually in the morning and afternoon. The fog and mist formation goes to its extreme during the month of July in the places like Choudha Feri, Pankhasari, Alubari, Chitray, Dhamdhamey Dara, Hattidara, Jorepokhari, Tinsimina etc. of the Neora Valley, while it is also frequent

Table 1.4: Mean maximum and minimum temperature (C) alongwith the highest and lowest temperature during 1990-94 at Kalimpong

Year Month	1990						1991						1992						1993						1994						Mean	
	Mean Max.	High- est	Mean Min.	Low- est	Mean Max.	High- est	Mean Min.	Low- est	Mean Max.	High- est	Mean Min.	Low- est	Mean Max.	High- est	Mean Min.	Low- est	Mean Max.	High- est	Mean Min.	Low- est	Mean Max.	High- est	Mean Min.	Low- est	Mean Max.	High- est	Mean Min.	Low- est	Mean Max.	High- est	Highest (C)	Lowest (C)
Jan.	14.5	19	8.4	6	10.3	16	6.2	4	15.8	18	11.1	8	14.6	20	8.0	6	18.6	21	10.4	9	18.8	21	10.4	6	18.6	21	10.4	9	18.8	18.8	6.6	
Feb.	17.7	21	10.3	6	12.1	16	9.2	7	17.5	20	11.1	5	16.7	21	10.7	6	17.7	21	10.4	8	19.8	21	10.4	6	17.7	21	10.4	8	19.8	19.8	6.4	
Mar.	22.3	26	14.7	13	18.0	16	15.5	9	21.2	26	15.8	13	21.5	26	12.6	9	22.3	26	14.8	12	24.0	26	14.8	9	22.3	26	14.8	12	24.0	11.2	11.2	
Apr.	24.8	28	16.9	14	21.0	23	17.3	16	26.7	29	18.4	15	24.6	27	16.8	12	25.3	29	16.9	15	27.2	29	16.9	12	25.3	29	16.9	15	27.2	14.4	14.4	
May	25.3	29	18.3	17	22.0	20	19.0	17	25.4	29	17.7	15	25.3	28	18.2	16	27.4	32	20.0	17	27.6	32	20.0	16	27.4	32	20.0	17	27.6	16.4	16.4	
Jun.	25.4	30	19.0	20	24.7	26	20.4	17	26.4	30	17.1	16	25.6	29	19.6	19	26.3	30	21.3	24	29.0	30	21.3	19	26.3	30	21.3	24	29.0	19.2	19.2	
Jul.	26.5	27	19.2	21	23.0	26	20.0	20	26.6	30	18.5	17	26.5	30	21.5	20	27.5	30	22.7	27	28.6	30	22.7	20	27.5	30	22.7	27	28.6	21.4	21.4	
Aug	23.2	27	18.3	23	23.0	25	21.0	18	26.6	30	19.6	19	25.7	28	20.6	18	28.0	34	22.8	22	28.8	34	22.8	18	28.0	34	22.8	22	28.8	20	20	
Sep.	22.6	28	18.3	18	21.6	23	19.0	16	26.6	29	19.2	18	26.2	30	20.3	18	26.7	29	21.5	20	27.8	29	21.5	18	26.7	29	21.5	20	27.8	18	18	
Oct.	21.5	22	18.3	14	20.5	23	17.6	15	23.7	26	17.3	13	24.3	26	18.4	15	24.7	30	18.0	16	24.5	30	18.0	16	24.7	30	18.0	16	24.5	14.6	14.6	
Nov.	18.7	20	13.4	12	20.7	22	17.6	16	21.8	26	12.8	10	21.9	25	15.2	13	20.6	25	14.4	10	23.6	25	14.4	10	20.6	25	14.4	10	23.6	12.2	12.2	
Dec.	13.9	15	8.8	8	17.6	20	9.4	8	17.4	20	10.0	8	19.6	22	11.9	10	13.2	20	10.9	10	19.4	20	10.9	10	13.2	20	10.9	10	19.4	8.8	8.8	
Total	256.4	292	183.9	172	234.5	256	192.2	163	275.7	313	188.6	157	272.5	312	193.8	162	278.3	327	203.8	190	300.0	327	203.8	162	278.3	327	203.8	190	300.0	169.2	169.2	
Average /	21.37	24.33	15.33	14.33	19.54	21.33	16.02	13.58	22.98	26.08	15.72	13.08	22.71	26.00	16.15	13.50	23.19	27.25	16.98	15.83	25	27.25	16.98	13.50	23.19	27.25	16.98	25	25	14.1	14.1	

Source: Regional Sericulture Research Station, 7th Mile, Kalimpong. Alt.: 975m.

during the months of June, August, and occasionally also in September. Sun is almost invisible during some of the monsoon days and remains enclosed within the heavy fog and mist, and the continuous over-casting of the sky with clouds is a common feature. While the sky remains moderately clouded in other seasons, the winter mornings are frequently filled with lifted fog. However, the clear sky and sunny days prevail during autumn whereas sky remains smoggy during the summer or spring.

1.5. TOPOGRAPHY

Neora Valley is situated on the flanks of Eastern Himalaya and its topography is extremely variable with varied altitudinal range from as low as 300m near Samsing in terai region to as high as 3100m at Rechila Peak, the highest point of the valley. The V-shaped Neora Valley is almost like a conglomeration of several undulating hilly ridges and furrows dissected by low-lying hill slopes, small streams and rivulets. Stretching right from terai region to almost the lower alpine zones, the valley also forms a trans-boundary line with Sikkim and Bhutan (a neighbouring country) at some points. Low and deep undulating spurs and hilltop in the V-shaped valley are covered with dense vegetation except being nude or open at some parts. The natural scene is very attractive by virtue of the picturesque landscape of the valley, lakes, streams and dense green vegetation.

Alubari Khasmahal, the only flat piece of land in the valley ascend upward to a historical place called Tinsimana meaning "tri-junction"- a common boundary where the parts of the Royal Kingdom of Bhutan, State of Sikkim (a sovereign country before it merged with India in 1975) and Darjeeling district of West Bengal meet at that point. The higher ridges of the valley descend downward to the tea garden settlement near Samsing at the terai region. From the Rechila peak of the valley, one can have a glance of the beautiful sceneries of the part of Chumbi Valley of Tibet, part of the Royal kingdom of Bhutan, parts of Sikkim State and the hilly and terai regions of the Darjeeling and Jalpaiguri districts of West Bengal. The river Neora originates from below this peak-point taking on other small tributaries from the hill spurs and crest on its way downward, flowing towards the river Teesta in the plain. Some of these tributaries and subsidiary streams are named, and all have their origin within the domain of the park.

From the peak of the Neora Valley (3100m), the hill slopes and furrows descend downward to Jorepokhari (3040m), Tinsimana (2900m) and further down to Chitray (2600m), Lower Alubari (2280m), PHE source (2130m), Jaributti (2195m), Sakam (1800m), etc. The hill ridges lying in the west of these places extend further towards Rechila Park (2280m), Pankhasari (2200m) and Choudha Feri (2260m), ultimately leading to Labha (2000m). The hill ridges of the valley towards eastern side descend down to places called Tangta (1300m), Todey (1250m), Godak (1200m) and Jholung (1100 m). On the other side, the hills of Neora Valley rise high from Gorubathan (300m-1000m) and Samsing forests (300-1200m) to Machuki (1300 m), Ruka Hill (2500m), Thosum Beat (2500-2800m) and finally to Rechila Peak (3100m).

1.6. DRAINAGE SYSTEM

In the entire Neora Valley, the largest water source is the Neora Khola (literally meaning narrow stream/river) that originates from Jorepokhari (Bhujel, 1992-93). The seepage water of other smaller lakes also forms the source and catchment of the Neora Khola. The Neora khola is also fed by many other smaller tributaries and jhoras originating from

different hill ridges and crests and lie enclosed in the valley. Rising from Jorpokhari, this hill stream is fed by nine main streams and sixteen subsidiary streams, the main feeder being the Thosum Chu (Guha, 1982-83).

1.6.1. LAKES

There are quite a few beautiful lakes at the hill summit, in the midst of forest cover and as well as deep in the valley between hilltops, some of them often drying up during the dry season. Amongst these prominent water bodies/lakes of the Neora forest, there are three beautiful high altitude lakes supporting a large number of plants and animals, specially the migratory birds. At the hill summit of trijunction (2900m), a couple of small lakes serve the purpose of water source to a number of animals including transboundary animal population that come from across the adjoining forest of Royal Kingdom of Bhutan and vice-versa. These animals use the transboundary forest areas as their ideal habitat making use of drinking water source of the Tinsimana Pokhari.

Jorepokhari, which literally means paired lakes, are the permanent lakes of the Neora Valley, situated in an open patch of flat land at the upper region of the Rechila Chowk and is situated at an altitude of 3040m. The size of the lake is about 200 x 200m and is located above the international trijunction demarcation. The lake also serves as the permanent source of drinking water to the cattle, herdsmen, hunters, orchid and medicinal plants collectors, timber thieves, trekkers, businessmen travelling to the transboundary places of Bhutan, Sikkim, Kalimpong, Dooars area, etc. through the forest route of Neora Valley. Besides this, Jorepokhari also provides the seepage water to the small tributaries of the river of Neora serving as the ultimate source of the Neora Khola. (Plate VIII: 81).

Apart from these lakes, another but comparatively larger lake (300 x 200m) and unnamed because of its remote location, is situated in the bowl-like ground remaining almost unexposed being covered by dense canopy of gigantic trees, and lake marginal vegetation. (Plate VIII: 77).

1.6.2. STREAMS AND RIVERS

There are many small water tributaries originating from different hilltops and ridges, flowing down to join small springs or khola. *Neora Khola* (*khola*=narrow river) is one such prominent but small rain-fed river with the maximum catchment area of all the river systems in the Neora forest. Flowing through the valley, Neora khola is about 60 km long with the average width of its bed varying between 90 to 120m (Bhujel, 1992-93). In fact, the Neora Khola is one of the main sources of drinking water for the people of Kalimpong town situated about 50 km away from the Neora Valley.

A small stream called *Asala khola* emerges from the cliffs and crest of the hills of Machuki and flows down to Phari, Samsing and Suntalay down in the foothills. Chel khola, another stream originates from the forest valleys of Sakam and passes down via Amblok and Gorubathan, and finally joins the River Teesta in the plains.

There are also other small perennial streams/jhoras, many of which however in true sense, acquire the shape of streams only during the rainy season. Some of these perennial streams or jhoras of the Park include Siri Khola, Thosum Chu, Ruka Kholsa, Norchu, Sakam khola, etc. Apart from this, there are few unnamed seasonal jhoras or tributaries

originating from undulating deep and low crest and ridges of the Neora Valley, but remain almost dried up during winter.

1.7. VEGETATION STRUCTURE

The region of the valley can be broadly divided into two vegetational zones- (i) Mixed semi-deciduous forests and (ii) Rhododendron-forest (**Plate VIII: 79**). While the latter type is forming a thick and dense cap over the hills (above 2800m), it is poor in floristic richness with more or less barren to thin forest floor species composition. In contrast, mixed semi-deciduous forests occupying the regions below 2800m altitude are very rich in floristic composition of all habit groups including trees, shrubs, climbers, annuals, geophytes, epiphytes, etc. While the vegetation is mostly dominated by angiosperms, there are appreciable number of ferns and four species of gymnosperms including two planted conifer species of the plantation forests (*Taxus baccata*, *Tsuga dumosa* and the planted two species being *Pinus longifolia* and *Cryptomeria japonica*). The flora is extremely important with the occurrence of numerous interesting and useful species of plants. Based on the present study and some earlier fragmentary studies (Majumdar *et al* 1984; Bhujel 1992-93), the forests of Neora Valley can broadly be grouped into following types depending upon the elevation of the area and the dominant species composition:

Tropical Forest (Low Hill Forest, upto 1000m)

Sub-tropical Forest (Middle Hill Forest, 1000-1600m)

Temperate Forest (Upper Hill Forest, 1600-2400m)

Cold Temperate Forest (2400-2800m)

Rhododendron/Sub-Alpine Forest (2800-3000m)

Alpine Scrubs (3000m and above)

Also, there are some secondary grasslands and plantation forests (upto 2300m).

1.7.1. TROPICAL FORESTS

Extending upto an elevation of about 1000 m, the valley has tropical type of forested vegetation which can further be categorized into sub-types as evergreen, semi-evergreen, moist and dry deciduous forests. The forest area of this tropical zone comprises of the dense broad-leaved semi-evergreen to evergreen forest forming a closed evergreen canopy. The tree species in it are attaining a height of 20 to 30 metre and exhibit clear demarcation with bushy and dense herbaceous undergrowth. The canopy is composed of mostly zizantic species of trees. Amongst the trees, prominent ones include *Schima wallichii*, *Bombax ceiba*, *Terminalia myriocarpa*, *Albizia spp.*, *Toona ciliata*, *Lagerstroemia parviflora*, *Bauhinia purpurea* etc. Other species of trees encountered in the lower belt of the park include *Tetrameles nudiflora*, *Duabanga grandiflora*, *Syzygium formosa*, *Litsea polyantha*, *Sterculia villosa*, *Mangifera sylvatica*, *Garcinia paniculata*, *Ostodes paniculata*, *Pterospermum lancifolium* etc. Tree ferns and *Pandanus nepalensis* are commonly seen interspersed in the forest in comparatively open areas. Some shrub species of this range include *Morinda angustifolia*, *Coffea bengalensis*, *Desmos chinensis*, *Desmos dumosus*, *Miliusa roxburghiana*, *Buddleja macrostachya*, *Murraya paniculata*, *Murraya koenigii*, *Paramignya monophylla*, *Leea guineensis*, *Cassia tora*, *Desmodium sequax*, *Desmodium laxiflorum*, *Crotalaria ferruginea*, etc.

This type of vegetation is observed in the areas of Samsing, Phari, Machuki, lower part of Sakam, Gorubathan, Chel, upper part of Jaldhaka, etc.

1.7.2. SUB-TROPICAL FORESTS

Forests of middle hill zone (1000-1600m) comprise of evergreen as dominant species. This zone encompasses the areas such as upper parts of Sakam, Machuki, Chel, upper belt of Todey-Tangta, Phaparkheti, lower parts of Ruka Hills, etc. Alongwith the deciduous trees, the large epiphytes and climbers also occur in this zone. Most common trees in this part of forest area are *Quercus glauca*, *Castanopsis indica*, *Castanopsis tribuloides*, *Castanopsis hystrix* and *Michelia champaca*. Other dominant species of trees of this region include *Exbucklandia populnea*, *Litsea polyantha*, *Alnus nepalensis*, *Phoebe attenuata*, *Juglans regia*, *Engelhardtia spicata*, *Macaranga postulata*, *Betula alnoides*, etc. Thin patches of bamboo (*Dendrocalamus hookeri*) also occur in the lower belt of the zone. Epiphytic orchids, aroids and other epiphytes and climbers etc. are abundantly represented. The undergrowth of the forest consists of numerous herbaceous and shrubby species. *Dichroa febrifuga*, *Sida acuta*, *Dobinea vulgaris*, *Desmodium multiflorum*, *Smithia ciliata*, *Crotalaria ferruginea*, *Eupatorium odoratum*, *Litsea cubeba*, *Thysanolena maxima*, etc. are some of the shrubs frequently seen in this forest zone. Some climber species growing in this range include *Clematis buchaniana*, *Clematis gouriana*, *Kadsura heteroclita*, *Desmos dumosus*, *Cyclea bicristata*, *Stephania glandulifera*, *Stephania elegans*, *Dicentra paucinervia*, *Natsiatum herpeticum*, *Berchemia floribunda*, *Rhamnus nepalensis*, *Gouania leptostachya*, *Parthenocissus semicordata*, etc. *Cardamine flexuosa*, *Nasturtium officinale*, *Viola diffusa*, *Viola pilosa*, *Viola hamiltoniana*, *Viola sikkimensis*, *Sagina japonica*, *Drymaria diandra*, *Drymaria villosa*, *Portulaca oleracea*, *Oxalis corniculata*, *Impatiens pulchra*, *Impatiens spirifer*, *Impatiens drepanophora*, etc. are the common herb species growing here.

1.7.3. TEMPERATE FORESTS

This type of forests is found in the altitudinal belt of 1600-2400m of the Park. The vegetation in this part of the valley is extremely thick and covered by mostly medium sized and evergreen species of trees. Deciduous trees also occur here but these form a small proportion in the vegetation. The Park areas such as Jaributti, Pankhasari, Alubari, Hattidara, Dhamdhamay Dara, Chouda Feri, Zero Point, Chonko Bhir, PHE Source, Middle Rechila, Chitray, Ruka Beat, Lower parts of Thosum Beat, Mulkharka, Reshete, etc. fall in this temperate forest zone. The vegetation is mainly mixed-type, however, oaks and laurels cover a large portion of forests. The occurrence of mosses, lichens and other epiphytes were mainly concentrated on the branches of gregarious oak trees. The prolific growth of the species of smaller herbs, shrubs and fern on the forest floor is a common sight inside the forest. Woody climbers are also prevalent. Common taxa predominant in this range include *Quercus lamellosa*, *Quercus pachylla*, *Quercus lineata*, *Michelia cathartii*, *Michelia doltsopa*, *Magnolia campbelli*, *Castanopsis hystrix*, *Castanopsis tribuloides*, *Machilus edulis*, *Acer campbelli*, *Betula alnoides*, *Symplocos glomerata*, *Symplocos theaefolia*, *Prunus nepalensis*, *Prunus cerasoides*, *Eurya japonica*, *Phoebe attenuata*, *Evodia fraxinifolium*, *Taxus baccata*, *Pieris formosa*, etc.

Alnus nepalensis with its quality of rapidly establishing itself on the landslide-affected areas is found growing extensively along watercourses on the lower part of these forests. The preponderance of this taxon has precisely delineated the altitudinal zones by virtue of their pattern of occurrence.

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The dense thickets of shrubs in this forest range include *Lycesteria formosa*, *Lycesteria stipulata*, *Viburnum erubescence*, *Viburnum cordifolium*, *Maesa chisia*, *Ancuba himalaica*, *Elsholtzia fruticosa*, *Ilex crenata*, *Rubus lineatus*, *Rubus splendidissimus*, *Daphne bholua*, *Maesa chisia*, *Ardisia* spp., *Neillia thyrsoiflora*, *Lonicera* sp, *Arundinaria* sp, *Gaultheria griffithiana*, *Agapetes saligna*, etc. These species constitute impenetrable shrub layer (thickets) in the forest and form a dense shrub canopy. Apart from this, there are patches of forest where bamboo species, mainly the *Dendrocalamus hamiltonii* grow gregariously interspersed amidst the forest areas. The herb species composition of this forest zone includes mainly *Fragaria nubicola*, *Viola biflora*, *Impatiens bracteata*, *Impatiens spirifer*, *Hemidesmus indicus*, *Begonia gemmipara*, *Begonia sikkimensis*, *Cynoglossum glochidiatum*, *Campanula pallida*, *Potentilla polyphylla*, *Potentilla sundaica*, *Epilobium clarkeanum*, *Epilobium royleanum*, *Oxalis corymbosa*, *Oxalis acetosella*, *Didymocarpus aromaticus*, *Chirita macrophylla*, *Ajuga lobata*, *Prunella vulgaris*, etc.

1.7.4. COLD TEMPERATE FORESTS (2400-2800m)

The richness of arboreal flora gradually decreases within and above this range but the diversity of herb species including endemics of Eastern Himalayas is found to be increasing in generalised term (Hara 1966; Bhujel 1996). Apparently, this vegetation zone can be distinguished into mixed temperate forests usually at the upper elevations and the Hemlock-Acer-Rehododendron mixed forests. The vegetations of both the forest types are enriched by the addition of numerous climbers, shrubs and herbaceous ground cover. Some of these shrub species which may be mentioned here include *Arundinaria maling*, *Gaultheria fragrantissima*, *Smilax glaucophylla*, *Himalayacalamus falconeri*, *Dendrocalamus hamiltonii*, *Dichroa febrifuga*, *Helwingia himalaica*, *Aconogonum molle*, *Schisandra grandiflora*, *Daphne bholua*, *Hoelboellia latifolia*, *Agapetes saligna*, *Vaccinium retusum*, *Pieris formosa*, *Lyonia ovalifolia*, *Neillia rubiflora*, *Rubus paniculatus*, *Rubus lineatus*, etc.

Two species of the coniferous trees (*Taxus baccata*, *Tsuga dumosa*) are also found intermingled with the tree canopy of the cold temperate forests but their abundance is quite low. Apart from this, they are sparsely present in the hill tracts. Interestingly, *Alnus nepalensis* is seen nicely growing over the slope and landslide areas. Amongst numerous herb species of this vegetation zone, important ones to mention are *Poa annua*, *Potentilla fulgens*, *Fragaria nubicola*, *Peracarpa carnosia*, *Viola pilosa*, *Elsholtzia strobilifera*, *Prunella vulgaris*, *Hydrocotyle himalaica*, *Gnaphalium affine*, *Fimbristylis dichotoma*, *Streptolirion volubile*, *Carex inanis*, *Isacne albens*, etc.

One important natural phenomenon observed in the cold temperate forest zone is that the invasion of bamboo. Upto the upper reaches of this belt (2800m), the bamboos have rapidly infested the forest vegetation. Bamboo is seen to gradually replacing the other species of plants thereby establishing themselves in some areas. Only few shade-loving plants are growing there in these bamboo-infested forest patches including one endangered species of *Balanophora polyandra*.

1.7.5. RHODODENDRON/SUB-ALPINE FORESTS (2800-3000m)

The forest zone in the sub-alpine range of the Neora Valley is mainly composed of *Rhododendrons* and conifers. In the lower belt of sub-alpine zone, tree species like *Quercus lineata*, *Quercus pachyphylla*, *Betula utilis*, *Acer campbelli*, *Acer sikkimensis*

and *Magnolia campbellii* have extended quite often, and are gradually replaced by Rhododendron-forest at the higher-up elevations. Interspersed among the *Rhododendrons* are *Tsuga dumosa*, indeed not much enough. The *Arundinaria spp.* exhibits its full growth and dense patches forming thick undergrowth in *Rhododendron* and silver-fir mixed forest. Various species of *Rhododendron* in the zone include *Rhododendron arboreum*, *Rhododendron barbatum*, *Rhododendron falconeri*, *Rhododendron dalhousie*, *Rhododendron edgeworthii*, *Rhododendron grande*, *Rhododendron glaucophyllum*, *Rhododendron griffithianum*, *Rhododendron triflorum*, etc. The areas of the valley within this range include mainly upper regions of Chitray, Thosum Hills, Tinsimana, Jorpokhari, left and right hill cliffs of Jorpokhari, etc. (Plate VIII: 79).

1.7.6. ALPINE SCRUBS (3000m and above)

At about 3000 m and above this elevation, vegetation at some places has adapted in the form of scrubs towards the higher steeper slopes, and in true sense, there is no tall tree in this range. The vegetation at this zone represents the mosaic of *Rhododendron Settsu*, *Rhododendron anthopogon*, *Rhododendron thomsonii*, *Rhododendron campanulatum* and, species of *Aconitum*, *Viola*, *Primula*, *Arisaema*, *Geranium*, *Fragaria*, *Ranunculus*, *Meconopsis*, *Potentilla*, etc. are found frequently growing.

1.7.7. GRASSLANDS

A few grasslands of secondary origin are also seen in the valley in Alubari Khasmahal, Jorpokhari and Jaributti areas of the National Park. Biotic and climatic factors like grazing animals and snowfall check the natural regeneration at these areas. Commonly growing grasses of these grasslands include *Eulalia mollis*, *Poa alpina*, *Helitotrichon virescens*, *Agrostis myriantha*, *Festuca leptopogon*, etc. Apart from these species of grasses, some herbaceous species growing in the area include *Potentilla polyphylla*, *Fragaria daltoniana*, *Primula denticulata*, *Halenia elliptica*, *Ranunculus diffusus*, *Anaphalis triplinervis*, *Plantago erosa* etc.

1.7.8. PLANTATION FORESTS

In some parts of the National Park such as Chouda Feri, Zero Point (2100-2300m) etc., the natural vegetation has been replaced by plantation forest by the Forest Department. The growing need of timber to human and the revenue generation activity of government have resulted into the indiscriminate felling of timber trees and Department of Forest has initiated the plantation of monoculture or mixed coniferous species. The plantation of rapidly growing monoculture plant speceise, namely *Cryptomeria japonica* and *Pinus longifolia* have certainly a direct impact on the rich biodiversity of the Neora Valley.

In Alubari Khasmahal area, Forest Department is raising seedlings of plants like *Exbucklandia populnea*, *Acer campbellii* etc., and these are also being planted in semiopen places of the Park. However, the plantation forests near Chouda Feri are highly invaded by the bamboos.

1.8. PREVIOUS FLORISTIC WORK

The nature bestowed rich biodiversity of this Himalayan belt have attracted a number of researchers, scientists and naturalists from around the country and the worldover. The botanical splendor of Eastern Himalaya can be realised from the visits of D. Don (1825),

followed by the visit of famous naturalist Griffith in 1847 and Sir Joseph Dalton Hooker during 1848-49. J. D. Hooker undertook an incredible expedition work visiting many places of this region and made a vast collection of plant materials, many of which now being the representative specimens today, which are also included in the comprehensive monumental work titled *The Flora of British India* in seven volumes (1872-97). His much-appreciated work include *The Flora of British India (1854, 1872-97, 1904)*, *The Himalayan Journals (1854)*, *Flora Indica (1855)* with T. Thomson, *Rhododendrons of Sikkim Himalaya (1849-51)*, and *A sketch of the Flora of British India (1907)*. Eventhen, we donot find any mention of floristic richness of Neora Valley nor the reference of plant samples collected from this pocket of Biodiversity Hotspot. The Valley was hitherto unknown to almost all the successive botanical explorers after Hooker including Thomas Anderson (1832-1870), J.A. Gammie (1894), Robert Pantling with Sir George King (1898), George H. Cave (1897) with Sir W.W. Smith (1909), H.J. Elwes (1877), C.B. Clarke (1876, 1885), George Watt (1881), C.C. Lacaïta (1913) and many other botanists. Although these infamous botanists visited this Eastern Himalayan belt, Neora Valley was overlooked in their floristic explorations, and in true sense, not even the checklist of plant species or study report pertaining to the bioresources of the Neora Valley in the broad sense is available as of today.

However, some botanists have made contributions to the flora of Darjeeling-Sikkim Himalayas including J.S. Gamble (1878, 1895), A.M. Cowan and J.M. Cowan (1929), S.K. Mukherjee (1940), H. Hara (1963, 1968, 1971), H. Kanai (1966, 1971), M. Mizushima (1968), H. Ohashi (1975), A.J.C. Grierson and D.G. Long (1979-1987). Apart from this, in the post 1940s, botanists such as K.P. Biswas (1967), B.N. Ghosh (1951), R.S. Rao (1963), B.D. Sharma (1970) also visited Sikkim Hills and the adjoining areas but failed to reach the virgin valley of Neora. Similarly, many other botanists like B. Krishna (1987), R.C. Srivastava (1992, 1996), A.P. Das (1987), D.G. Long (1990), P.K. Hajra and D.M. Verma (1996) and H.J. Noltie (1994 and 2000) have also visited the adjacent hilly terrains leaving behind the Neora Valley. Moreover, N.C. Majumdar, B. Krishna and M.C. Biswas's joint paper (1984) which deals with the brief description of the vegetation of Neora Valley and adjacent regions in Kalimpong Forest Division is the first report of botanical excursion to this place. Their paper gives very brief floristic account especially of the lower areas, and it appears that they too have missed to reach the interior difficult terrains of the valley. R.B. Bhujel in his expedition to Neora Valley, visited a few interior areas of the valley in 1993 in connection with the study of environmental damage caused by the controversial *Neora drinking water project*, and has mentioned some plant species in the report. Very recently, A.K. Samanta and A.P. Das (1998) have studied the angiospermis climbers of the valley, and have described some interesting climbers.

Nevertheless, no comprehensive work either on flora or fauna of the virgin Neora Valley has appeared until now.

1.9. IMPORTANCE OF THE PRESENT WORK

The hilly region of West Bengal forms an important part of Eastern Himalayas, which is recognised as a *Biodiversity Hot Spot* by IUCN in recent times. District of Darjeeling is one such hill station of the State of West Bengal having rich and interesting botanical regions in the whole of Indian sub-continent and has been a central point of attraction for large number of domestic and foreign tourists, researchers and the plant hunters.

The region is being estimated to represent comparatively a higher percentage of flora of the country, representing all the major groups of plant kingdom including a number of endemics (Chetterjee 1940; Biswas 1967; Das and Chanda 1987). Migration of several species from adjoining countries and their naturalization is a unique feature in this hill region (Das 1995; Bhujel 1996).

Neora Valley forest is one such species-rich area and is declared National Park by the Government of West Bengal. The Neora Valley National Park is surrounded by the rich forests of Sikkim and Bhutan, and has got a vast tract of virgin vegetation. There has been insignificant or no study at all, about the vegetation and flora of this valley. The hilly terrains, deep valleys and interior regions of this part of Darjeeling District were hitherto remained unexplored. The present attempt is a floristic work through extensive trekking or field visit, survey and documentation of the floristic elements of the Neora valley. In this study, latest nomenclature of plant species, taxonomic description, their local names, flowering and fruiting periods, the places of their distribution, ecological status, and the ethnobotanical knowledge of local people about its floristic elements have been dealt with which will be extremely useful for many scientific purposes. Besides, a checklist of the flora of Neora Valley achieved in this work will be an important information base for the researchers, students, scientists, and planners and overall to the government for its proper utilisation and management. This will equally be useful for the people of Botanical Survey of India involved with the assignment of preparation of *Flora of India*.

The Neora Valley keeps a great meaning in terms of ethnobotany of the hill people. People living in the periphery of the valley maintain their own science and economy, and meet-up their regular needs of food, medicine, fuel, numerous useful household materials, etc. The ethnobotanical information recorded from the valley will be much useful for further ethnobotanical studies. The Flora may be very useful for the assessment of our natural wealth and resources. This may also help to identify, segregate and conserve the economically important plant species viz., medicinals, wild edibles, timber, ornamental, aromatic, spices and many other non timber forest produces (NTFPs).

Most importantly, this flora may find a prompt and justifiable use in the overall planning and strategy of many developmental programmes. Researchers including botanists, naturalists, foresters, ecologists and economic planners may use the flora for policy advocacy, conservation activities, sustainable exploitation, mass education, planning environmental strategies, and propagation of the endangered and highly vulnerable floristic elements.

Herbarium so developed in this study is a source of authentic information and may find an utmost use by researchers, students, teachers, foresters and scientist in the future.

Chapter-II

2. MATERIALS AND METHODS

2.1. SELECTION OF ROUTES AND CAMPING

A thorough reconnaissance survey of the virgin Neora Valley was made with the volunteers of Siliguri based North Eastern Society for Preservation of Nature and Natural Resources (NESPON), a non-Government Organisation and the personnel of Forest Department, Government of West Bengal. Map procured from the Forest Department was thoroughly studied and altitudes of the various places of the difficult valley were recorded. In the process, trekking routes or paths and the Camps-sites were identified. The vast areas of the valley were demarcated on the basis of available trekking path, availability of water source, ideal camping site to cover the areas from as low as 300m to as high as 3100m. With the past experience of Forest Department personnel as well as trained mountaineers, routes to reach dense and deep valley, hill furs and crests in all the four directions were identified and camping sites selected. Different camping sites were selected in various parts of the dense valley so as to penetrate the inaccessible and difficult terrain of Neora Valley. One ideal place was earmarked as Base Camp and from there many advanced Mobile Camps were selected depending upon the areas to be covered in each trip and duration of the field survey. However, the big problem faced in the process of selecting some of the Camps-sites and erecting camps in desired places of the Valley was the non-availability of the water sources on the ridges.

A plan of action was drawn for the purpose of field survey, collection of plant samples, etc. Tents and trekking equipments were hired from Himalayan Mountaineering Institute, Darjeeling, and Forest Personnel as well as volunteers of NESPON were deputed to assist in the field arrangement. Porters were employed to carry the head loads/luggage. A few cowboys were also approached for guiding the scientific team in the dense forest.

Base camp was established in a natural cave at Alubari (2280m). Abandoned mule track was followed as a path to cross some hill terrains. The choppers had to be used now and then to cut the way for a single file to sneak through. The activity of collection of specimens from the field was initiated in the year 1993 and continued till the year 1998. The areas of the Neora forest were visited repeatedly in different seasons so as to record all the species growing in the area. The plant samples were randomly collected from all the accessible parts of the Neora Forests during the field surveys. Initially, short field trip was undertaken in order to acclimatise the members of the team in the entirely different set of climatic conditions of the valley, and the subsequent field trips were arranged for longer durations (upto 20 days).

A Control Room was set up at Lava Range Office of the Forest Department with a view to give back-up support and security to the scientific team as well as to coordinate and meet up the various needs of the team in the field for the entire field activities. The scientific team used to communicate with the control room through wireless set (Walky-talky) provided by the Forest Department, and the control room used to coordinate the activities of the field team in the extremely remote and difficult hill terrains of the valley.

2.2. COLLECTION AND PROCESSING OF MATERIALS

With a precise and clear workplan, the team sneaked through all types of the habitats including virgin dense forests, partially denuded areas, seasonally cultivated forest lands, grasslands, river catchments, lakes, etc. Fields were visited in different seasons to facilitate the record of flowering and fruiting and also to encounter the seasonal short-living plants. Wherever it was possible, the specimens were collected in both the flowering and fruiting conditions. However, some plants were collected also in their vegetative condition. The specimens were properly tagged on the spot and field characters were recorded in the field notebook. The specimens were then temporarily preserved in large polythene bags with mouths being kept tied with rubber band in order to prevent the desiccation. Such collections were further processed at the camp in which each specimens were segregated, cleaned, trimmed and then, properly displayed in Blotting-paper sheets taking care of the exposure of different plant parts, and pressed under the Herbarium Press. Generally, some amount of formalin solution was sprayed over the specimens for better preservation, especially to check the fragmentation of plant parts. Next day, the specimens were replaced to fresh blotting papers, checked, repositioned and readjusted. This operation was continued everyday or every two to three days. Then, coming back to University Laboratory, the specimens were shifted to larger plant press. Sometimes, Hot Air oven was also used for proper and quick drying. These specimens were then poisoned with 4% solution of HgCl_2 in rectified spirit in order to save those specimens from fungal and insect attacks.

Thereafter, the specimens were carefully mounted on standard herbarium sheets (i.e. 41.5 x 28 cm) using adhesives, needle and thread. The herbarium label of the size 15.5 x 10cm with important information of the specimen written on it was pasted on the right hand bottom side of each sheet. Some crucial information contained in the label included (a) Field Number, (b) Date of Collection, (c) Name of the plant species, (d) Family to which it belongs, (e) Local Names if any, (f) Habit, (g) Habitat, (h) The place of collection, (i) Altitude of the place of collection, (j) Flower colour, (k) Ecological status, (l) Ethnobotanical and medicinal uses, (m) Names of collector and determinator, etc.

Beside, other significant and larger plant parts like fruits, tubers, rhizomes etc. were also collected whenever felt necessary, and cut systematically into smaller parts and dried and preserved separately using cotton pads and blotting-papers. Hot-hair oven was also used from time to time in order to ensure easy and quicker drying of these specimens.

2.3. IDENTIFICATION AND STORAGE

Identifications of processed specimens were done stagewise one after other in the Taxonomy and Environmental Biology Laboratory of the Department of Botany, North Bengal University by matching in the NBU-Herbarium (NBUH) and using literature. The indeterminate specimens were taken to different Herbaria of Botanical Survey of India at Calcutta (CAL) and Gangtok (BHSC), Sikkim, Herbarium of the Forest Department, Government of Sikkim, Gangtok, and compared with the available preidentified herbarium sheets.

In the final state of checking the authentication of identification, these specimens were again properly matched and varified at the Central National Herbarium (CAL), Howrah, West Bengal. Different floras, monographs, prologues, revisions etc. have been referred

to in the identification process and the effort has been made to provide latest or updated i.e. the correct nomenclature.

Specimens for all the recorded taxa were processed into 3 sets to prepare 3 separate herbarium sheets. One set of these voucher specimens will be deposited in the Central National Herbarium, Howrah (CAL). The next set is preserved in the Herbarium of the Department of Botany, North Bengal University (NBU), Siliguri, and the last set will be submitted to the Department of Forest, Government of West Bengal where it is likely to be stored at the *Interpretation Centre* at Lava.

2.4. DESCRIPTION

Specimens were studied properly in the Taxonomy and Environmental Biology Laboratory of the Department of Botany, North Bengal University, and were described in usual technical terminology. Major characters are placed in the following definite sequence within the description: Habit ⇒ Stem ⇒ Leaf ⇒ Flower ⇒ Fruits and seeds. Leaves, inflorescence, flowers were also described sequentially into further details as follows:

Leaf: base ⇒ petiole ⇒ lamina (measurement ⇒ margin ⇒ tip ⇒ base)

Inflorescence: type ⇒ peduncle ⇒ pedicel ⇒ bract ⇒ bracteole

Flower: overall characters ⇒ calyx ⇒ sepal ⇒ corolla ⇒ petal ⇒ androecium ⇒ stamen ⇒ filament ⇒ anther ⇒ gynoecium ⇒ carpels ⇒ ovary ⇒ chamber ⇒ style ⇒ stigmas.

However, all the major characters were not essentially used in the description of all plants. Instead, only some important characters have been selected which are essential for the recognition of the species, and are arranged according to above sequence.

2.5. CITATION OF REFERENCES

For each taxon, references to the protologues have been provided after the author-citation. After this, major taxonomic references related to the taxon have been cited in this work. Following abbreviations have been used in the citation for the well-known books, journals, periodicals, etc. so as to make the presentation shorter.

Important Books

- Beng. Pl. : *Bengal Plants* by D. Prain
- EFPN : *An Enumeration of the Flowering Plants of Nepal* by Hara *et al* (ed.).
- FBI : *Flora of British India* by J.D. Hooker (ed.)
- FEH : *Flora of Eastern Himalaya* by H. Hara and H. Ohashi (ed.)

- Fasc. Fl. Ind : *Fascicles of Flora of India* (Publication of Botanical Survey of India)
- Fl. Ind. : *Flora Indica* by W. Roxburgh
 FI : *Flora of India* (Publication of Botanical Survey of India)
- FPK : *An Enumeration of the Flowering Plants of Kurseong* by K.M. Mathew
- Prodr. Fl. Nep. : *Prodrumus Florae Nepalensis* by D. Don
- Pl. As. Rar. : *Plantae Asiaticae Rariores* by N. Wallich
- Rho. Sik. Him. : *The Rhododendrons of Sikkim Himalaya* by J.D. Hooker
- Fl. Sik. : *Flora of Sikkim* by P.K. Hajra and D.M. Verma (Vol. 1)
- Fl. Asm. : *Flora of Assam* by U.N. Kanjilal and A. Das
- Fl. Meg. : *Forest Flora of Meghalaya* by K. Haridasan and R. R. Rao
- Orch. Sik. Him. : *The Orchids of Sikkim Himalaya* by G. King and R. Pantling
- FB : *Flora of Bhutan* by Grierson *et al* (ed.) and H.J. Noltie
- FWB : *Flora of West Bengal* (Publication of Botanical Survey of India)
- FWP : *Flora of West Pakistan* by E. Nasir and S.I. Ali (ed.).
- WI : *Wealth of India*. (Anonymous)
- Fl. Jow. : *Flora of Jowai* by N.P. Balakrishnan
- Trs. N. Beng. : *Trees of North Bengal* by A.M. Cowan and J.M. Cowan
- Trs. Sik. Hil. : *Trees of the Sikkim Hills* by L.K. Rai
- FIEM : *Flora Indicae Enumeratio Monocotyledonae* by S. Karthikeyan, S. Jain, M. Nayar and M. Sanjappa
- F. & Fl. Nep.Him.: *The Fauna and Flora of Nepal Himalaya* by H. Kihara (ed.)
- Fl. Non. Arun. Prad.: *A Contribution to the Flora of Nongpoh and Vicinity* by J. Joseph

HFD : *Herbaceous Flora of Dehra Dun.*

Nam. Chang. Flr. Pl.: *Name Changes in Flowering Plants* by S.S.R. Bennett

SFSH : *Spring Flora of Sikkim Himalaya* by H. Hara.

Important Journals, Papers and Periodicals

AMBG : *Annals of the Missouri Botanical Garden.*

ARBGC : *Annals of the Royal Botanic Garden, Calcutta.*

BASB : *Bulletin of Asiatic Society of Bengal.*

BBMB : *Bulletin of British Museum (National History) Botany*

BBSB : *Bulletin of Botanical Society of Bengal.* Calcutta.

BBSI : *Bulletin of Botanical Survey of India.*

Gard. Bull. Singap. : *The Garden's Bulletin.* Singapore.

IF : *Indian Forester.* Dehra Dun.

IJF : *Indian Journal of Forestry.* Dehra Dun.

JAA : *Journal of Arnold Arboretum.* Massachusetts.

JASB : *Journal of Asiatic Society of Bengal.*

JBNHS : *Journal of Bombay Natural History Society.* Bombay

JJB : *Journal of Japanese Botany.* Tokyo.

Jour. Econ. Tax. Bot. : *Journal of Economic and Taxonomic Botany.*

Journ. Lin. Soc. : *Journal of Linnean Society.*

KB : *Kew Bulletin.* United Kingdom.

RBSI : *Records of Botanical Survey of India.*

TBRI : *Transactions of the Bose Research Institute.* Calcutta

NRBGE : *Notes from Royal Botanic Garden.* Edinburgh.

2.6. METHODS OF ENUMERATION

The flora of Neora Valley in this work has been presented following the sequence of arrangement of major taxa as in Bentham and Hooker's *Genera Plantarum* (1862-1883) which was also followed in *The Flora of British India* (Hooker, 1872-1897), and have been presented with the slight changes made in conformity with the recent literature including that of *Flora of Bhutan* by D.G. Long and A.G.C. Grierson (1993, 1984, 1991, 1994). In the presentation, the families have been delimited just by following Hutchinson (1973), Cronquist (1981), Dahlgren (1980) and Dahlgren *et al* (1985). The names of different families have been used as per the guidelines given in Article 18 of the *International Code of Botanical Nomenclature*, Tokyo (1994). All the genera and species have been presented in the alphabetical sequence under each family whereas in case of the varieties, type variety has been placed first followed by others.

The local names of different species of plants, wherever and whenever available, either in the literature or from the local people have been given before the taxonomic description of the species.

The valid names of the species are written in bold and italic, and the basionyms and synonyms are presented in italics only. The nomenclature of the taxa have been updated as per the provisions presented by S.S.R. Bennett in his work *Name Changes in Flowering Plants* (1987), and the recently available volumes of *Flora of Bhutan* (D.G. Long and A.G.C. Grierson), *Flora of Sikkim* (R.C. Srivastava), *Flora of West Bengal*, *Flora of India* (Publications of Botanical Survey of India) and other taxonomic literature dealing with the different taxa which have been referred to properly in the enumeration. However, only a few important basionyms and synonyms have been presented in the systematic enumeration for each taxon. Early operable identification keys to the genera and species have been developed and presented in the work. Besides, local and general distributions for each of the enumerated taxa have also been indicated along with their status.

Chapter-III

3. ENUMERATION

The identified plants collected from Neora Valley National have been arranged in accordance with the Bentham and Hooker's System of Classification. However, genera and species in all the families are placed in alphabetical order to simplify the presentation of each species in the enumeration. For each species of plants, altitudes (above mean sea level) of the places from where the specimens were cited are given in numeral in metre. The sequence of enumeration is (i) Correct name, (ii) Basiobym, (iii) Synonym if any, (iv) Local Name, (v) Description, (vi) Flowering and fruiting periods, (vii) Specimen Cited (i.e., reference to voucher specimen), (viii) Distributional status, (ix) Local Distribution, (x) General Distribution and (xi) Note on some special features, use etc. of the taxon concerned. On the other hand, gymnosperms and pteridophytes have been only listed separately with their correct names.

3.1. ABBREVIATIONS USED IN ENUMERATION

In order to shorten the sentences and/or words to a shorter possible form, following abbreviations have been technically used in this work.

Local Names

Nep. : Nepali

Bht. : Bhutia

Lep. : Lepcha

Eng. : English

Beng. : Bengali

Flowering and Fruiting Calender

Flr. : Flowering

Jun. : June

Frt. : Fruiting

Jul. : July

Jan. : January

Aug. : August

Feb. : February

Sep. : September

Mar. : March

Oct. : October

Apr. : April

Nov. : November

May : May

Dec. : December

Authorities of Botanical Names

Aans. : Adanson	Bl. : Blume
A. DC. : Alphonse de Candolle	Brow. : Browne
Anders. : T. Anderson	Bung. : Bunge
Arnt. : Arnott	Burm. f.: Burman (filius)
Baill. : Baillon	Cav. : Cave
Benn. : S.S.R. Bennett	Cham. : Chamisso
Benth. : Bentham	Cl. : C.B. Clarke
Berh. : Berhandi	Cogn. : Cogniaux
Buch.-Ham.: Buchanan-Hamilton	Hutch. : Hutchinson
DC. : Augustine de Candolle	Jacq. : Jacquin
Denns. : Dennstedt	Jeff. : Jeffery
Decne. : Decaisne	Juss. : Jussieu
Dumort. : Dumortier	Ker-Gawl : Ker-Gawler
Edgew. : Edgeworth	Kitam. : Kitamura
Falc. : Falconer	Koid. : Koidzumi
Fisch. : Fischer	Kuntz. : Kuntze
Forssk. : Forsskal	L. : C. Linnaeus
Griff. : Griffith	L. f. : C. Linnaeus (filius)
Griseb. : Grisenbach	Lamk. : Lamareck
Hand.-Mzt.: Handel-Mazzetti	Lour. : Loureiro
Hausk. : Hauskal	Mart. : Martius
Hk. : Hooker	Maxima. : Maximowicz
Hk. f. : Hooker (filius)	Mer. : Merrill
Humb. : Humboldt	

Meisn. : Meisner	Muel. : Mueller
Mich. : Michaux	Pax. : Paxton
Mill. : Miller	Planch. : Planchon
Miq. : Miquel	Rehd. : Rehder
Reich. : Reichenbach	Spreng : Sprengel
Retz. : Retzius	Steud. : Steudal
Roem. : Roemer	Thoms. : Thomas Thomson
R. Br. : Robert. Brown	Thunb. : Thunberg
Roxb. : Roxburgh	Vent. : Venttenat
Salisb. : Salisbury	Wall. : Wallich
Schr. : Schrader	Wettst. : Wettstein
Ser. : Seringe	Willd. : Willdenow
Shult. : Schultes	Wt. : Wight
Sieb. : Siebold	Zucc. : Zuccarini

Distributions

C : Central	W : Western
E : Eastern	NE : North-Eastern
S : South	Amsl : Above mean sea level

Beside this, the following abbreviations of commonly occurring words are used.

Ill. : Illustrations	Acad. : Academy
Journ. : Journal	Bull. : Bulletin
n. : Number	Cat. : Catalogue
Rep. : Report	Contr. : Contribution
Repert.: Repertorium	Faun. : Fauna
S : Society	f. : Figure (s)
Pl. : Plate	Fl. : Flora
Ic. : Icones	

Abbreviations of Important Places

Asm. : Assam	Him. : Himalaya
As. : Asia	Ind. : India
Beng. : Bengal	Jap. : Japan.
Calc. : Calcutta	Nep. : Nepal
Corom.: Coromandal	Sik. : Sikkim.
Edinb. : Edinburgh	

Other Abbreviations used in the Enumeration

<i>agg.</i>	: aggregated species
<i>auct.</i>	: of various authors (<i>auctorum</i>)
<i>c.</i>	: about (<i>circa</i>)
<i>cf.</i>	: compare (<i>confer</i>)
<i>f.</i>	: form (<i>forma</i>)
<i>nom. illeg.</i>	: illegitimate name (<i>nomen illegitimum</i>)
<i>nom. nud.</i>	: <i>nomen nudum</i>
<i>p.p.</i>	: in part (<i>pro parte</i>)
<i>sensu</i>	: in the sense of author indicated and not as originally intended
<i>ssp./subsp.</i>	: sub-species
<i>sp. nov.</i>	: new species (<i>species novo</i>)
<i>var.</i>	: variety
<i>var. nov.</i>	: new variety

Measurement

For the measurement of different plant parts, metric system of units (metre, centimetre and millimetres) have been followed. The size of a leaf is presented as eg., 2-3 x 1-1.3 cm where the first figures (i.e., 2-3) signify the length of the leaf ranging from 2 to 3 cm, and the second figures (i.e. 1-1.3 cm) indicate the breadth or width in the similar fashion. In a case where only one figure for measurement is given, e.g., 1.6cm (fruit), then the figure signifies the length or height. Whenever the figures are given within the parenthesis, e.g., 8-10 (-12) cm, then the measurement refers to the normal range as 8-10cm, but exceptionally going upto 12 cm.

3.2. PLACEMENT OF RECORDED FAMILIES IN A CLASSIFICATORY SYSTEM

For the present enumeration of the flora of Neora Valley National Park, Bentham and Hooker's (1862-1883) System of classification has been followed, though, for the delimitation of families, Hutchinson (1973) and other recent floras and classifications including Cronquist (1981) and Dahlgren (1980) have been followed. The family numbers provided in the list below are just serial numbers and not the *Genera Plantarum*

numbers. Bentham and Hooker's terminology '*Cohort*' has been replaced here by '*Order*' and '*Natural Order*' by '*family*.'

3.2.1. MAGNOLIOPSIDA (DICOTYLEDONS)

Following is the distribution of Dicotyledonous Families collected from the Neora Valley National Park.

CLASS: DICOTYLEDONS

- | | |
|-------------------------------|-----------------------------------|
| Sub-Class: POLYPETALAE | Order: GERANIALES |
| Series: THALAMIFLORAE | Families: 25. Linaceae |
| Order: RANALES | 26. Geraniaceae |
| Families: 1. Ranunculaceae | 27. Oxalidaceae |
| 2. Magnoliaceae | 28. Balsaminaceae |
| 3. Schizandraceae | 29. Rutaceae |
| 4. Annonaceae | 30. Burseraceae |
| 5. Menispermaceae | 31. Meliaceae |
| 6. Lardizabalaceae | |
| 7. Berberidaceae | Order: OLACALES |
| | Families: 32. Icacinaceae |
| Order: Parietales | 33. Aquifoliaceae |
| Families: 8. Fumariaceae | |
| 9. Papaveraceae | Order: CELASTRALES |
| 10. Cruciferae | Families: 34. Celastraceae |
| 11. Violaceae | 35. Rhamnaceae |
| 12. Flacourtiaceae | 36. Vitaceae |
| | 37. Leeaceae |
| Order: POLYGALINEAE | |
| Family: 13. Polygalaceae | Order: SAPINDALES |
| | Families: 38. Sapindaceae |
| Order: CARYOPHYLLINEAE | 39. Aceraceae |
| Families: 14. Caryophyllaceae | 40. Staphylleaceae |
| 15. Portulacaceae | 41. Sabiaceae |
| | 42. Anacardiaceae |
| Order: GUTTIFERALES | |
| Families: 16. Hypericaceae | Series: CALYCIFLORAE |
| 17. Theaceae | Order: ROSALES |
| 18. Actinidiaceae | Families: 43. Leguminosae |
| 19. Saurauiceae | (Fabaceae) |
| 20. Stachyuraceae | Sub-Families: i. Caesalpinoideae* |
| | ii. Mimosoideae* |
| Order: MALVALES | iii. Papilinoideae* |
| Families: 21. Malvaceae | 44. Rosaceae |
| 22. Sterculiaceae | 45. Saxifragaceae |
| 23. Tiliaceae | 46. Hydrangeaceae |
| 24. Elaeocarpaceae | 47. Grossulariaceae |
| | 48. Hammelidaceae |
| Series: DISCIFLORAE | 49. Callitrichaceae |

Order: MYRTALES

- Families: 50. Combretaceae
51. Myrtaceae
52. Melastomataceae
53. Sonneratiaceae
54. Onagraceae

Order: PASSIFLORALES

- Families: 55. Passifloraceae
56. Cucurbitaceae
57. Begoniaceae

Order: FICOIDALES

- Family: 58. Datisceae

Order: UMBELLALES:

- Families: 59. Umbelliferae
(Apiaceae)
60. Araliaceae
61. Cornaceae
62. Helwingiaceae
63. Nyssaceae
64. Alangiaceae
65. Sambucaceae
66. Caprifoliaceae

Sub-Class: GAMOPETALAE

Series: INFERRAE

Order: RUBIALES

- Families: 67. Rubiaceae
68. Valerianaceae

Order: ASTERALES

- Family: 69. Composite
(Asteraceae)

Order: CAMPANALES

- Families: 70. Campanulaceae
71. Lobeliaceae

Order: VACCINIALES

72. Vacciniaceae
73. Ericaceae

Series: HETEROMERAE

Order: PRIMULALES

- Families: 74. Monotropaceae
75. Primulaceae
76. Myrsinaceae

Order: EBENALES

- Families: 77. Sapotaceae
78. Styracaceae
79. Symplocaceae

Series: BICARPELLATAE

Order: GENTIANALES

- Families: 80. Oleaceae
81. Apocynaceae
82. Asclepiadaceae
83. Buddlejaceae
84. Gentianaceae

Order: POLEMONIALES

- Families: 85. Boraginaceae
86. Convolvulaceae
87. Solanaceae

Order: PERSONALES

- Families: 88. Scrophulariaceae
89. Orobanchaceae
90. Gesneriaceae
91. Acanthaceae

Order: LAMIALES

- Families: 92. Verbenaceae
93. Labiatae (Lamiaceae)

Sub-Class: MONOCHLAMYDEAE

Series: CURVEMBRYEAE

- Families: 94. Plantaginaceae
95. Amaranthaceae
96. Phytolaccaceae
97. Polygonaceae
98. Podostemaceae

Series: MULTIOVULATE TERR-
-ESTRIS

- Family: 99. Aristolochiaceae

Series: MICREMBRYEAE

- Family: 100. Saururaceae
101. Piperaceae

Series: DAPHNALES

- Family: 102. Lauraceae

Series: ACHLAMYDOSPORAE

- Families: 103. Thymeliaceae

104. Elaeagnaceae
105. Loranthaceae
106. Santalaceae
107. Balanophoraceae

Series: UNISEXUALES

Families: 108. Euphorbiaceae
109. Buxaceae
110. Bischofiaceae

111. Daphniphyllaceae
112. Ulmaceae
113. Cannabaceae
114. Moraceae
115. Urticaceae
116. Juglandaceae
117. Betulaceae
118. Fagaceae
119. Salicaceae

*The three sub-families have been treated as independent families in the present work.

RANUNCULACEAE Juss.

Key to the Genera:

1. Plants climbing; petioles and petiolules tendrillar.....*Clematis*
1. Annual or perennial herbs, rarely climbing; tendrils absent2
2. Cauline leaves decompose3
2. Cauline leaves simple.....4
3. Flower solitary, terminal, bisexual*Dichocarpum*
3. Flowers in paniculate inflorescence, unisexual*Thalictrum*
4. Inflorescence paniculate; corolla inconspicuous*Cimicifuga*
4. Inflorescence cymose; petals conspicuous5
5. Peduncles with leafy involucre bracts*Anemone*
5. Peduncles with or without bracts but never forming an involucre.....6
6. Leaves ternatisect or lobed.....*Ranunculus*
6. Leaves palmatisect into deep 5-lobes/segments.....*Trollius*

ANEMONE L.

Anemone rivularis Buch.-Ham ex DC., Syst. Nat. 1:211. 1817; FBI 1:9. 1872; FEH 1:87. 1966; 2:28. 1971; EFPN 2:12. 1979; FB 1(2):292. 1984; TBRI 50(4):105. 1987.

Rosette perennial silky pubescent herb with stout and woody rootstock. Leaves simple; petioles upto 28cm long; radical leaves 3-foliolate; leaflets 4.5-10.5 x 3.5-6.5cm, broadly elliptic, serrate, acute, base cuneate, often 3-lobed, stiffly pubescent. Scape 8-32cm; involucre leaf-like, to 0.2cm broad, segments narrow linear, incise-serrate. Sepals 1.1-1.6 x 0.5-1cm, elliptic, white, bluish outside; styles hooked. Achenes 0.65-0.7 x 0.45-0.5cm, oblong, compressed, with persistent hooked styles to 0.1cm.

Flr.: May - Jul. *Fr.:* Jun. - Aug.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 1836, dated 12.9.1997.

Status: Common.

Local Distrib.: Rechila Middle, Jaributti, Pankhasari, Tinsimana, Thosum. 2000-2900m.

General Distrib.: Himalayas, India, Tibet, Sri Lanka, Myanmar, W. and N. China.

CIMICIFUGA Wernis.

Cimicifuga foetida L., Syst. Ed. 12:659. 1767; FBI 1:30. 1872; FI 1:7. 1993; FWB 1:119-120. 1997.

Erect, perennial foetid herbs, upto 1.8m tall, much branched. Stem leafy. Petioles upto 18cm long. Leaves pinnately compound, upto 36cm long; leaflets 3-7.9 x 2.5-4.8cm, ovate to lanceolate, margin sharply toothed. Racemes short with crowded flowers. Flowers small; sepals 0.3-0.4cm, ovate, greenish, deciduous; petals 0.4-0.5cm, elliptic, yellowish; stamens many; ovary superior, unilocular. Follicles 0.8-1cm, oblong, many seeded, with a curved beak.

Flr. & Fr.: Jul. - Oct.

Specimen Cited: Thosum Hill, 2790m, AP Das & PC Rai 0888, dated 23.10.1994.

Status: Frequent.

Local Distrib.: Ruka Forest, Chitray, Thosum Hill. 2400-2800m.

General Distrib.: C. Europe, Siberia, Himalaya (Kashmir-Bhutan).

CLEMATIS L.

Key to the species:

1. Young stem glabrous.....2
1. Young stem hairy.....3
2. Flowers solitary in each axile; sepals 1.7-2cm.....*C. montana*
2. Flowers many from each axile; sepals 0.5-0.7cm.....*C. gouriana*
3. Panicles few flowered; sepals recurved at tip.....*C. acuminata*
3. Panicles many flowered; sepals tips revolute.....*C. buchananiana*

Clematis acuminata DC., Syst. Nat. 1:148. 1817 & Prodr. 1:6. 1824; FBI 1:5. 1872; Fl. Asm. 1:4.1935; FEH 2:29. 1971; EFPN 2:14. 1979; FB 1(2):289. 1984; FI 1:154. 1993; FWB 1:121.1997.

A large woody climber with slender, terete branches. Leaves ternate, 3-foliolate; Petioles 2.5-3.7cm long; lamina of leaflets 2.5-9 x 1.6-4.2cm, lanceolate or ovate, serrate, acuminate, base rounded, veins 5 at base, usually glabrous or sparsely pubescent. Panicles axillary, few-flowered, branches slender. Sepals 1.2-1.6 x 0.45-0.6cm, ovate, apically recurved, thinly to densely pubescent; filaments clothed with spreading dense hairs. Achenes with slender, elongated persistent styles.

Flr. & Frt.: Oct. - Feb.

Specimen Cited: Below PHE Source, 2180m, AP Das & PC Rai 056, dated 14.6.1994.

Status: Rare.

Local Distrib.: Chouda Feri, Alubari, Sakam, PHE Source. 1400-2300m.

General Distrib.: Himalayas (Punjab-Arunachal Pradesh), Meghalaya, Assam.

Clematis buchananiana DC., Syst. Nat. 1:140. 1817; FBI 1:6. 1872, p.p.; Trs. N. Beng.7. 1929; FEH 1: 88.1966; EFPN 2:14.1979; FPK 9.1981; TBRI 50(4):109. 1987; FB 1(2): 289.1984; FI 1:60. 1993; FWB 1:121. 1997.

Local Name: Pinasay Lahara (Nep.).

Shrubby perennial pubescent climbers. Leaves pinnately 3-5 foliate, exstipulate; petioles upto 10cm, broadly thickened and narrowly connate at base, brownish pubescent, straight or loosely tendrillar; petiolules upto 7.5cm, hoary-pubescent, often curled or tendrillar; lamina of leaflets 4.5-8 x 2.5-5.5cm, broadly ovate, 3-lobed, coarsely serrate or 3-lobed, acute to acuminate, base slightly cordate, dark-green and thinly pubescent

above, shining pale and more densely hairy. Panicles axillary and terminal, many flowered. Bracts leafy, paired. Flowers large, 3.5-4cm across, fragrant; sepals 4-6, 2.5-3.8 x 0.6-0.8cm, ovate, longitudinally ribbed, tips revolute, silky brown outside; stamens numerous; filaments hairy; anthers elongate. Achenes ovate-lanceolate, pubescent, tipped with long plumose style.

Flr.: Jul. - Oct. *Fr.*: Nov. - Jan.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 0235, dated 16.6.1994.

Status: Less Common.

Local Distrib.: Reshete, Chitray, Dhamdhamay Dara, Alubari, Mulkharka. 1900-2600m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya, N. Myanmar, W. China.

Clematis gouriana DC., Syst. Nat.1:138.1817; FBI 1:4.1872; FEH 1:88.1966; EFPN 2:14.1979; FBI 1(2):290.1984; FI 1:64.1993; FWB 1:122. 1997.

Local Name: Kaneshi Lahara (Nep).

Slender perennial shrubby climbers. Stem longitudinally ribbed, ribs pubescent. Leaves pinnate with 5-7 leaflets, exstipulate; petioles upto 6cm, glabrous to sparsely hairy; petiolules 0.6-1.5cm; leaflets distant, lamina 2.8-7.5 x 1.3-3cm, entire, acute, base rounded to subcordate, pubescent along veins above, glabrous beneath or sparsely pubescent on veins, nerves 3 at base. Cymes paniced, axillary, branches stout. Flowers many, greenish-white; sepals 0.5-0.7cm, elliptic, pubescent; stamens numerous; filament narrow. Achenes narrow-oblong, gray-pubescent; style in achene slender, upto 4cm long, plumose.

Flr. : Aug. - Oct. *Fr.* : Oct. - Feb.

Specimen Cited: Trijuntion-Jorhpokhari, 2900-3040m, **AP Das & PC Rai** 0521, dated 15.10.1994.

Status: Rare.

Local Distrib.: Tinsimana, Jorpokhari, Alubari. 2200-3040m.

General Distrib.: Himalayas, Myanmar, Sri Lanka, W. and C. China.

Clematis montana Hamilt. ex DC., Syst. Nat. 1: 164.1817; FBI 1: 2. 1872; Trs. N. Beng. 7. 1929; FEH 1: 89. 1966; EFPN 2: 15. 1979; FB 1(2):286.1984; TBRI 50(4):109. 1987; FI 1:69. 1993; FWB 1:122. 1997.

Local Name: Kaneshi Lahara (Nep.).

Climbing shrub, woody, almost glabrous or slightly silky when young. Stem longitudinally ribbed. Leaves 3-foliolate, exstipulate; petioles upto 7cm long, glabrous; petiolules 0.3-1cm, glabrous; lamina of leaflets 3.5-8 x 1.8-4.5cm, ovate, coarsely serrate

or lobed, acute to acuminate, base oblique, sparsely pubescent and pale greenish, yellow beneath. Peduncles slender, longer than petioles, upto 11.5cm, terete. Flowers 4.5-6cm in diam., solitary, axillary; sepals 4, 1.7-2 x 0.8-1.2cm, elliptic, acute or obtuse, densely pubescent; stamens numerous; anthers yellowish, introse; filaments glabrous; carpels many. Achenes 0.4-0.5 x 0.3-0.4cm, ovate, sparsely appressed silky, compressed; persistent style silky, plumose, upto 4.7cm long. (**Plate IX**).

Flr.: Apr. - Sep. *Frt.*: Jul. - Nov.

Specimen Cited: Tinsimana-Jorpokhari, 2900-3040m, **AP Das & PC Rai** 0760, dated 20.10.1994.

Status: Abundant above 2600m, rare below this range.

Local Distrib.: Thosum Hill, Ruka Hill, Chitray, Hattidara. 2400-2800m.

General Distrib.: Afganistan, Himalayas (Kashmir-Bhutan), Meghalaya, W. and C. China, Taiwan.

Note: Cultivated for ornamental value.

DICHOCARPUM *W. T. Wang et P. K. Hsiao*

Dichocarpum adiantifolium (Hk. f. *et* Thoms.) Wang *et* Hsiao in Acta Phytotax. Sin. 9:323. 1964; FB 1(2): 307. 1984; FI 1:102. 1993; FWB 1:126. 1997.

Isopyrum adiantifolium Hk. f. *et* Thoms., Fl. Ind. 1:42. 1855; FBI 2: 23. 1872; FEH 1:89. 1966; EFPN 2:18. 1979; TBRI 50(4):117. 1987.

Perennial short (9-16cm) herb with slender root-stock. Stem slender, greenish-white, glabrous. Leaves ternately compound, radical leaves long petioled, stipellete; petioles long and slender, 1.5-8.5cm, glabrous; petiolules upto 1.6cm, glabrous; lamina 3.5 x 4cm; leaflets 3-5 lobed or foliolate, 0.6-1.5 x 0.4-1.1cm, broadly obovate, rounded and crenate at apex, cuneate, glabrous both surfaces, 3-nerved. Flowers solitary, terminal with a 1-2cm glabrous pedicel, actinomorphic, 1-2cm across; sepals 5, white, 0.4-0.6 x 0.15-0.2cm, elliptic or obovate, petaloid, deciduous; petals 5, white, 0.5-0.7 x 0.2-0.25cm, obovate, nerved externally with light pink vertical markings; stamens 12; anthers whitish; filament whitish-green; carpels 2, connate; styles short; stigma brown when mature. Follicles 2, divergent, 0.5-0.6 x 0.1-0.15cm wide-spreading, cylindric.

Flr.: Apr. - Jun. *Frt.*: Jun. - Jul.

Specimen Cited: Neora Khola-Middle Rechila Zone, 2320-2490m, **AP Das & PC Rai** 1078, dated 27.4 1995; Chouda Feri, 2285m, **AP Das & PC Rai** 1298, dated 05.5.1995.

Status: Common.

Local Distrib.: Chitray, Alubari, Chouda Feri, Rechila Middle, Rechila Peak. 2200-3100m.

General Distrib.: Eastern Himalaya.

RANUNCULUS L.

Key to the species:

- 1. Prostrate herbs; flowers solitary.....2
- 1. Erect herbs; flowers numerous in naked inflorescence.....*R. laetus*
- 2. Petals ovate; achenes rounded.....*R. diffusus*
- 2. Petals obovate; achenes ellipsoid.....3
- 3. Petioles longer (upto 4cm).....*R. ficariifolius*
- 3. Petioles shorter (upto 2.5cm).....*R. hyperboreus*

Ranunculus diffusus DC., Prodr.1:38. 1824; D. Don, Prodr. Fl. Nep. 195. 1825; FBI 1:19.1872; BBSI 2:103. 1960; FEH 1:90. 1966; EFPN 2:19. 1979; FPK 9. 1981; FB 1(2):303. 1984; TBRI 50 (4):124. 1987; FI 1:119. 1993; FWB 1:130. 1997.

Small diffuse herb with perennial root-stock; branches decumbent or prostrate. Stem soft, basally branched, densely hirsute, hairs yellowish white, spreading. Leaves 3-lobed or deeply divided or 3-foliolate; petiole upto 9.5cm long, densely hirsute; auricles 0.8-1.1cm, brown scarious; lamina 1.5-5 x 1.7-5.2cm; leaflets or lobes obovate, margins both sharply and shallowly lobed/toothed, lobes/ teeth rounded or acute, pubescent both sides, 5-nerved at base. Flowers 1-1.5cm across, solitary, axillary and terminal; sepals 0.3-0.35 x 0.15cm, elliptic; petals 5, 0.4-0.6 x 0.2-0.3cm, obovate, yellow, glabrous; stamens numerous; carpels many; style short. Achenes 0.1-0.18cm across, suborbicular, compressed with hooked style. (**Plate I: 1, Plate X**).

Flr. : Apr. - Sep. *Fr.* : Jun. - Oct.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 025, dated 13.6.1994; Jaributti, 2195m, **AP Das & PC Rai** 045, dated 14.6.1994; Rechila Peak, 3100m, **AP Das & PC Rai** 0154, dated 15.6.1994; Jaributti-Alubari, 2195-2280m, **AP Das & PC Rai** 0513, dated 15.10.1994; Rechila Peak, 2280-3100m, **AP Das & PC Rai** 0696, dated 19.10.1994; Tinsimana-Jorhpokhari, 2900-3040m, **AP Das & PC Rai** 0794, dated 20.10.1994.

Status: Abundant.

Local Distrib.: Alubari, Tinsimana, Jaributti, Jorhpokhari, Rechila Peak. 2000-3100m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya, N. Myanmar, China.

Ranunculus ficariifolius Le'veille *et* Vaniot in Bull. Soc. Bot. France 51:289. 1904; FEH 3:37. 1975; EFPN 2:19. 1979; FB 1(2): 301. 1984; FI 1: 120. 1993; FWB 1:130. 1997.

R. flaccidus HK. f. *et* Thoms., Fl. Ind.1: 38. 1855 & FBI 1:20.1872, p.p *non* Persoon 1775.

R. microphyllus Handel-Mazzetti, Symb. Sin. 7: 299.1931; FEH 1:91. 1966, 2:30.1971.

Small prostrate or decumbent tufted herb, perennial, nearly glabrous to thinly hairy; nodes rooting. Petioles 0.4-2cm long; lamina 0.2-0.7cm long and broad, ovate or

suborbicular, margin shallowly 3-5 partite, rounded to subacute, base cordate or truncate, glabrous, basal nerves 3-5. Flowers leaf-opposed, solitary; sepals 0.15-0.25cm, elliptic; petals 0.2-0.35 x 0.15-0.25cm, obovate, pale-yellow; stamens and carpels many. Achenes 0.15 x 0.1cm, ellipsoid, slightly compressed.

Flr.: May - Jul. *Fr.*: Jul. - Aug.

Specimen Cited: Rechila Peak, 3100m, **AP Das & PC Rai** 0150, dated 15.6.1994.

Status: Abundant above 2800m.

Local Distrib.: Rechila Middle, Hattidara, Tinsimana, Ruka Hill. 2400-3100m.

General Distrib.: Himalaya (Nepal-Bhutan), W. and C. China.

Ranunculus hyperboreus *sensu* FBI *non* Rottboell, Skrift. Kjoeb. Sclsk. 10: 458. 1770; FBI 1:18. 1872; FI 1:121. 1993.

Small, glabrous creeping, stoloniferous herb of wet places. Petiole 1.2-2.5cm long; lamina 0.5-1 x 0.5-1cm, orbicular or ovate, shallowly 3-5 lobed, base cuneate or cordate, segments oblong, obtuse, glabrous, nerves distinct beneath. Flowers solitary with 2-2.5cm erect pedicel; sepals upto 0.4cm, narrow, ovate, greenish; petals slightly exceeding sepals, 0.4-0.5 x 0.15-0.2cm, obovate, yellowish. Achenes many, 0.1-0.12cm, obovoid, beaked with a short persistent and hooked style.

Flr.: May - Jul. *Fr.*: Jul. - Sep.

Specimen Cited: Rechila Peak, 3100m, **A P Das & P C Rai** 0718, dated 9.10.1994.

Status: Less Common.

Local Distrib.: Jorpokhari, Tinsimana, Rechila Peak, Mulkharka. 2300-3100m.

General Distrib.: Nepal, India (Jammu and Kashmir-Sikkim, Darjeeling), Bhutan, Pakistan.

Ranunculus laetus Royle, Ill. Bot. Him. Mts. 53. 1834; FBI 1:19. 1872; FEH 2:31. 1971; EFPN 2:19. 1979; FB 1(2):303. 1984; TBRI 50(4):124. 1987.

Perennial erect herb, 30-65cm. Rootstock rigid. Branches prostrate, narrow, often rooting at nodes. Lamina of radical leaves 5.5-10.5cm, 3-lobed, lobes oblong, sharply toothed, appressed pubescent, cauline leaves smaller, short petioled. Flowers many in leafless inflorescence; sepals 0.55-0.6cm, elliptic, villous; petals 0.85-1.2cm, rounded ovate; style straight, persistent. Achenes to 0.35cm, ovate.

Flr.: Apr. - Jul. *Fr.*: Jul. - Aug.

Specimen Cited: Above Alubari, 2360m, **AP Das & PC Rai** 1837, dated 12.9.1997.

Status: Frequent.

Local Distrib.: Alubari, Reshete, Mulkharka, Chitray, 2180-2700m.

General Distrib.: C. Asia, Afganistan, Himalaya (Kashmir-Arunachal Pradesh), Tibet, W. China.

THALICTRUM L.

Key to the species:

1. Filaments filiform; anthers beaked.....*T. foliolosum*
1. Filaments club-shaped; anthers obtuse.....*T. javanicum*

Thalictrum foliolosum DC., Syst. Nat. 1:175. 1818; FBI 1:14. 1872; FEH 1:91.1966; FB 1(2): 298. 1984; TRBI 50(4): 128. 1987; FI 1: 136.1993; FWB 1:132. 1997.

Local Name: Chitray (Nep).

Small, perennial, erect, branched, leafy, glabrous herb. Leaves pinnately decompose, imperipinnate, base sheathing; petioles upto 2.5cm long; leaflets 0.9-1.5 x 0.5-1.2cm, broadly ovate to orbicular, margin lobed or bluntly toothed, tip acute or obtuse, glabrous, glaucous beneath. Panicles axillary and terminal, much branched. Flowers polygamous, dull bluish or greenish-white; sepals 0.35-0.4 x 0.18-0.2cm, obovate, greenish white, caducous; stamens exceeding sepals; anthers 0.25-0.3cm long, beaked; filament equalling anther, filiform, light white; styles deciduous. Achenes 0.3cm across, ellipsoid, sharply ribbed at both ends, sessile.

Flr.: Jul. - Sep. *Fr.:* Sep. - Nov.

Specimen Cited: Rechila, 2280m, AP Das & PC Rai 0702, dated 19.10.1994.

Status: Less Common.

Local Distrib.: Alubari, PHE Source, Rechila Middle, Pankhasari, Rechila. 1900-2600m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Tibet, N. Myanmar

Thalictrum javanicum Blume, Bijdr. 2:1825; FBI 1:13.1872; FEH 2:33.1971; EFPN 2: 21.1979; FB 1(2):298. 1984; FI 1: 136.1993; FWB 1:132. 1997.

T. glyphocarpum Wight & Arn., Prodr. 2. 1834.

Local Name: Jainbari (Nep.).

Small herb. Stem erect upto 40cm, glabrous. Leaves ternately decompose, lamina orbicular, margin bluntly obtuse, lobed towards apex, base rounded, glabrous, nerves prominent beneath. Panicles both axillary and terminal. Pedicels short, filiform. Sepals 0.25-0.45cm, obovate, white; petals 0; anthers 0.1-0.15cm, apically obtuse; filament club-shaped. Achenes 0.25-0.3cm, ellipsoid, strongly ribbed, persistent with hooked style.

Flr.: Jul. - Sep. *Fr.:* Aug. - Oct.

Specimen Cited: Jaributti, 2195m, AP Das & PC Rai 049, dated 14.6.1994.

Status: Less Common.

Local Distrib.: Lava, Jaributti, Tinsimana, Jorpokhari, Thosum Hill. 2100-3050m.

General Distrib.: Himalaya (Simla-Bhutan), India, Sri Lanka, China, Java.

TROLLIUS L.

Trollius pumilus D.Don, Prodr. Fl. Nep. 1825; FBI 1: 22. 1872; Ann. Bot. Gard. Calcut. 5 (2): 86, t. 113. 1896; Bot. Mag. sub t. 9143. 1928; SFSH 19. 1963; FEH 1: 92. 1966; FI 1: 145. 1993.

T. sikkimensis (Bruehl) Dorosz., Bot. (Polsk.) 41: 32. 1974.

T. pumilus D.Don subsp. *normalis* var. *sikkimensis* Bruehlin in Ann. R. Bot. Gard. Cal. 5. 88. 1896.

T. gammieanus Stapf in Bot. Mag. sub. t. 9143; Clavi. 1928.

Small perennial herb, 10-16cm, growing on damp, moist places. Root-stock stout, hard. Basal leaves 6-10cm long; petioles 4-7cm; leaflets 2-4cm long and broad, orbicular, palmatisect into deep 5-lobed rhombic segments towards base, segments in turn cut into linear-lanceolate, acutely toothed, greenish and white-spotted above, pubescent above when young, glabrous and nerves prominent beneath; cauline leaves few, below the middle of stem, shortly petiolate. Flower and fruit not collected.

Specimen Cited: Jorhpokhari, 3040m, AP Das & PC Rai 1209, dated 03.5.1995.

Status: Rare.

Local Distrib.: Found in Jorpokhari only.

General Distrib.: E. Himalaya (Nepal to Bhutan), Khasia, S. Tibet and China.

MAGNOLICEAE Juss.

Key to the Genera:

- 1. Flowers axillary.....*Michelia*
- 1. Flowers terminal.....2
- 2. Lamina ovate or elliptic-obovate; pistil apocarpous.....*Magnolia*
- 2. Lamina oblanceolate; carpels united.....*Talauma*

MAGNOLIA L.

Magnolia campbellii Hk. f. et Thoms., Fl. Ind. 1: 77. 1855; Ill. Him. Pl. t. 4 & 5. 1855; FBI 1: 41. 1872; FEH 1: 95. 1966; 2: 36. 1971; EFPN 2: 24. 1979; FB 1(2): 234. 1984; TBRI 50(4): 119. 1987.

Local Name: Ghogay Champ, Lal Champ (Nep.).

Deciduous trees, upto 15-25m high. Petioles 3-5cm long; lamina 12-30 x 6-14.8cm, elliptic-ovate, acute, base rounded or oblique, glabrous above, pubescent beneath. Flowers 14-15cm diam., erect, appearing before leaves, enclosed initially by 4-6cm long spathy bract; sepals 3; petals 9-14, outer yellowish, hairy, inner ones whitish, purplish

near base; stamens many, striate, with flat filament; anthers introrse; pistil apocarpous, purple. Fruiting receptacle 12-17 x 3-4cm, cylindrical; seeds dark red. (**Plate I: 2**)

Flr.: Mar. - May *Fr.:* Sep. - Dec.

Specimen Cited: Near Chitray, 2520m, **AP Das & PC Rai** 1799, dated 10.9.1997.

Status: Common.

Local Distrib.: Thosum, Ruka Hill, Middle Rechila, Chitray, Jorpokhari. 2200-2800m.

General Distrib.: Himalaya (Nepal-Bhutan), Manipur, S.E. Tibet, N. Myanmar, Yunnan.

Note: Produce good quality timber.

MICHELIA L.

Key to the species:

1. Calyx deep brown; petals creamy white turning pink; carpels beaked.....2
1. Calyx greenish; petals white; carpels not beaked.....*M. velutina*
2. Petal broader; fruits lenticellate.....*M. cathcartii*
2. Petals narrow; fruits not lenticellate.....*M. doltsopa*

Michelia cathcartii Hk. f. *et* Thoms., Fl. Ind. 1:79. 1855; Ill. Him. Pl. t. 7. 1855; FBI 1:42. 1872; FI 1:175. 1993; FWB 1:140. 1997.

Alcimandra cathcartii (Hk. f. *et* Thoms.) Dandy in KB 1927:260. 1927; FEH 1:95. 1966; 2:36. 1971; FB 1(2):237. 1984; TBRI 50(4):105. 1987.

Local Name : Titay Champ (Nep.).

Large evergreen tree, upto 40m high. Young shoot densely silky. Petioles 0.55-5cm long; lamina 6.5-13 x 3.2 -5.5 cm, oblong-lanceolate, acuminate, base rounded, shining hairy above, brown pilose beneath. Stipules upto 2.2cm long, densely hairy. Flowers 7-10.5cm across, terminal, creamy-white, fragrant; sepals and petals 9 in 3 whorls, 3-5.2cm long, oblong; stamens to 2.6cm long, overtopping carpophare; carpels sessile, free, beaked. Fruits aggregate, 6.5-11.5cm with ripe follicles 0.8-1cm diam., lenticellate. (**Plate I:3**)

Flr.: May - Jul. *Fr.:* Sep. - Dec.

Specimen Cited: Rechila Middle, 2340m, **AP Das & PC Rai** 1230, dated 04.5.1995.

Status: Less Common.

Local Distrib.: Reshete, Pankhasari, Rechila. 1900-2400m.

General Distrib.: E. Himalaya (Darjeeling-N. Assam), Naga Hills, Manipur, N. Myanmar, Tonkin.

Michelia doltsopa DC., Syst. Nat. 1:448. 1817; FEH 1:96. 1966; Photo-Alb. Pl. E. Him. f. 47. 1968; FEH 2:37. 1971; EFPN 2:25. 1979; FB 1(2):235. 1984; TBRI 50(4):120. 1987.

Magnolia excelsa Wallich, Tent. Fl. Nep. 1:5, t. 2. 1824.

Michelia excelsa (Wallich) Blume ex Wight, Ill. Ind. Bot. 1:14. 1838; FBI 1:43. 1872.

Local Name: Seto Champ, Rani Champ (Nep.).

Evergreen tree, 10-25m tall, with sericeous greyish-brown buds. Branches silky pubescent. Petioles 2-4cm long; yellowish hairy; lamina 9-22 x 5-8.5cm, oblong-lanceolate, acuminate, base cuneate, brownish pubescent beneath, mid-rib silky above. Stipules upto 2.2cm long, densely silky. Flowers terminal, 6.5-10cm across, whitish, scented; sepals and petals 9-12 in whorls, 3-5.5 cm long, sepals obovate, deep brown; petals narrower, stamens 2.5cm long, yellow; carpels beaked. Fruits aggregate, 8-13 cm long, ripe follicles 0.8-1.1cm diam., suborbicular.

Flr.: Apr.- Jun. *Fr.:* Oct. - Dec.

Specimen Cited: Near Pankhasari, 2260m, **AP Das & PC Rai** 1800, dated 10.9.1997.

Status: Sparse.

Local Distrib.: Rechila Middle, Pankhasari, Chitray. 1800-2500m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Meghalaya, S. Tibet, Manipur, N. Myanmar, Yunnan.

Note: The species is a threatened plant. It has got a high price timber value.

Michelia velutina DC., Prodr. 1:79. Jan. 1924; FEH 1:96. 1966; EFPN 2:25. 1979; FB 1(2):235. 1984; TBRI 50(4):120. 1987.

M. lanuginosa Wallich, Tent. Fl. Nep. 1: 8, t. 5. 1824; FBI 1:43. 1872; Bot. Meg. t. 6179. 1875; NRBGE 16. 131. 1928; Trs. N. Beng. 9.1929.

Local Name: Phusray Champ, Guay Champ (Nep.).

Large evergreen trees, 15-30m tall, young parts densely grey-tomentose. Petioles 1-2.2cm long; lamina 14-28 x 4.5-8.5cm, oblong-lanceolate, acute, base cuneate, glabrous above, grey tomentose beneath. Stipules oblong. Flowers axillary, 6.5-11cm across, white; perianth parts about 18, 2.7-4.2 x 0.55-0.75cm, oblanceolate; stamens several, yellowish; filament glabrous; carpels densely pubescent in the beginning, glabrous when mature; style glabrous. Fruits aggregate upto 13.5cm long, with ripe follicles c 1cm across; seeds orange-red.

Flr.: Sep. - Oct. *Fr.:* Jan. - May

Specimen Cited: Rechila Middle, 2300m, **AP Das & PC Rai** 1801, dated 10.9.1997.

Status: Frequent; population decreasing.

Local Distrib.: Reshete, Ruka, Rechila. 1900-2500m.

General Distrib.: E. Himalaya, Khasia Hills, Naga Hills, Manipur and China.

Note: Good quality timber yielding tree.

TALAUMA Juss.

Talauma hodgsonii Hk.f. et Thom., Fl. Ind. 74. 1855, et in Hk.f. FBI 1: 40. 1872; Man. Ind. Timb. 8. 1902; Ind. Trs. 8.1906; Fl. Asm. 1(1): 17. 1935; FJ 1: 60. 1981; Fl. Meg. 1: 62. 1987; TBRI 50 (4): 128. 1987.

Local Name: Bhalu Kath (Nep.).

Large tree upto 25 m tall. Branches spreading. Bark warty, nearly smooth, gray-brown. Petioles upto 6.25 cm long, swollen at the base; leaves simple; lamina 20-40 x 6.5-19.8cm, oblanceolate, elliptic, margin entire, acuminate, base narrowly cuneate, glabrous greenish and glossy above, nerves prominent beneath. Flowers solitary, terminal, about 4.8-5 x 4 cm, white; sepals 3, petaloid, thick, white or pink-tinged; petals similar to sepals; stamens many; filaments flat, broad; carpels many, united, beaked, greenish; ovules 2-4. Follicles dehiscent by ventral suture and separating off from axis; seeds red.

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Neora catchment site near Samsing, 850 m, AP Das & PC Rai 1757, dated 18.5.1997.

Status: Less Common.

Local Distrib.: Asala Khola, Samsing, Sakam, Machuki. 700-1600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Naga Hills and Myanmar.

SCHISANDRACEAE Blume

Key to the Genera:

1. Leaves entire; fruitlets crowded in ahead.....*Kadsura*
1. Leaves cartilaginous; fruitlets scattered on elongated axis.....*Schisandra*

KADSURA Juss.

Kadsura heteroclita (Roxb.) Craib, Fl. Siam Enum.1: 28. 1925; FPK 10. 1981; FI 1: 189. 1993.

Uvaria leteroclita Roxb., Fl. Ind. 2:663 . 1832.

K. roxburghiana Arn. in Mag. Zool. Bot. 2: 546. 1838; FBI 1:45. 1872.

K. wightiana Arn. in Mag. Zool. Bot.2: 546. 1838; FBI 1: 45. 1872.

K. wattii C.B. Cl. in J. Linn. Soc. Bot. 25: 4. 1884.

Local Name: Patiamilo (Nep.).

Rambling shrubby climber. Branches alternate, short. Stem greenish, sparsely hairy. Leaves exstipulate; petioles 0.4-0.1.1 cm, minutely silky hairy; lamina 2-9 x 1-3 cm, ovate- elliptic, entire, acute to acuminate, cuneate in younger leaves and round in older, glabrous to sparsely hairy, dark green above, pale and minutely glandular beneath, nerves thick and quite prominent beneath, mid-rib pubescent in young leaves. Pedicels 1.7-2.5 cm, slender, broader above, narrower below, shortly hairy. Flowers 1-1.4cm across,

unisexual, light greenish-white to yellowish -pink; tepals 5, free, 0.6-1 x 0.5-0.9cm, ovate-nearly round, vertically lined; stamens 6; anthers yellowish-gray; filaments 0.2-0.25cm long, free, green; staminal column 0.7 x 0.65cm, subglobose; carpels 0.25 x 0.2cm, angular, condensed into a swollen subglobose yellowish and 5-angled head. Fruits obovoid and red when fully mature.

Flr. & Frt.: Apr. - Dec.

Specimen Cited: Alubari Belt, 2280m, AP Das & PC Rai 0252, dated 16.6.1994;

Status: Rare.

Local Distrib.: Alubari, Jaributti, Milkharka, Rechila Middle. 1900-2500m.

General Distrib.: Eastern Himalaya (Darjeeling-Sikkim), Assam, Meghalaya Hills.

Note: Edible.

SCHISANDRA *Michx.*

Key to the species:

- 1. Leaf base rounded or cuneate; perianth segments yellowish.....*S. neglecta*
- 1. Leaf base attenuate; perianth segments white or pale pink.....*S. grandiflora*

Schisandra grandiflora (Wallich) Hk. f. *et* Thoms. in FBI 1:44. 1872; FEH 1:96. 1966; EFPN 2:26. 1979; FB 1(2):248. 1984.

Kadsura grandiflora Wallich, Tent. Fl. Nep. 10, t. 14. 1824.

Local Name: Singhatta-Lahara (Nep.).

Climbers, woody, glabrous, apparently dioecious. Petioles 1.5-3.5 cm long. Leaves lanceolate, ovate or oblong-lanceolate, attenuate at base, distantly toothed along margins, acuminate at apex, 7-15 x 2-6 cm, somewhat fleshy, pale beneath. Flowers *ca* 0.25 cm across, solitary, sometimes with 1-2 secondary bracts, fragrant. Male flowers: pedicels 1-4 cm long; perianth segments 7-8 in series, broadly elliptic or obovate, 1-1.8 x 0.5-1.5 cm, white or pale pink; staminal column ovoid or cylindric above, 0.7-1.5 cm long; anthers ovoid, 0.2-0.3 cm long; filaments 0.1-0.2 cm long; connectives thickened. Female flowers: pedicels 0.15-0.6 cm long; perianth as in male flowers; carpels many-striate, ovoid, *ca* 0.15 x 0.075 cm with *ca* 0.05 cm long appendage. Fruiting column 15-20 cm long, 0.3-0.6 cm thick, fleshy, usually bearing 30-80, ovoid-ellipsoid, 0.7-0.9 x 0.5-0.6 cm, red fruitlets. Seeds ellipsoid. (Plate I: 4)

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Chouda Feri, 2180m, AP Das & PC Rai 0323, dated 18.6.1994.

Status: Common.

Local Distrib.: Pankhasri, Chouda Feri, Rechila Middle, Reshete. 200-2400 m.

General Distrib.: Himalayas (Punjab-Bhutan).

Schisandra neglecta A.C.Smith in Sargentia 7:127.f.17,g.1947; FEH 1:96.1966; EFPN 2:26. 1979; FB 1(2):249. 1984; TBRI 50 (4):126. 1987; FI 1:193. 1993.

S. elongata Hk.f. & Thoms.in FBI 1:44.1872, excl. *syn.*

Local Name: Sighatta Lahara (Nep.).

Shrubby climber. Branches short and leafy. Stem glabrous. Petiole 0.5-1.1cm; lamina 4-9 x 1.5-3.5cm, ovate to oblong-lanceolate, remotely cartilaginous-denticulate, acuminate, base acute or cuneate, glabrous, glaucous beneath, nerves much prominent below, lateral veins 6-10 pairs. Pedicel 1.4-2cm, slender, borne on axils of scale on leafy short lateral branch, glabrous. Flowers solitary, axillary, drooping, unisexual, 1.3cm across, 0.8-1.1 x 0.7-1cm, petaloid, outer ones larger, nearly round, glabrous, vertically nerved; stamens numerous, in a fleshy head.

Flr.: May - Jun. *Fr.:* Aug. - Sep.

Specimen Cited: Rechila Middle, 2490m, AP Das & PC Rai 1235, dated 04.5.1995.

Status: Less Common.

Local Distrib.: Chouda Feri, Rechila Middle, Reshete. 2200-2500m.

General Distrib.: E. Himalaya (Nepal-Sikkim), Meghalaya, N. Myanmar, W. China.

Notes:

1. Useful in local medical formulation.
2. Fruits edible.

ANNONACEAE Juss.

Key to the genera:

1. Outer petals equal and alike with sepals; inner petals coherent at base; ripe carpels not moniliform.....*Milium*
1. Outer petals longer than sepals; inner petals free; ripe carpels moniliform with many seeds in a row.....*Desmos*

DESMOS Lour.

Key to the species:

1. Leaves oblong-lanceolate, glabrescent beneath.....*D. chinensis*
1. Leaves ovate-oblong or obovate-lanceolate, tomentose beneath.....*D. dumosus*

Desmos chinensis Lour., Fl. Cochinch. 352, 1790; RBSI 19.2: 20. 1966; EFPN 2: 27. 1979; FJ 1: 63. 1981; Fl. Meg. 1: 66. 1985; FI 1: 257.1993; FWB 1:147. 1997.

Unona discolor Vahl, Symb. Bot. 2: 63 t. 36. 1791; FBI 1: 59. 1872; Man. Ind. Timb. 16, 1902; Ind. Trs. 16. 1906; Fl. Asm. 1(1): 35. 1935.

Erect or subscondant shrub, 2-4 m tall. Bark grayish. Leaves shortly petiolate, lamina 5-10 x 2-3.8cm, oblong-lanceolate, entire, acute to acuminate, base rounded, glabrescent beneath, impressed above. Flowers solitary, axillary, leaf-opposed, 4-9.2cm long., pale

yellow; sepals 3, valvate, ovate, greenish; petals 6 (3+3), outer bigger and with distinct venation, lanceolate, pale yellow; stamens many, hooded; styles recurved; carpels when ripe constricted between seeds. Seeds 2-5.

Flr.: May - Jul.

Frt.: Aug. - Dec.

Specimen Cited: Samsing Suntalay, 655m, A P Das & P C Rai 1534, dated 04.6.1996.

Status: Frequent.

Local Distrib.: Samsing, Phari. 500-800m.

General Distrib.: Tropical E. Himalaya (Darjeeling-Bhutan), Assam, Myanmar, Malaysia.

Desmos dumosus (Roxb.) Safford in Bull. Torrey Bot. Club 39. 506. 1912; FB 1 (2):241. 1984; Fl. Meg. 1: 67. 1985; FI 1: 260. 1993; FWB 1:148. 1997.

Unona dumosa Roxb., Fl. Ind. 2: 670. 1832; FBI 1: 59. 1872.; Ind Trs. 16. 1906; Fl. Asm.1(1): 35. 1935.

Local Name: Malay Lahara (Nep.).

A large straggling bushy shrub with dark or grayish brown barks. Young parts tomentose. Leaves alternate, shortly stalked; lamina 8-18 x 3-6cm, ovate-oblong or obovate-lanceolate, entire, acuminate, blade rounded, rarely truncate or subcordate, glabrous to glabrescent above, tomentose beneath. Flowers 13.5cm long, extra axillary, green becoming greenish yellow afterwards; sepals upto 1.5cm long, ovate, prominently marked; stamens numerous, subsessile; ripe carpels jointed.

Flr.: May - Jun.

Frt.: Jun. - Oct.

Specimen Cited: Samsing Suntalay, 655m, A P Das & P C Rai 1510, dated 04.6. 1996.

Status: Frequent.

Local Distrib.: Asala Khola, Samsing, Suntalay. 400-800m.

General Distrib.: Eastern Himalaya (Nepal-Bhutan), Assam, Malaysia.

MILIUSA Lesch.

Milium globosa (DC.) Panigr. et S.C. Mishra in Taxon 33:713. 1984; FI 1:215. 1993; FWB 1(2):149. 1997.

Milium roxburghiana (Wallich) Hk. f. et Thoms., Fl. Ind. 150. 1855; FBI 1:87. 1872; EFPN 2:27. 1979.

Hyalostema roxburghiana Wallich, Cat. No. 219, n. 6434. 1832 *nom. ill.*; FB 1(2):240. 1984.

Local Name: Sungden Kung (Lep.).

A small deciduous shrub to small tree, 3.5-5 m, young shoots pubescent. Branches spreading. Bark closely lenicelled, gray. Leaves subsessile or petioles upto 0.5 cm long;

lamina 5-14 x 2.7-4.5 cm, oblong - elliptic, acuminate, base rounded, somewhat aromatic, usually glabrous except the puberulous midrib, lateral nerves about 10 on each side of midrib, arched forming intramarginal nerve towards the edge. Pedicels upto 2 cm long. Bract 0.28-0.3 x 0.1 cm, elliptic. Flowers dioecious or polygamous either, outer petals alike, 0.3-0.4 x 0.15 cm, spreading, tomentose outside, somewhat reflexed; inner petals 1-1.1 x 0.68 cm, ovate, almost saccate at base, subacute, crimson red. Ripe carpels 0.7-0.8 cm across, subglobose or oblong, glabrous, borne on 1.5-1.9 cm long stalks
Flr.: Mar. - Apr. *Frt.*: Nov. - Dec.

Specimen Cited: Neora Khola at Samsing, 730 m, **AP Das & PC Rai** 1716, dated 17.5.1997.

Status: Common.

Local Distrib.: Gorubathan, Sakam, Samsing, Phari. 500-1000m.

General Distrib.: Himalayas (Nepal-Sikkim), Asasam, Myanmar.

MENISPERMACEAE Juss.

Key to the Genera:

1. Leaves peltate, rounded or slightly cordate; flowers in umbels on a discoid axis.....*Stephania*
1. Leaves not peltate, deeply cordate; flowers in axillary decomposed panicle.....*Cyclea*

CYCLEA Arnott. ex Wt.

Cyclea bicristata (Griff.) Diels in Pfl.-reich, 4-94. Ht. 46. 317. F. 93 A-E. 1910; FEH 2:35. 1971; FB 1(2):338. 1984; TBRI 50(4):111. 1987.

Lophophyllum bicristatum Griff., Notul. 4:313. 1854; FBI 1:105. 1872.

Cyclea populifolia Hk. f. et. Thoms., Fl. Ind. 1:202. 1855.

Shrubby dextrorse climbers with whitish bark. Stem terete, pubescent. Petioles upto 8 cm long, thickened at both ends, hairy. Leaves 7-12 x 6-11 cm, ovate-cordate, acute cordate at base, margin entire, 7-9 nerved, pilose beneath. Panicles axillary, tomentose. Flowers green. Male flowers: apetalous, sepals 4, upto 1.5cm long, fleshy; staminal column to 0.15cm, anthers 4-5, connate into a peltate disc. Female flowers: sepals 4, free, 4-lobed; petals 0, style 3-lobed. Drupes upto 0.75 long, stony, tubercled.

Flr.: Mar. - Apr. *Frt.*: Apr. - May

Specimen Cited: Near Machuki, 1560m, **AP Das & PC Rai** 1932, dated 30.10. 1997.

Status: Frequent.

Local Distrib.: Samsing, Sakam, Machuki. 700-1600m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya, Manipur.

STEPHANIA Lour.

Key to the species:

1. Lamina deltoid, always entire.....*S. elegans*
1. Lamina ovate-orbicular, obscurely dentate or slightly lobed.....*S. glandulifera*

Stephania elegans Hk. f et Thoms., Fl. Ind. 1:195. 1855; FBI 1:103. 1872; Trs. N. Beng. 12.1929; FEH 1:95. 1966; 2:36. 1971; EFPN 2:28. 1979; FB 1(2):337. 1984; TBRI 50(4):128. 1987; FI 1:333. 1993.

Slender small twinner, shrubby, with tuberous root-stock. Branches angled. Stem terete, glabrous. Petioles 2.2-4.2 cm long. Leaves 4-10 x 2.5-6cm, elongate-deltoid, acute, cuneate at base, margin entire, light green, glabrous, 5-7 nerved. Cymes axillary, umbellate. Peduncles upto 5cm long. Pedicels short. Flowers purple-green, smelly. Male flowers: sepals to 0.2 cm, obovate, acuminate; petals shorter than sepals, broadly ovate, purple. Female flowers: sepals 0.4-0.45 x 0.1cm, obovate; petals minute, obovate. Drupes 0.5-0.6 cm across, obovoid, fleshy, reddish on ripening.

Flr.: May - Sep. *Frt.:* Oct. - Dec.

Specimen Cited: Reshete, 2240m, AP Das & PC Rai 0348, dated 14.10. 1994.

Status : Common.

Local Distrib.: Lava, Dhamdhamay Danra, Reshete, Machuki. 1400-2400m.

General Distrib: India: Tropical and Sub-Tropical Himalayas, Assam, Meghalaya, Naga Hills.

Stephania glandulifera Miers., Contr. Bot. 3:220. 1871; Trs. N. Beng.12. 1929; FEH 1:95. 1966; 2:36. 1971; EFPN 2:28. 1879; FB 1(2):37. 1984; TBRI 50(4):101. 1987; FI 1:334. 1993.

Stephania rotunda auct. non Lour.: Hk. f. & Thoms. , Fl. Ind. 197. 1855!; FBI 1:103. 1872 p.p., non Lour.

Local Name: Tamarkay (Nep.).

Sinistrorse shrubby twinner with tuberous rootstock. Petioles long upto 10.5cm. Leaves 3-12.5 x 5-11.5cm, peltate, ovate, subacute to acute, rounded at base, margin entire to crenate, glabrous on both surfaces. Cymes umbellate, axillary on leafless branches. Peduncles upto 8 cm long. Sepals in male flowers obovate, glandulaor papillose near apex; petals 0;staminal column to 0.2cm across; female flowers similar to male ones. Fruits 0.4-0.6cm across, globose.

Flr.: Feb. - May *Frt.:* Aug. - Nov.

Specimen Cited: Lower part of Ruka Hill, 2300m, AP Das & PC Rai 0943, dated 24.10.1994.

Status: Less Frequent.

Local Distrib.: Sakam, Machuki, Pankhasari, Hattidanra. 500-2100m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya.

Note: Ethnobotanically much important plant.

LARDIZABALACEAE Decne.

HOLBOELLIA Wallich

Key to the varieties:

1. Leaflets digitately 3-5 foliolate, ovate lanceolate; flowers 1-1.6 cm long
.....*Holboellia latifolia* var. *latifolia*

1. Leaflets digitately 7-9 foliolate, linear-lanceolate; flowers 1.2-1.4 cm long
.....*Holboellia latifolia* var. *angustifolia*

Holboellia latifolia Wallich, Tent. Fl. Nep. 24, t.16. 1824; FBI 1: 108. 1872; FEH 1:92. 1966; 2: 34. 1971; EFPN 2: 32. 1979; FB 1(2): 330. 1984; Fasc. Fl. Ind. 19: 32. 1988. var. *latifolia*: FWB 1:173. 1997.

Local Name: Gofla (Nep.).

Shrubby to liana. Bark thick, silvery. Stem nearly quadrangular, rough or smooth. Petioles upto 1.5-9 cm; pttl. 0.8-3.5 cm; leaflets usually 3 or even upto 5, 2.5-10 x 0.6-3.9 cm, very variable, asymmetric-symmetric, broad ovate to elliptic-oblong, entire to crenate; acute-acuminate, base cuneate-obtuse, nerves impressed above and prominent below, both surfaces glabrous, glossy above, pale & reticulate beneath. Racemes axillary, drooping, shorter than leaves, 1.5-1.7 cm, 3-7 flowered. Peduncles 0.7-2.2 cm. Pedicels 0.2-2.2 cm. Flowers 1-1.6 cm long, tubular-bell shaped, fragrant, light pinkish, nectar glands inside; tepals 5, ovate-elliptic, glabrous to thinly hairy; stamens 6, 0.4-0.5 x 0.1 cm, free. (Plate I:5)

Flr.: Mar. - May *Fr.:* Aug. - Nov.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 0239, dated 16.6.1994.

Status: Abundant on bushes and degraded forests.

Local Distrib.: Thosum Beat, Jaributti, Tinsimana, Jorpokhari, Alubari, Reshete. 2100-3100m.

General Distrib.: India: Himalayas (Kumaon-NEFA), Manipur, Meghalaya, N. Assam; W. China.

Note: Ripe fruits edible.

var. *angustifolia* (Wallich) Hk.f. et Thoms. in FBI 1: 108. 1879; EFPN 2: 32. 1979; FB 1(2): 330. 1984; Fasc. Fl. Ind. 19: 34. 1988; FWB 1:175. 1997.

H. angustifolia Wallich, Tent. Fl. Nep. 25, t.17. 1824.

Local Name : Gofla (Nep.).

Like var. *latifolia* but leaves digitate with 7-9 leaflets, 2.3-10 x 0.6-3.3 cm, lanceolate, more narrower, entire to indistinctly crenate, acute-acuminate, base cuneate. 3-5 flowers in axillary fascicles, sometimes racemed, pendulous. Peduncles 1.8-3cm long. Pedicels 0.7-2cm. Tepals 5, ovate-elliptic to lanceolate, greenish white or greenish-purple, glabrous, sparsely hairy; stamens 6, free.

Flr.: Apr.- May *Frt.*: Aug. - Nov.

Specimen Cited: Jorpokhari-Tinsimana, 3040-2900m, AP Das & PC Rai 0802, dated 20.10.1994; Jaributti-Rechila Middle, 2160-2480m, AP Das & PC Rai 1008, dated 23. 4. 1995

Status : Common.

Local Distrib.: Rechila Park, Jaributti, Jorpokhari, Tinsimana. 2000-3000m.

General Distrib.:Himalayas (Kumaon-Arunachal Pradesh), Meghalaya, Manipur, N. Assam, W. China.

BERBERIDACEAE Juss.

Key to the Genera:

1. Leaves pinnately compound; spines absent; bracts present at inflorescence base*Mahonia*
1. Leaves simple; spines present; bracts absent.....*Berberis*

BERBERIS L.

Key to the species:

1. Flowers fascicled; leaves subsessile; lamina oblong-lanceolate.....2
1. Flowers in racemes or corymbs; leaves petiolate; lamina obovate.....*B. asiatica*
2. Flowers more than 8; pedicels 0.5-1.5cm long.....*B. wallichiana*
2. Flowers upto 6; pedicels 1.5-2.5cm long.....3
3. Stem terete, red, usually unarmed or with minute spines (upto 0.5cm long)
.....*B. insignis*
3. Stem subangled, yellow, armed with prominent spines upto 2.5cm long
.....*B. hookeri*

Berberis aristata DC., Syst. Nat. 2:8. 1821; Bot. Mag. 52: t. 2549. 1825; Wallich Cat. 40, n. 1474. 1829; Fl. Ind. 1:222. 1855, p.p.; in FBI 1:110. 1872, p.p.; F. & Fl. Nep. Him. 132. 1955; EFPN 2: 29. 1979; FB 1(2):326. 1984; TBRI 50(4):107. 1987; FI 1: 381. 1993.

B. chirita Lindley in Bot. Reg. 9: t. 729. 1823; FEH 1:92. 1966.

Local Name: Chutro (Nep.).

Spinous shrubs to 1-2.5 m tall, deciduous. Stem grooved, spiny, brown. Lamina 2.5-3.2 x 0.8-1.5cm, obovate; acute or obtuse, base attenuat, margin entire or spinose towards apex, veins prominent, glaucous beneath. Racemes 4.5-6 cm long, branched. Pedicels

0.65-1.1cm long, red. Flowers large, yellow; outer sepals 1-1.5 x 0.1 cm, ovate, inner ones 0.65-0.7 x 0.3-0.4 cm, obovate; petals 0.6-0.7 x 0.35-0.4 cm, obovate, distinctly 3-veined. Berries 0.65-0.7 x 0.1-0.15 cm, ellipsoid, tapering into the persistent style c 0.1cm.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Below Alubari, 2220m, **AP Das & PC Rai** 0296, dated 17.6.1994.

Status: Common .

Local Distrib.: Reshete, Helipad, Alubari Khasmal, Chonko Bhir. 1900-3200m

General Distrib.: Temperate Himalayas, Nilgiri and Sri Lanka.

Berberis hookeri Lemaire in *Illust. Hort.* 6:207. 1859; FEH 1:93. 1966; EFPN 2: 30. 1979; FB 1(2): 327. 1984; FI 1:395. 1993; FWB 1:167. 1997.

Berberis wallichiana *auct non DC.*, *Prodr.* 1: 107. 1824; FBI 1:110. 1872; FEH 1: 93. 1966; TBRI 50(4): 107. 1987.

Small evergreen shrub, 1-3.5cm tall. Stem laxly branched, grooved, yellowish. Leaf lamina 2-7 x 0.9-2.4cm, lanceolate-elliptic, strongly spinose-dentate, acute. Pedicels 1.5-2.5cm, erect, deep pink. Flower 3-8 in fascicles; sepals pink, in 2 whorls, outer ones 0.35 x 0.16cm, ovate, inner ones 0.75 x 0.4cm, elliptic; petals 0.5-0.65 x 0.3-0.45cm, obovate, yellow; ovules 3-8. Berry ovoid to oblong.

Flr.: Apr. - Jun. *Frt.:* Sep. - Dec.

Specimen Cited: Tinsimana-Jorhpokhari, 2900-3040m, **AP Das & PC Rai** 0783, dated 20.10. 1994; Rachila Middle-Jorhpokheri, 2490-3040m, **AP Das & PC Rai** 1192, dated 03.5. 1995.

Status: Common.

Local Distrib.: Chitray, Tinsimana, Rechila Middle, Jorpokhari. 2300-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Berberis insignis Hk.f. *et* Thoms., *Fl. Ind.* 1:226. 1855; FBI 1:111. 1872; JBNHS 51: 423. 1953; FEH 1:93 1966; FB 1(2): 324. 1984; TBRI 50 (4): 107. 1987; FI 1: 399. 1993; FWB 1:167. 1997.

Local Name: Chutro (Nep).

Spinous evergreen shrub, erect, 1.5m, thickly branched. Wood yellow, spines few; 4-7cm. Leaves subpetiolate; lamina 5-17 x 2-4.7cm, spinous toothed, acuminate, base attenuate, shining on both surfaces, veins prominent below, glaucous. Pedicels 1.2cm, thick, curved. Flowers many in axillary fascicles; sepals in 2 whorls, outer 0.2 x 0.19cm, ovate, inner ones 0.6-0.35cm, elliptic; petals 0.5-0.3cm, obovate, bifid, yellowish. Berries 0.75 x 0.46cm, ovoid-ellipsoid, black.

Flr.: Apr. - Jun. *Fr.*: Aug. - Dec.

Specimen Cited: Rachila Middle, 2480m, **AP Das & PC Rai** 0590, dated 16. 10. 1994; Jaributti-Rachila Chowki, 2160-2490m, **AP Das & PC Rai** 1009, dated 15. 5. 1998.

Status: Common.

Local Distrib.: Jaributti, Rechila Middle, Pankhasari, Alubari. 2000-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), N. Assam.

Berberis wallichiana DC., Prodr. 1:107. 1824; Pl. As. Rar. 3:23, t. 243. 1832; FBI 1:110. 1872 quoad var. 1.; Trs. N. Beng.13. 1929; FEH 1:93. 1966; TBRI 50(4):107. 1987; FI 1:395. 1993.

Small spinous, erect shrubs, 2-3 m tall. Stems glabrous, laxly branched; spines upto 2.2 cm long. Leaves sessile; lamina 5-11.5 x 1.5-3cm, oblong-lanceolate, acute or subacute, spinules 12-24 along margin, lateral veins 5-9, reticulate. Pedicels 0.7-1cm, stout. Flower 0.65-0.75 cm diam., fascicled. Prophylls small, 0.1 x 0.1cm, acuminate. Sepals 2-seriate, outer 0.25-0.3 x 0.1-0.15 cm, oblong-obovate, inner 0.4-0.45 x 0.25- 0.3 cm; petals 0.45-0.5 x 0.25 cm, obovate, entire; ovules single, stipitate; stamens 0.35-0.4 cm. Berries 0.85-0.9 x 0.45-0.5 cm, ovoid, blackish, persistent style 0.6-0.7cm.

Flr. & Fr.: Mar. - Sep.

Specimen Cited: Alubari Khasmal, 2280m, **AP Das & PC Rai** 009, dated 13.6.1994.

Status: Frequent.

Local Distrib.: Choudha Feri, Dhamdhamay Dara, Alubari, Reshete.1700-2400m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya.

MAHONIA L.

Mahonia napaulensis DC., Syst. Nat. 2: 21. 1821, excl. B. Prodr. 1: 109. 1824, excl. B-Benerji in JBNHS 51: 423. 1953; FEH 1:94. 1966; EFPN 2:31. 1979; FB 1(2):327. 1984. FI 1: 411. 1993; FWB 1:171. 1997.

Berberis nepalensis Spreng. *sensu* Hk. f. *et* Thoms. in FBI 1: 109. 1872, Quoad Var. 1.

Mahonia acanthifolia G. Don, Hist. 1: 118. 1831; FEH 1: 94. 1966; TBRI 50 (4): 109. 1987.

Local Name: Keshari (Nep.)

Large shrub, 1.5-3.5 cm. Stem erect, leafy near the apex. Leaves 28-46 cm, sheathing at base with 2 subulate stipules, leaflets 7-13 pairs, 2-8 x 1.8-3 cm, ovate-suborbicular, sessile, spinose dentate, acute, base rounded or truncate, glabrous, palmately 3-5 nerved. Racemes dense flowered, 9-26 cm in fascicles of 5-10, erect. Bracts 0.25-0.6 x 0.1-0.25 cm; pedicels 0.4-1.1 cm, slender. Flowers golden-yellow; sepals 0.2-0.7 x 0.2-0.4 cm, ovate to oblong-ovate; petals 0.4-0.65 x 0.2-0.4 cm, obovate. Berry 0.75-1.3 x 0.5-0.65 cm, ellipsoid, violet, glaucous. (Plate I: 6)

Flr.: Oct. - Dec. *Fr.:* Jan. - May

Specimen Cited : Chitray, 2550 m, **AP Das & PC Rai** 0138, dated 15.6.1994; Alubari Belt, 2280 m, **AP Das & PC Rai** 0604, dated 16.10.1994.

Status : Common.

Local Distrib.: Chouda Feri, Alubari, Chitray, Reshete. 1800-2700m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Note: Umbellatine (alkaloid) extracted from this plant.

FUMARIACEAE DC.

Key to the Genera:

1. Herbs erect or diffuse; flowers zygomorphic.....*Corydalis*
1. Herbaceous climber; flowers actinomorphic.....*Dicentra*

CORYDALIS DC. in Lamark & Candolle

Key to the species:

1. Plants erect; flowers yellow.....2
1. Plants decumbent; flowers dull purple.....*C. leptocarpa*
2. Bracts obovate; capsules cylindrical.....*C. geraniifolia*
2. Bracts linear or lanceolate; capsules obovoid.....*C. chaerophylla*

Corydalis chaerophylla DC., Prodr. 1: 128. 1824; Wallich, Tent. Fl. Nep. 52, t. 40. 1846; FBI 1: 126. 1872; FEH 1: 103. 1966; EFPN 2: 33. 1979; FB 1(2): 393. 1984.

Robust perennial herb upto 35 cm. Root-stock stout. Stem branched above, erect, surrounded with persistent petiole bases. Leaves ternately dissected, radical ones long petioled (petioles 12-17cm); pinnae sessile, decurrent, segment oblong, blunt, paler beneath, glabrous both sides, veins obscure above, prominent beneath; cauline leaves smaller, often subsessile to sessile upwards. Racemes 10-17 cm long, terminal, branched. Pedicels slightly shorter than bracts. Bracts 0.35-0.5 cm, lanceolate, entire. Flowers many, secund; petals yellow, outer ones apiculate, upper 1-1.3 cm long; spurs 0.75-0.85 cm, slender and straight. Capsule 0.8-1.2 x 0.2-0.25 cm, obovoid, closely placed (dense) on racemes, black when dry. (**Plate I: 8**)

Flr.: Jun. - Jul. *Fr.:* Aug.-Oct.

Specimen Cited: Jaributti, 2195 m, **AP Das & PC Rai** 0456, dated 15.10.1994.

Status: Common.

Local Distrib.: Alubari, Jaributti, Ruka Hill, PHE Source. 2100-2750m.

General Distrib.: Himalayas (Kumaon-Bhutan), Naga Hills.

Corydalis geraniifolia Hk. f. et Thoms., Fl. Ind. 1: 269. 1855; FBI 1: 126. 1872; FB 1(2): 394. 1984; FWB 1:199. 1997.

C. chaerophylla var. *geraniifolia* (Hk. f. et Thoms.) Hara, FEH 1:103. 1966; EFPN 2: 33. 1979.

Like *C. chaerophylla* but large, lax and leafy herb. Stem with regular alternate branches at an acute angles emerging from alternate leaf axils. Leaf segments comparatively larger, acute. Bracts 0.85-0.98 cm, obovate, segmented. Racemes leafy. Flowers larger with spurs 0.9-1.1 cm. Capsules not so closely placed in the fruiting raceme, slightly longer, cylindrical.

Flr.: Jul. - Aug. *Fr.*: Aug. - Oct.

Specimen Cited: Rechila, 2280 m, AP Das & PC Rai 0713, dated 19.10.1994.

Status: Common.

Local Dsitrib.: Tangta, Rechila, Chitray, Tinsimana. 2200-2900m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Note: Medicinal plant.

Corydalis leptocarpa Hk. f. et Thoms., Fl. Ind. 1: 260. 1855; FBI : 122. 1872; FEH 2: 40. 1971; EFPN 2: 34. 1979; FB 1(2): 389. 1984.

Corydalis leptocarpa Hk. f. et Thoms., Fl. Ind. 1: 260. 1855; FBI 1: 122. 1872; FEH 2: 40. 1971; EFPN 2: 34. 1979; FB 1(2): 389. 1984.

Diffuse annual herb, 15-18 cm. Stem glabrous. Leaves bipinnate; petioles 2-5.5 cm; leaflets 1-2.7 x 0.6-2.2 cm, ovate-elliptic, crenately lobed, glabrous, pale beneath, nerves not so prominent. Racemes 2-4.5 cm, 4-7 flowered. Bracts obovate. Flowers 2.2-3.5 cm long; petals spurred (spurs 1.2-1.4 x 0.3-0.32 cm), upper pair crested, tip deflexed, purple or pinkish red. Capsules 2-3.5 x 0.2-0.25 cm, linear.

Flr.: Apr. - Jun. *Fr.*: May - Jul.

Specimen Cited: PHE Source, 2155 m, AP Das & PC Rai 0302, dated 17.6.1994.

Status: Sparse.

Local Dsitrib.: Jaributti, PHE Source, Rechila Chowk. 1900-2500m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Naga Hills, Myanmar, Manipur.

DICENTRA Bernh.

Key to the species:

1. Leaflets ovate-lanceolate or ovate-elliptic; veins 5-7; nectariferous glands hooked at apex.....*D. scandens*
1. Leaflets broadly ovate; veins 3-6; nectariferous glands not hooked at apex
.....*D. paucinervia*

Dicentra scandens (D. Don) Walpers, Rep. 1: 228. 1842; FEH 1: 104. 1966; EFPN 2: 35. 1979; FB 1(2): 382. 1984; TBRI 50 (4): 111. 1987; FWB 1:200. 1997.

Dielytra scandens D. Don, Prodr. Fl. Nep. 198. 1825.

Dicentra thalictrifolia (Wallich) Hk. f et Thoms., Fl. Ind. 1: 273. 1855; FBI 1: 121. 1872.

Herbaceous slender climbing herb with perennial root-stock. Stem flexuous. Leaves decomposed and with terminal branched tendril, 2-3 ternate; leaflets 0.7-2.8 x 0.4-1.7 cm, ovate-elliptic, entire, obtuse or acute, base cuneate, 4-6 nerved. Peduncles 2-6 cm. Bracts 0.3-0.8 cm, lanceolate, entire, smooth. Flowers on short stalked pendulous corombs, yellow; sepals 4, 0.2-0.3 cm, triangular; petals 4, the outer two 1.6-1.9 cm, yellow; stamens 2 bundles of 3 each, both being expanded into a nectariferous gland of 0.4-0.5 cm, hooked at top; ovary elongated; style slender; stigma flattened; ovules numerous. Capsules 1.2-1.9 x 0.5-0.7 cm, narrowly ovoid-ellipsoid; pericarp membranous or nearly fleshy; seeds shiny and black.

Flr.: Jun. - Sep. *Fr.:* Sep. - Oct.

Specimen Cited: Below Jorpokhari, 2960m, AP Das & PC Rai 0819, dated 21.10.1994; Ruka Hill-Thosum Beat, 2480-2540m, AP Das & PC Rai 0941, dated 24.10.1994.

Status: Sparse.

Local Distrib.: Ruka Hill, Thosum Beat, Tangta, Jorpokhari. 2500-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Myanmar, W. China.

Note: An important folk medicine.

Dicentra paucinervia Stern in Brittonia 13: 45, f. 31, 1-8. 1961; FEH 1: 104. 1966; FB 1(2): 383. 1984; TBRI 50 (4): 117. 1987.

Climbing herb. Root-stock perennial. Stem soft and slender, much branched. Leaves bipinnate, larger; leaflets opposite, 2.3-4 x 2-2.6 cm, broadly ovate, entire, 3-6 veined from base, glabrous both sides. Bracts acuminate, scarious. Flowers 7-10 on pendent racemes; nectariferous glands short and thick; petals 4, nearly cordate, yellow, outer ones longer, 1.8-2.1 x 0.4-0.5 cm broad, slightly reflexed; spur 0.2-0.3 cm; inner petals 1.3-1.7 cm; filaments united; styles slender; ovules many. Capsules 1.2-2 x 0.4-0.7 cm.

Flr.: Mar. - May *Fr.:* Jun. - Aug.

Specimen Cited: Thosum Beat, 2590-2780 m, AP Das & PC Rai 0896, dated 23.10.1994.

Status: Rare.

Local Distrib.: Jaributti, Thosum Beat. 2150-2800m.

General Distrib.: E. Himalaya (Darjeeling-Arunachal Pradesh), Meghalaya, Naga Hills, N.E. Myanmar.

Note: An important medicinal plant.

PAPAVERACEAE Juss.

MECONOPSIS Vig.

Meconopsis paniculata (D. Don) Prain in JASB 64 f: 316. 1895; FEH 1: 104. 1966; EFPN 2: 37. 1979; Nam. Chan. Fl. Pl. 363. 1987; FWB 1:183.1997.

Papaver paniculatum C. Don, Prodr. 197. 1825 p.p.

Meconopsis napaulensis sensu Hk. f. et Thoms. FBI 1: 118. 1872 (ut *nipalensis*) non DC.

M. longipetiolata Taylor in Gard. Chron. 92: 41. 1932; Razi, RBSI 18(1): 33. 1959.

M. robusta sensu Hk. f. et Thoms., FBI 1: 118. 1872. p.p.

Robust gregarious plant, upto 2 m tall. Stem hairy. Leaves pinnately lobed, lanceolate; basal leaves in rosette, upto 40 cm, upper ones clasping on stem, margins variously cut into lobes, lobes lanceolate with long spiny tip, densely shining hairy both sides. Flowers yellow, upper one stalked, lower ones on branched stalks; sepals 2, falling before opening of buds; petals 4, upto 5 cm, rounded; stamens 4; ovary superior. Capsule ellipsoid-oblong, splitting by pores or valves, densely bristly-haired. (Plate I: 7)

Flr. & Frt.: Jun. - Nov.

Specimen Cited: Rechila Peak, 3100m, AP Das & PC Rai 0169, dated 15.6.1994.

Status : Less Common.

Local Distrib.: Helipad region, Rechila Peak, Jorpokhari, rechila Middle. 2200-3100m.

General Distrib.: E. Himalaya (Nepal-Bhutan), S. Tibet, W. China.

Note : Ornamental.

CRUCIFERAE Juss. (BRASSICACEAE nom. alt.)

Key to the Genera:

1. Pods short and conical, few seeded; rosette plants with erect flowering stem.....*Capsella*
1. Siliqua elongated and cylindrical, many seeded.....2
2. Marshy herbs; stem decumbent, much branched.....*Nasturtium*
2. Terrestrial herbs; stem erect, less branched.....*Cardamine*

CAPSELLA Moench.

Capsella bursa-pastoris (L.) Medicus, Pfl.-Gatt. 1: 85. 1792; FEH 1: 108. 1966; EFPN 2: 40. 1979; FB 1(2): 423. 1984; TBRI 50 (4): 108. 1987; FWB 1:188. 1997.

Small annual rosette herb, 20-34 cm. Stem hairy. Basal leaves deeply pinnatifid, runcinate, 3-9 x 0.5-2 cm, acute, base short stalked, lateral lobes 5-6 pairs, unequally serrate, oblanceolate, densely pubescent; stem leaves sessile, smaller, 1.5-5.5 x 0.3-1.5 cm, ovate-lanceolate, acute, base auricled. Flowers in ebracteate racemes, white; sepals 0.15 x 0.1 cm, ovate, spreading; petals larger, 0.25 x 0.15 cm, obovate, white. Pods short, 0.5-0.7 cm, obcordate, angular, flattened dorsiventrally; seeds oblong and punctate.

Flr.: Apr. - Jul.

Fr.: May - Aug.

Specimen Cited: Jaributti-Alubari Belt, 2160-2290 m, AP Das & PC Rai 1006, dated 23.4.1995; PHE Source-Alubari, 2155-2490 m, AP Das & PC Rai 1048, dated 26.4.1995.

Status: Abundant.

Local Distrib.: Reshete, Alubari, Chouda Feri. 1900-2300m.

General Distrib.: Temperate Eurasia and E. Canada.

Note: Young shoots eaten as vegetable.

CARDAMINE L.

Key to the species:

1. Flowers white, sometimes pinkish-purple.....2
1. Flowers always purple.....*C. macrophylla*
2. Leaves trifoliolate, irregularly lobed.....*C. trifoliata*
2. Leaves pinnate or pinnatisect.....3
3. Leaflets ovate, crenate.....*C. yunnanensis*
3. Leaflets ovate-elliptic to obovate or suborbicular, sinuate.....4
4. Leaves always glabrous.....*C. flexuosa*
4. Leaves hairy on upper surface.....5
5. Stem upto 15cm and without bulbils.....*C. hirsuta*
5. Stem slightly elongated, basally bulbiferous.....6
6. Plants robust, erect; pedicels 0.3-0.4cm.....*C. loxostemonoides*
6. Plants decumbent; pedicels more than 0.4cm.....*C. trichocarpa*

Cardamine flexuosa Withering, Bot. Arr. Brit. Pl. 'ed.' 3(3): 578. 1796; BBSI 15: 210. 1976; FB 1(2): 431. 1984; FWB 1:189. 1997.

C. scutata Thunb. ssp. *flexuosa* (Withering) Hara in J. Fac. Sci. Univ. Tokyo Bot. 6: 59. 1952 & FEH 1: 108. 1966.

C. hirsuta L. var. *sylvatica* sensu Hk. f. et T. Anders., FBI 1: 138. 1872, p.p. Jafri(FWP 55: 169. 1973) treats *C. flexuosa* Withering as a distinct species.

Local Name: Simrayo (Nep.).

Small suberect herb with flexuous stems, 6-10 cm. Basal leaves pinnatisect in a loose rosette; stem leaves 4-6 cm, leaflets 2-4 pairs, 0.3-0.8 x 0.6 cm, ovate-elliptic, entire or obscurely irregular-sinuate, obtuse to subacute, glabrous both sides on maturation, white pubescent above when young; terminal leaflet 1.3-1.8 x 0.5-0.8 cm, narrow, obovate or suborbicular, some often 3-4 lobed. Flowers terminal, few to many; sepals 0.2-0.25 x 0.07-0.1 cm, oblong-elliptic, greenish white; petals 0.3-0.4 x 0.1-0.15 cm; stamens 6; anthers brownish green. Pods 1.5-2 x 0.08-0.1 cm, erect.

Flr.: Jan. - Jun.

Fr.: May - Dec.

Specimen Cited: Reshete, 2240 m, AP Das & PC Rai 1324, dated 06. 5. 1995.

Status: Abundant.

Local Distrib.: Reshete, Alubari, Chouda Feri. 1900-2300m.

General Distrib.: Temperate Eurasia and E. Canada.

Note: Shoots eaten as vegetable.

Cardamine hirsuta L., Sp. Pl. ed. 1(2): 655. 1753; FB 1(2): 431. 1984.

Annual herb. Stem almost erect to +-13 cm, pubescent with few simple hairs. Basal leaves many, in rosette, 2.5 cm, leaflets variable in shape but usually ovate-orbicular; terminal leaflet larger and 3-lobed, 0.3-1 x 0.2-0.9 cm. Flowers upto 0.5 cm long, white, clustered in ebracteate racemes; sepals 0.2-2.5 cm, elliptic; petals longer than sepals, 0.3-0.35 cm, white, narrow; stamens. 4-6. Pod 0.5-2 cm, cylindrical, whitish green; seeds cylindrical-round, few to upto 13 per pod, pale brown.

Flr.: Mar. - May

Fr.: Apr. - Oct.

Specimen Cited: Jaributti-Rechila, 2195-2280m, **AP Das & PC Rai** 0449, dated 15.10.1994; Tinsimana-Jorpokhari, 2900-3040m, **AP Das & PC Rai** 0768, dated 25.11.1994; Alubari, 2490m **AP Das & PC Rai** 1239, dated 04.5.1995.

Status: Less Common.

Local Distrib.: Alubari, Jaributti, Rechila Middle, Jorpokhari. 2100-3000m.

General Distrib.: Temperate Eurasia.

Cardamine loxostemonoides Schulz in Notizbl. 9: 1069. 1927; EFPN 2: 40. 1979; FB 1(2): 432. 1984.

C. pratensis auct. non L.: Hk. f. *et* Anders. FBI 1: 138. 1872.

Small slender showy herb growing on wet mossy walls, to 15 cm tall. Stem slightly squared, spreading, flexuous, basally bulbiferous. Leaves pinnate, 2-4 cm; leaflets 0.4-1 x 0.15-0.4 cm, radical ones orbicular or ovate, entire or often 2-3 lobed; cauline ones linear-oblong, entire. Pedicels 0.3-0.4 cm long. Flowers 0.5-0.7 cm across; sepals 0.25-0.35 x 0.15-0.2 cm, green; petals 0.5-0.8 x 0.25-0.35 cm, spreading, nerved, white; anthers light yellow; filaments 0.25-3 cm long, greenish white; styles equal to stamens, thick. Pods 1.2-1.5 cm long, narrow linear.

Flr.: May - Jul.

Fr.: Jun. - Aug.

Specimen Cited: Neora Khola, 2280m **AP Das & PC Rai** 1080, dated 27.4.1995.

Status: Rare.

Local Distrib.: Jaributti, Neora Khola, Rechila Middle. 2100-2500m.

General Distrib.: Tibet, Darjeeling, N. W. Asia, Europe, N. America.

Cardamine macrophylla Willd., Sp. Pl. 3 (1): 484. 1800; FBI 1: 139. 1872; FEH 1: 108. 1966; 2: 43. 1971; EFPN 2: 40. 1979; FB 1(2): 430. 1984; FWB 1:189. 1997.

Glabrous, leafy erect herb, 30-40 cm. Stem simple. Leaves pinnate; leaflets 3-5 pairs, 1.2-3.5 x 0.6-1.2 cm, ovate-lanceolate, serrate-crenate, obtuse, base cuneate, glabrous, lateral nerves not so prominent. Pedicels 0.6-1 cm long. Flower few to many, 1-1.4 cm across; sepals 4-6 x 0.15-0.25 cm, oblong-elliptic with papery margins, coarse and sparsely hirsute; petals 0.9-1.3 x 0.25-0.6 cm, obovate or oblanceolate, purple-violet; style upto 0.6 cm long, thick; stigma rounded or bilobed. Fruit not collected.

Flr.: May - Jul.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 0167, dated 15.6.1994; Jaributti, 2195 m, **AP Das & PC Rai** 0498, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Chitray, Alubari Khasmahal, Ruka Hill, Tinsimana. 2200-2900m.

General Distrib.: Himalayas (Kashmir-Bhutan), Tibet, China, N. Korea.

Note: Shoot edible.

Cardamine macrophylla Willd., Sp. Pl. 3(1): 484. 1800; FBI 1: 139. 1872; FEH 1:108. 1966; FB 1(2) : 430. 1984. ssp. *polyphylla* (D. Don) O.E. Schulz in Bot. Jahrb. 32: 401. 1903; FEH 1: 108. 1966 & EFPN 2: 40. 1979.

C. polyphylla D. Don, Prodr. 201. 1825.

C. macrophylla sensu Hk. f. *et* Anders., FBI 1: 139. 1972 p.p.

C. m. var. *sikkimensis* Hk. f. *et* Anders., FBI 1: 139. 1872.

Stout, erect herb with unbranched stem upto 37 cm. Leaves pinnate, 4-9 cm; leaflets large, lateral, 1-4 x 0.6-1.3 cm, lanceolate, margin toothed, obtuse-pointed, base unevenly cuneate, mid nerve prominent above, not medianly placed, surfaces sparsely hairy. Pedicels long upto 1.2 cm. Flowers in elongated terminal clusters, large, 1-1.4 cm across, few to many, nearly bell-shaped, lilac, pinkish red; sepals oblong-elliptic with papery margin, sparsely hirsute; petals 0.9-1.3 cm, oblanceolate, pinkish red. Pod 3-5 x 0.2-0.3 cm, narrow linear, compressed, glabrous.

Flr.: May - Jul.

Fr.: Jun. - Aug.

Specimen Cited: Alubari-Jorpokhari, 2280-3040 m, **AP Das & PC Rai** 0167, dated 15.6.1994.

Status: Less Common.

Local Distrib.: Rechila Middle, Jorpokhari, Chitray, Alubari. 2200-3050m.

*General Distrib.:*Himalayas (Kashmir-Bhutan), Tibet, China and N. Korea.

Note: Shoots edible.

Cardamine trichocarpa Hochst. ex A. Rich, Tent. Fl. Abyss. 1:18. 1847; FTN 1: 11. 1983; Nam. Chang. Flr. Pl. 101. 1987.

Cardamine subumbellata Hk. f. et Anders. in FBI 1: 138. 1872

Cardamine trifoliolata Hk. f. et Thoms., J. Lin. Soc. Bot. 5:145. 1861.

Slender herb. Stem 16-42 cm tall trailing or decumbent. Petioles 2.5-5.5 cm. Leaflets 0.75-2x 0.25-1cm, oblanceolate, suborbicular or broadly ovate often 3-lobed, acute or obtuse, usually glabrous, sometime pilose above. Racemes few flowered, ebracteate. Sepals about 0.3 x 0.1 cm, oblong; petals 0.55-0.75 x 0.25- 0.3 cm, white. Pods 1.6-1.9 x 0.1 cm, cylindrical.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Near Chouda Feri, 2240 m, **AP Das & PC Rai** 0354, dated 14.10.1994.

Status: Common.

Local Distrib.: Pankhasari, PHE Source, Sakam, Chouda Feri, Rechila Middle. 1800-2400m.

General Distrib.: Concan, Malabar, Sri Lanka, Darjeeling.

Note: This is the first report of its occurrence in the Himalayas as well as entire North and N. Eastern part of India.

Cardamine trifoliolata Hk. f. et Thoms. in J. Lin. Soc. Bot. 5:145. 1861; FBI 1: 138. 1872; FEH 1: 109. 1966; FI 2: 117. 1993; FWB 1:190. 1997.

Succulent herb to 42 cm tall. Root-stock creeping. Leaves trifoliolate; petioles 1-8.2cm long; leaflets obovate to oblanceolate, terminal leaflet usually tri-lobed, lateral ones oblong to narrow ovate, usually bi-lobed, sometimes entire, lobes hairy above. Racemes sub-corymbose. Pedicels upto 0.5cm long. Flowers upto 0.8cm across, pale; sepals 0.25-0.4cm long, obovate; petals 0.55-0.8cm long, obovate cuneate or sometimes clawed, apex sub-truncate; stamens 2-seriate, inner ones to 0.5 cm long, outer upto 0.3cm long; ovary many ovuled; style thick; stigma globose or subulate. Fruits 1.4-2.1cm, erect; seeds 0.1cm diam., ovoid.

Flr. & Frt.: Apr. - Aug.

Specimen Cited: Near Alubari 2280m, **AP Das & PC Rai** 1903, dated 23. 10. 1997.

Status: Rare.

Local Distrib.: Thosum Beat, Ruka Hill, Alubari, Jorpokhari, Tinsimana. 2200-3050m.

General Distrib.: Himalayas (Kumaon-Bhutan).

Cardamine yunnanensis Franchet in Bull. Soc. Bot. Fr. 33: 398. 1886; EFPN 2: 41. 1979; FB 1(2): 431. 1984.

C. inayatii Schulz, in Notizbl. 9: 1069. 1927; FEH 2: 43. 1971.

C. sikkimensis Hara in Journ Jap. Bot. 37: 97. 1962; FEH 1: 109. 1966.

Erect herb to 23 cm tall. Stem stout, simple, ribbed. Leaves alternate, 5-8 cm, sparsely hairy; lateral leaflets 2-3 pairs, 0.9-2.5 x 0.4-1.1 cm, ovate, crenately serrate, obtuse, base nearly cuneate, minutely pilose below; terminal leaflet solitary, larger upto 2.7 x 1.5 cm. Flowers few, white or pink; sepals short, 0.2-0.25 x 0.1-0.15 cm; petals slightly longer, 0.3-0.4 cm. Pod 2-3 cm, narrow.

Flr.: Apr. - Jun. *Fr.:* May - Jul.

Specimen Cited: Jaributti-Rechila, 2195-2280 m, **AP Das & PC Rai** 0498, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Jaributti, Rechila Peak, Hattidara, Mulkharka, Jorpokhari. 2200-3050m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan).

***NASTURTIUM* Br.**

Nasturtium officinale Brown, Hook. Kew ed. 2(4): 110. 1812; FBI 1: 133. 1872; FEH 1: 110. 1966; FB 1(2): 436. 1984; FWB 1:195. 1997.

Rorippa nasturtium-aquaticum (L.) Hayek, Sched. Fl. Stir. Exs. 22. 1905; TBRI 50 (4): 125. 1987.

Local Name: Simrayo (Nep.).

Perennial, marshy herb. Stem erect-spreading, 5-9 cm, rooting from lower nodes. Leaves imperipinnate, 1-3.5 cm; lateral leaflets 0.3-1 x 0.2-1.8 cm, elliptic; terminal leaflet slightly broader and longer than lateral ones, ovate-cordate, sinuate or entire, obtuse-acute. Flowers in short and ebracteate racemes, white; sepals 4, in two pairs, free, 0.25 x 0.1 cm, oblong; petals 4, free and alternating with sepals, 0.4 x 0.15 cm, obovate, tapering below. Pods 0.9-1.6 x 0.15-0.25 cm, cylindrical, curved upwardly; seeds in two rows (2-seriate), small.

Flr.: Apr. - Jun. *Fr.:* May - Oct.

Specimen Cited: Rechila Durpinay, 2300 m, **AP Das & PC Rai** 1379, dated 06.5.1995.

Status: Less Common.

Local Distrib.: Machuki, Sakam, Rechila Durpinay. 1400-2200m.

General Distrib.: Eurasia, N. Africa; naturalised.

Note: Eaten as vegetable.

VIOLACEAE Batsch.

VIOLA L.

Key to the species:

1. Stoloniferous herbs.....2
1. Stolons absent.....4
2. Leaf base rounded or attenuate.....*V. diffusa*
2. Leaf base cordate.....3
3. Flowers blue.....*V. thomsonii*
3. Flowers white.....*V. hamiltonii*
4. Spurs saccate.....*V. biflora*
4. Spurs not saccate.....5
5. Leaves ovate-lanceolate, crenate, glabrous.....6
5. Leaves nearly deltoid, serrate, pilose.....*V. pilosa*
6. Stipules ovate-lanceolate, lacerate or free toothed.....*V. sikkimensis*
6. Stipules lanceolate, fringed.....*V. canescens*

Viola biflora L., Sp. Pl. 936. 1753; FBI 1: 182. 1872 p.p.; FEH 1: 212. 1966; EFPN 2: 47. 1979; Fasc. Fl. Ind. 12: 17. 1983; FFI 12: 17. 1983; Nam. Chang. Flr. Pl. 591. 1987; FB 2(1): 224. 1991.

Small perennial herb upto 8 cm long, stoloniferous. Rootstock nodular. Stem erect, glabrous. Stipules 0.3-0.65 cm, ovate, leafy. Petioles upto 4 cm, pubescent; lamina 1-1.8 x 1.2-2 cm, broadly ovate, margin toothed, obtuse or subacute, base cordate, pubescent above. Bracts 0.15-0.25 cm, linear. Flowers 1-1.5 cm across; sepals 0.35-0.4 cm, lanceolate, acute; appendage much reduced and rounded; petals 0.85-1.5 cm, yellow, upper 4 reflexed, lower ones streaked with reddish purple linings; spurs 0.2 cm, saccate. Capsule 0.55-0.6 cm, ovoid, glabrous.

Flr.: Apr. - Aug. *Fr.*: Jul. - Oct.

Specimen Cited : Jaributti, 2195 m, AP Das & PC Rai 0987, dated 15.6.1995.

Status : Less Common.

Local Distrib.: Tinsimana, Jaributti, Mulkharka, Thosum Hill. 2100-3050m.

General Distrib.: Europe, Siberia, C. Asia, Himalayas (Kashmir-Arunachal Pradesh), W. and N. China, N. Korea, Japan, America.

Note: A medicinal plant.

Viola canescens Wallich in Roxb., Fl. Ind. 2: 450. 1824; EFPN 2: 47. 1979. Nam. Chan. Flr. Pl. 591. 1987; TBRI 50(4): 130. 1987; FB 2(1): 223. 1991; FWB 1:218. 1997.

V. serpens Wallich var. *canescens* Thoms. in FBI 1: 184. 1872 p.p.

Perennial stemless herb, hoary or pubescent. Petioles 2-7 cm long, hairy; stipules lanceolate, fringed and brown. Leaves 1.3-3.5 x 1-2.8 cm, ovate-cordate to kidney-shaped, sinuate, apex blunt, base cordate, blade thick and gray hairy. Flowers 0.8-1 cm

across, pale violet, spurred; sepals 5, free, greenish, hairy externally; petals 5, exceeding the sepals in length, free; stamens united basally; ovary superior. Fruit not seen.

Flr.: Mar. - May

Speciment Cited: PHE Source, 2155 m, **AP Das & PC Rai** 1065, dated 26.4.1995.

Status : Common.

Local Distrib.: Dhamdhamay Dara, PHE Source, Chitray, Reshete. 2100-2600m.

General Distrib.: Temperate Himalayas, Khasia Hills, Nilguries, Sri Lanka, Java, China, etc.

Viola diffusa Gingins in DC., Prodr. 1: 298. 1824; FBI 1: 183. 1872; W. Becker in Beih. Bot. Centrabl. Abt. 2, 40: 114. 1920; FEH 1: 212. 1966; EFPN 2: 47. 1979; Fasc. Fl. Ind. 12: 20. 19813; FB 2(1): 224. 1991; TBRI 50(4): 130. 1987; FWB 1:218. 1997.

Annual or perennial herb, widely spreading by stolons. Leaves simple; stipules upto 0.9 cm, lanceolate, pale, ciliate; petioles upto 2.2 cm, pubescent; lamina 1.7-3.9 x 1.2-2.7 cm, ovate, crenate, ciliate, obtuse, base rounded to cordate, blade decurrent with petiole, scarcely pubescent both sides, hairs straight. Bracts 0.5-0.6 cm, linear-lanceolate, thinly ciliate. Peduncles 5-7.5 cm long, slender, glabrous. Sepals 0.3 cm, lanceolate, acute, base scarcely ciliate; appendage 0.1 cm, acute; petals twice longer than sepals, recurved, pale blue, base greenish yellow, glabrous; styles slender at base, thickening upwards to the stigma; spur globose. Capsule upto 0.5 cm, oblong-ovoid, glabrous.

Flr.: Feb. - Apr.

Fr.: Jun. - Aug.

Specimen Cited : Near Dhamdhamay Dara, 2500 m, **AP DAs & PC Rai** 0674, dated 18.10.1994.

Status : Common.

Local Distrib.: Middle Rechila Choek, Sakam, Dhamdhamay Dara, Alubari. 1600-2500m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Naga Hills, Myanmar, Japan, Malaysia.

Note: A medicinal plant.

Viola hamiltoniana D. Don, Prodr. Fl. Nep. 206. 1825; EFPN 2: 47. 1979; Fasc. Fl. Ind. 12: 23. 1983; Nam. Chang. Flr. Pl. 391. 1987. TBRI 50(4): 130. 1987; FB 2(1): 228. 1991; FWB 1:219. 1997.

V. distans Wallich in Tr. Med. Phys. S. Calc. 7: 227. 1835; FBI 1: 183. 1872.

V. distans var. *acaulis* Hk.f. et Thoms. in FBI 1: 184. 1872.

V. arcuata Bl., Bijdr. 58. 1825 (June-Dec.); Fl. Asm. 1: 81. 1934.

Perennial and stoloniferous herb. Stolons slender. Leaves stipulate, 0.75-1 cm, lanceolate, fimbriate, brownish; petioles upto 9 cm, glabrous or sparsely pubescent; lamina 1.5-6.2 x

1.3-4.3 cm, ovate, crenate-serrate, acute to rounded, deep cordate or deltoid, sparsely pubescent above, glabrous beneath. Bracts 0.75-0.95 cm. Peduncles upto 9.5 cm long. Sepals 0.65-0.7 cm, ovate, acute, appendage 0.25 cm, acute; petals 0.95-1 cm, lower most smaller, white, glabrous or thinly pubescent within; spur 0.25-3 cm, saccate and rounded; styles straight, tapering upward. Capsule many seeded.

Flr.: Mar. - Jun. *Fr.*: Apr. - Aug.

Specimen Cited: Helipad region, 2500 m, **AP Das & PC Rai** 1092, dated 27.4.1995; Near Mulkharka, 2240 m, **AP Das & PC Rai** 1190, dated 30.4.1995.

Status : Common.

Local Distrib.: Helipad region, Mulkharka, Jaributti, Rechila Durpinay, Alubari. 2000-2500m.

General Distrib.: Himalayas (Simla-Arunachal Pradesh), Myanmar, China, Malaysia, Philippines.

Viola pilosa Bl., Cat. Gew Butzg 57. 1823; FM 7(1): 207. 1971 excl. *V. glaucescens* Oud.; FEH 3: 83. 1975. EFPN 2: 48. 1979; Fasc. Fl. Ind. 12: 30. 1983; Nam. Chang. Flr. Pl. 291. 1987; TBRI 50 (4):130.. 1987; FB 2 (1): 228. 1991; FWB 1:220. 1997.

V. serpens Wallich ex Ging. in DC., Prodr. 1: 296. 1824; FBI 1: 184. 1872.

V. serpens var. *glabra* Hk.f. et Thoms., FBI 1: 184. 1872.

V. palmaris Buch.-Ham ex Ging. in DC., Prodr. 1: 298.1824.

Perennial herb with stolons, comparatively small. Stipules 0.8-1.3 cm, ovate-lanceolate with fimbriate margins, hairy. Petioles 0.7 cm long, dense retrorse-pubescent. Leaf lamina 1.6-4 x 1.3-3.2 cm, ovate-lanceolate, crenate-serrate, acute, base cordate, glabrous to sparsely pubescent. Bracts 0.35-0.4 cm, linear lanceolate. Peduncles 2.5-5.5 cm, thinly hairy. Flowers 1-1.5 cm; sepals 0.4-0.5 cm, ciliate, base hairy; appendage 0.1 cm, acute; petals 0.85-1 cm, mauve, upper ones normally with hairs at base; spur 0.3-0.4 cm, rounded; stigma 3-lobed and beaked. Capsule glabrous or pubescent.

Flr.: Mar. - May *Fr.*: May - Jul.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 0218, dated 16.6.1994.

Status : Abundant.

Local Distrib.: Neora Valley-Mulkharka Border, Ruka Hill, Alubari. 2200-2600m.

General Distrib.: E. Afganistan, Himalayas (Kashmir-Bhutan), Meghalaya, Naga Hills, Myanmar, China.

Note : A much variable plant of immense medicinal value.

Viola sikkimensis W. Becker in Beih. Bot. Centralbl. Abt. (2) 34: 260. 1916; FEH 1: 213. 1966; FFI 12: 34. 1983; Nam.Chang. Flr. Pl. 591. 1987; TBRI 50 (4):130. 1987; FB 2(1): 223. 1991; FWB 1:221. 1997.

Viola hookeri Thoms. in FBI 1: 183. 1872 p.p.

Small perennial, stoloniferous herb, upto 9 cm, young shoots pilose. Stem short. Leaves stipulate; stipule upto 0.6-0.9 cm, ovate-lanceolate, brownish, lacerate or free toothed; lm 1.1-2.2 x 1-1.9 cm, broadly ovate, rarely suborbicular, margin crenate, obtuse to subacute, base cordate, glabrous. Peduncles 4-8 cm long, glabrous. Bracts 0.5-0.7 cm, linear. Flowers white or pale blue; sepals 0.4-0.1 cm, acute; appendage upto 0.1 cm, rounded and glabrous; petals 0.75-1 cm, white or pale bluish, violet tinged in lowermost one, glabrous within; spur 0.2-0.3 cm, saccate; style narrowed towards the base; stigma 3-lobed, obscurely beaked. Fruit not seen.

Flr.: Apr. - Jun.

Specimen Cited : Alubari-Rechila Middle, 2285-2490 m, **AP Das & PC Rai** 1299, dated 05.5.1955.

Status : Common.

Local Distrib.: Lava, Alubari, Rechila Middle, Zero Point, Today-Tangta. 1400-2400m.

General Distrib.: E. Himalaya (Darjeeling-Sikkim), Meghalaya, Myanmar, China.

Viola thomsonii Oudemans in Ann. Mus. Bot. Lugd.-Bat. 3: 74.1867; EFPN 2: 48. 1979; Nam. Chang. Flr. Pl. 592. 1987; TBRI 50(4): 130. 1987; FB 2(1): 223. 1991; FWB 1:223. 1997.

V. distans Wallich var. *fimbriata* Hk.f. et Thoms., FBI 1: 184. 1872 p.p.

Thinly pubescent or glabrous herb. Stems or stolons trailing, long and leafy. Petioles 1-2.8 cm; stipules lacerate or fimbriate. Leaf 1-2.7 x 1-2.5 cm, ovate, apex blunt or rounded, base broadly cordate, sinus shallow. Flowers pale blue; petals wingless; style slender, narrowed towards base; stigma 3-lobed. Capsule 0.7-0.9 cm long, valves acute.

Flr.: Mar. - Jul. *Fr.*: Apr. - Oct.

Specimen cited : Alubari 2280 m, **AP Das & PC Rai** 0105, dated 14.6.1994.

Status : Less Common.

Local Distrib.: Thosum Beat, Alubari, Chitray, PHE Source. 2100-2700m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Manipur, Myanmar.

FLACOURTIACEAE DC.

Key to the Genera:

1. Leaves gland-dotted; flowers bisexual; stamens 6-10.....*Caesaria*
1. Leaves not gland-dotted; flowers unisexual; stamens numerous.....*Gynocardia*

CASEARIA Jacq.

Caesaria glomerata Roxb., Fl. Ind. ed. 2, 2:419.1832; FBI 2:591. 1879; RBSI 19(2):25. 1966; FEH 2:83.1971; EFPN 2:48.1979; FB 2(1): 220.1991.

Shrub or tree to 11m high. Leaves entire; petiole 0.7-1.2cm; lamina 7-17 x 3.2-7.3cm, elliptic to oblong-elliptic, shortly acuminate, base cuneate, sometimes rounded, crenate-serrulate, often denticulate, glabrous on maturity. Bracts numerous. Pedicels 0.4-0.5cm, thickly pubescent. Flowers bisexual, yellowish green; calyx 0.2-0.3cm, 4-lobed, persistent, pubescent; petals 0; stamens 8; staminodes hairy; style upto 0.1cm; stigma trilobed. Capsule 1.35 x 1cm, ellipsoidal, yellow-orange.

Flr. & Frt.: Apr. - May.

Specimen Cited: Suntalay, 650m, **AP Das & PCRai** 1506, dated 04.6.1996; Phari, 900m, **AP Das & PC Rai** 2001, dated 17.8.1998.

Status: Abundant in low altitude.

Local Distrib.: Sakam, Zero Point, Suntalay, Below Rachila, Phari, Reshete. 500-2250 m.

General Distrib.: Himalayas (Punjab-Arunachal Pradesh), India east to China.

GYNOCARDIA *R. Br.*

Gynocardia odorata R. Br. in Roxb., Pl. Corom. 4:95, t. 299.1820; FBI 1:195.1872; EFPN 2:49.1979; FB 2 (1): 219. 1991.

Chaulmoogra odorata (R.Br.) Roxb., Fl. Ind. ed. 2, 3:835.1832.

Local Name: Gantay, Bandre, Ramphal (Nep.).

Trees, 8-18m. Leaves simple; petiole 1-1.6cm; lamina 13-22 x 5-7.9cm, oblong, apiculate, base nearly rounded, margin uneven, coriaceous, pale beneath, veins decurrent on mid-rib. Pedicels to 3cm. Flowers in fascicles, unisexual; male flowers in few flowered racemes, arising from leaf axils, calyx 0.7-1cm long with obtuse lobes; petals to 1.5cm, oblong, yellowish green; stamens many; anthers basifixed. Female flowers similar to male flowers; ovary superior; styles 5, short; stigma cordate; staminodes 6-15, hairy. Capsule 8-12.4cm across, rough, glabrous and brown; seeds 2cm, obovoid and embedded in pulp.

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Near Samsing, 600m, **AP Das & PC Rai** 1782, dated 10.9.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Machuki, Asala Khola. 500-1300 m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Myanmar.

Note: Fruit pulp is used as fish poison.

POLYGALACEAE Juss.

Key to the Genera:

1. Flowers pedicellate, racemed; sepals unequal, in 2 whorls.....*Polygala*
1. Flowers sessile, in dense spikes; sepals subequal.....*Salomonina*

POLYGALA L.

Key to the species:

1. Shrubs upto 5m; leaves upto 12cm long; capsules ribbed.....*P. arillata*
1. Herbs below 1m; leaves upto 8cm long; capsules not ribbed.....2
2. Flowers white; wing sepals curved; capsules suborbicular.....*P. glomerata*
2. Flowers pink or pinkish violet; wing sepals rounded.....*P. erioptera*

Polygala arillata D. Don, Prodr. Fl. Nep. 199:1825; FBI 1:200. 1972; FEH 1:173. 1966; EFPN 2:50. 1979; TBRI 50(4):123. 1987; FB 2(1):46. 1991.

Chamaebuxus arillata (D. Don) Hasskarl. in Ann. Mus. Bot. Lugd.-Bot. 1: 153. 1863.

Local Name: Marcha (Nep.).

Erect shrub, 2-5m high, branched. Young twigs densely pubescent. Leaves alternate; petioles 0.6-1.4cm long; lamina 4.5-16 x 1.2-4.5cm, elliptic-lanceolate, entire, ciliate, acuminate, dark green above. Racemes axillary and terminal, 7-16cm long, lax. Bracts and bracteoles ovate-lanceolate, caducous. Pedicels upto 0.55 cm, recurved. Flower yellow, purple tinged; outer sepals 0.3-0.4cm, broadly ovate, ciliolate, solitary sepal larger, 0.55-0.7cm, boat-shaped, wing sepals 1.2-1.6cm, obovate, rounded at top; keel petal 1.5-2cm, glabrous; style curved. Capsules oblong-elliptic to suborbicular, winged, subglabrous; seeds 0.5 x 0.4cm, subglobose, black; aril obscurely lobed, orange to yellowish.

Flr.: May - Aug. *Fr.:* Aug. - Nov.

Specimen Cited: Rechila Park, 2240m, **AP Das & PC Rai** 1315, dated 05.5.1995.

Status: Common.

Local Distrib.: Chouda Feri, Chonko Bhir, Mulkharka, Ruka Hill. 1700-2640m.

General Distrib.: Himalayas (Nepal-eastwards) Meghalaya, Nilgiris, Myanmar, China and Malaysia.

Note: An important ingredient in ethnic medicine.

Polygala erioptera DC., Prodr. 1:326. 1824; FBI 1:203. 1872; FTN 1:21. 1983; Nam. Chang. Flr. Pl. 443. 1987; FI 2: 467. 1993.

P. vehliana DC., Prodr. 1:326. 1824.

Small annual herb, erect, glabrous. Stem slender. Leaves subsessile; lamina 0.85-4 x 0.2-0.7cm, oblong-linear or oblanceolate, acute, sometimes emarginate at apex, narrowed to base, margins revolute, glabrous above, tomentose beneath. Racemes upto 4cm long, leaf-opposed, condensed pedicels 0.2-0.25cm. Bracts persistent. Flowers upto 0.45cm,

often solitary, pinkish or purple. Outer sepals 1.5-2.5cm long, ovate-lanceolate, glabrous to hairy outside, wing sepals longer than outer ones, 3-5 nerved; petals 3-lobed, pinkish, staminal sheaths adnate to petal lobe; ovary 0.1cm, ovoid; style to 0.25-0.3cm long with capitate stigma. Capsule 0.4-0.5 x 0.2-0.25cm, oblong-ellipsoid, pilose; seeds oblong, densely hairy, blackish.

Flr. & Frt.: Jan. - Nov.

Specimen Cited: Below Chouda Feri, 1600m, **AP Das & PC Rai** 1364, dated 6.5.1995.

Status: Sparse.

Local Distrib.: Seen only in lower region of Chouda Feri.

General Distrib.: Tropical Africa and Asia.

Polygala glomerata Lour., Fl. Cochinch. 1:426. 1790; FBI 1:206. 1972; TBRI 50(4): 123. 1987; FB 2 (1):50. 1991.

Small suffrutescent herb, 30-40cm high. Stem erect, ascending, branched and densely crispate-pubescent. Petioles 0.2-0.3cm; lamina 1-3.6 x 0.85-2cm, elliptic-ovate, apiculate, ciliate, grey-green, pubescent above. Racemes 0.55-0.75cm, few flowered. Bracts and bracteoles ovate-lanceolate. Flowers whitish pink, shortly pedicellate; outer sepals 0.55 cm, ovate-lanceolate, ciliate; wing sepals equal to outer sepals, curved, green; keel petal crest very small and filiform. Capsules 0.4-0.45cm, suborbicular, with ellipsoid seed to 0.25cm.

Flr.: Jul. - Aug. *Frt.:* Aug. - Oct.

Specimen Cited: Samsing, 700m, **AP Das & PC Rai** 1826, dated 10.9.1997.

Status: Less Common.

Local Distrib.: Samsing, Phari, Gorubathan. 600-1000m.

General Distrib.: E. Himalaya (Darjeeling-Sikkim), Meghalaya, Assam, China.

SALOMONIA Lour.

Salomonium ciliata (L.) DC. Prodr. 1:334. 1824; FBI 1:206. 1872; NRBGE 26:344. 1964; Nam. Chang. Flr. Pl. 499. 1987; FB 2(1):51. 1991.

Polygala ciliata L., Sp. Pl. 705. 1753.

S. oblongifolia DC., Prodr. 1:334. 1824.

Annual herb, 6-20cm, sparingly branched. Stem winged, glabrous to denticulate in wings. Leaves alternate, subsessile or sessile-amplexicaul, lamina 0.55-0.95 x 0.3-0.6cm, elliptic-ovate, acute, often mucronate at apex, margins ciliate, 3-veined. Spikes terminal, upto 2cm long, often elongating many times. Flowers small; sepals unequal, lower ones usually larger, upto 0.15cm, uninerved; petals adnate to staminal sheath, pink or white; stamens 4, united at base; anthers 4. Capsules broadly obovoid, margin filiform-echinate; seeds ellipsoidal, glossy black.

Flr. & Frt.: Aug. - Nov.

Specimen Cited: Samsing-Phari, 950m, AP Das & PC Rai 1829, dated 10.9.1997.

Status: Sparse.

Local Distrib.: Found only in Samsing-Phari. 400-700m.

General Distrib.: India (Darjeeling, Sikkim), Myanmar, Sri Lanka, Malaysia, Philippines and Europe.

CARYOPHYLLACEAE Juss.

Key to the Genera:

1. Leaves without stipules; styles free.....2
1. Leaves with stipules; styles united at base.....*Drymaria*
2. Petals entire or lacerate.....3
2. Petals notched or bifid.....4
3. Herbs climbing; capsules globose, one-seeded.....*Brachystemma*
3. Herbs prostrate or erect; capsules 4-5 valved, few seeded.....*Sagina*
4. Styles 3; herbs diffuse; petals bifid to halfway.....*Stellaria*
4. Styles 5; herbs erect; petals notched or bilobed to one-third downward.....*Cerastium*

BRACHYSTEMMA D. Don.

Brachystemma calycinum D. Don, Prodr. Fl. Nep. 216. 1825; FBI 1:235. 1874; FEH 1:79. 1966; EFPN 2:53. 1979; FB 1(2):209-210. 1984.

Diffuse and subscandent herb. Stem much branched, upto 2m long, quadrangular, glabrous. Petioles upto 2.2cm long. Lamina 3.5-8.5 x 1.5-4.5 cm, ovate-lanceolate, crenulate, acute, 3-nerved. Cymes 8-14.5cm long, axillary and terminal. Peduncles slender. Bracts 0.3-0.4cm, linear. Flowers 1.2-1.5 cm across; sepals 5, ca 0.65-0.7cm, oblong-lanceolate; petals 5, shorter than sepals, narrow, whitish; stamens 10, 0.15-0.2cm; styles 2; ovary one-chambered, ovules 2. Capsule globose; seeds reniform.

Flr. & Frt.: May - Aug.

Specimen Cited: Near Phaparkheti, 1680m, AP Das & PC Rai 0111, dated 14.6. 1994.

Status: Less Common.

Local Distrib.: Machuki, Phari, Sakam, Phaparkheti. 1100-1750m

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, W. China.

CERASTIUM L.

Cerastium glomeratum Thillier, Fl. Env. Paris ed. 2:226. 286. 1799; Sci. Rep. Thoku Univ. Ser. 4, Biol. 29: FB 1(2): 205. 1984; Nam. Chang. Flr. Pl. 114. 1987; FWB 1:243. 1997.

C. vulgatum L., Fl. Suec. Ed. 2: 158. 1755, nom ambig.; F.; 38, f. 24. 1936.

C. vulgatum var. *glomeratum* (Thuill) Edge. et Hk. f., FBI 1: 228. 1874. ut '*glomerata*'.

Slender and suberect herb to 30 cm. Leaves 0.5 - 1.9 x 0.3 - 0.7 cm, oblanceolate or ovate, acute or obtuse, base narrowed or rounded, eglandular pubescent, sometimes glandular. Flowers in terminal cymes; sepals 5, free, 0.5-0.6 x 0.1-0.15 cm, lanceolate, either glandular or eglandular, pubescent, margins scarious; petals 5; stamens 10; ovary unicelled; styles 5, filiform. Capsule 0.9-1.2 cm, cylindrical, 10-valved and straw - coloured.

Flr. & Frt.: May - Sep.

Specimen Cited: Lava, 2020 m, **AP Das & PC Rai** 1918, dated 29.7.1997.

Status : Abundant.

Local Distrib.: Ruka Hill, Tinsimana, Milkharka, Lava, Jorpokhari. 2200-3050m.

General Distrib.: Cosmopolitan.

DRYMARIA Willd.

Key to the species:

- 1. Plants glabrous; stipules lacerate.....*D. diandra*
- 1. Plants villous; stipules entire.....*D. villosa*

Drymaria diandra Bl., Bijdr. 62. 1825; Fl 2:533. 1993; FWB 1(2):243. 1997.

Drymaria cordata (L.) Willd. ex Roemer and Schultes, Syst. Veg. 5: 406.1819; FBI 1:244.1874; BBSI 16:151.1977; FB 1(2): 215.1984; Nam. Chang. Flr. Pl. 199. 1987.

Holosteum cordatum L., Sp. Pl. 88. 1753.

Drymaria cordata ssp. *diandra* (Bl.) Duke in AMBG 48:253.1961; Journ Jap. Bot. 38(5):149-154. 1963.

D. villosa ssp. *villosa* sensu Mizushima in Journ. Jap. Bot. 38(5): 149-154. 1963; IF 94:645.1968.

Small suberect or prostrate herb, rooting at nodes. Stipules short (upto 0.2cm), lacerate. Petioles 0.3-0.5cm long. Leaves 0.45-2 x 0.35-2cm, suborbicular or ovate, acute or obtuse, mucronate, base rounded, glabrous, usually 5-nerved. Pedicels papillose. Flowers in axillary or terminal cymes, broader above middle; sepals 5, 0.3-0.35cm, elliptic-ovate, scarious, 3-nerved; petals 5, about 0.25cm, white; stamens few to 5; ovary unilocular; styles 2, united at base. Capsules 3-valved; seeds 1 or many, tuberculate.

Flr. & Frt.: May - Jul.

Specimen Cited: Above Phari, 750m, **AP Das & PC Rai** 1775, dated 10.9.1997.

Status: Abundant in low altitude areas.

Local Distrib.: Samsing, Machuki, Alubari, Phari, Rechila Middle, Reshete. 700-2400m.

General Distrib.: Tropical and Subtropical Asia, Formosa, W. and S. China, Oceania, Hawaii.

Note: An important folk medicinal plant.

Drymaria villosa Chamisso et Schlechteudal in *Linnaea* 5: 232. 1830; FEH 3:31. 1975; EFPN 2:54. 1979; FB 1(2): 216. 1984; TBRI 50 (4):112. 1987; FI 2:532. 1993; FWB 1:245. 1997.

Local Name : Abijalo (Nep.).

Small diffuse, much branched, villous, annual herb, 11-16 cm. Leaves opposite; stipules entire; petioles 0.2-0.4 cm; lamina 0.3-0.9 x 0.3-1 cm, ovate-cordate, obtuse-mucronate, 5-nerved, villous on both surfaces with long whitish hairs. Cymes axillary and terminal, much branched. Pedicels 0.5 cm, slender, densely villous with whitish hairs. Bract small. Flowers white; sepals 5, 0.3 cm long, lanceolate, margins membranous, pubescent; petals 2-lobed, membranous, white; stamens 5; styles trifid. Capsule 3-valved, ovoid; seeds many, rough and minutely papillate.

Flr.: Apr. - Aug. *Fr.*: Jul. - Dec.

Specimen Cited : Jaributti-Alubari 2195-2280 m, **AP Das & PC Rai** 0304, dated 17.6.1996; Rechila 2200m, **PC Rai & AP Das** 0399, dated 15.10.1994.

Status : Abundant.

Local Distrib.: Jaributti, Rechila Park, Pankhasari, Reshete, Zero Point, Samsing. 700-2300m.

General Distrib.: C. America along Pacific coast of S. America to Peru. Highly naturalised in Himalaya (Nepal-Bhutan), India, Malaysia, Africa.

Note: Medicinally useful plant.

SAGINA L.

Key to the species:

- 1. Leaves awn tipped; pedicels erect; sepals 5.....*S. japonica*
- 1. Leaves without awn; pedicels recurved near top; sepals 4.....*S. saginoides*

Sagina japonica (Swartz.) Ohwi in *Journ. Bot.* 13:438. 1937, excl. *syn. S. maxima* A. Gray, *Mizushima Journ. Jap. Bot.* 35. 257. 1960; 38: 152. 1963; FEH 1: 81. 1966; 2: 26. 1971; 3: 33. 1975; EFPN 2: 55. 1979; FB 1(2): 214. 1984; TBRI 50(4): 126. 1987; FI 2:558. 1993; FWB 1:246. 1997.

Spergula japonica Swartz in *Gex. Naturf. Freninde Berl. Neue Schr.* 3: 164, t. i, f. 2. 1801.

Small perennial herb to 7-13 cm. Leaves opposite, 0.4-1 x 0.05-0.1 cm, basally connate, acuminate with awn-like tip, glandular above, ciliate near base, nerves indistinct. Pedicels 0.4-1.5 cm, sparsely glandular-pubescent. Flowers both axillary and terminal, solitary, globose, white; sepals 5, 0.15-0.2 cm, obtuse; petals equal to sepals, broadly ovate, white; stamens 5-10; styles 5. Capsule 0.2-0.35 cm, 5-valved; seeds rough and papillate, brownish.

Flr.: May - Jul. *Fr.*: Aug. - Dec.

Specimen Cited : South Hill top of Rechila, 2424 m, AP Das & PC Rai 0594, dated 16.10.1994.

Status : Less Common.

Local Distrib.: South Hill ridges of Rechila, Tinsimana, Thosum beat, Ruka Hill, Jorpokhari. 2000-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Korea, China, E. Tibet, Formosa, Japan.

Sagina saginoides (L.) Karsten, Dentsch. Fl. 539. 1882; Journ. Jap. Bpt. 35 (7): 194. 1960; FB 1(2): 214, 1984; Nam. Chang. Flr. Pl. 497. 1987; TBRI 50 (4):126. 1987; FI 2:559. 1993.

Spergula saginoides L., Sp. Pl. 1: 441. 1753.

Sagina procumbens non L.: Edgew. & Hk. f., FBI 1: 243. 1874.

Small perennial herb, 1-4 cm high. Leaves small, linear, acuminate, sometimes awned at apex. Pedicels glabrous. Sepals 0.13-0.2 cm, keeled ovate; petals equal or slightly larger than sepals, white. Capsule slightly longer than sepals, 5-valved; seeds dorsally grooved, tubercled and pale brown.

Flr. & Frt.: May - Jul.

Speciman Cited: Above Lava, 2190 m, AP Das & PC Rai 0310, dated 18.6.1994.

Status: Less Common.

Local Dsitrib.: Lava, Sakam, Tinsimana, Jorpokhari. 2100-3050m.

General Distrib.: Subcosmopolitan.

STELLARIA L.

Key to the species:

1. Densely tufted herbs; ovary trilocular.....2
1. Laxly tufted herbs; ovary unilocular.....3
2. Leaves sessile; sepals upto 0.5-0.6cm long.....*S. monosperma* var. *monosperma*
2. Leaves with a short petiole; sepals shorter*S. monosperma* var. *paniculata*
3. Sepals free to base.....4
3. Sepals united at abse.....5
4. Seeds tubercled.....*S. media*
4. Seeds smooth.....*S. sikkimensis*
5. Plants hairy.....6
5. Plants glabrous or basal part of lamina ciliolate.....*S. uliginosa*
6. Herbs with long silky hairs.....*S. patens*
6. Herbs with stellate hairs.....*S. vestita*

Stellaria media (L.) Villars, Hist. Pl. Dauph. 3: 615, 1789; FEH 1: 82. 1966; FB 1(2): 207. 1984; TBRI 50 (4):128. 1987; FWB 1:250. 1997.

Eng. Name: Chickweed.

Suberect to decumbent, mat-forming herb. Stems 8-38 cm, quadrangular, often rooting at nodes. Leaves usually sessile only, where ones with petioles upto 1.35 cm, lamina 1-2.4 x 0.55-1.5 cm, ovate, acute, base cordate or rounded, usually glabrous, sometimes ciliate hairs on the basal parts. Cymes comprising few to numerous flowers, terminal and leafly. Pedicels upto 1.5 cm. Sepals 0.3-0.4 cm, ovate, margin scarious, thinly pubescent and glandular; petals equal or shorter than sepals, sharply bifid; stamens 3-8; ovary one celled. Capsule 0.5 0.65 cm, ovoid.

Flr. & Frt.: Feb. - Nov.

Specimen Cited: Above Lava, 2190 m, **AP Das & PC Rai** 0317, dated 18.6.1994.

Status : Abundant.

Local Distrib.: Todey-Tangta, Phari, Samsing, Jorpokhari, Lava, Pankhasari, Reshete. 700-3000m.

General Distrib.: Cosmopolitan.

Stellaria monosperma D. Don, Prodr. Fl. Nep. 215. 1825; FEH 1: 83. 1966; FBH 40. 1977; Nam. Chang. Flr. Pl. 537. 1987; FWB 1:251. 1997. var. *monosperma* Mizushima in FEH 3: 33. 1975; EFPN 2: 58. 1979; FB 1(2): 206. 1984; TBRI 50 (4):128. 1987; FWB 1:251. 1997.

D. monosperma D. Don var. *monosperma* f. *paniculata* (Edgew.) Mizushima, FEH 1: 83. 1966.

S. paniculata Edgew. in Trans. Lin. Soc. 20: 35. 1846; FBI 1: 229. 1874.

Tall annual suberect herb, upto 100 cm. Stem 4-angled, shining, glabrous below and hairy above. Leaves opposite, lamina 1-6.5 x 0.5-1.8 cm, elliptic or lanceolate, entire to slightly crisped, acute-acuminate, base rounded, coriaceous, pale beneath, glabrous, one nerved. Cymes both axillary and terminal, branched, glandular pubescent. Peduncles divaricate, hairy. Pedicels slender, upto 0.4 cm, divaricate, hairy. Flowers small, white, pubescent; sepals 5, 0.3-0.4 cm long, oblong-lanceolate, margin slightly scarious, acute, hairy; petals 5, usually shorter than sepals, notched to middle, white. Capsule 0.25-0.32 cm, subglobose; seeds wrinkled.

Flr. & Frt. Aug. - Nov.

Specimen Cited : Rechila-Pankhasari, 2280-2550 m, **AP Das & PC Rai** 0346, dated 14.10.1994; Jorpokhari 3040 m, **AP Das & PCRai** 0732, dated 19.10.1994.

Status : Frequent.

Local Distrib.: Pankhasari, Rechila, Jorpokhari, Chitray. 2200-3050m.

General Distrib.: N. E. Afganistan, Temperate Himalayas (Kashmir-Bhutan), N. W. Assam.

Stellaria monosperma var *paniculata* (Edgew.) Majumdar in Journ. Ind. Bot. Soc. 44 (1):141. 1965; EFPN 1:58. 1979; FB 1(2):206. 1984; TBRI 50 (4):128. 1987.

S. monosperma var. *monosperma* f. *paniculata* (Edgew.) Mizushima, Journ. Jap. Bot. 32:248, f. 1P. 1957; FEH 1: 83 .1966.

Similar to above but leaves shortly petiolate; sepals smaller i.e., less than 0.4cm; petals very small.

Flr. & Frt.: Sep. - Nov.

Specimen Cited: Rechila Middle, 2420m, AP Das & PC Rai 0572, dated 16.10.1994.

Status: Less Common.

Local Distrib.: Found only in upper Rechila.

General Distrib.: Temperate Afganistan, Himalayas, Assam, Nilgiri and Indonchin.

Stellaria patens D. Don, Prodr. Fl. Nep. 215. 1825; Mizushima in Faun. and Fl. Nep. 124. 1955; FEH 1: 84. 1966; 2: 26. 1971; 3: 35. 1979; EFPN 2: 58. 1979; FB 1(2): 207. 1984; TBRI 50 (4):128. 1987; FWB 1:251. 1997.

S. longissima Edgew. et Hk. f. in FBI 1: 232. 1874.

Decumbent slender herb, laxly tufted stems to 13-45 cm, 4-angled, pilose with white hairs. Branches silky. Leaves opposite, sessile, lamina 0.5-1.3 x 0.2-0.3 cm, linear lanceolate, margin entire, prominent below, pilose white hairs on undersurface. Cymes few flowered, axillary or terminal, silky hairy. Peduncle long upto 3 cm, minutely white-hairy. Pedicels slender, hairy. Bracts scarious. Flowers white; sepals upto 0.5 cm, narrow lanceolate, margin scarious, glabrous; petals deeply 2-partite with broader segments, white, shorter or even equalling the sepal; stamens 10; filament slender. Capsule 0.27-0.34 cm, ovoid; seeds tubercled, dark brown.

Flr. & Frt.: Apr. - Jun.

Specimen Cited : Jaributti 2195 m, AP Das & PC Rai 026, dated 14.6.1994.

*Status :*Common.

Local Distrib.: Jaributti, Middle Rechila, Hattidara, Thosum, Jorpokhari. 2000-3050m.

General Distrib.: Himalayas (Punjab-Bhutan).

Stellaria sikkimensis Edgw. et Hk. f., FBI 1: 1874; FEH 1: 84. 1966; 2: 26. 1971; 3: 35. 1975; EFPN 2: 58. 1979; FB 1(2): 207. 1984; TBRI 50 (40):128. 1987; FWB 1:251. 1997.

Mat-forming decumbent herb, spreading upto 72 cm, covered by flaccid brown hairs. Stem branched, shining below, villous, hairs spreading. Leaves opposite; petiole 0.1-0.2 cm; lamina 1-1.9 x 0.2-0.3 cm, ovate-lanceolate, ciliate, acute, hairy both sides. Cymes many flowered, terminal. Pedicels spreading, longer than sepals, 1.3 cm long. Flowers 0.4 cm in diam., white; sepals 0.4-0.5 cm, lanceolate, margin scarious, acute, pilose;

petals 2-partite, shorter than sepals, 0.3-0.4 cm, white; stamens 10; styles 3. Capsule 0.5-0.6 cm, ovoid, elongated; seeds many, minute and tubercled.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 034, dated 13.6.1994; Tinsimana-Jorpokhari, 2900-3040m, AP Das & PC Rai 0784, dated 20.10.1994.

Status: Very Common.

Local Distrib.: Rechila Peak, Tinsimana, Jorpokhari, Alubari. 2000-3100m.

General Distrib.: Eastern Himalaya (Nepal-Bhutan).

Stellaria uliginosa Murray, Prodr. Strip. Gotting. 55. 1770; var. *undulata* (Thunb.) Ohwi in Acta Phytotax. Geobot.10:136. 1941; EFPN 1:58. 1979; FB1(2):208. 1984; TBRI 50(4):128. 1987.

Stellaria aquatica auct non. Poll.: Wallich, Cat.19,n. 635 .1829.

S. undulata Thunb., Fl. Jap. 185. 1785.

S. alsine Grimm. var. *undulata* (Thunb.) Ohwi, Act. Phyt. Geobot.10:136. 1941; FEH 1:62. 1966.

Leafy, glabrous annual herb, profusely branching, 20-40 cm long. Stem quadrangular, brownish. Leaves subsessile, 2.2-3.5 x 1.5-2.3cm, elliptic-lanceolate, slightly repund or entire, acute, sometime mucronate, both surfaces glabrous. Cymes terminal or axillary, few flowered. Peduncle deflexed. Flowers 0.55-0.6cm across, bracteate; bracts upto 0.2cm long, ovate. Sepals 5, 0.3-0.4 cm, lanceolate, glabrous; petals shorter than sepals, bifid; stamens 10; styles 3. Capsules 0.3-0.45 cm, ovoid; seeds tubercled.

Flr. & Frt.: Oct. - Mar.

Specimen Cited: Jaributti, 2120 m, AP Das & PC Rai 0467, dated 15.10.1994.

Status: Very Common.

Local Distrib.: All open places above 1400m.

General Distrib.: Himalayas (Nepal- Bhutan), east to China, Japan .

Stellaria vestita Kurz in Journ. Bot. 11: 194. 1873; Journ. Jap. Bot. 38: 153. 1963; FEH 1: 85. 1966; 3: 35. 1975; FB 1(2): 206. 1984; TBRI 50 (4):128. 1987; FWB 1:252. 1997.

S. saxatilis Hamilt. ex D. Don, Prodr. Fl. Nep. 215. 1825; FBI 1: 232. 1874.

S. hamiltoniana Majumdar in J. Ind. Bot. Soc. 44: 142. 1965.

Shining decumbent weak herb, 25-54 cm. Stem gray, pubescent. Leaves sessile or shortly petioled, lamina 1-3 x 0.4-1 cm, elliptic-ovate, almost entire, acute, base rounded, both surfaces tomentose. Cymes axillary, loose. Bracts subulate. Pedicels 2-3 cm long. Flowers few, 0.5-0.7 cm in diam., white; sepals 5, 0.45-0.55 cm, acute, margin membranous and wooly; petals 2-partite, shorter than sepals, 0.3-0.4 cm, white; stamens 10, free; filaments slender; ovary 1-locular; styles 3. Capsule ovoid, short; seeds compressed, tubercled, black.

Flr.: May - Sep. *Fr.*: Jun. - Oct.

Specimen Cited : Rechila-Jorpokhari, 2280-3040 m, **AP Das & PC Rai** 0724, dated 19.10.1994.

Status : Less Common.

Local Distrib.: Sakam, Jorpokhari, Hattidara, Rechila. 1600-3050m.

General Distrib.: Temperate Himalaya (Nepal-Bhutan), Assam, W. Madras, W. and C. China, Formosa, Malaysia.

PORTULACACEAE Juss.

PORTULACA L.

Portulaca oleracea L., Sp. Pl. ed. 1, 1: 445. 1753; FBI 1: 246. 1874; Rep. 37: 258. 1934; FEH 1: 79. 1966; FB 1(2): 196. 1984; TBRI 50 (4):123. 1987; FWB 1:254. 1997.

Prostrate or decumbent fleshy annuals to 18-32 cm. Leaves simple, subopposite or spirally arranged, shortly petiolate (0.3-0.75 cm), lamina 1-2.4 x 0.6-0.2 cm, spatulate or obovate, obscurely emarginate or rounded, base cuneate, fleshy, tuft of 0.1 cm long hairs in the axils. Flowers usually 5-10 in axillary or terminal clusters, bisexual, actinomorphic; sepals to 0.6 cm, strongly keeled above, connate at base; petals 4-6, 0.5-0.7 cm long, basally connate, yellowish; stamens 7-10 or even more, adnate to petals; ovary 1-celled, semi-inferior; style upto 0.3 cm, branched from the middle. Capsule 0.4 x 0.3 cm, ovoid, supported by persistent calyx- base.

Flr. & Fr. Jan. - Dec.

Specimen Cited: Samsing, 720 m, **AP Das & PC Rai** 1717, dated 17.5.1997.

Status : Common near the lower border in open places.

Local Distrib.: Phari, Samsing, Machuki, Sakam. 700-1600m.

General Distrib.: Pantropic.

HYPERICACEAE Juss.

HYPERICUM L.

Key to the species:

1. Shrubby plants with woody stems.....2
1. Herbaceous plants.....4
2. Flowers 4-6.5cm in diam.....3
2. Flowers upto 3cm in diam.....*H. urala*
3. Flowers solitary or upto 3 only at branch-tips.....*H. choisianum*
3. Flowers in terminal many flowered clusters.....*H. hookerianum*
4. Erect herbs with almost unbranched stem.....5
4. Slender much branched herbs, generally diffuse.....6
5. Lamina margins glandular.....*H. choisianum*

5. Lamina not glandular.....*H. petiolulatum*
 6. Lamina upto 1cm long; petals 0.3-0.4cm long; stem quadrangular.....*H. japonicum*
 6. Lamina 1.2-2.6cm long; petals 0.6-0.9cm long; stem terete.....*H. himalaicum*

Hypericum choisianum N. Robinson in FWP 32: 6. 1973; EFPN 2: 61. 1979; FB 1(2): 374. 1984; FI 3:54. 1993.

H. hookerianum Wight et Arnt., var. *leschenaultii sensu* FBI 1: 254. 1874, non *H. leschenaultii* Choisy.

Norsyca hookeriana (Wight et Arnt.) Wight var. *leschenaultii* Kitamura, FEH 1: 210. 1996; 2: 81. 1971.

Local Name : Mehandi Phool (Nep.).

Bushy shrub with spreading branches, upto 2 m tall. Petioles 0.15-0.3 cm; leaf lamina 3-6.5 x 1.2-2.2 cm, ovate to alnceolate, entire, subacute or bluntly apiculate, base rounded to sometimes cuneate, pale green beneath. Flowers 4-6.5 cm across, pentamerous , singly or in a group of 3 at branchlet tips; sepals 0.8-1.6 x 0.4-0.7 cm, elliptic or ovate, usually spreading, widened at middle, acute or often subacute; petals 1.5-2.5 x 1.3-2 cm, obovate-rounded; styles shorter than ovary being 0.45-0.65 cm. Capsule upto 1.6 cm, ovoid.

Flr.: Jun. - Jul. *Fr.*: Sep. - Nov.

Specimen Cited: Helipad Belt, 2520m, **AP Das & PC Rai** 1413, dated 14.10.1996.

Status: Less Common.

Local Distrib.: Rechila Middle, Alubari, Helipad Belt, Ruka Hill, Thosum Beat. 2100-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Java, Sumatra.

Hypericum elodeoides Choisy in DC., Prodr. 1: 552. 1824; FBI 1: 255. 1874; FEH 1: 209. 1966; 2: 81. 1981; EFPN 2: 61. 1979; FPK 15. 1981; FB 1(2): 377. 1984; TBRI 50 (4): 116. 1987; FI 3:56. 1993; FWB 1:262. 1997.

H. napaulense Choisy, *sensu* FBI 1: 256. 1874, p.p.; FEH 2: 81. 1971.

Erect small, stout herb to 12-30 cm. Stem usually unbranched, terete, glabrous. Leaves sessile, 1.2-3.9 x 0.4-1.1 cm, ovate-lanceolate, nearly rounded acute, base cordate, clasping the stem, veins prominent below, margins gland-dotted. Cymes terminal, branched, few flowered. Bracts lanceolate, glandular, ciliate. Pedicels 0.5-1 cm, glabrous. Sepals 0.6-0.7 x 0.2-0.3 cm, elliptic-lanceolate, serrate with intra-marginal black ciliate glands and dots; petals 0.8-0.95 cm, nearly oblanceolate, striate, yellow, thinly glandular; stamens 3, adelphous at the base; anthers with black glands; ovary narrowly ovoid, 3-celled; styles 3, exceeding stamens. Capsule ovoid, upto 0.75 cm, ribbed; seeds subglobose, numerous.

Flr.: Jun. - Oct. *Fr.*: Aug. - Dec.

Specimen Cited: Alubari-Jorpokhari, 2280-3040 m, **AP Das & PC Rai** 0151, dated 15.6.1994; Jaributti-Rechila, 2195-2280 m, **AP Das & PC Rai** 0469, dated 15.10.1994.

Status: Very Common.

Local Distrib.: Alubari, Jaributti, lava, Jorpokhari, Jaributti. 2100-3050m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Myanmar.

Hypericum himalaicum N. Robson in Journ. Jap. B. 52: 287. 1977; EFPN 2: 61. 1979; FB 1(2): 377. 1984; TBRI 50 (4): 116. 1987; FI 3:64. 1993.

H. pallens D. Don, Prodr. Fl. Nep. 219. 1825, *nom. illegit.* Superfl., p.p. excl. typum; non Banks et Solander 1794.

H. setosum Wallich, Cat. 170. n. 4814. 1831; *nom. nud.*; non L. 1753.

H. napaulense auct. non. Choisy; Dyer in FBI 1: 256. 1874, p.p.; FEH 2: 81. 1971.

H. wightianum auct. non. Wallich ex Wight et Arnt.: JBNHS 51: 744. 1953.

H. humifusum auct. non L.: sensu, FEH 1: 209. 1966.

Diffuse herb with numerous slender, short, weak and glabrous branches. Leaf lamina 0.8-2 x 0.4-1.1 cm, lanceolate-elliptic, nearly entire with blackish gland-dots, obtuse, narrowly cuneate, nerves raised below, impressed above, both surfaces finely pale dotted. Cymes 3-12 flowered. Bracts glandular-ciliate. Pedicels 0.2-0.4 cm, glabrous. Sl. 2.5-0.4 x 0.15-0.25 cm, elliptic-lanceolate, serrate, ciliate with marginal glands; petals 0.5-0.8 cm, yellow, persistent; styles 3, exceeding stamens. Capsule 0.4 x 0.3 cm, ovoid to subglobose; seeds numerous.

Flr.: Jun. - Aug. *Fr.:* Aug. - Oct.

Specimen Cited: Jaributti-Lower Rechila Chowk, 2195-2280 m, AP Das & PC Rai 0446, dated 15.10.1994.

Status: Less Common; usually seen in open places among the grasses.

Local Distrib.: Rechila Chowk, Jaributti, Chitray, Ruka. 2100-2700m.

General Distrib.: Himalayas (Pakistan-Bhutan).

Hypericum hookerianum Wight et Arnt., Prodr. Fl. Ind. Or. 1: 99. 1834; FBI 1: 254. 1874, p.p.; EFPN 2: 61. 1979; FB 1(2): 375. 1984; TBRI 50 (4): 116. 1987; FI 3:64. 1993; FWB 1:264. 1997.

H. patulum auct. non. Thunb. ex Murray; Prodr. Fl. Nep. 218. 1825.

H. oblongifolium auct. non Choisy; Pl. As. Rar. 3: 23, t. 244. 1832 *et auct.*

Norysca hookeriana (Wight et Arnt.) Wight, Ill. Ind. Bot. 1: 110. 1840; FEH 1: 210. 1966; 2: 81. 1971; FPK 15. 1981.

Local Name: Mehandi Phool (Nep.).

Small bushy shrub. Branches terete, hollow, slightly pendent. Leaves distichous, sessile, very shortly stalked, thick and comparatively large (upper ones larger), lamina 2.8-6.9 x 1.2-2.3 cm, lanceolate to narrowly ovate, entire, subacute, sparsely hairy above and indistinctly superficial-glandular beneath. Flowers in terminal clustres, with upto 1.2 cm long glabrous pedicels, 4-6 cm in diam.; sepals 5, 0.65-1 x 0.4-0.7 cm, free, imbricate, suborbicular or obovate, usually rounded or even acute, persistent; petals 5, 2-2.9 x 1.8-

2.2 cm, obovate, golden yellowish; styles shorter than ovary, slightly recurved; stigma 5, persistent. Capsule ovate-conical, greenish yellow.

Flr.: Jun. - Aug. *Fr.*: Sep. - Dec.

Specimen Cited: Lower Rechila Chowk-Hattidara, 2280-2549m, AP Das & PC Rai 0613, dated 17.10.1994.

Status: Common along the cliffs and other semi-open places.

Local Distrib.: Hattidara, Dhamdhamay Dara, Alubari, Lower Rechila Chowk. 2000-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Mishmi Hills.

Hypericum japonicum Thunb. ex Murary, Syst. Veg. ed. 14:702. 1784; Fl. Jap. 295, t. 31. 1784; Prodr. Fl. Nep. 219. 1825; FBI 1:256. 1874; EFPN 2:62. 1979; TBRI 50(4): 116. 1987; FI 3:69. 1993.

H. chinense Osbeck, Dagbok Ostind. Resa 244. 1757, *nom. ambig.*

Prathys nepalensis Blume, Mus. B. Lugd.- Bot. 2:19. 1856.

H. calyculation Jacq. ex Dyer, FBI 1:256. 1874 in syn.

Annual herb, 8-30cm high. Stem erect or decumbent, quadrangular, dichotomously branched, often rooting at basal nodes. Leaves sessile; lamina 0.35-8.5 x 1.5-5cm, elliptic-ovate or oblanceolate, obtuse or rounded, base cordate. Pedicels 0.55-0.75cm long. Bracts upto 0.25cm long, linear-lanceolate. Flowers in monochasia; sepals 5, free, 0.35-0.45 x 0.15-0.2cm, oblong-oblanceolate, 2-3 veined, persistent; petals yellow, equal or slightly shorter than sepals, elliptic to obovate; stamens many in fascicles, 0.25-0.3cm long; ovary to 0.25cm long, ovoid to subglobose; styles 3, to 0.13cm long, free. Capsules 0.4-0.45cm long, ovoid, with transverse and striate seeds.

Flr.: Almost year round. *Fr.*: Oct. - Feb.

Specimen Cited: Middle Rechila, 2400m, AP Das & PC Rai 1236, dated 04.5.1995.

Status: Common among grasses.

Local Distrib.: Alubari, Pankhasair, Jaributti, Chowda Feri. 1750-2400m.

General Distrib.: Subtropical and temperate Himalayas, Meghalaya, Assam, Myanmar, Bangladesh, New Zealand, Australia, Japan and China.

Hypericum petiolulatum Hk. f. ex Dyer in FBI 1: 255. 1874; FEH 2: 81. 1971; EFPN 2: 62. 1979; FPK 15. 1981; FB 1(2): 378. 1984; TBRI 50 (4): 116. 1987; FI 3:75. 1993; FWB 1:265. 1997.

Rigid perennial erect herb. Stem much branched, slender, terete, glabrous. Petioles upto 0.2 cm; lamina 1-2.5 x 0.45-1.2 cm, ovate-elliptic, entire, obtuse, cuneate, glaucescent beneath. Cymes 3-flowered, both axillary and terminal. Pedicels slender, 0.3-1.1 cm. Sepals 5, free, linear-lanceolate, entire, greenish; petals 5, free, yellow; stamens 3, united

at base; ovary superior, 3-celled; ovules numerous; styles 3, green. Capsules with glandular lines; seeds numerous.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Lava-Rechila Chowk, 2118-2280 m, AP Das & PC Rai 0316, dated 18.6.1994.

Status: Common.

Local Distrib.: Lava, Lower Rechila Chowk, Reshete, Pankhasari, Chitray. 1900-2600m.

General Distrib.: Endemic to E. Himalaya.

Hypericum uralum Buch-Ham. ex D. Don in Bot. Mag. 50:t, 2375. 1823; EFPN 2: 62. 1979; FB (1) 2: 375. 1984; TBRI 50 (4): 117. 1987; FI 3:77. 1993; FWB 1:265. 1997.

Norysca urala (Hamilt.) K. Koch, Hort. Dendr. 66. 1853; FEH 1: 210. 1966; FPK 15. 1981.

H. patulum Thunb. *sensu* Dyer in FBI 1: 254. 1874; Trs. N. Beng. 17. 1929.

H. petulum var. *uralum* (D. Don) Koch. Deut. Dendr. 415. 1893; Man. ed. 2: 638. 1940.

Local Name: Urilo (Nep.).

Similar to *H. hookerianum* but more woody and all parts slightly smaller. Branchlets many, spreading, 4-edged. Leaf lamina 0.7-2.4 x 0.25-0.9 cm, ovate lanceolate, entire, acute, cuneate, faded white and black dotted beneath. Cymes terminal, few flowered (usually 3-5). Flowers 2.6-3 cm in diam.; sepals 5, free, 0.4-0.65 x 0.29-0.39 cm, obovate, wider above, nearly rounded; petals 1-1.4 x 0.7-1 cm, obovate, deep yellow; stamens upto 0.5 cm; ovary sub-globose; styles persistent. Capsule 0.7 x 0.6 cm, conical with persistent erect sepals; seeds ovate-cylindric, numerous, brownish.

Flr.: Jun. - Sep. *Frt.:* Nov. - Dec.

Specimen Cited: Rechila Chowk, 2280 m, AP Das & PC Rai 0271, dated 16.6.1994.

Status: Common.

Local Distrib.: Pankhasari, Rechila Chowk, hattidara, Mulkharka. 2100-2600m.

General Distrib.: Himalayas (Kashmir-Bhutan), Myanmar, Thailand.

Note: Seeds are used in local medicine.

THEACEAE D. Don

Key to the Genera:

1. Flowers bisexual; trees; fruits woody capsule.....*Schima*
1. Flowers unisexual; shrubs or small trees; fruits berry.....*Eurya*

EURYA Thunb.

Key to the species:

1. Young parts villous; leaf veins not prominent; fruits with persistent style
.....*E. acuminata*
1. Young parts glabrous or appressed hairy; leaf veins prominent; fruits without persistent
style.....*E. cerasifolia*

Eurya acuminata DC., Mem. Ternstr. 26. 1822; Prodr. 1: 525. 1824; FBI 1: 285. 1874; Trs. N. Beng. 18. 1929; Ann. Miss. Bot. Gard. 25:321. 1938; FEH 1: 208 1966; EFPN 2: 64. 1979; FPK 16. 1981; FB 1(2): 363. 1984; TBRI 50 (4): 114. 1987; FI 3:178. 1993; FWB 1:273. 1997.

Local Name: Sanu Jhinguni (Nep).

Large shrubs to small trees with profuse branches, young twigs pubescent. Petioles 0.2-0.4cm, pubescent; lamina 3.8-10.5x1-2.9cm, elliptic-lanceolate, serrulate, short acuminate, cuneate, glabrous, glossy, mid-nerve elevated and pubescent beneath. Pedicels 0.2-0.25cm. 3-5. Flowers in axillary fascicles, 0.5cm across, bracteolate, dioecious; sepals 5, 0.15-0.2cm, broadly elliptic, glabrous, persistent; petals 0.3-0.4 x 0.25cm, ovate, white; stamens 15, shorter than petals; ovary 0.15cm across, subglobose, glabrous; styles 3, united at base. Fruit 0.45cm in diam., subglobose.

Flr.: Sep. - Nov. *Fr.:* Nov. - Jan.

Specimen Cited: Alibari, 2300m, AP Das & PC Rai 084, dated 14.6.1994; Jaributti, 2200m, AP Das & PC Rai 0408, dated 15.10.1994; PHE Source, 2155m, AP Das & PC Rai. 1054, dated 26.6.1995.

Status: Common.

Local Distrib.: Jaributti, Thosum Hill, PHE Source, Alubari, Phari. 900-2700m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, manipur, Myanmar, Thailand, Ind0-China, Malaysia.

Note: Good fodder and fuelwood.

Eurya cerasifolia (D. Don) in Anna. Miss. Bot. Gard. 25: 326. 1938; FEH 1: 209 1966; EFPN 2: 84. 1979; FPK 16. 1981; FB 1 (2):364. 1984; TBRI 50(4):114. 1987; Nam. Chang. Flr. Pl.. 225. 1987; FI 3. 183. 1993; FWB 1:275. 1997.
E. symplocina Bl., Mus. Bot. Lugd.- Bat. 2: 133. 1856; FBI 1: 285. 1874.

Local Name: Thulo Jhinguni (Nep.).

Shrub to small tree, branches striate. Buds and young twigs white, pubescent. Petioles 6-11.5 x 1.7-3cm, elliptic-lanceolate, margins entire or serrate above middle, acuminate, base cuneate to rounded, glossy, greenish becoming brownish on drying, mid-vein raised beneath, depressed above, veins prominent both sides. Fascicles crowded, many flowered, bracteolate. Flowers minute; sepals 0.2 x 0.15-0.2cm, obtuse, silky; petals 5, 0.35-0.4 x 0.18-0.2 cm, oblong-elliptic, whitish yellow; stamens upto 15; ovary glabrous;

styles branched. Fruit 0.35-0.45 x 0.3-0.45cm, subglobose or broadly ellipsoid, blue-black; persistent sepals brown.

Flr.: Oct. - Jan. *Fr.*: Apr. - Oct.

Specimen Cited: Mulkharka, 2070m, **AP Das & PC Rai** 1163, dated 30.4.1995.

Status: Frequent.

Local Distrib.: Machuki, Sakam Forest, Zero Point, Mulkharka. 1200-2100m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, S. Tibet, Manipur, Myanmar, Thailand, W. China.

SCHIMA *Rwdt.*

Schima wallichii Korthals, Bijdr. Ternstr. in Temminck, Verh. Nat. Gesch. Bot. 143. 1839-42; FBI 1: 289. 1874; Fl. Asm. 1: 119. 1934; Reinwardtia 2: 136. 1952; FB 1(2): 365. 1984; Nam. Chang. Flr. Pl. 509: 1987; FWB 1:276. 1997.

Gordonia wallichii DC., Prodr. 1: 528. 1824.

Schima mollis Dyer in FBI 1: 288. 1874

Local Name: Aulay Chilaunay (Nep.).

Evergreen large tree upto 30 m. Buds and young parts adpressed pubescent. Petioles upto 2 cm long, pubescent. Leaf lamina 8-18 x 3.5-6 cm, ovate-elliptic, entire, acute to acuminate, base cuneate or rounded, glabrous above, pubescent beneath, midrib depressed above. Pedicels 2-3 cm, bearing 0.5 x 0.2 cm, oblong. Flowers 3-5 cm across, bisexual, axillary solitary, fragrant, whitish; sepals 5, subequal (4 cm), suborbicular, imbricate, glabrous or margins ciliate; petals 5, 2.5-3 x 1-1.5 cm, obovate, silky pubescent outside towards base, otherwise glabrous; stamens many; filaments adnate to the petal base; anthers yellow; ovary hairy at the bottom, glabrous above. Capsule 2-2.4 cm across, subglobose, woody, gray-pillose when young, warty and supported by persistent calyx at maturity, dehiscing into 5-valves; seeds 0.65 x 0.4 cm, surrounded by wing 0.2-0.3 cm except along the ventral edge.

Flr.: May - Jul. *Fr.*: Nov. - Feb.

Specimen Cited: Samsing, 720 m, **AP Das & PC Rai** 1721, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Gorubathan, Machuki. 700-1200m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Tibet, China.

Note: Branches and twigs are used as excellent firewood and manure. Trunk is used as timber for building houses and ploughshares. Bark juice causes intense itching.

ACTINIDIACEAE Van Tiegh.

ACTINIDIA Lindl.

Actinidia strigosa Hk. f. et Thoms in J. Lin. Soc. 5: 55. 1851; FBI 1: 286. 1874; Trs. N. Beng. 19. 1929; FEH 1: 207. 1966; TBRI 50(4): 104. 1987; FB 1(2): 359. 1984; FI 3: 196. 1993; FWB 1:277. 1997.

Local Name: Thekiphal (Nep).

Woody scandent shrub. Stem minutely fistular, greenish when young, brownish green at later stage, coarse and rough, densely strigose, hairs 0.15-0.2cm long, sticky rough and brown. Leaves alternate; petiole 0.8-3.2cm, slender, covered with brown bristles; lamina 3-12x1.9-7.5cm, ovate-elliptic, finely serrulate, acuminate, cuneate or rounded, dark green above, pale beneath, glabrous to sparsely hairy (bristles 0.15-0.2cm), lateral nerves 8-12 pairs. Cymes axillary, few flowered, ebracteate. Pedicels 0.4-0.6cm long, tomentose. Flowers unisexual, buds almost rounded, green; sepals 5, imbricate, 0.4-0.5 x 0.3-0.4cm, ovate, tomentose; petals 5, 0.5-0.6 x 0.4-0.45cm, obovate or rounded, tomentose, white; stamens numerous; anthers slender, 0.1-0.15cm, cylindric, slightly curved upwards, 2-celled; filament long, 0.2cm; ovary of 0.3cm, oblong, dense hairy; styles many, 0.4cm, linear, persistent. Fruit baccate with persistent enlarged and reflexed sepals at base, brown, lenticelled.

Flr.: May - Jun. *Frt.:* Oct. - Dec.

Specimen Cited: Rechila Chowk, 2280m, **AP Das & PC Rai** 0328, dated 18.6.1994; Alubari-Jaributti, 2280-2195m, **AP Das & PC Rai** 0413, dated 15.10.1994; Mulkharka, 2070m, **AP Das & PC Rai** 1156, dated 29.4.1995.

Status: Common in hedges.

Local Distrib.: Rechila Chowk, Jaributti, Mulkharka, Chouda Feri, Chitray. 2100-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

SAURAUJACEAE J.G. Agardh.

SAURAUJA Willd.

Saurauja napaulensis DC., Mem. Ternstr. 29. 1822; Pl. As. Rar. 40, 77 t. 178. 1813; FBI 1: 286. 1874; Trs. N. Beng. 20. 1929; FEH 1: 207. 1966; FPK 17. 1981 FB 1(2): 359. 1984; TBRI 50 (4): 126. 1987; FI 3: 201. 1993.

Local Name: Gagun (Nep.).

Soft wooded small deciduous tree to 7 m; young twigs brown tomentose, scaly; leaves simple, alternate; petiole up to 1.7 cm; lamina 14-23 x 3-6 cm, elliptic-lanceolate, finely serrulate, acuminate, base rounded, glabrous or thinly brown tomentose beneath, dark green above, whitish-green beneath, nerves hairy beneath, mid vein thick, elevated and light red, lateral nerves 32-34 pairs. Flowers in axillary panicles, shorter than leaves;

sepals 0.45-0.55 x 0.35-0.4 cm, ovate, glabrous; petals 0.9 x 0.5 cm, obovate, rounded, pinkish; stamens numerous, free ovary glabrous; styles 5. Fruit 0.9 cm in diam., globose, sweet.

Flr.: May - Aug. *Fr.:* Sep. - Dec.

Specimen Cited: Rechila Durpinay, 2300 m, **AP Das & PC Rai** 1376, dated 06.5.1995.

Status : Less Common.

Local Distrib.: Rachila Durpinay, Thartharay, Zero Point. 1900-2300 m.

General Distrib.: Himalayas (Garhwal-Bhutan), Khasia, Mishmi Hills, N. Myanmar, Indo-China and W. China.

Note: Fruits edible. Good fodder for cattle.

STACHYURACEAE J.G. Agardh.

STACHYURUS Sieb. et Zucc.

Stachyurus himalaicus Bentham, Journ. Lin.Soc. 5: 55. 1861; FBI 1: 288. 1874; FEH 1: 214. 1966; 2: 83. 1971; EFPN 2:65. 1979; Fasc. Fl. Ind. 20. 135. 1990; FB 2(1): 228. 1991; FI 3: 205. 1993.

Local Name: Churay Lahara (Nep).

Deciduous small shrub, often with straggling branches. Leaves simple with linear stipule; petioles upto 1cm; lamina 3-8 x 2-4cm, ovate-elliptic, finely serrate, acuminate, rounded, both surfaces glabrous, strongly net-veined beneath. Raceme spike-like, axillary, unbranched, 3-4.5cm long, pendulous. Bracts 0.3cm, ovate, brown. Flowers bisexual, greenish-yellow to pinkish red, usually appear before leaves; sepals 0.4 x 0.3cm, obovate; petals longer than sepals, obovate; stamens 0.35-0.45cm (in male flower); carpel upto 0.5cm; ovary superior (in female flower); pistillodes 0.35cm (in male flower). Fruit 0.5cm across, subglobose.

Flr.: Jan. - Apr. *Fr.:* May - Aug.

Specimen Cited: Helipad Area, 2400-2520m, **AP Das & PC Rai** 1029, dated 25. 4.1995; Rechila Middle-Trijunction, 2490-2900m, **AP Das & PC Rai** 1244, dated 04.5.1995.

Status: Less Common.

Local Distrib.: Middle Rechila, Mulkharka, Helipad area, Tinsimana. 2100-2900m.

General Distrib.: Himalayas (Nepal-Bhutan), Manipur, Naga Hills, S.E. Tibet, Myanmar, China.

MALVACEAE Juss.

Key to the Genera:

1. Fruits schizocarpic.....2
1. Fruits capsular.....3
2. Epicalyx present.....*Urena*
2. Epicalyx absent.....*Sida*
3. Calyx spatheaceous, deciduous, obscurely 2-3 lobed.....*Abelmoschus*
3. Calyx not spatheaceous, persistent; 5-lobed or toothed.....*Hibiscus*

ABELMOSCHUS Medic.

Abelmoschus manihot (L.) Medikus, Malv. 46. 1787; EFPN 2:66. 1979; Fasc. Fl. Ind. 19:74. 1988; FB 2(1): 185. 1991; Nam. Chang. Flr. Pl. 1:1987; FI 3:304. 1993.

Hibiscus manihot L., Sp. Pl. 696. 1753, FBI 1: 341. 1874.

H. pungens Roxb., Fl. Ind. ed. 2 (3):213. 1832.

1-2m high, strigose undershrub. Stem terete, stout. Leaves extremely variable in size and shape; lamina 4-12cm across, orbicular to broadly ovate, lower leaves obscurely 3-5 angled, upper deeply lobed, acute to acuminate at apex, base cordate, margin dentate. Stipules upto 1.8cm, linear, stellate hairy. Racemes terminal, 2-7 flowered. Pedicels upto 4cm long. Epicalyx segments 4-6, ovate to lanceolate, acute to acuminate, densely clothed with hairs. Calyx 2-3 x 0.5-1.5cm, extremely velutinous; petals 4-7 x 3-6cm, obovate to orbicular, yellowish; staminal tube to 2 cm; ovary ovoid; style hairy. Capsules 4-6 x 1.7-2.5cm, ovoid-oblong, 5-angled; seeds 0.3-0.4cm, dark brown and stellately hairy.

Flr.: Aug. - Oct. Frt.: Oct. - Dec.

Specimen Cited: Suntalay, 600m, AP Das & PC Rai 1509, dated 04.6.1996.

Status: Common.

Local Distrib.: Samsing, Phari, Gorubathan, Suntalay, upto 1000m.

General Distrib.: Tropical Himalayas (Kumaon-Sikkim), Pakistan, Nepal, Bhutan, China, Malaysia and Australia.

HIBISCUS L.

Hibiscus micranthus L. f., Suppl. Pl. 308. 1781; FBI 1:335. 1874; Nam. Chang. Flr. Pl. 282. 1987; FI 330. 1993.

Upto 3m high undershrub. Branches terete, stellately hairy. Petioles 0.5-2cm long. Leaves 1.7-5cm long, ovate-oblong, acute to obtuse, margin serrate, stellately hairy on both surfaces. Stipules 0.35-1.2cm, filiform. Pedicels upto 4cm long; hairy. Flowers solitary and axillary; calyx segmented to the middle, lobes to 0.55cm; petals 1-1.2 x 0.35-0.4cm, oblong-obtuse, glabrous within. Capsules globose, splitting into 5 valves; seeds blackish, reniform, hirsute.

Flr. & Frt.: Jul. - Jan.

Specimen Cited: Near Phari, 1000m, AP Das & PC Rai 1506, dated 04.6.1996.

Status: Less Common.

Local Distrib.: Samsing, suntalya, Phari, Gorubathan. 600-1000.

General Distrib.: Pakistan, Africa, Sri Lanka and Myanmar.

NAYARIOPHYTON Paul

Nayariophyton zizyphifolium (Griff.) Long & Miller in Edinburgh Jor. Bot. 47(3):357. 1990; FB 2(1): 187. 1991, FI 3: 344. 1993.

N. jujubifolium (Griff.) Paul in Fasc. Fl. Ind. 19:185. 1988.

Kydia jujubifolia Griff., Notul. 4:534. 1854; Icon. Pl. Asia. 4:595. 1854; Trs. N. Beng. 21. 1929; Fl. China, Malv. 72. 1955; FEH 1:205. 1966; EFPN 2:68. 1979; FPK 17. 1981; Nam. Chang. Flr. Pl. 312. 1987; TBRI 50(4):122. 1987.

Dycellostyles jujubifolia (Griff.) Benth., Gen. Pl. 1:207. 1862; FBI 1:333. 1874.

Local Name: Kubinday (Nep.).

5-10m high trees. Branchlets greyish, stellate hairy. Petioles upto 3.5cm long, pubescent. Leaves 7-14.5 x 5.5-10cm, broadly ovate or suborbicular, acute to acuminate, base rounded to subcordate, shallowly 3-5 lobed, glabrous above, pilose beneath, basally 5-7 nerved. Stipules subulate. Pedicels 0.6-1.45cm long, hairy. Flowers solitary or in short raceme of 2-5 flowers, axillary. Epicalyx segments 4-6, 1-1.6 x 0.5cm, oblong-lanceolate, accrescent, thinly pubescent above, velutinous beneath. Calyx lobes 1-1.5 x 1 cm, triangular, connate upto the middle; petals 5, 1.5-2.5 x 1-1.5 cm, oblong, densely stellate hairy; staminal column 0.9-1cm, pubescent; stamens many with reniform anthers; ovary globose, 2-chambered; styles branched with rugose capitate stigma. Capsules upto 0.85 cm diam., globose; seeds reniform.

Flr.: May - Jul. *Frt.:* Sep. - Oct.

Specimen Cited: Phari, 900m, AP Das & PC Rai 1418, dated 08.10.1995.

Status: Frequent.

Local Distrib.: Samsing, Phari Gorubathan-Phaparkheti, 500-1600m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya, Mizoram, Myanmar and China.

Note: A good fodder plant.

SIDA L.

Key to the species:

1. Mericarps 5; awn absent; leaf base cuneate to rounded.....*S. acuta*
1. Mericarps more than 5; awn present; leaf base cuneate but not rounded
.....*S. rhombifolia*

Sida acuta Burm. f., Fl. Ind. 147. 1768 ssp. *acuta*; Blumea 14: 186. 1966; Nam. Chang. Flr. Pl. 522. 1987; FB 2 (1): 192. 1991; FWB 1:308. 1997.

S. carpinifolia sensu Masters in FBI 1: 323. 1874, *non* L. f.

Local Name: Jharool/ Khareto (Nep.).

Annual or perennial herbs or undershrub, erect, ascending, upto 1 m high, branched throughout. Shoot thinly stellate-pubescent, glabrous at a later stage. Leaves simple; petiole 0.3-0.4cm; stipules 0.35-1 cm, each pair unequal, linear-lanceolate, 2-3 veined; lamina 1-6 (-8) x 0.45-1.5 (-2) cm, narrowly lanceolate to lanceolate, serrate, acute, base cuneate to rounded, glabrescent. Pedicels to 0.2-0.35 cm. Flowers axillary, solitary, sometimes in a cluster of 2-5 flowers; calyx 0.5-0.82 cm, acuminate; petals 0.79-1(-1.2) cm, obovate, yellowish; ovary 5-celled; style branched. Mericarps reticulate with glabrous awns to 0.1 cm.

Flr. & Frt.: Dec. - May.

Specimen Cited: Near Samsing, 700 m, AP Das & PC Rai 1780, dated 10.9.1997.

Status: Common in lower region.

Local Distrib.: Phari, Samsing, Suntalay, Machuki. 500-1400m.

General Distrib.: Pantropic.

Note: Sweeping-broom is made from its dried shoots.

Sida rhombifolia L., Sp. Pl. 684. 1753 ssp. *rhombifolia*; Borssum in Blumea 14: 195. 1966, FEH 1: 205. 1966; Nam. Chang. Fl. Pl. 522. 1987; FB 2(1): 193. 1991; FWB 1:310. 1997.

S. rhombifolia var. *rhomboidea* (DC.) Masters in FBI 1: 324. 1874.

S. rhombifolia var. *obovata* Wallich ex Masters in FBI 1: 324 1874.

S. orientalis Car., Diss. 1: 21, t. 12, f. 1. 1785; Fl. China (Malvaceae) 18. 1955.

Erect or prostrate, annual to perennial, stellate-pubescent subshrub, upto 1 m tall. Petiole 0.25-0.45 cm long; stipules 0.4-1 cm, filiform. Lamina 2.5-8 x 1.2- 3.6 cm, lanceolate-orbicular, very often rhombic, acute, rounded or retuse, base cuneate, serrate, glabrous above, pubescent beneath. Pedicels 1.2-2 cm long. Flowers axillary, both solitary or in fascicles of 2-3 flowers; calyx 0.9-1.1 cm; petals 0.75-1(-1.8) cm, obtriangular, pale orange; style arms many. Mericarps reticulate, muticous, glabrous or hairy.

Flr. & Frt.: Jul. - Dec.

Specimen Cited: Near Samsing, 720 m, AP Das & PC Rai 1423, dated 8.10.1995.

Status: Common.

Local Distrib.: Phari, Sakam, Machuki, Samsing, Phaparkheti. 500-1200m.

General Distrib.: S.E. Asia.

Note: Fibres obtained from this plant is used to make the rope.

URENA L.

Urena lobata L., Sp. Pl. ed. 1, 2:692. 1753; FBI 1:329. 1874; FEH 1:206. 1966; EFPN 2:69. 1979; TBRI 50(4):129. 1987. sub. sp. *lobata* Fasc. Fl. Ind. 19.228. 1988; FB 2(1):194. 1991.

Local Name: Kuray Paat (Nep.).

Erect annual or perennial undershrub, 0.5-2m high. Petioles 0.6-12cm long. Leaves variable in size and shape; lamina 1.5-11.5 x 0.5-11cm, usually ovate to orbicular, unlobed to shallowly unlobed, irregularly incised towards base, lobes usually upto 5, often more, apex and base obtuse to acute or rounded, entire or serrate, stellate hairy on both sides, ultimately becoming glabrescent, basally 3-9 nerved. Stipules 0.25-0.4cm, filiform. Epicalyx segments 0.55-0.75cm, linear-lanceolate. Pedicels upto 0.5cm. Flowers solitary or few in clusters, axillary; calyx tubular, lobes 0.65-0.75cm, ovate to deltoid; petals 1-2cm, obovoid, pinkish; staminal column upto 1.6cm. Mericarps 0.45-0.6cm, hooked with sharp bristles; seeds 0.25-0.3cm across, reniform, brownish.

Flr. & Frt.: Jul. - Jan.

Specimen Cited: Phari, 700m, AP Das & PC Rai 1427, dated 08.10.1995.

Status: Abundant.

Local Distrib.: Phari, Samsing, Gorubathan, Machuki. 600-1580m.

General Distrib.: Pantropic.

Note: A fibre yielding plant.

STERCULIACEAE Vent.

Key to the Genera:

- 1. Herbs; carpels united to produce syncarp.....*Melochia*
- 1. Trees; carpels separated to produce fruitlets.....2
- 2. Leaves digitate or lobed; flower unisexual or polygamous.....*Sterculia*
- 2. Leaves simple; flower bisexual.....*Pterospermum*

MELOCHIA L.

Melochia corchorifolia L., Sp. Pl. 365. 1753; FBI 1:371. 1874; FEH 1:206. 1966; EFPN 2:70. 1979.

Annual herbs, sometimes woody, stellate hairy, 50-120cm high. Petioles upto 3.2cm long; lamina 3-6x1.5-2.5cm, ovate-lanceolate, serrate, acute, base rounded, sometimes lobed, nerves 5, stellate hairy beneath. Stipules upto 2cm long, subulate. Flowers in clusters, both axillary and terminal; sepals 5, upto 2cm long; petals 5, 2.5-3.5cm, obovate-spathulate, pinkish-white; stamens connate at base forming a column. Capsules 1-1.5cm diam., globose.

Flr. & Frt.: Jun. - Dec.

Specimen Cited: Samsing 700m, **AP Das & PC Rai** 1382, dated 07.5.1995.

Status: Less Common.

Local Distirb.: Suntalay, Phari, Samsing, Gorubathan. Upto 900m.

General Distrib.: Pantropic.

PTEROSPERMUM Schreber

Pterospermum acerifolium (L.) Willd., Sp. Pl. 3:729.1802; Fl. Ind. ed. 2, 3:158.1832; Ic. Pl. Ind. Or. 2:t, 631.1843; FBI 1:368.1874; EFPN 2:70.1979; FB 2(1): 204. 1991; FWB 1:328. 1997.

Pentapetes acerifolia L., Sp. Pl. 698. 1753.

Local Name: Hattipahainle (Nep.).

Tree to 28 m high. Branches tomentose. Petioles upto 25 cm long; stipules 1-1.4cm, comb-like. Lamina unlobed or lobed, extremely variable in size and shape, 14-42 x 10-31 cm, suborbicular or oblong, rounded, apex often abruptly acuminate to truncate and coarsely toothed, base cordate or peltate, margins lobed or irregularly serrate, 7-9 veined basally, glabrous above, pale pubescent beneath. Flowers either solitary or 2-3 on short peduncle, 9-12 cm, fragrant ; calyx lobes 8.5-1.2 x 0.7-1 cm, linear, villous; petals 0.65-1.1 x 0.65-1.1 cm, linear, whitish but becoming red on drying. Column 2-2.5 cm; staminodes upto 8 cm; stamens 4-5 cm; style upto 7 cm, club-shaped with hairy base. Capsule 1-1.45 x 4.4 cm, with brownish tomentum.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Phari, 700 m, **AP Das & PC Rai** 1431, dated 08.10.1995.

Status : Less Frequent.

Local Distrib.: Samsing, Phari, Suntalay. 500-1000m.

General Distrib.: India, Himalayas (Punjab-Bhutan).

Note: Flowers used as disinfectant and used in washing clothes.

Sterculia villosa Smith in Rees, Cyclop. 34:n. 16. 1816; FBI 1:355. 1874; EFPN 2:70. 1979; FB 2(1):199. 1991.

Local Name: Odal (Nep.).

12-20m high deciduous trees with prominent leaf scars on twigs. Leaves aggregated at the ends of twigs. Petioles 12-40cm long; lamina palmately 5-7 lobed, 15-48cm in diam., suborbicular, with cordate base, membranous, lobes entire, acuminate, stellate hairy above. Stipules 1.5-3cm, ovate-lanceolate. Panicles 20-50cm long, pendulous, on the axils of fallen leaves, stellate tomentose. Pedicels 0.3-0.5cm long. Flowers yellowish;

calyx tube 0.25-0.3cm, lobes 5, ovate. Fruits 6-8 x 3-5cm, red, with 4-5 spreading follicles; seeds blackish.

Flr.: Jan. - Mar. *Fr.:* Apr. - May

Specimen Cited: Phari, 700m, **AP Das & PC Rai** 1898, dated 26.10.1997.

Status: Less Frequent.

Local Disrib.: Samsing, Phari, Gorubathan. Upto 1000m.

General Distrib.: Tropical Himalaya (Punjab-Bhutan), N. India.

Note : An important fibre yielding plant; fruits used for decoration.

TILIACEAE Juss.

Key to the Genera:

1. Shrubs or trees; fruits drupaceous.....*Grewia*
1. Herbs or undershrubs; fruits capsular.....*Triumfetta*

GREWIA L.

Grewia eriocarpa Juss. in Ann. Mus. Nat. Hist. Nat. 4: 93. 1804; FB 2(1): 177. 1991; FI 3: 497. 1993; FWB 1:338. 1997.

G. elastica Royle, Ill. Bot. Himal. Mts. 1: 104. t. 22. 1834.

G. vestita Wallich ex Brandis, For. Fl. N. W. Ind. 40. 1874.

G. mesopoda Burret in Notizbl. Bot. Gart. Berlin-Dahlem 9: 633. 1926; J. Ind. Bot. Soc. 29: 179. 1950.

Local Name: Syalphusray (Nep.).

Shrub or small tree, 4-7 m high. Stem and branches tomentose. Leaves stipulate; stipules 0.6-0.8 cm, lanceolate; petioles upto 1.2 cm long; lamina 6-17 x 4-10 cm, elliptic or oblong-ovate, acuminate, base obliquely rounded, crenate-serrate, membranous, 5-veined at base, softly tomentose beneath, reddish when young. Cymes axillary. Peduncles 2-3 per axil, 0.6-2cm. Pedicels equal to peduncles in length. Sepals 5, free, to 0.4-1 cm, linear, greenish, yellowish within; petals 5, equal to sepals, linear, pale green; stamens many, inserted on glandular receptacle; filaments to 0.3cm; ovary 0.2cm diam.; style subacute and lobed. Drupe to 0.6 -1 cm diam., subglobose to globose, obscurely lobed.

Flr. & Fr.: Mar. - Jul.

Specimen Cited: Machuki, 1300 m, **AP Das & PC Rai** 1779, dated 10.9.1997.

Status: Frequent in the foothills and terai region.

Local Distrib.: Sakam Forest, Machuki, Asala Khola Gorubathan. 500-1100m.

General Distrib.: Subtropical Himalayas (Garhwal-Bhutan), Assam, Meghalaya, Sri Lanka.

Note: Foliage a good fodder for cattle.

TRIUMFETTA L.

Key to the species:

1. Sepals linear; capsule bristles 0.5-0.6cm long.....*T. pilosa*
1. Sepals oblong; capsule spines upto 0.2cm long.....*T. rhomboidea*

Triumfetta pilosa Roth, Nov. Sp. 223. 1821; FBI 1:394. 1874; FEH 1:203. 1966; EFPN 2:72. 1979; TBRI 50(4):101. 1987; FB 2(1):175. 1991.

T. canna Blume, Bijdr. 116. 1825. *non* FBI

1 to 2 m high suffrutescent subshrub, perennial. Rootstock small, woody. Stem densely stellate hairy. Petioles 1-3cm long; lamina 6-16 x 2-6.5cm, ovate-lanceolate, irregularly serrate, often shallowly 2-lobed, acuminate, base shallowly cordate or rounded, tomentose beneath, 5-veined at base. Stipules 0.7-0.9cm, subulate. Cymes lateral, dense. Sepals upto 1 cm long, linear, pubescent; ptals 5, equal to sepals, yellowish; stamens 10. Capsule 1.5-2cm across, pilose, with bristly hooked spines.

Flr.: Aug. - Dec. *Fr.:* Oct. - Jan.

Specimen Cited: Phari 900m, AP Das & PC Rai 1165, dated 30.4.1995.

Status: Frequent only in lower range of the park.

Local Distrib.: Samsing, Phari, Machuki. Upto 1400m.

General Distrib.: Himalayas, India to Indochina.

Triumfetta rhomboidea Jacquin., En. Pl. Carib. 22. 1760; FBI 1:396. 1874; EFPN 2:72. 1979; FB 2(1):174. 1991.

T. bartramia L., Syst. Nat. ed. 10 (2):1044. 1759, *nom. illeg.*; FEH 1:203. 1966.

Local Name: Bhenray Kuro (Nep.).

Erect annual herb, 20-100cm high, woody at base, villous and stellate pilose. Petioles 2-5.5cm long; lamina 3.5- 8 x 3-7.5cm, suborbicular to broadly ovate, 3-lobed, irregularly serrate, acuminate, rounded at base, 3-5veined, stellate hairy, upper leaves unlobed. Stipules 0.35-0.45cm, lanceolate. Cymes to 1cm across, axillary or terminal, few flowered. Sepals 0.5-0.6cm, oblong, stellate-pubescent; petals equal to sepals, spathulate, yellowish. Capsule 0.5-0.6cm, white pilose and with many hooked spines, spines upto 0.2cm long.

Flr.: Aug. - Dec. *Fr.:* Nov. - Jan.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1905, dated 28.10.1997.

Status: Very common only in the lower range.

Local Distrib.: Phari, Samsing, Gorubathan, Machuki. Upto 1000m.

General Distrib.: Himalayas, India, East to China, Malaysia.

Note: Good fodder for cattele.

ELAEOCARPACEAE DC.

Key to the Genera:

1. Leaves hairy beneath; flowers solitary or in fascicles; capsule spiny or bristly
.....*Sloanea*
1. Leaves glabrous or glandular beneath; flowers racemed; drupe glabrous
.....*Elaeocarpus*

ELAEOCARPUS L.

Key to the species:

1. Stones distinctly tubercled.....*E. sphaericus*
1. Stones smooth or obscurely tubercled.....2
2. Leaves crowded at branch ends; petals laciniate; drupes ellipsoid, tapering at both ends.....*E. aristatus*
2. Leaves with normal distribution on branches; petals many segmented upto middle; drupes ovoid, not tapering at ends.....*E. lanceifolius*

Elaeocarpus aristatus Roxb., Fl. Ind. ed. 2 (2):599. 1832; FBI 1:405. 1874; FB 2(1): 168. 1991.

Local Name: Dalchiwri (Nep.).

Trees, 5-20m tall. Leaves crowded at ends of branchlets. Petioles long upto 25cm; lamina 14-28 x 7-17cm, obovate, serrulate, rounded or subacute, base cuneate, pink-green when young, lateral veins glandular beneath. Racemes upto 13 cm long, axillary, upto 12-flowered. Pedicels 1.5-2cm long. Sepals 1.3-1.65cm., lanceolate, tomentose; petals 2-2.5cm, obtriangular, whitish, laciniate; stamens 1 cm, with awns ca 0.3cm. Drupe 2.5 – 3.5cm, ellipsoid, compressed, tapering at both ends, 1-seeded.

Flr.: Apr. - May *Fr.:* Aug. - Sep.

Specimen Cited: Samsing, 750m, AP Das & PC Rai 1774, dated 26.8.1997.

Status: Rare.

Local Distrib. : Found only in Samsing. 700m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Assam.

Elaeocarpus lanceifolius Roxb., Fl. Ind., ed. 2, 1:598. 1832; FBI 1:402. 1872; Ind. Trs. 102. 1906; FEH 1:201. 1966; EFPN 2:72.1979; TBRI 50 (4):112. 1987; FB 2(1):170. 1991.

Local Name: Bhadrasy (Nep.).

Tree upto 21 m high. Petioles 1-2.2 cm long; leaf lamina 11-18.5 x 3-6 cm, narrowly elliptic, acute or acuminate, base attenuate, scarcely thin pubescent beneath or usually glabrous, minutely blistered on drying, lateral veins axils glandular along midrib beneath. Racemes 5-7.5 cm, usually 10-flowered on average. Pedicels 0.05 cm. Sepals 0.5-0.69 x 0.15-0.2cm, lanceolate, tomentose or glabrous; petals 0.65-0.8 x 0.3-0.4 cm, obtriangular, whitish, segmented to middle into many segments, hairy within; stamens numerous (upto 32), 0.25-0.35 cm, apex bristly; ovary 3-locular. Fruits 3-5 x 2.1-2.5 cm, ovoid to ellipsoid; stone 3-grooved, rugose, one seeded.

Flr. & Frt.: Aug. - Oct.

Specimen Cited: Below Zero Point, 2100 m, AP Das & PC Rai 1392, dated 07.5.1995.

Status: Frequent.

Local Distrib.: Zero Point, Lava, Tiffin Dara, Sakam Forest. 1300-2200m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Myanmar, S. China.

Note: Wood has timber value for house-building, tea-boxes and charcoal boxes.
Fruits edible.

Elaeocarpus sphaericus (Gaertner)Schumann in Engl., Pfl.-fam. 3(6):5. 1890; FEH 1:202. 1966; EFPN 2:72. 1975; FB 2(1):168. 1991.

Ganitrus sphaericus Gaertn., Fruct. and Sem. 2:271. Pl. 139, f. 6. 1791.

E. ganitrus Roxb., Fl. Ind. ed. 2(2):592. 1832; FBI 1: 400. 1874.

Local Name: Rudrakshay (Nep.).

Trees, 10-20m high, buttressed at base, puberulous when young. Petioles 1.2-1.6cm long; lamina 7-14.5 x 4.-5cm, oblong-lanceolate, subentire to serrate, acute to acuminate, base cunea, glandular along veins beneath. Recemes 6-8.5cm. Sepals 0.65-0.75cm, linear-lanceolate; petals 0.7-0.9cm, oblong, laciniate toward base, whitish; stamens many, awn bristly at apex; many 4-locular. Fruits 1.6-2.4cm across, globose, deep blue, stone 5 grooved, tubercled.

Flr.: May - Jul. *Frt.:* Sep. - Dec.

Specimen Cited: Near Sakam 1350m, AP Das & PC Rai 1424, dated 08.10.1997.

Status: Only two plants seen.

Local Distrib.: Phari, Gorubathan, Sakam. 600-1400m.

General Distrib.: Himalayas (Nepal-Sikkim), India, Malaysia.

Note: A sacred plant, usually grown in the compound of the holy places like temple.

SLOANEA L.

Sloanea dasycarpa (Benth.) Hemsl. in Hook., IC. Pl. 27: t. 2628. 19.01; EFPN 2: 73. 1979; KB 38: 405. 1983; Nam. Chang. Flr. Pl. 525. 1987; FB 2(1): 167. 1991.

Echinocarpus dasycarpus Benth. in J. Proc. L. Soc. 5 suppl. 2: 73. 1861; FBI 1: 400. 1874; Man. Ind. Timb. 113. 1902; Ind. Trs. 101. 1906; Fl. Asm. 1 (1): 183. 1934; Fl. Meg. 1: 161. 1987.

Evergreen, large tree, 14-30 m tall. Petioles 1.2-3.3 cm long, glabrous. Leaves 7.5-21 x 4.2 - 6.2 cm., oblanceolate or obovate, margin distantly serrulate, acute to acuminate, base cuneate, glabrous except vein axils with tufts of hairs beneath along midnerve, lateral nerves 5-6 on either sides. Pedicels 2.2-3 cm long, often extending upto 7.5 cm in fruit. Flowers solitary axillary; sepals 4 or 5, unequal, 0.5-0.6 (-0.75) x 0.4-0.5 (- 0.65) cm, ovate-lanceolate, tomentose; petals 4 or 5, about 0.5 (-1.25) cm, lacinate at the apex; stamens many; anthers acute; ovary ovoid, villous. Capsules 2.5-3 cm diam., globose, 4-valved and densely covered with deciduous bristles; bristles 0.2 cm long, plumose; seeds arillate.

Flr. & Frt.: Jul. - Apr.

Specimen Cited: Sikkim and Neora Valley Border, 2120 m, AP Das & PC Rai 1151, dated 29.4.1995.

Status: Rare.

Local Distrib.: Chouda Feri, Sikkim and neora Valley Border, Sakam Forest. 1300-2200m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

LINACEAE Gray

ANISADENIA Wallich

Anisadenia saxatilis Meissner, Pl. Vas. Gen. Comment. 2:96.1838; FBI 1: 412. 1874; EFPN 2:73. 1979; Fasc. Fl. Ind. 13:3. 1983; FB 1(3):752. 1987; FI 3: 573. 1993.

A. khasyana Griffith, Notul. 4:534. 1854; EFPN 2:73. 1989; FPK 18.1981; TBRI 50(4):105. 1987.

Small perennial herb, generally epiphytic, 12-35cm. Stem unbranched, subglabrous. Leaves arrangement variable, mainly alternate (lower ones), upper somewhat whorled towards top; lamina 2-7.5 x 0.8-2.5cm, elliptic-lanceolate, acute, base cuneate, pubescent beneath. Bracts lanceolate, caducous. Flowers in terminal spike; calyx 0.25-0.4cm, strongly nerved and glandular bristly; corolla 0.75-0.95cm, obovate, pinkish; stamens 0.45cm long. Fruits 0.2cm, oblong.

Flr.: Jun. - Sep. *Frt.:* Aug. - Nov.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0302, dated 17.6.1994.

Status: Rare.

Local Distrib.: Found only in Alubari. 2280m.

General Distrib.: Himalayas (Kashmir-Bhutan), Arunachal Pradesh, Nagaland.

GERANIACEAE Juss.

GERANIUM L.

Geranium nepalense Sweet, Geran. 1:t.12. 1820; FBI 1:430. 1874; FEH 1:167. 1966; 3:74. 1975; FEPN 2: 76. 1975; TBRI 50(4):115. 1987; FB 1(3):749. 1987; FWB 1:356. 1997.

Slender sprawling herb. Stem upto 35cm, diffuse, less or much branched. Leaves opposite; petiole 0.6-55cm, densely pubescent; lamina deeply 3-5 lobed, lobes ovate-rhombic, unequally toothed, hairy, lower leaves on large petioles; stipules 0.2-0.9 cm, linear-lanceolate, free. Peduncle 2-6.5 cm, slender, 2-flowered, hairy. Pedicels 0.9-2.2cm, pubescent, eglandular. Flowers nearly 0.9cm in diam., light pink or purple yellow; sepals 5, free, 0.4-0.5cm, distinctly 3-nerved, persistent, lower surface hairy, whitish yellow; petals 5, longer than sepals, distinctly veined; stamens 10; filaments free; anthers 2-celled; ovary superior, 5-celled with 1-2 pendulous ovules in each chamber; styles 5, united into a basal elongated base. Capsule upto 1.6cm with lobed beak. (Plate III: 25).

Flr.: Mar. - Oct. *Fr.:* Sep. - Dec.

Specimen Cited: Rachila, 2280m, AP Das & PC Rai 0190, dated 15.6.1994; Lava-Alubari, 2118-2280m, AP Das & PC Rai 0308, dated 18.6.1994; Jaributti-Alubari, 2195-2280m, AP Das & PC Rai 0393, dated 15.10.1994; PHE Source, 2155m, AP Das & PC Rai 1073, dated 26.4.1995.

Status: Abundant.

Local Distrib.: Jaributti, Alubari, Lava, PHE Source, Rechila Park, Chitray. 2000-2600m.

General Distrib.: Afganistan, Himalayas, Meghalaya, Manipur, W. China.

OXALIDACEAE R. Br.

OXALIS L.

Key to the species:

1. Peduncles 2-5 flowered.....2
1. Peduncles 1-flowered.....*O. acetosella*
2. Plants with runners.....*O. corniculata*
2. Plants with bulbs.....3
3. Leaflets obcordate.....*O. debilis*
3. Leaflets obtriangular.....*O. latifolia*

Oxalis acetosella L., Sp. Pl. 43. 1753; FBI 1:436. 1874; RBSI 6(8):325-341. 1919; J. Fac. Sci. Univ. Tokyo Bot. 6:81. 1952; En. Sper. Jap. 3:7. 1954; TBRI 50(4):121. 1987; FI 4:242. 1997.

Acaulescent herb with rigid and creeping root-stock. Leaves ternate; petioles 6-13cm long, pubescent; leaflets 1-3 x 1-3.5cm, broadly obcordate, appressed pubescent beneath along margins. Peduncles 7-17cm, slender, axillary, 1-flowered. Flowers 1.55-1.7cm diam., white; sepals 1.5-1.65 x 0.55-0.6cm, oblong, rounded; petals equal to sepals, spathulate-oblong, white; stamens 10, unequal and alternately placed; ovary 0.2-0.3cm, glabrous. Capsules 0.55 - 0.65 x 0.45-0.5cm, ovoid, ribbed.

Flr. & Frt.: May - Aug.

Specimen Cited: Below Pankhasari, 1920m, **AP Das & PC Rai** 1368, dated 06.5.1995.

Status: Rare.

Local Distrib.: Chouda Feri, Sakam, Pankhasari. 1420-2180m.

General Distrib.: E. Himalaya, Meghalaya, Assam, Manipur, Myanmar, China, Japan and Taiwan.

Oxalis corniculata L., Sp. Pl 435. 1753; FBI 1: 436. 1874; FEH 1:168. 1966; EFPN 2: 77. 1979; TBRI 50(4): 121. 1987; FB 1(3):742. 1987; FWB 1:373. 1997.

Local Name: Chari-amilo (Nep.).

Perennial herb, branches runners, leafy, spreading upto 13cm, densely pubescent. Leaves palmate-trifoliolate, radicals, clustered; stipules adnate, to. 25cm; petiole 1.2-4cm, densely brownish hairy; leaflets 0.7-1.1x0.8-1.2cm, entire-ciliate, broadly obcordate, emarginate, lobes rounded, base cuneate, both sides densely hairy, veins indistinct. Peduncles axillary, 2.2-5.5cm long, usually 2-5 flowered, hairy. Pedicels upto 1.2cm long. Flowers 0.8-1cm across; sepals 0.25--0.35x0.1-0.16cm, linear-elliptic, persistent; petals yellow, larger than sepals, 0.5-0.8cm, notched in the middle. Capsules 1-1.8x0.2-0.25cm, subcylindric, pubescent, fruiting pedicel deflexed; seeds many, transversely ribbed.

Flr.: Feb. - Sep. *Frt.:* Mar. - Oct.

Specimen Cited: Alubari Belt, 2280m, **AP Das & PC Rai** 036, dated 13.6.1994; Jaributti-Rechila, 2160-2490m, **AP Das & PC Rai** 1015, dated 23.4.1995.

Status: Abundant in open places.

Local Disrtib.: Jaributti, Alubari, Rechila Middle, Machuki. Upto 2500m.

General Distrib.: Cosmopolitan.

Note: Edible as well as medicinal

Oxalis debilis H. B. K. var. *corymbosa* (DC) Lour. in AMBG 67:840. 1980; Nam. Chang. Flr. Pl. 405. 1987.

Oxalis corymbosa DC., Prodr. 1:696. 1824; FEH 1: 168. 1966; EFPN 2:77. 1979; TBRI 50(4):121. 1987; FB 1(3): 743. 1987.

O. martiana Zuccarini in Denkschr. Akad. Muench. 9:144. 1824.

Small stemless herb with tunicated basal bulb. Bulbils many, ovoid, outer scales 3-nerved. Leaves basal; petioles upto 6-16cm long, hairy; leaflets 2.5-3.5 x 1.6-3 cm, obcordate, bilobed, pilose and gland dotted beneath. Umbels compound, upto 12 flowered. Peduncles 10-25cm long. Pedicels 1-3cm long. Sepals 0.45-0.6cm, elliptic, glandular at the apex; petals 1-1.6cm, spathulate, pinkish. Capsules 2.5-3cm, subeylindric.

Flr.: Mar. - Jun. *Fr.:* May - Jul.

Specimen Cited: Samsing, 720m, AP Das & PC Rai 1817, dated 10.9.1997.

Status: Common in open places.

Local Distrib.: Today, Phari, Samsing, Gorubathan, Machuki. 600-1460m.

General Distrib.: S. America, naturalised in Asia.

Oxalis latifolia Humboldt, Bonpland & Kunth., Nov. Gen. Sp. 5:184, t. 467. 1821; FEH 1: 168. 1966; EFPN 2:77. 1979; TBRI 50(4): 121. 1987; FB 1(3): 743. 1987.

Like *O. corymbosa* but bulbil scales many nerved; leaflets 3-6 x 2.5-4cm, obtriangular, shallowly emarginate, eglandular and glabrous; umbels not compound; flowers campanulate; sepals with 2 hastate apical glands; petals red-pink.

Flr.: May - Jul. *Fr.:* Jun. - Aug.

Specimen Cited: Sakam Forest, 1650m, AP Das & PC Rai 1849, dated 12.9.1997.

Status: Frequent in open places.

Local Distrib.: Machuki, Sakam, Phaparkhati, Gorubathan. 1050 -1900m.

General Distrib.: C. and S. America. Naturalised in S. Europe, India, Malaysia.

BALSAMINACEAE A. Rich.

IMPATIENS L.

Key to the species:

1. Annual herbs; flowers pink.....2
1. Perennial herbs; flowers yellow, later petals flushed with purple.....*I. drepanophora*
2. Flowers pedunculate; peduncles elongated.....*I. bracteata*
2. Flowers epedunculate.....*I. spirifer*

Impatiens bracteata Wallich in Roseb., Fl. Ind. 2:459. 1824; Fl. Jow. 1: 111. 1981; Nam. Chan. Flr. Pl. 291. 1987; FB 2(1):103: 1991; FWB 1:361. 1997.

I. fimbriata Hk., Exot. Fl. 2:t.146. 105; FBI 1: 461. 1874.

Annual herb, 20-33cm, glabrous. Stem usually simple or very rarely branched into few. Leaves arrangement variable, usually opposite, sometimes sub-opposite or even alternate;

petioles upto 1.6cm long, glabrous; lamina 2.5-12x1.5-4.3cm, elliptic to elliptic-lanceolate, margin toothed, acute, base narrow rounded, glabrous, dark green above, paler beneath. Inflorescence terminal, dense, few to many flowered. Bracts overlapping, distinctly fimbriate. Peduncles 2-6.8cm, glabrous. Flowers pinkish with yellow throat; lower sepal navicular, spur 1.5-2cm, filiform, curved; dorsal petal 0.4 x 0.29cm, ovate when stretched; lateral petals 0.95-1.2cm, united; upper lateral petal 1.4-2 x 1.4-2cm, sub-orbicular; lower lateral petal 0.55-0.8 x 0.38-0.55cm, nearly obovate, emarginate along inner margin. Capsule 0.55-0.78cm, glabrous.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Near Zero Point, 2210 m, **AP Das & PC Rai** 1388, dated 07.5.1995.

Status: Frequent.

Local Distrib.: Machuki, Todey, Zero Point, Chonkobhir. 1000-2250m.

General Distrib.: E. Himalaya (Darjeeling-Assam), Meghalaya.

Impatiens drepanophora Hk. f. in RBSI 4(2): 17 & 22. 1905; Toppin in Kew Bull. 1920: 364, fig. 1920; FEH 1:195. 1966; FB 2(1): 97. 1991.

Glabrous perennial herbs, upto 45cm high. Stem glandular, either decumbent or erect. Petioles 0.5-1.5cm long; lamina 2.2-8 x 1.3-3.9cm, variable from lanceolate-elliptic to ovate-elliptic, obscurely sinuate-serrate, acute-acuminate, lateral veins 5-8 pairs, faint green beneath. Raceme spreading, few to many flowered. Peduncles 2-7cm. Flowers yellow; lower sepal 2.6-2.9cm long, with gland-tipped appendage and tapered into 1.7-2.9cm long spur; dorsal petal 0.5-0.85 x 0.4-0.65cm, ovate-oval, erect or deflexed; lateral petals united: upper one 0.8-1 x 0.35-0.5cm, triangular-ovate, lower one 1.5-2 x 0.4-0.5cm, elliptic-lanceolate. Capsule 1.2-1.6 x 0.2-0.3cm, cylindric.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Thosum Beat, 2480m, **AP Das & PC Rai** 0937, dated 24.10.1994.

Status: Frequent.

Local Distrib.: Ruka Forest, Thosum Beat, Middle Rechila, Reshete. 1900-2500m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan), Meghalaya, Manipur.

Impatiens spirifer Hk. f. et Thomas. in Journ. Lin. Soc. 4: 135. 1860; FBI 1: 471. 1875; Hk. f. in RBSI 4(2): 17 & 22. 1905; FEH 1: 197. 1966; EFPN 2: 80. 1975; FB 2(1): 94. 1991; FWB 1:368. 1997.

I. gaegi Hk. f. in Hk., Icon Pd. t.2951. 1911, *e typo*.

Annual herbs, 24-32cm. Stem whitish yellow. Leaves shortly petiolate (petioles upto 0.75cm long), lamina 2-5 x 1.4-2.2cm, elliptic to ovate-lanceolate, margin toothed, acute-acuminate, base narrow, sparsely pubescent above, glabrous to scarcely pubescent along nerves beneath. Bracts linear to linear lanceolate. Flowers single or often in pairs, epedunculate, pale pink; spur yellowish-orange; lower sepal 1.2-2cm long, constricted

forming an incurved spur 1-1.3cm; dorsal petal 1.1-1.55 x 1.2-1.75cm when fully stretched, cucullate, keely crest placed above; lateral petals united; upper lateral petal 0.8-1.4 x 0.801.0.5cm, suborbicular, obscurely emarginate; lower petal 1.8-2.55 x 0.6-1cm; elliptic. Capsule 2-2.3 cm long, sub-fusiform, glabrous.

Flr. & Frt.: Jul. - Oct.

Specimen Cited: Below Alubari, 2289m, AP Das & PC Rai 1266, dated 05.5.1995.

Status: Common.

Local Distrib.: Rechila Middle, Alubari, Thosum Hill, Chouda Feri. 1900-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan), S. Tibet.

RUTACEAE Juss.

Key to the Genera:

1. Flowers polygamous; seeds albuminous.....2
1. Flowers bisexual; seeds exalbuminous.....3
2. Armed shrubs to trees; leaves alternate.....*Zanthoxylum*
2. Unarmed trees; leaves opposite.....*Euodia*
3. Ovules 1-2 in each ovary chamber.....4
3. Ovules 4-8 in each ovary chamber.....5
4. Erect shrubs; leaves pinnately compound.....*Murraya*
4. Scrambling shrubs; leaves unifoliolate compound.....*Paramignya*
5. Leaves 2-3 ternate; stamens 6-8; ovary pedicellate.....*Boenninghausenia*
5. Leaves 3-foliolate; stamens 5.....6
6. Prickly scandent shrubs.....*Todallia*
6. Unarmed erect shrubs or small trees.....*Skimmia*

BOENNINGHOUSENIA Reichenbach

Boenninghausenia albiflora (Hk.) Meisn, Pl. Vase. Gen. 2: 44. 1836; FBI 1: 496. 1875 p.p.; FEH 1: 169. 1966; EFPN 2: 81. 1979; FPK 20. 1981; TBRI 50(4): 107. 1987; FB 2(1): 7. 1991; FWB 1:380. 1997.

Undershrubs upto 70cm. Branches slender, glabrous. Leaves bipinnate; leaflets 0.5-1.9 x 0.4-1.2cm, elliptic-obovate, entire, obscurely emarginate to slightly rounded, cuneate, glabrous, pale green, nerves distinct beneath. Flowers in paniculate terminal cymes; calyx short, 0.12.0.15cm, 4-lobed, persistent; petals 0.5-0.75 x 0.25-0.3cm, nearly oblong-obovate, white; stamens and styles exceeding petals. Gynophore enlarged in fruits. Capsule 0.5cm across.

Flr.: Jul. - Oct. *Frt.:* Oct. - Jun.

Specimen Cited: Rechila Chowk, 2280-2424m, AP Das & PC Rai 0602, dated 16.10.19943.

Status: Less Common .

Local Distrib.: Chitray, Hattidara, Rechila Chowk, Jaributti. 1900-2600m.

General Distrib.: Himalayas (Kashmir-Bhutan), India, China, Taiwan, Malaysia.

EUODIA J. R. & G. Forst.

Euodia trichotoma (Lour.) Planch. in Pierre, Fl. Cochinch t. 287. 1893; FWB 1:382. 1997.

Tetradium trichotoma Lour., Fl. Cochinch. 91. 1790

Tetradium fraxinifolium (Hk) Hartley, Gard. Bull. Sing. 94(1): 109.1981; FB 2(1): 8.1991.

Evodia fraxinifolia (D.Don) Hk f. in FBI 1: 490. 1875; Trs. N. Beng. 27.1929; FEH 1: 170. 1966; EFPN 2: 81. 1979; FPK 20. 1981; TBRI 50(4):114. 1987; FB 2(1): 8.1991.

Local Name : Khankpa (Nep).

Much branched, medium, soft wooded deciduous trees. Barks brownish or ash gray, warty. Young twigs brownish-red, pubescent. Leaves 20-38cm, odd-pinnate; leaflets 2-7 pairs, 6-16 x 1.3-3.6cm, ovate-elliptic to oblong- lanceolate, crenulate, acuminate, base obliquely rounded, sparsely hairy to almost glabrous, greenish above, finely reticulate. Cymes terminal with pubescent branches, spreading. Flowers 4- merous, unisexual; calyx shortly 4-toothed; petals 0.4-0.55cm, greenish white; stamens exceeding petal length; ovary glabrous; stigma capitate. Follicles 0.8-1.4cm across, blackish.

Flr.: May - Jun. *Fr.:* Oct. - Nov.

Specimen Cited: Reshete, 2240m, AP Das & PC Rai 1320, dated 06.5.1995.

Status: Less Common.

Local Distrib.: Chitray, Reshete, Dhamdhamay Dara, Sakam Forest. 1400-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Myanmar, China.

Note: Fruits and leaves highly medicinal for dysentery. Fruits also consumed as pickle.

MURRAYA Koenig ex L. (*nom. cons.*)

Key to the species:

1. 3-6m tall shrub; leaflets 3-7; inflorescence paniculate.....*M. paniculata*
1. 1-3m tall shrubs; leaflets many (13-23); inflorescence corymbose.....*M. koenigii*

Murraya koenigii (L.) Spreng., Syst. Veg. 2:315.1825; FBI 1:503.1875; Ind. For. 93:44. 1967; FEH 3:75. 1975; EFPN 2:82. 1979; FB 2 (1): 17. 1991; FWB 1:386. 1997.

Bergera koenigii L., Mant. Pl. 2:563. 1771; Fl. Ind. ed. 2, 2:375. 1832; Ic. Pl. Ind. Or. 1: t. 13.1838, 'Koinigii'.

Chalcas koenigii (L.) Kurz in JASB 44 (2):132. 1875; Standard Cyclap. H. 2076. 1917; Jour Trop. Agr. 1:29. 1929.

Local Name: Mechi Saag (Nep.).

Evergreen shrub or tree upto 3.2 m high. Leaves pinnate, 13.5- 28 cm; leaflets many (13-23), 1.45-6.6 x 0.85-2.6 cm, ovate, crenate, acuminate, base obliquely rounded or cuneate, glabrous or thinly pubescent. Corymbs many flowered. Flowers bisexual; calyx 0.1 cm, cup-shaped; petals 5, 0.5 x 0.15 cm, free, imbricate; stamens upto 0.5cm; ovary 2-5 celled; style to 0.5 cm; stigma capitate. Fruit 0.81-0.91 x 0.69-0.79 cm, ovoid, crimson.

Flr. & Frt.: Feb. - Apr.

Specimen Cited: Above Machuki, 1100 m, **AP Das & PC Rai** 1422, dated 08.10.1995.

Status: Less frequent.

Local Distrib.: Phari, Samsing, Machuki. 500-1050m.

General Distrib.: Tropical Himalayas (Garhwal-Bhutan), India, Sri Lanka.

Note: Leaves consumed as curry.

Murraya paniculata (L.) Jack. in Malay. Misc. 1:535. 1824; Fl. Jow. 1:120. 1981; EFPN 2:82. 1979; Fl. Meg. 1:187. 1985; FB 2 (1):17. 1991.

Chalcas paniculata L., Mant. ed. 1:68. 1707.

M. exotica L., Mant. Pl. 2:563. 1771; FBI 1:502. 1875; Ind. Trees 113. 1906; Fl. Asm. 1(2): 207. 1936.

Local Name: Kamini (Beng.).

Small evergreen shrub or tree, 3-6m high, aromatic. Young parts puberulous. Bark smooth, white-grey. Leaves pinnate, 10-15cm, 3-7 foliolate; lamina 6-10 x 2.5-5cm, ovate or elliptic, entire, acute to bluntly acuminate, base obliquely cuneate, glabrous. Inflorescence paniculate, many flowered. Flowers fragrant, white; sepals 0.1-0.2cm, ovate, acute; petals 1.6-1.8 x 0.5cm, oblanceolate, greenish white; stamens upto 1 cm long; styles to 1.2cm. Berry 0.8-1 x 0.5-0.6cm, ovate, reddish, 1-2 seeded.

Flr.: Feb. - May *Frt.:* Jul. - Dec.

Specimen Cited: Samsing 700m, **AP Das & PC Rai** 1876, dated 24.10.1997.

Status: Abundant in the lowermost belt.

Local Distrib.: Phari, Machuki, Samsing, Gorubathan. 600-1200m.

General Distrib.: India, Sri Lanka, Myanmar, Indo-China, Malaysia, Australia.

PARAMIGYNA Wight

Paramigyra monophylla Wight, Ill. Ind. Bot. 1:109 t. 42. 1838-1840; FBI 1:510. 1875; EFPN 2:82. 1979; TBRI 50(4):121. 1987; FB 2 (1):19. 1991.

Local Name: Natkanta (Nep.).

Evergreen scrambling shrub, armed with recurved axillary spines. Leaves simple, alternate, 6-12 x 2.5-5cm, ovate-lanceolate, acute to shortly acuminate, base cuneate or rounded, subcoriaceous, lower surface dotted. Flowers bisexual, axillary; calyx to 0.3cm, cup-shaped, 4-5 lobed, lobes rounded; petals 1-1.5 x 0.35-0.4cm, oblong-elliptic; stamens upto 1 cm; ovary densely pubescent; style equal to stamens. Berry 3-3.5cm, globose, yellowish, with thick rind.

Flr.: Mar. - Apr. *Fr.*: May - Aug.

Specimen Cited: Phari, 950m, **AP Das & PC Rai** 1303, dated 05.5.1995.

Status: Less Common.

Local Distrib.: Samsing, Phari, Gorubathan, Machuki. 500-1100m.

General Distrib.: Sub-Tropical Himalayas (Nepal-Bhutan), India, Sri Lanka.

SKIMMIA *Thunb.*

Key to the species:

1. Shrubs or trees, 4-9m tall; racemes short and crowded; petals 0.25-0.4cm.
.....*S. arborescens*
1. Shrubs, 1-3m tall; racemes elongated; petals 0.45-0.5cm.....*S. laureola*

Skimmia arborescens Anders. ex Gamble in Jour. Lin. Soc. Bot. 43: 491.1916; FEH 1: 170.1966; EFPN 2: 82. 1979; FB 2(1): 19. 1991; FWB 1:387. 1997.

Limonia laureola sensu FBI 1:499.1875, p.p. *non* (DC.) Walpers.

Local Name: Limbuniphul, Choulamay (Nep.).

Evergreen, large shrubs to trees, 4.5-8.5 m. Leaves closely alternate, falsely whorled at branch ends; petioles 0.7-1.7 cm; lamina 7-12 x 2.5-4.5 cm, elliptic-oblongate, entire, caudate-acuminate, cuneate, glabrous, glossy beneath, lateral veins 5-7 on each side. Racemes 1.3-4 cm long, terminal. Sepals 0.1-0.15 cm; petals 0.25-4 x 0.15-0.2 cm, cream-coloured; stamens 0.3-0.5 cm; anthers brown; filaments greenish-white; ovary 0.15 cm long. Fruit 0.75-0.9 x 0.55-0.7 cm, ellipsoid, reddish.

Flr.: Apr. - May *Fr.*: Nov. - Mar.

Specimen Cited: Mulkharka 2120 m, **AP Das & PC Rai** 1146, dated 29.4.1995.

Status: Common.

Local Distrib.: Ruka Hill, Thosum Forest, Mulkharka, Chitray. 2100-2800m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Thailand, W. China.

Skimmia laureola (DC.) Walpers, Repert. 5: 405. 1842-1847; FBI 1: 449. 1875; EFPN 2: 83. 1979; TBRI 50(4): 127. 1987; FB 2 (1): 18. 1991; FWB 1:387. 1997.

Limonia laureola DC., Prodr. 1: 536.1824; Pl. As. Rar. 3: 23, t. 245. 1832.

S. wallichii Hk. f. *et* Thoms. ex Gamble in Journ. Lin. Soc. 43:492. 1916.

S. melanocarpa Rehder et Wilson in Pl. Wilson. 2: 138. 1914, p.p.; FEH 1: 170. 1966; 3:75. 1975.

Local Name: Jainberiphul (Nep.).

Small evergreen, glabrous, erect shrub. Leaves simple, generally crowded at branch ends, alternate; petioles short upto 1.8 cm, glabrous; lamina 5.5-15 x 1.7-5 cm, oblanceolate or oblong-elliptic, entire, acute or caudate-acuminate, cuneate, softly coriaceous, glabrous, dark green above, pale beneath, mid-vein thick and elevated beneath, lateral nerves 6-8 pairs, obscure above. Bracts upto 0.2 cm, ovate-oblong, ciliate, persistent. Bracteoles like bracts but smaller. Peduncles white, ciliate. Flowers in terminal erect racemes, fragrant, dioecious; sepals 5-lobed, 0.15 cm; petals 5, 0.45-0.49 x 0.15-0.18 cm, oblanceolate, greenish-white; stamens 5, equal or slightly exceeding petals; anthers yellowish; filaments upto 0.4 cm long; ovary 0.2 cm; style short. Fruits 0.8-1 cm across, subglobose, black on maturation, fruiting peduncles elongated upto 0.5 cm.

Flr.: Mar. - May *Fr.:* May - Nov.

Specimen Cited: Rechila Chowk, 2300 m, **AP Das & PC Rai** 0321, dated 18.6.1994; Alubari Belt 2280 m, **AP Das & PC Rai** 0579, dated 16.10.1994.

Status: Very Common.

Local Distrib.: Alubari, Jorpokhari, Rechila Chowk, Thosum Hill, Chitray. 2000-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan, Assam), Myanmar, W. China.

TODDALIA Juss. (*nom. cons.*)

Toddalia asiatica (L) Lamk., Tab. Encycl. 2:116. 1797; FEH 1:171.1966; EFPN 2:83. 1979; Fl. Jow. 1:117. 1981; TBRI 50(4): 129. 1987; FB 2(1):11. 1991.

Paulinia asiatica L., Sp. Pl. 1:365. 1753.

T. aculeata Persoon, Syn. Pl. 1:249. 1805; FBI 1:497. 1875.

Local Name: Main Kanra, Singhanay Kanra (Nep.).

Large evergreen, prickly scandent shrub. Prickles to 0.2cm, curved. Bark dark brown, lenticellate. Petioles 3-4.5 cm long. Lamina 6-14cm long, palmately 3 foliate; leaflets 4-9 x 2-3.5cm, oblanceolate, acute or acuminate, base narrowed, rounded or truncate, margin crenate, glabrous. Inflorescence upto 9cm long. Flowers unisexual; calyx 0.1-0.15cm, glandular pubescent outside; petals 5, to 0.35cm, imbricate, oblong, greenish yellow; stamens 5, slightly exceeding petals; ovary to 0.3cm, ovoid, greenish. Fruit upto 1cm in diam., globose, obscurely grooved, orange yellow.

Flr.: Feb. - May *Fr.:* Jul. - Nov.

Specimen Cited: Phari, 950m, **AP Das & PC Rai** 1878, dated 24.10.1997.

Status: Less Frequent.

Local Distrib.: Samsing, Phari, Sakam, Gorubathan. 700-1800m.

General Distrib.: Tropical Africa, Sub-Tropical Himalayas, Meghalaya, Sri Lanka, Myanmar, Indo-China, China, Malaysia.

Note: Fruits edible (Cowan & Cowan 1929.)

ZANTHOXYLUM L.

Key to the species:

1. Erect prickly shrub; rachis winged; petals absent.....*Z. acanthopodium*
1. Scrambler with hooked prickles; rachis not winged; petals present.....*Z. oxyphyllum*

Zanthoxylum acanthopodium DC., Prodr. 1. 727. 1824; FBI 1:493. 1875; Trs. N. Beng. 29.1929; FEH 1:171. 1966; EFPN 2:83. 1979; FPK 21. 1981; TBRI 50(4): 130. 1987; FB 2 (1):13.1991; FWB 1:388. 1997.

Local Name: Boke Timbur (Nep).

Prickly shrub, young branchlets ferruginous, tomentose, sometimes glabrous. Leaves imperipennate, upto 24cm; leaflets 3-9, 4.3-7.5 x 1.5-3.1cm, lacceolate or ovate-lanceolate, obscurely serrate, shortly acuminate or acute, rounded, glabrous above, pubescent beneath along nerves, veins distinct beneath, wings between leaflets upto 0.65cm broad. Inflorescence axillary, small crowded cymes, shortly pedunculate. Calyx leaves linear, ciliate; stamens brownish. Fruits 0.3-0.4cm in diam., sub-globose, red; fruiting pedicel elongated to 0.2cm; seeds 0.25-0.3cm across, globular, blackish.

Flr.: Oct. - Feb.

Fr.: Dec. - Jun.

Specimen Cited: Mulkharka Pokhari, 2240 m, AP Das & PC Rai 0525, dated 30.4.1995; Dhamdhamay Dara, 2520 m, AP Das & PC Rai 0681, dated 18.10.1994.

Status: Less Common.

Local Distrib.: Dhamdhamay Dara, Chitray, Reshete, Mulkharka Pokhari. 2000-2600m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar, Thailand, Indo-China, W. China.

Note: Fruits chewed to cure indigestion and flatulence.

Zanthoxylum oxyphyllum Edgew. in Tr. Lin. Soc. 20: 42. 1846; FBI 1: 494. 1875; Trs. N. Beng. 29. 1929; EFPN 2:83. 1979; TBRI 50(4): 130. 1987; FB 2(1):14. 1991; FWB 1:389. 1997.

Local Name: Bhainsi Timbur (Nep.).

Medium scrambler with hooked prickles. Leaves imparipinnate, upto 20 cm; leaflets 1-8 pairs, both opposite and alternate, 1.9-4.7 x 0.9-1.5 cm, ovate-lanceolate to oblong, glandular crenate, acute to short acuminate, base cuneate or rounded, both sides glabrous, nerves elevated beneath; rachis prickly. Cymes much branched, sub-umbellate, many flowered, terminal, glabrous. Pedicels 0.2-0.3 cm. Flowers 0.4-0.55 cm long, unisexual, brownish to violet purple; calyx 4-lobed, segments 0.1-0.13 cm; petals 0.35-0.40 x 0.15-

0.2 cm; ovate-elliptic, reticulately nerved; stamens 4; filament 0.3-0.4 cm, whitish 4; anthers slightly extruded; carpels 4, 0.35-0.43 cm, ovoid. Follicles 0.45-0.6 cm in diam., subglobose, dull red; persistent abortive carpels at base. (Plate I: 9)

Flr.: Apr. - May *Fr.:* Aug. - Dec.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 0158, dated 15.6.1994; Chouda Feri, 2285 m, AP Das & PC Rai 0557, dated 5.5.1995; Rechila 2490 m, AP Das & PC Rai 1249, dated 06.5.1995.

Status: Common.

Local Distrib.: Chouda Feri, Rechila Middle, Alubari, Thosum Forest. 2200-2800m.

General Distrib.: Himalayas (Garhwal-Bhutan), Meghalaya, Myanmar.

BURSERACEAE Kunth.

GARUGA Roxb.

Garuga gamblei King ex Smith in RBSI 4: 262. 1911; RBSI 11(1): 57. 1926; *Flr. Asm.* 1: 222. 1934; *FWB* 1:396. 1997.

Garuga floribunda Decn., *Naur. Ann. Muss. Paris* 3:477. 1834 var. *gamblei* (King ex Smith) Kalkman in *Blumea* 7: 466. 1953; *Nam. Chang. Flr. Pl.* 251. 1987; *FB* 2 (1): 27. 1991.

Local Name: Dabdabe (Nep.).

Large deciduous trees to 15 m, often buttressed at base. Bark ashy-gray, nearly smooth, young parts puberulous. Leaves alternate, generally imparipinnate, lamina 30-45 cm long, rachis pubescent when young; stls. 0.5-0.7 cm, oblong and deciduous; leaflets subsessile, lamina 5-18 x 2-4 cm, elliptic or lanceolate, crenate-serrate, acuminate, base obliquely rounded, pubescent at first, glabrous afterwards, turning yellow before shedding, lateral nerves upto 18 pairs on either halves, arching. Peduncles 12-30 cm long, axillary at branch ends, finely tomentose. Bracteoles deciduous, lowers ones often 3-lobed. Receptacle 0.15 cm. Flowers small, pale yellow; sepals 0.15 cm, triangular, glabrous inside, minutely tomentose outside, persistent in fruits; petals 5, 0.3-0.4 x 0.4-0.15 cm, ovate, pale yellow, pubescent outside, glabrous within except at base; stamens 10 in 2 rows, inner ones longer than outer, upto 0.2 cm long; filament glabrous; anthers bluish; ovary 5-celled, globose, usually glabrous; style stout, glabrous. Drupes 0.55-0.85 x 0.55-1.1 cm, greenish.

Flr.: Apr. - May *Fr.:* Aug. - Nov.

Specimen Cited: Rechila Durpinay, 2250 m, AP Das & PC Rai 1344, dated 06.5.1995.

Status: Less Frequent.

Local Distrib.: Pankhasari, Rechila Durpinay, Jaributti, Machuki, Todey. 1300-2250m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Assam, Meghalaya.

Note: Used as fodder and firewood.

MELIACEAE Juss.

TOONA (Endlicher) Roemer

Toona ciliata Roem., Syn. Hesper 139. 1846; Fl. Meg 1: 212. 1987; Nam. Chang. Fl. Pl. 268. 1987; FB 2 (1): 38. 1991; FWB 1:406. 1997.

Cedrela toona Roxb. ex Rottl., Ger. Naturf. Fr. Neve Schr. 2: 198. 1803; FBI 1: 568. 1875; Man. Ind. Timb. 157. 1902; Ind Tr. 145. 1906; Fl. Asm. 1(1): 242. 1935.

C. toona var. *listeri* C. DC. in RBSI 3:370. 1908.

Local Name : Tooni (Nep.).

A large deciduous lofty tree to 16-37 m tall. Bark initially gray turning brownish afterwards, coarse, scaly and peeling-off in flakes of irregular shape. Leaves generally paripinnate, 30-60 cm long; petioles terete, glabrous; petiolules 0.5 - 1.25 cm long, leaflets 5-24, opposite or alternate, 5-16 x 1.8-5cm, obscurely ovate - lanceolate or oblong-lanceolate, margin entire or subentire, obtuse, glabrous and thinly hairy on the secondary nerve axils beneath, lateral nerves 10-15 cm each side of mid-nerve and arching. Panicles large, pyramidal. Flowers 0.65 - 08 cm diam., white, slightly fragrant. Calyx subentire or minutely lobed, lobe ovate, obtuse or subacute, pubescent outside; petals oblong, whitish, margin ciliated; stamens 5; filaments hairy; disc orange-red; ovary hairy; stigma free, capitate. Capsule upto 2.5 cm long, ellipsoid, 5-valved, usually smooth; seeds winged at both terminal ends, brown.

Flr. & Frt.: Nov. - Sep.

Speciment Cited: Forest area near Sikkim Border, 1800m, AP Das & PC Rai 1158, dated 29.4.1995.

Status: Less Frequent.

Local Distrib.: Neora Valley-Sikkim Border, Chouda Feri, Sakam Forest. 1300-2000m.

General Distrib.: Afganistan, Himalayas, India, Sri Lanka, East to China.

Note: Wood is a good quality timber used to make furniture, doors, windows etc. The timber of this tree is much in demand.

ICACINACEAE Miers.

NATSIATUM Arnott

Natsiatum herpeticum Arnt. in Edinb. New. Philos. Journ. 16:314:1834; FBI 1:595. 1875; FEH 1:191. 1966; EFPN 2: 87. 1979; FB 2 (1):135. 1991.

Local Name: Sungoo-rik (Lep.).

Shrubby climber, woody. Stem densely strigose, ridged. Petioles upto 9.5cm long, appressed hairy; lamina 5-16x 4-12 cm, broadly ovate, acute-acuminate, base cordate, margin coarsely dentato-serrate, densely hairy beneath, nerves 7-9, divergent from base. Racemes upto 13 cm long, axillary, pendent. Peduncles densely strigose throughout. Bracts 0.2-0.3 cm, linear-subulate. Pedicels upto 0.25cm long. Flowers greenish yellow. Male flowers: calyx to 0.3cm, 5-lobed; petals 5, free, upto 0.3cm long, lanceolate; fertile stamens 5, antisepalous, staminodes 5; pistillode minute. Female flowers similar to male ones excepting stamens being reduced to staminodes, with 2-3 lobed styles. Drupes 0.85-1.2 cm, obscurely ovoid, single seeded .

Flr.: Nov. - Jan. *Fr.:* Feb. - Apr.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1947, dated 02.11.1997.

Status : Common.

Local Distrib.: Gorubathan, Phari, Samsing, Machuki. Upto 1000m.

General Distrib: E. Himalaya (Darjeeling-Sikkim, Khasia Hills), Assam, Nepal, Bangladesh, Myanmar, China, Thailand.

AQUIFOLIACEAE Bartl.

ILEX L.

Key to the species:

1. Leaf margin spinescent.....2
1. Leaf margin never spinescent.....3
2. Lamina 10-17cm long; fruits 0.5-0.75cm long.....*I. insignis*
2. Lamina 7-12cm long; fruits 0.8-1cm long.....*I. dipyrena*
3. Plant deciduous; lamina rugose, blackish and brittle on drying.....*I. fragilis*
3. Plants evergreen; lamina not rugose.....4
4. Cymes axillary, 1-3 flowered; lamina crenate or serrate.....*I. crenata*
4. Flowers in axillary pseudopanicles or fascicles of cymes; lamina serrate.....5
5. Fruiting pedicels elongated , glabrous; corolla reddish-pink.....*I. sikkimensis*
5. Fruiting pedicels not elongated, pubescent; corolla green.....*I. odorata*

Ilex crenata Thunb., Fl. Jap. 78. 1784 var. *thomsonii* (Hk. f.) Loesener, Monogr. Aquifol. 1: 202, t. 4, f. 2C. 1901; FEH 1: 187. 1966; 2: 70. 1971; FB 2(1): 108. 1991; FWB 1:414. 1997.

I. thomsonii Hk. f., FBI 1: 602. 1875.

Small tree, young shoot puberulous. Petioles 0.15-0.25 cm; lamina 1-2.3 x 0.6-1.1 cm, elliptic to obovate, crenate towards apex, acute, attenuate, glabrous, glossy above, dotted with dark raised glands beneath, lateral nerves indistinct. Flowers 1-3 in axillary cymes, 4-merous; calyx 4-lobed, glabrous, lobes sub-orbicular to broadly ovate; corolla 4-lobed, 0.2-0.22 x 0.15-0.22 cm, sub-orbicular or broadly ovate, white; stamens 4, nearly as long as petals. Fruit 0.5-0.6 cm across, glabrous, black on ripening; fruiting pedicels elongated to 0.8 cm, hairy.

Flr.: May - Jul.

Fr.: Aug. - Nov.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 0452, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Alubari, Jaributti, Ruka Hill. 2100-2700m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya.

Ilex dipyrena Wallich in Roxb., Fl. Ind. ed. Carey 1: 430. 1820; FEH 1: 187. 1966; EFPN 2: 87. 1979; TBRI 50(4): 117. 1987; FB 2(1): 108. 1991; FWB 1:414. 1997.

Local Name: Lise (Nep.).

Medium evergreen trees, branches stout. Petiole upto 0.5 cm; lamina 7-12 x 2.5-3.4 cm, elliptic-lanceolate with distant marginal spines (longer in juvenile leaves), acuminate, cuneate, glabrous, leathery, dark glossy green above, pale beneath, veins distinct beneath. Fascicles axillary, glabrous, sessile. Pedicels short. Flowers unisexual, 0.6 cm in diam., 4-merous; calyx 4-lobed, lobes ovate, 0.5 x 0.12 cm, ciliated; corolla lobes 4, obovate, 0.25-0.35 x 0.15-0.2 cm, greenish-white; stamens 4, upto 0.3 long; ovary ovoid, 2-celled, 0.25 x 0.2 cm; stigma discoid. Drupe 0.8-1cm, red when ripe, glabrous, elongated pedicels of 0.25 cm.

Flr.: Mar. - May

Fr.: Nov. - Dec.

Specimen Cited: Jaributti-Alubari, 2195-2280 m, AP Das & PC Rai 0419, dated 15.10.1994.

Status: Common.

Local Distrib.: Alubari, Chitray, Ruka Hill, Jaributti, Hattidara. 2100-2700m.

General Distrib.: Himalayas (Punjab-Arunachal Pradesh), Manipur, W. China.

Ilex fragilis Hk. f. in FBI 1 : 602 . 1875 ; FEH 1 : 187 . 1966 ; EFPN 2 : 87 . 1979 ; TBRI 50 (4) : 117 . 1987 ; FB 2 (1) : 106 . 1991; FWB 1:414. 1997.

Local Name: Phalamkath (Nep.).

Small tree; branches brittle, glabrous, lenticellate. Leaves alternate but terminal ones paired, brittle when dry ; petiole 0.5-1.2 cm ; lamina 5.5-8.5 x 1.3-3.5 cm , ovate to elliptic-ovate, serrate, acuminate, rounded, glabrous, pale greenish-yellow beneath, mid-vein broad, lateral veins 6-9 pairs, rugose. Fascicles unbranched, axillary, monoecious. Pedicels 0.2-0.25 cm, glabrous. Flowers 0.3cm across; calyx glabrous, 5-7 lobed, rounded to ablong, ciliated; corolla-lobes 5-7 or more, larger than sepals, 0.2 x 0.15 cm, spreading, ciliated, white; stamens 5-8, inserted on the petals, 0.14-0.2 cm long. Ripe drupe red, glabrous, 0.4 cm across.

Flr.: May - Jun.

Fr.: Sep. - Feb.

Specimen Cited : Chouda Feri- Rechila Middle Zone, 2285-2490 m, **A P Das & P C Rai** 1271, dated 05.5.1995; Rechila Durpinay, 2300 m, **A P Das & P C Rai** 1398, dated 06.7.1995.

Status : Very Common.

Local Distrib.: Rechila Middle, Rechila Durpinay, Chouda Feri, Dhamdhamay Dara. 2200-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Myanmar, W. China.

Ilex insignis Hk. f., FBI 1: 599. 1875; FEH 1: 88. 1966; EFPN 2: 87. 1979; TBRI 50(4): 117. 1987; FWB 1:416. 1997.

Local Name: Lise (Nep.).

Small to medium evergreen trees upto 10m, young branches grooved, glabrous, grayish. Petioles 1.5-2 cm, brownish red; lamina 10-17 x 4-7 cm, elliptic-oblong, stiff and thick, spinous in juvenile shoots, spinose-toothed in mature, acute, attenuate, dark green above, glabrous, mid-rib thick and elevated beneath. Flowers in sub-globose clusters, 4-merous, glabrous, sessile; calyx 0.15-0.2 x 0.15-0.2 cm, 4-lobed, persistent; corolla 0.35-0.5 x 0.2-0.25 cm, 4-lobed, greenish white, mid-vein strong; stamens 4; filaments 0.3-0.4 cm long, whitish green; ovary green. Fruits globose, red.

Flr.: Apr. - May

Fr.: Aug. - Dec.

Specimen Cited: Reshete, 2240 m, **AP Das & PC Rai** 1323, dated 06.5.1995.

Status: Common.

Local Distrib.: Pankhasari, Rechila Middle, Reshete, Mulkharka. 2000-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), W. China.

Ilex odorata Buch-Ham. ex D. Don, Prodr. 189. 1825; FBI 1:599. 1875 p.p.; EFPN 2: 88. 1979; Nam. Chang. Flr. Pl. 290. 1987.

I. theaeifolia Hk. f., FBI 1: 601. 1875.

Medium tree, young twigs reddish; barks silvery gray, thin, lenticellate. Petioles upto 2.6 cm; lamina 6.5-12.5 x 2.4-5 cm, elliptic-oblong, serrate to serrulate, acute or often obtuse, base cuneate to narrowly rounded, glabrous, light brownish purple above when young, greenish white beneath, mid vein elevated beneath, lateral nerves 9-11 on either sides, anastomosing towards margin. Flowers dented; calyx lobes upto 0.15cm long, ciliate; corolla green, lobes 0.25-0.32cm; stamens to 0.15cm long. Drupes 0.5-0.6cm across.

Flr.: Apr. - May

Fr.: Aug. - Feb.

Specimen Cited: Reshete, 2240 m, **AP Das & PC Rai** 1328, dated 06.5.1995.

Status: Less Common.

Local Distrib.: Hattidara, Ruka Hill, Reshete, Chitray. 2200-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, W. China.

Ilex sikkimensis Kurz., JASB 44:202. 1875; FEH 1:188. 1966; FWB 1:416. 1997.

I. hookeri King in JASB 55(2): 266, t. 14. 1886; Monogr. Aquifol. 287. 1901; FB 2 (1): 109. 1991.

Local Name: Lise (Nep.).

Small trees to 8 m, glabrous; terminal bud-scales leafy with ciliated margin, glabrous. Petioles 0.7-1.5 cm, pinkish red; lamina 5-11 x 1.5-3.3 cm, lanceolate to narrowly oblong, serrate, acute to acuminate, attenuate, coriaceous, greenish above, both sides glabrous, mid-rib thick and channeled beneath, depressed above. Male flowers in axillary clusters; females solitary, axillary; calyx 0.11 x 0.1 cm, 4-lobed; corolla 0.22-0.28 x 0.15-0.2 cm, lobes 4, reddish pink; stamens 4, upto 0.25 cm long; ovary 0.2 x 0.16 cm. Drupe 0.45-0.6cm across,, fruiting pedicel elongated, glabrous.

Flr.: Apr. - May

Frt.: Aug. - Nov.

Specimen Cited: Jorpokhari, 3000m, AP Das & PC Rai 1212, dated 3.5.1995.

Status: Common.

Local Distrib.: Tinsimsna, Jorpokhari, Chitray, Thosum Hill. 2500-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

CELASTRACEAE R. Br.

Key to the Genera:

1. Erect shrubs or trees; spinescent.....*Maytenus*
1. Climbing or epiphytic shrubs; never spiny.....2
2. Leaves alternate, entire; fruits 2-3 valved, uniseeded.....*Celastrus*
2. Leaves opposite, serrate; fruits 4-5 valved, amny seeded.....*Euonymus*

CELASTRUS L.

Key to the species:

1. Lamina obovate to orbicular; cymes paniculate, terminal.....*C. paniculatus*
1. Lamina ovate-oblong or ovate-orbicular; cymes axillary.....*C. dependens*

Celastrus dependens Wallich in Roxb., Fl. Ind. ed. Carey, 2:389. 1824; Cat. no. 4302. 1831, *nom.nud*; TBRI 50(4):109. 1987.

A greenish liana with pendulous branches, glabrous but lenticellate. Leaves alternate; lamina ovate-oblong or ovate-orbicular, serrate, acuminate, reticulate nerves distinct and depressed. Stipules minute, linear or laciniate. Cymes axillary few flowered. Flowers pentamerous, greenish; calyx deeply lobed and persistent. Disc cup shaped, 5-lobed; filaments hairy; ovary 3-celled. Capsule 3-celled; seeds 1-5, arillate.

Flr. & Frt.: Apr. - Aug.

Specimen Cited: Below Reshete, 2180m, **AP Das & PC Rai** 1331, dated 06.5.1995.

Status: Rare.

Local Distrib.: Confined to Reshete area of Neora Valley.

General Distrib.: E. Himalaya.

Celastrus paniculatus Willdenow, Sp. Pl. 1: 1125. 1797; FBI 1: 617. 1875; FEH 1: 189. 1966; EFPN2: 88. 1979; FB 2(1): 122. 123. 1991. sub.sp. *paniculatus*: FWB 1:419. 1997.

Local Name: Bhainsay Lahara (Nep.).

Scandent shrubs. Branchlets terete, pubescent. Stem grooved, lenticellate, grayish green. Leaves simple, alternate; petioles 0.4-1 cm, lamina 3-8 x 1.4-4 cm, obovate to orbicular, crenate-serrulate, abruptly acuminate, base attenuate, glabrous, soft, lower surface light whitish green. Paniculate cymes terminal, pendulous, pubescent. Peduncles pubescent. Flowers whitish-green; sepal lobes 5, ovate, fimbriate, greenish; petals 5-lobed, margin irregular, clawed, obovate; stamens 5; anthers yellow; filament greenish-white; stigma 3-lobed. Capsule 0.6-0.8 cm, globose; seeds arillate, ellipsoid.

Flr.: Jun. - Jul. *Frt.:* Sep.- Dec.

Specimen Cited: Jaributti 2195 m, **AP Das & PC Rai**, 0431 dated 15.10.1994; Jaributti-Middle Rechila, 2160-2490 m, **AP Das & PC Rai** 0989, dated 23.4.1995; Chouda-Feri-Rechila Chowk, 2285-2490 m, **AP Das & PC Rai** 1254, dated 05.5.1995; Zero Point, 2285 m, **AP Das & PC Rai** 1382, dated 07.5.1995.

Status: Common.

Local Distrib.: Mulkharka, Middle Rechila, Jaributti, Chouda Feri, Rechila Chowk. 1900-2500m.

General Distrib.: Himalayas, India, Sri Lanka, Myanmar, Indo-China, Malaysia, China, Formosa, Australia.

EUONYMUS L.

Key to the species:

1. Plants shrubs or trees.....2
1. Plants epiphytic climbers.....3
2. Lamina 2.5-12 x 1.2-2.4cm, oblong lanceolate, sharply serrate
.....*E. frigidus* var. *frigidus*
2. Lamina 8-18 x 0.6-0.62cm, very narrow, distantly toothed
.....*E. frigidus* var. *elongatus*
3. Petioles shorter (0.5-1cm); corolla white.....4

3. Petioles longer (0.7-1.5cm); corolla crimson.....*E. viburnoides*
 4. Flowers 0.8cm across; ovary smooth; fruits 2-4 ribbed, smooth.....*E. vagans*
 4. Flowers 0.5cm across; ovary warted; fruits echinate.....*E. echinatus*

Euonymus echinatus Wallich in Roxb., Fl. Ind. ed. Carey, 2: 410. 1824; FBI 1: 611. 1875; FEH 1: 189. 1966; EFPN 2: 89. 1979; TBRI 50 (4): 113. 1987; FB 2(1): 118. 1991; FWB 1:421. 1997.

Epiphytic climbers climbing over trees or on rock-crevices with tufted adventitious roots, or low spreading shrubs, semi-erect. Leaves opposite; petioles 0.3-1 cm; lamina 2-7 x 1-3.5 cm, ovate-lanceolate, serrate, acute, base rounded, glabrous, dark green, lateral nerves widely spreading and arching, prominent above. Cymes 2-4 cm, usually terminal or axillary. Peduncles divided. Flowers 0.5 cm across, 4-merous, dark red; sepal lobes shorter, 0.1-0.13 cm; petals 4, 0.25-0.35 cm rounded, red; stamens inserted on fleshy disc; anthers 4, attached with greenish and warted ovary. Capsules 0.7 cm in diam., globular, echinate, armed with many short spines.

Flr.: Apr. - Jun. *Fr.:* Aug. - Oct.

Specimen Cited: Jaributti-Alubari, 2195-2280 m, AP Das & PC Rai 059, dated 14.6.1994; Thosum Beat, 2590-2780 m, AP Das & PC Rai 0887, dated 23.10.1994.

Status: Common.

Local Distrib.: Thosum Beat, Rechila Middle, Jaributti, Jorpokhari. 2100-3050m.

General Distrib.: Himalayas (Kashmir-Bhutan).

Euonymus frigidus Wallich in Roxb., Fl. Ind. ed. Carey, 2: 409. 1824; FBI 1: 611. 1875; FEH 1: 189. 1966; 2: 71. 1971; EFPN 2: 89. 1979; FB 2(1): 119. 1991, var. *frigidus*: FWB 1:422. 1997.

Small evergreen shrubs, 1.5 m; terminal buds large upto 0.8 cm, conical. Branchlets smooth. Young stems grooved; nodal region thinly white hairy. Leaves opposite; petioles 0.4-0.9 cm; lamina 2.5-12 x 1.2-2.4 cm, oblong-lanceolate, sharply serrate, acute-acuminate, base cuneate, glabrous both sides, nerves prominent above. Cymes 3-5 cm, axillary, few flowered. Peduncles upto 4 cm, slender, filiform, glabrous. Pedicel 1 cm, filiform. Flowers 4-merous, 0.9 cm in diameter; sepals lobed, 0.7 cm; petals 0.24-0.3 cm, ovate-orbicular, pinkish-white; anthers minute, sessile, almost orbicular when matured, one-celled; ovary immersed in disc. Capsule 1.3 cm in diameter, sub-globose with 4-tapering wings, fleshy, when ruptured appears nearly flat and red; seeds minute.

Flr.: May - Jun. *Fr.:* Aug. - Dec.

Specimen Cited: Tinsimana-Jorpokhari, 2900-3040 m, AP Das & PC Rai 0789, dated 20.10 1994.

Status: Frequent.

Local Distrib.: Ruka Hill, Tinsimana, Thosum Beat, Jorpokhari, Alubari. 2200-3050m.

General Distrib.: E. Himalaya, Assam, Manipur, Myanmar and China.

Note: Ornamental.

Euonymus frigidus Wallich in Roxb., Fl. Ind. ed. Carey, 2: 409. 1824; FBI 1: 611. 1875; FEH 1: 189. 1966; 2: 71. 1971; EFPN 2: 89. 1979; TBRI 50 (4):113. 1987; FB 2(1): 119. 1991; FWB 1:422. 1997, var. *elongatus* Cowan et Cowan, Trs. N. Beng. 35. 1929; FB 2(1): 119. 1991.

E. frigidus f. *elongatus* (Cowan et Cowan) Hara in FEH 1: 189. 1966; EFPN 2: 89. 1979; TBRI 50 (4): 114. 1987.

Same as above but leaves long upto 18 cm, very narrow, long-acuminate and distantly toothed. Cymes longer, upto 10 cm.

Flr.: May - Jun. *Fr.:* Aug. - Jun.

Specimen Cited: Alubari 2280 m, AP Das & PC Rai 0189, dated 15.6.1994; Tinsimana-Jorpokhari 2900-3040 m, AP Das & PC Rai 0792, dated 20.10.1994; Rechila-Jorpokhari 2490-3040 m, AP Das & PC Rai 1177, dated 03.5.1995.

Status: Common.

Local Distrib.: Jorpokhari, Rechila Chowk, Tinsimana, Alubari. 2100-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Myanmar.

Note: Ornamental.

Euonymus vagans Wallich in Roxb., Fl. Ind. ed. Carey, 2: 412. 1824; FBI 1:611. 1875; FEH 1:190. 1966; 2:71. 1971; EFPN 2: 90. 1979; TBRI 50(4):114. 1987; FB 2(1):118. 1991.

Similar to *E. echinatus* but differing in variable shapes and sizes of the leaves. Cymes upto 30-flowered. Flowers smaller, upto 0.8 cm across. Capsules subglobose, lobes 2-4, shallowly rounded .

Flr. & Fr.: May - Aug.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 0222, dated 16.6.1994.

Status: Very Common.

Local Distrib.: Chouda Feri, Sakam, Ruka, Alubari. 1700-2400m.

General Distrib.: E. Himalaya, Assam, Manipur, Tibet and China.

Euonymus viburnoides Prain, JASB 73:194. 1904; FEH 1:190. 1960; TBRI 50(4):114. 1987; FB 2(1):118. 1991.

E. frigidus sensu FBI 1:611. 1875, p.p, *non* Wallich.

Local Name: Haray Lahara (Nep.).

Epiphytic evergreen shrub, lenticellate. Branchlets 4-angled. Leaves petiolate; petioles 0.7-1.5cm long; lamina 3.5-9 x 2.2-4cm, ovate-lanceolate, acuminate, base cuneate or rounded, margins irregularly serrulate, nerves 7 pairs. Cymes 4-9cm, many flowered, axillary, divaricately branched. Flowers 0.55-0.7cm across, 4-merous; calyx lobes upto 0.15 cm, concave; petals 0.25-0.3 cm, orbicular, crimson. Capsules 0.85-1.1 x 1-1.2 cm, turbinate, quadrangular.

Flr.: Mar. - Jun. *Fr.*: Jul. - Sep.

Specimen Cited: Alubari Khasmahal, 2300m, AP Das & PC Rai 0253, dated 16.6.1994.

Status: Less Common.

Local Distrib.: Jaributti, Reshete, Ruka Hill, Alubari.1900-2700m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), W. China.

MAYTENUS Molina

Maytenus rufa (Wallich) Hara, Journ. Jap. Bot. 40: 327. 1965; FEH 1:190. 1966; 2:72. 1971; EFPN 2:90. 1979; TBRI 50 (4):119. 1987; FB 2(1):124. 1991.

Celastrus rufa Wallich in Roxb., Fl. Ind. 2:397. 1824.

Gymnosporia rufa (Wallich) Lawson in FBI 1: 620. 1875.

2-5 m high shrubs. Branches slender, spinose. Spines upto 1 cm long, naked. Lamina 4.5-11.5 x 1.2-4.2cm, broadly lanceolate to elliptic lanceolate, serrate, acuminate, carinate, glabrous. Cymes 2.5-4cm diam., axillary, pendulous. Flowers numerous, small; calyx teeth minute, triangular; petals 0.15-0.2cm, suborbicular, creamy-white. Capsules 0.75-1cm, turbinate.

Flr.: Apr. - May *Fr.*: Jun. - Sep.

Specimen Cited: Near Machuki, 1350m, AP Das & PC Rai 1446, dated 12.10.1995.

Status: Rare.

Local Distrib.: Sakam, Alubari, Helipad, Machuki.1200-2300m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya.

RHAMNACEAE Juss.

Key to the Genera:

- 1. Plants spinous.....*Zizyphus*
- 1. Plants unarmed.....2
- 2. Fruits inferior, 3-winged.....*Gouania*
- 2. Fruits superior, 1-winged or not winged.....3
- 3. Erect shrubs or small trees; flowers unisexual, peduncled in fascicles or racemes
.....*Rhamnus*
- 3. Shrubs with scandent branches; flowers bisexual.....*Berchemia*

BERCHEMIA A. DC.

Berchemia floribunda (Wallich ex Roxb.) Brongniar in Ann. Sci. Nat. 10: 357, t. 13. 1. Me'm. Fam. Rhamn. 50. 1826, FBI 1: 637. 1875, FEH 1:197. 1966; 2:76. 1971; EFPN 2:91. 1979; Fasc. Fl. Ind. 20:29. 1990; FB 2(1):142. 1991.

Zizyphus floribunda Wallich ex Roxb., Fl. Ind. ed. Carey, 2:368. 1824.

Berchemia floribunda Wallich ex Lawsson in FBI 1:637. 1875.

Local Name: Bangey (Nep.).

Large climbing shrub, unarmed, branches glaucous in young stage. Leaves alternate, lamina 4.5-8 x 2.5-4.5 cm, ovate-elliptic, vein parallel, pale green beneath, acute to short acuminate, margin entire. Panicles compound, branched. Peduncles pubescent. Flowers 0.55-0.6 cm across; calyx lobes 0.25-0.3 cm long, triangular, keeled to half length; petals 0.6-0.2 cm, spatulate; yellowish-green. Drupes 1-1.2cm, cylindrical.

Flr.: Apr. - Aug. *Fr.:* Feb. - Mar.

Specimen Cited: Near Machuki, 1480 m, AP Das & PC Rai 1841, dated 11.9.1997.

Status: Less Common.

Local Distrib.: Below Durpinay, Machuki. 1100-1900 m.

General Distrib.: Himalaya (Jhelum-Bhutan), Assam, Myanmar, China.

Note: Tender leaves are poisonous to cattle (Cowan & Cowan, 1929).

GOUANIA Jacq.

Gouania leptostachya DC., Prodr. 2:40. 1825; FBI 1:643. 1875; FEH 1:197. 1966; 2:76. 1971; EFPN 2:91. 1979; TBRI 50(4):100. 1987; Fasc. Fl. Ind. 20:38. 1990; FB 2(1):146. 1991.

Local Name: Patpatay, Bhainsi Kanra (Nep.).

Climbing shrubs, upto 8.5m, unarmed, tendrillar. Stem glabrous. Leaves alternate; petioles 1.5-3 cm; lamina 6-12 x 3.5-8cm, ovate, acuminate, base cordate or truncate, margin obscurely crenate, thinly pubescent on veins beneath. Stipules 0.6-0.75cm, lanceolate. Racemes 15-35cm, slender, pubescent. Pedicels short (upto 0.15cm). Flowers in clusters, whitish; calyx lobes 0.15-0.2 cm long, spatulate. Disc-lobes triangular. Capsules 1.5-2cm, persistent calyx remains glabrous.

Flr.: Jun. - Jul. *Fr.:* Aug. - Oct.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1168, dated 01.5.1995.

Status: Abundant.

Local Distrib.: Samsing, Phari, Suntalay. 500-900m.

General Distrib.: Himalayas (Kumaon-Assam), Myanmar, Indo-China, Malaysia.

RHAMNUS L.

Key to the species:

1. Erect medium-sized shrubs or small trees; leaves elliptic-obovate; flowers fascicled; petals absent.....*R. purpureus*
1. Scrambling shrubs; leaves oblong-elliptic; flowers paniced; petals 5
.....*R. nepalensis*

Rhamnus nepalensis (Wallich) Lowson in FBI 1:640.1875, '*nipalensis*'. Grubvo in Fl. Syst. Pl. Vasc. 8:299. 1949; EFPN 2:91. 1979; FB 2(1): 143. 1991; FWB 1:427. 1997.
Ceanothus napalensis Wallich in Roxb., Fl. Ind. 2:375 & 575. 1824; Cat. 150, n. 4263. 1831.

Local Name: Archal (Nep.).

Large shrubby climber upto 6 m. Branchlets puberulous at young stage. Leaves alternate or subopposite; petioles upto 1.6 cm; lamina 7-15.5 x 4.2-6.8 cm, oblong-elliptic, apiculate, base rounded, margins serrulate, glabrous except hair-tufts at vein axils beneath, coriaceous. Stipules minute and caducous. Racemes simple or compound, ± paniculate, branched, terminal and axillary. Peduncles pubescent. Pedicels to 0.1-0.2 cm. Flowers numerous, 3.2-7.2 cm, greenish; calyx-lobes 5, upto 0.15 cm, triangular; petals 5, inconspicuous to 0.05-0.08 cm, spatulate; ovary rounded; styles columnar, deeply trilobed. Drupes to 0.05 cm across, subglobose, 2-3 lobed, red becoming black on ripening, subtended by persistent calyx-cup; seeds 2-3.

Flr. & Frt.: Jul. - Oct.

Specimen Cited: Near Kuwa Paani, 1800 m, AP Das & PC Rai 1619, dated 18.4.1997.

Status: Less Common.

Local Distrib.: Phaparkheti, Kuwapaani, Machuki, Chouda Feri, Sakam Forest. 1500-2250m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Myanmar, Indo-China, China, Malaysia.

Rhamnus purpureus Edgew. in Trans. Lin. Soc. 20:44. 1846; FBI 1:639. 1875; FEH 1:198. 1966; 2: 77. 1971; EFPN 2: 91. 1979; TBRI 50(4): 125. 1987; Fasc. Fl. Ind. 20:57. 1990; FB 2 (1): 144. 1991.

Unarmed erect shrub or small tree with other features resembling to that of *B. nepalensis* except leaves membranous, elliptic-obovate, serrate, base cuneate; flowers 0.55-0.65cm across, 3-6 in axillary fascicles; calyx lobes 0.35-0.4cm long; petals nil. Drupes 0.65-0.8 cm diam, 3 or 4 lobed.

Flr.: May - Jul. *Frt.:* Jul. - Oct.

Specimen Cited: Rechila Middle, 2460m, AP Das & PC Rai 1370, dated 06.5.1995.

Status: Sparse.

Local Distrib.: Observed only in middle part of Rechila and Thosum Peak. 2300-2550m .

General Distrib.: Himalaya (Nepal-Bhutan), Assam, Myanmar, Indo-China, China, Malaysia.

ZIZYPHUS Miller

Zizyphus xylopyrus Willd., Sp. Pl. 1:1104 . 1789; Fl. Ind. ed. Carey, 2: 360. 1824; EFH 1: 198. 1966; EFPN 2:91. 1979; TBRI 50 (4):101. 1987.

Deciduous large shrub. Stem with one prickle straight and the other hooked. Leaves alternate, broadly oblong, serrulate, acuminate, base obscurely cordate, 3-nerved. Flowers and fruits not observed.

Specimen Cited: Above Samsing-Phari. 1300m, AP Das & PC Rai 1839, dated 11.9.1997.

Status : Rare.

Local Distrib.: Not seen in other parts of the Valley except the places of specimen citation.

General Distrib.: India, Nepal, Bhutan and Sri Lanka.

VITACEAE Juss.

Key to the Genera:

1. Flowers unisexual; stigma 4-lobed.....*Tetrastigma*
1. Flowers bisexual; stigma simple or bilobed.....2
2. Petals 5, spreading.....*Parthenocissus*
2. Petals 4, separating at later stage.....*Cissus*

CISSUS L.

Cissus javanica DC., Prodr. 1:628. 1824; FEH 1:199. 1966; 2:78. 1971; 3:81. 1975; EFPN 2:94. 1979; TBRI 50(4):109. 1987; FB 2(1):158. 1991.

C. discolor (Blume) Dalzell in Hk. , Kew Journ. Bot. 2:39. 1850.

Vitis discolor Blume, Bijdr. 1:181. 1825.

Local Name: Sano Pureni (Nep.).

Small climbers with perennial rigid rootstock. Branches angular, reddish, usually glabrous or often with tufts of hairs at nodes. Stem terete. Tendrils leaf-opposite, twice bifid. Leaves simple; petioles 0.6-3 cm long; lamina 8-14.5 x 3-6 cm, lanceolate to ovate, acuminate, base truncate or cordate, margins serrulate, upper surface ornamentally coloured with white and purple blotches, glabrous beneath except midrib beneath. Stipules upto 0.4 cm long, ovate. Cymes 2.5-3 cm diam., leaf-opposite. Peduncle reddish. Flowers yellowish; calyx unlobed, truncate; petals to 0.2cm. Berries 0.5-0.6 cm across, obovoid-ellipsoid, reddish purple.

Flr.: Jun. - Aug. *Fr.*: Aug. - Nov.

Specimen Cited: Samsing, 700 m, **AP Das & PC Rai** 1921, dated 30.10.1997.

Status: Common.

Local Distrib.: Phari, Gorubathan, Samsing, Machuki. 400-1000 m.

General Distrib.: E. Himalaya (E. Nepal-Sikkim), Meghalaya, Myanmar, Thailand, W. China, Malaysia.

Note: Potential ornamental plant to be introduced into the garden. Plants with beautiful variegated leaves have been reported to be introduced into the garden of European countries.

PARTHENOCISSUS *Planch.*

Parthenocissus semicordata (Roxb.) Planchon in DC., Monogr. Phan.5: 451. 1887; FEH 1: 200. 1966; 2: 79. 1971; EFPN 2: 94. 1979; TBRI 50(4): 101. 1987; FB 2(1):152. 1991; FWB 1:445. 1997. var. *semicordata*.

Vitis semicordata Roxb., Fl. Ind. ed. Carey, 2: 841. 1824.

V. himalayana (Royle) Brandis var. *semicordata* (Roxb.) Lawson in FBI 1: 656. 1875.

Local Name : Charcharey Lahara (Nep.).

A large stout shrubby climber; branches slender, glabrous. Stem quadrangular. Leaves ternately 3-foliolate; petioles 2-5 cm; leaflets asymmetric, 3-7 x 1.5-3.5 cm, ovate-elliptic, distantly serrate, caudate, cuneate or semi-cordate, membranous, glabrous when mature, pubescent along nerves when young. Tendrils upwardly branched, terminating into a disc-like pads. Flowers in terminal or leaf-opposed paniculate umbels; calyx salver-shaped; petals 5, 0.3-0.5cm; style truncate; stigma simple or bilobed. Berries globose; seeds smooth and black.

Specimen Cited: Dhamdhamay Dara, 2520 m, **AP Das & PC Rai** 0677, dated 18.10.1994; Chouda Feri, 2285 m, **AP Das & PC Rai** 1273, dated 05.5.1995.

Status: Common.

Local Distrib.: Chouda Feri, Dhamdhamay Dara, Reshete, Pankhasari. 2200-2550m.

General Distrib.: E. Himalaya and Khasia Hills.

Note: Leaves become red before being shed. A good fodder.

TETRASTIGMA *Planch.*

Key to the species:

1. A root climber; leaves pedately 3 or 5 foliolate; leaflets obovate.....*T. obtectum*
1. A tendril climber; leaves palmately 3-5 foliolate; leaflets lanceolate or ovate-elliptic.....2
2. Robust climbers; tendrils simple.....*T. dubium*
2. Slender climber; tendrils bifurcate at tip.....*T. serrulatum*

Tetrastigma dubium (Lawson) Planch. in DC., Monogr. Phan. 5: 473. 1887; FEH 1:200. 1966; EFPN 2:94. 1979; TBRI 50 (4): 128. 1987; FB 2(1): 154. 1991.
Vitis dubia Lawson in Hk. f., FBI 1:661. 1875.

Large climber with deep brown young shoot. Steem glabrous. Tendril simple, leaf-opposite. Leaves pedately 3-5 foliate; leaflets 4.5-11 x 2.5-5cm, ovate-elliptic, acuminate, margin distantly serrate, pubescent on veins beneath. Cymes 0.25-0.5 cm diam., compact, glabrous or sparsely pubescent. Flowers small, greenish; sepals ovate; petals to 0.1 cm, subulate-pointed; ovary 2-celled; style short; stigma 4-lobed. Berry upto 1 cm across, globose, 2-seeded.

Flr.: Feb. - Apr. *Fr.*: Apr. - Jul.

Specimen Cited: Phari, 900m, AP Das & PC Rai 1922, dated 30.10.1997.

Status: Common.

Local Distrib.: Samsing, Gorubathan, Phari, Machuki. 500-1200m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, W. China.

Tetrastigma obtectum (Wallich ex Lawson) Planch. ex Franch. in Bull. S. Bot. Fr. 33: 458. 1886; Monogr. Phan. 5:434. 1887; FEH 3:81. 1975; TBRI 50(4): 128. 1987; FB 2(1): 157. 1991.

Vitis obtecta Wallich ex Lawson, FBI 1: 657. 1875.

Tetrastigma Myanmarnicum Momiyama, FEH 2: 79. 1971, p.p. excl. basionym.

Shrubby root-climber with pendent branches. Stem terete, woody. Tendril terete, shortly branched. Petioles 1-1.5 cm long, pubescent. Leaves pedately 3 or 5 foliate; leaflets size variable (terminal one larger), 4.5-10 x 2.5-3.5 cm, obovate, acute, base cuneate, margin serrate, membranous, pubescent along veins beneath. Peduncle to 1.5 cm long. Cymes 2.5-3 cm across, compound-umbellate, pubescent. Pedicels upto 0.35 cm. Calyx minute; petals 0.25-0.3 cm, pinkish white; style short; stigma lobes 4, flat. Berries 0.45-0.5 cm across, globose, 2 seeded.

Flr.: Apr. - May *Fr.*: Jul. - Oct.

Specimen Cited: Near Sakam, 1700m, AP Das & PC Rai 1463, dated 13.11.1995

Status: Frequent.

Local Distrib.: Machuki, Phapar Kheti, Lava, Sakam. 1000-2200m.

General Distrib.: Temperate Himalayas (Kumaon-Darjeeling), China.

Tetrastigma serrulatum (Roxb.) Planchon in DC., Monogr. Phan. 5: 432. 1887; FEH 1: 201. 1966; 2: 80. 1971; 3: 82. 1975; EFPN 2: 95. 1979; TBRI 50(4): 128. 1987; FB 2(1): 155. 1991; FWB 1:449. 1997.

Cissus serrulata Roxb., Fl. Ind. ed. Carey, 1: 432. 1820.

Vitis capreolata D.Don, Prodr. Fl. Nep. 188. 1825; FBI 1: 659. 1875.

Local Name: Charchare (Nep.).

Slender glabrous climbers, often trailing on the ground. Stem pinkish red, rooting from nodes. Tendrils slender, bifurcate at the extremity, ending in adhesive discs. Leaves palmately 5-foliolate; stipules 0.3-0.35 cm, triangular; petioles 2-3.5 cm; petiolules 0.25-0.4 cm; leaflets variable, 2-5 x 1-2 cm, terminal largest, lateral ones smaller and oblique, lanceolate or obovate-elliptic, margin crenate with teeth-like outgrowth of lateral nerves between crenation, acute-acuminate, cuneate, glabrous, lateral nerves 5-7 on either half, tertiary nerves almost indistinct. Cymes 3-6.5 cm, branched umbellately, lax. Peduncles 3-6.5 cm, reddish. Flowers pale green; sepals minute; petals 0.15 cm, slightly thickened at apex into a blunt horn-like point; style short. Fruit 0.7 mm across, globose, red, black on ripening; seeds 2, rounded.

Flr.: May - Oct.

Fr.: Oct. - Jan.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 0217, dated 16.6.1994; Jaributti 2195 m, **AP Das & PC Rai** 0423, dated 15.10.1994; Chouda Feri, 2285 m, **AP Das & PC Rai** 1276, dated 05.5.1995.

Status: Common.

Local Distrib.: Chouda Feri, Rechila Chowk, Jaributti, Alubari, Machuki. 1300-2300m.

General Distrib.: Himalayas (Garhwal-Bhutan), Assam, Myanmar, Thailand, Indo-China, W. China.

Note: A fodder plant.

LEEACEAE Dumort.

LEEA Royen ex L.

Lea guineensis G. Don, Gen. Hist. 1:712. 1831; Blumea 22: 92. 1974; EFPN 2:96. 1979; Nam. Chang. Flr. Pl. 318. 1987; FB 2(1):163. 1991; FWB 1:452. 1997.

K. wightii Cl. in J. Bot. 19: 105. 1881; Ind. Trs. 179. 1906.

Local Name: Galeni (Nep.).

Shrub upto 2.7 m, stems glabrous. Leaves bipinnate, long upto 64 cm; petioles 11-22.5 cm; stipules 2.6-3.1 cm, broadly ovate, caducous. Leaflets 8.5-21.5 x 3.2- 9.5 cm, ovate-lanceolate, acuminate-caudate, base rounded, coarsely serrate, margin teeth acute, basally 3-5 veined, few bristles on upper surface, glabrous beneath. Corymbs 7.2-12.2 cm diam., rusty-red pubescent. Flowers red or orange-yellow; calyx cup-shaped, lobes upto 0.08 cm, triangular. Fruits to 1 cm diam., subglobose.

Flr. & Fr.: May - Aug.

Specimen Cited: Near Samsing, 820 m, **AP Das & PC Rai** 1777, dated 26.8.1997.

Status: Frequent in lower belt.

Local Dsitrib.: Phari, Samsing, Suntalay. Upto 1000m.

General Distrib.: Africa, Himalayas (Nepal-Bhutan), India, Myanmar, Thailand, Indo-China, W. China.

SAPINDACEAE Juss.

SAPINDUS L.

Sapindus rarak DC., Prodr. 1: 608. 1824; Fl. Jow. 1: 143. 1981; Nam. Chang. Flr. Pl. 501. 1987; FB 2 (1): 70. 1991.

Local Name : Rittha (Nep.).

Deciduous trees, 5-15 m high. Leaves pinnate, 20-41 cm, rachis hairy; petiolules upto 0.8 cm; leaflets 7-9 pairs, 5.8-11.9 cm x 2.4-3.7 cm, elliptic-lanceolate, acuminate, base obliquely cuneate, lateral veins many, midrib hairy beneath. Panicles both axillary and terminal, upto 27 cm, densely pubescent, brownish. Flowers to 0.3 cm across; sepals unequal. 0.2- 0.3 cm, ovate; petals 4, to 0.4 cm, concave, each bearing villous nectary scale, whitish; stamens 8, all inserted around ovary-base; ovary 3-locular; stigma trilobed. Fruits 2.2- 2.6 cm diam., globose, fleshy, orange-yellow, with 2 abortive carpels at base; seeds 1.29-1.55 cm across, globose, hard and blackish.

Flr. & Frt.: May - Jun.

Specimen Cited: Near Samsing, 820 m, **AP Das & PC Rai** 1773, dated 26.8.1997.

Status: Less Frequent.

Local Dsitrib.: Phari, Suntalay, Asala Khola, Samsing. 400-1100m.

General Distrib.: Himalayas, Assam, Myanmar, Indo-China.

ACERACEAE Juss.

ACER L.

Key to the species:

1. Lamina unlobed or the 1/8th lamina length.....2
1. Lamina deeply dissected or lobed.....5
2. Stamens exerted in the flower.....3
2. Stamens inserted in the flower.....4
3. Lamina ovate, sharply serrate to biserrate.....*A. hookeri*
3. Lamina lanceolate, minutely serrulate.....*A. laevigatum*
4. Basal vein-axils with tuft of red hairs beneath.....*A. sikkimense*
4. Basal vein-axils not with such hairs but often pubescent with short and crisped hairs when young.....*A. oblongum*
5. Lamina dissected to half or more of its length.....6
5. Lamina dissected less than half of its length.....7
6. Outer margins of two parts of samara forming a straight line; basal nerves 5
.....*A. campbellii*

6. Outer margins of two parts of samara forming an angle of about 120°; basal nerves 3 *A. pectinatum*
 7. Lamina 5-lobed, 5-nerved at base; wings of samara widely spaced *A. sterculiaceum*
 7. Lamina 3-lobed, 3-nerved at base; wings of samara almost clasping to each other *A. thomsonii*

Acer campbellii Hk.f. et Thoms. ex Hieron in FBI 1: 696. 1875; Trs. N. Beng. 42. 1929; FEH 1:191. 1966; EFPN 2: 98. 1979; FPK 23. 1981; TBRI 50(4): 104. 1987; FB 2(1): 64. 1991; FWB 1:465. 1997.

Local Name: Kapasi (Nep.)

Large deciduous trees. Stem greenish. Leaves exstipulate, palmately 5-7 lobed; petioles 2-7 cm, dark red, glabrous; lamina 7-14.5 x 7.5-15 cm, lobes lanceolate or ovate-caudate, serrate-biserrate, teeth fine-acute, caudate acuminate, sub-cordate, glabrous both sides, dark green above, yellowish when dry, veins prominent and light yellow beneath, impressed above. Peduncles narrow, elongated, many flowered. Flowers 0.65 cm in diameter, actinomorphic; sepals 5, 0.35x 0.25 cm, ovate, hairy; petals nearly equal to sepals or shorter; stamens 8, as long as sepals; anthers almost exerted, dark red. Fruits (mericarps) numerous in each cluster, wings 1.9-2.3 x 0.65-0.75 cm; nuts globular, smooth.

Flr.: Apr. - May *Fr.:* Jun. - Aug.

Specimen Cited: Thosum Beat-Jorpokhari, 2780-3040 m, AP Das & PC Rai 0860, dated 22.10.1994.

Status: Common.

Local Distrib.: Dhamdhamay Dara, Rechila Peak, Chouda Feri, Thosum Beat, Chitray. 2200-2800m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), W. China.

Note: Woods used as firewood.

Acer hookeri Miq. in Arch. Neerl. Sci. Nat. 2: 471. 1852; FBI 1:694 1875; Trs. N. Beng. 41. 1929; FEH 1:191. 1966; EFPN 2: 98. 1979; TBRI 50(4):104. 1987; FB 2 (1):64. 1991; FWB 1:467. 1997.

Local Name: Lal Kapasi (Nep.)

Medium trees young, branchlets reddish. Petioles 2-4 cm, reddish, sparsely hairy in lower basal portion; lamina 5.5-12 x 3.3-7.5 cm, ovate, sharply serrate to biserrate, caudate-acuminate, shallowly cordate, glabrous and green both sides or sparsely hairy on veins of old leaves beneath, basally 5-nerved. Racemes simple, 5.5-10.5 cm, pendulous. Flowers actinomorphic, monoecious, greenish white and appear along with new leaves; sepals 0.4 x 0.1 cm, almost oblong; petals nearly equal to sepals but slightly broader, 0.38 x 0.15 cm, obovate; stamens 8, scarcely exerted. Fruits shortly winged, wings 1-1.6 x 0.5 cm.

Flr.: Apr. - Jun. *Fr.*: Jun. - Nov.

Specimen Cited: Rechila-Hattidara, 2280-2549 m, **AP Das & PC Rai** 0628, dated 17.10.1994; Tinsimana 2900 m, **AP Das & PC Rai** 1222, dated 04.5.1995.

Status: Common.

Local Distrib.: Hattidara, Tinsimana, Rechila, chitray. 2200-2600m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh).

Note: Ornamental plant.

Acer laevigatum Wallich, Pl. As. Rar. 2:3, t. 104. 1831; FBI 1: 693. 1875; Trs. N. Beng. 41. 1929; FEH 1:192. 1966; EFPN 2. 98. 1979; Fasc. Fl. Ind. 9: 10. 1982; TBRI 50(4): 104. 1987; FB 2 (1): 64. 1991; FWB 1:467. 1997.

Local Name: Putli (Nep.)

Deciduous medium trees. Petioles upto 1 cm, finely channeled above; lamina 9-17 x 2.5-5.3 cm, oblong-lanceolate, minutely serrulate, acuminate, cuneate to rounded, glaucous and glabrous but with tufts of silky hair in nerve axils beneath, midvein raised beneath, main lateral nerves 6-9 on either sides, nervules closely reticulate. Racemes appearing with new leaves, ramified, 7-12.5 cm, lax. Sepala 5, lanceolate; petals 5, clawed, whitish; stamens 5-8, exceeding petals; ovary hairy. Nuts elliptical, winged.

Flr.: Mar. - May *Fr.*: Jul. - Sep.

Specimen Cited: Alubari Belt, 2280-2424 m, **AP Das & PC Rai** 0581, dated 16.10.1994.

Status: Common.

Local Distrib.: Rechila Middle, Pankhasari, Ruka Forest, Alubari. 2200-2700m.

General Distrib.: Himalayas (Garhwal-Arunachal Pradesh), Meghalaya, Manipur, Myanmar, W. and S. China.

Note: A good timber yielding plant.

Acer oblongum DC., Prodr. 1:593. 1824; FBI 1:693. 1875; FEH 1:192. 1966; 2:73. 1871; EFPN 2:98. 1979; Fasc. Fl. Ind. 9:12. 1982; TBRI 50(4):104 1987; FB (1): 63. 1991.

Local Name: Phirphiri, Kapasi (Nep.).

10-20 m tall trees. Petioles 3-6.5 cm long. Leaves 7-14 x 3.5-6.5 cm, oblong-elliptic or ovate-oblong, acuminate, entire, basal nerves 3, glabrescent, young ones densely silky. Panicles 6-16 cm long, pubescent. Sepals 0.25-0.4 cm, linear; petals 0.35-0.5 cm, elliptic-lanceolate, greenish yellow; stamens inserted. Samaras upto 3.2 cm with divergent and elongated wings.

Flr.: Jan. - Mar. *Fr.*: Apr. - Aug.

Specimen Cited: Near Pankhasari, 2100 m, AP Das & PC Rai 1282, dated 05.5.1995.

Status: Sparse.

Local Distrib.: Lava, Pankhasari, Jaributti. 1500-2280 m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya, Nagaland, China, Indo-China.

Acer pectinatum Wallich, Pl. As. Rar. 2:4. 1831; IF 97: 248. 1971; EFPN 2:298. 1979; Nam. Chang. Flr. Pl. 7. 1987; FB 2 (1): 67. 1991; FWB 1:468. 1997.

A. caudatum f. *pectinatum* (Wallich) Hiern in FBI 1:695. 1875.

A. caudatum auct. non Wallich: Hiern. in FBI 1: 695. 1875 p.p.

Local Name: Lekh Kapasi (Nep.).

Medium tree, 9-15m tall, with slender branchlets. Leaves opposite; petioles upto 7.5cm long; lamina 6.5-12.5 x 6-12cm, usually 3-5 lobed, lobes upto 5.5cm, margins closely serrate, acuminate, base rounded or cordate, pubescent along veins beneath. Raceme loose. Flowers reddish green; sepals 5, 0.25-0.3 x 0.1cm, lanceolate; petals 5, slightly shorter than sepals; stamens inserted; ovary 2-celled; styles 2, basally connate. Mericarps winged, wing 1.4 x 0.65cm.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Pankhasari, 2300m, AP Das & PC Rai 1280, dated 05.5. 1995.

Status: Rare.

Local Distrib.: Pankhasari, Chitray. 2300-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Acer sikkimense Miq. in Arch. Neerl. Sci. Nat. 2:471. 1852; FBI 1:694. 1875; Trs. N. Beng. 41. 1929; FEH 1:191. 1966; EFPN 2: 98. 1979; FPK 23. 1981; Fasc. Fl. Ind. 9:16. 1982; TBRI 50 (4):104. 1987; FB 2 (1): 64. 1991; FWB 1:469. 1997.

Local Name: Lahara Kapasi (Nep.)

Large deciduous trees. Petiole 1.5-3 cm, red; lamina 5-9.5 x 2.3-5.1 cm, ovate, coarsely and unequally serrate, acuminate, slightly cordate, subcoriaceous, green and usually glabrous both sides but basal vein axils with grooves/tufts of red hairs beneath, 5-nerved basally. Racemes simple, upto 8 cm long. Peduncle greenish. Pedicels upto 0.7 cm long, shortly red-brown hairy. Flowers actinomorphic, 0.4 x 0.4 cm, greenish white; sepals shorter than petals, upto 0.2 cm; petals 10, overlap one another, 0.3x 0.2 cm, oblong, basally connate, greenish white, 3-4 nerved vertically, nerves basally fused; stamens 8, inserted, glabrous; filaments 0.25 cm long; anthers 2-celled, basifixed.

Flr.: Mar. - May

Frt.: Apr. - Aug.

Specimen Cited: Tinsimana Belt-Rechila Chowk, 2900-2490 m, **AP Das & PC Rai** 1222, dated 04.5.1995.

Local Distrib.: Rechila Chowk, Reshete, Alubari, Tinsimana. 2200-2900m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Tibet, Myanmar, W. China.

Status: Common.

Acer sterculiaceum Wallich, Pl. As. Rar. 2:3, t. 105. 1830; IF 97: 247.1971; EFPN 2: 98. 1979; Fasc. Fl. Ind. 9:17. 1982; FB 2(1): 68. 1991; FWB 1:469. 1997.

A. villosum Wallich, Pl. As. Rar. 2: 4: 1830; FBI 1: 695; 1875, *non* Presl. 1822.

Deciduous large trees. Young shoots brown hairy. Branchlets stout. Petioles 7-10.5 cm, ribbed and hairy; lamina 5-lobed (3 broad lobes and 2 basal lobes small and almost obscure), 9-15.5 x 8.5-15.5 cm, lobes ovate or even lanceolate, distinctly serrate, acuminate, cordate, dark green and glabrous above, pale green and shortly white hairy beneath, especially along the nerves, nerves 5 from base, hairy, elevated and yellowish beneath, impressed above. Racemes simple or branched. Flowers upto 1cm, actinomorphic, usually appearing before leaves, yellowish green; sepals 0.3 x 0.15 cm, oblanceolate, minutely ciliate, 3-nerved; petals nearly equal to sepals, narrow, linear oblong; stamens 5-8; anthers exserted; filament distinct. Mericarps borne on leafless side-branches, rusty haired, nearly erect or the edges bending at angle less than 90°, wings 3-4.8 x 1.5-2 cm.

Flr.: Mar. - Jun. *Fr.:* May - Dec.

Specimen Cited: Jaributti, 2195 m, **AP Das & PC Rai** 0438, dated 15.10.1994; Tinsimana Area 2900 m, **AP Das & PC Rai** 1234, dated 04.5.1995.

Status: Less Common.

Local Distrib.: Tinsimana, Alubari, Jaributti, Hattidara. 2400-2900m.

General Distrib.: Himalayas (Kashmir-Bhutan).

Acer thomsonii Miq. in Arch. Ne'erl. Sci. Nat. 2:470. 1867; FEH 1:193. 1966; 2:73. 1971; EFPN 2:98. 1979; Fasc. Fl. Ind. 9:18. 1982; TBRI 50(4):104. 1987; FB 2(1):66. 1991.

A. villosum Wallich var. *thomsonii* (Miq.) Hiern in FBI 1:695. 1875.

Local Name: Melo Kapasi (Nep.).

Trees, 15-28 m tall. Petioles 6-14.5 cm long. Leaves 9-21 x 6.8-16 cm, coriaceous, trilobed, mid-lobe ovate to triangular, entire or obscurely serrate, acuminate. Inflorescence spicate racemose, 8-21 cm long. Sepals upto 0.3 cm, oblong, pubescent within. Petals equal to sepals or slightly longer, yellowish. Samara reddish brown, wings 5-6cm, straight-parallel.

Flr.: Oct. - Dec. *Fr.:* Jan. - Jul.

Specimen Cited: Below Jaributti, 1750 m, AP Das & PC Rai 0444, dated 15.10.1994.

Status: Rare.

Local Distrib.: Lava, Pankhasari, PHE Source, Reshete. 1400-2400 m.

General Distrib.: Himalayas (Simla-Arunachal Pradesh), Manipur, Myanmar.

STAPHYLEACEAE (DC.) Lindl.

TURPINIA Ventenat

Key to the species:

1. Lamina of leaflets 5-8.5cm broad, oblong-ovate, crenate-serrate; petals larger than sepals.....*T. pomifera*
1. Lamina of leaflets 3-6cm broad, lanceolate or elliptic, sharply serrate; petals and sepals subequal.....*T. nepalensis*

Turpinia nepalensis Wallich ex Wight et Arn., Prodr. 156. 1834; Ic. Pl. Ind. Or. 3:t. 972. 1845; FEH 1:191.1966; 2:72. 1971; EFPN 2: 99. 1979; Nam. Chang. Flr. Pl. 577. 1987; FB 2 (1): 129. 1991; Mat. Fl. Arun. Prad. 1(2):332. 1996.

T. martabanica Wallich, Cat. 150, n. 4278.1831, *nom. nud.*

T. pomifera auct. non DC. : Hiern in FBI 1:698. 1875 p.p.; RBSI 19 (2):36. 1966, 'fomifera'.

Local Name: Thali (Nep.).

Small trees to 10-17m. Nodes swollen. Leaves opposite, unevenly 1-pinnate, rachis swollen at nodes; lateral petiolules short, terminal petiolules upto 1cm long; stipules interpetiolar, upto 0.45-0.6 cm, ovate-triangular; leaflets 7.5-15.7 x 3.2-5.9 cm, lanceolate or elliptic, acute, base cuneate, margin serrate, sparsely hairy above, nerves prominent beneath, lateral veins 6-9 on either sides. Flowers in axillary and terminal panicles, bisexual; sepals and petals 3, measuring 0.15-0.17 cm, subequal, scarcely ciliate; ovary superior and 3-celled; style 3; ovules 4 per cell. Fruits 1-1.5 cm across, sub-globose, apically 3-ridged, pericarp to 0.1-0.14 cm thick, hard on drying.

Flr.: Apr. - Jun. *Fr.:* Sep. - Oct.

Specimen Cited: Neora River Bank 2280 m AP Das & PC Rai 0264, dated 16.6.1994.

Status: Rare.

Local Distrib.: Lava, Neora Valley, Sakam Forest. 1650-2300m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Myanmar, Thailand, Indo-China.

Note: Provides good quality firewood and fodder.

Turpinia pomifera (Roxb.) DC., Prodr. 2:3.1825; FBI 1:698. 1875, p.p.; EFPN 2:99. 1979; TBRI 50(4):129. 1987; FB 2(1):129. 1991.

Dalrympelea pomifera Roxb., Pl. Corom. 3:76, t. 278. 1819.

Local Name: Nagpat, Thali (Nep.).

Trees, 12-20m high. Leaves pinnately compound, opposite, 20-50cm, rachis swollen; petiolules 0.3-1cm long, stipelate; lamina of leaflets 8-18 x 5-8.5cm, oblong-ovate, crenate-serrate, acuminate, base obliquely cuneate or sometimes rounded, coriaceous, lateral veins prominent beneath, usually 5-8 pairs, dark green. Stipules 0.55-0.6cm long, ovate; stipels to 0.1cm. Panicles 15-30cm long, branches pubescent. Bracts to 0.2cm, lanceolate. Flowers creamy; sepals upto 0.3 cm, ovate, ciliate; petals 0.3-0.35cm long, oblong. Fruit 2-3cm across, globose.

Flr.: Mar. - Apr. *Fr.:* Jul. - Nov.

Specimen Cited: Suntalay, 500m, AP Das & PC Rai 1897, dated 26.10.1997.

Status: Frequent in foothill region.

Local Distrib.: Samsing, Phari, Suntalay, Machuki. 500-1200m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Myanmar, Thailand, Indo-China, W. China.

Note: A medicinally important plant.

SABIACEAE Blume

Key to the Genera:

1. Scandent shrubs; sepals and petals equal; stamens all fertile.....*Sabia*
1. Erect shrubs or trees; sepals and petals unequal; only inner 2 stamens fertile, outer 3 staminodial.....*Meliosma*

MELIOSMA Blume

Meliosma pinnata (Roxb.) Maximowicz in Bull. Acad. Sci. St. Pet. 12: 64, in Obs. 1867; FBI 2:6. 1876; EFPN 2:99. 1979; Fl. Meg 1: 266. 1985; TBRI 50(4): 199. 1987; Fasc. Fl. Ind. 20:119. 1990.

Millingtonia pinnata Roxb., Fl. Ind. 1:103. 1820.

M. pinnata (Roxb.) Maximowicz in Bull. Acad. Sci. St. Pet. 12:64. 1867; FBI 2:6. 1876.

Local Name: Lekh Dabdabay (Nep.).

Tree, 10-25 m tall. Bark greyish, peeling off in papery flakes. Young branches rusty puberulous. Leaves imperipinnate, 15-40cm including petiole; lamina of leaflets 5-16 x 2-5cm, elliptic obovate, entire or often serrate, acuminate, base cuneate or rounded, glabrous above, sometimes pubescent along nerves beneath. Panicles upto 60cm long, terminal, rusty tomentose, branched. Flowers creamy white; sepals 0.1-0.15cm, ovate, pubescent; petals 2 seriate, outer glabrous, inner 0.55-0.6cm, ovate, deeply bifid; stamens to 0.1cm; ovary usually glabrous. Fruits 0.55-1cm across, subglobose.

Flr.: Apr. - Jun. *Fr.*: Aug. - Sep.

Specimen Cited: Phari, 950m, AP Das & PC Rai 1879, dated 24.10.1997.

Status: Frequent.

Local Distrib.: Samsing, Phari, Sentalay, Machuki. 600-1400m.

General Distrib.: Darjeeling, Sikkim, Nepal, Khasia Hills, Korea, etc.

SABIA *Colebrooke*

Key to the species:

1. Leaves coriaceous; flowers in axillary cymose fascicles; cymes 10-30 flowered
.....*S. parviflora*
1. Leaves not coriaceous; flowers solitary, axillary.....*S. campanulata*

Sabia campanulata Wallich *ex* Roxb., Fl. Ind. 2: 311. 1824; cat. 28, n.1002. 1829; FBI 2:1. 1876; FEH 1: 194. 1966; 2:74. 1971; EFPN 2: 100. 1979; TBRI 50(4): 126. 1987; FWB 1:473. 1997.

S. leptandra Hk.f. *et* Thoms.; Fl. Ind. 1:209. 1855; Hk.f., FBI 2:2. 1876.

Local Name: Simali Lahara, Kali Lahara (Nep.).

Medium boody, usually deciduous, glabrous climbing shrubs. Branchlets pendulous. Stem rounded, lenticellate. Leaves simple, alternate; petiole 0.4-1 cm; lamina 2.5-10 x 1.4-4.2 cm, ovate-elliptic or lanceolate, entire, caudate-acuminate, base rounded, glabrous, pale white green beneath, nerves distinct below. Pedicels upto 3.1 cm, slender, gradually widening above. Flowers solitary, axillary, 1.2 cm across, appearing with young leaves; sepals 5, 0.35-0.45 x 0.2 cm, elliptic, persistent; petals 5, 0.6-0.7 x 0.4-0.5 cm, elliptic-obovate, light greenish purple; stamens upto 0.4 cm; style equal to stamens or slightly long. Drupe 0.65-0.8 cm across, suborbicular, purple blue.

Flr.: Mar. - Jun. *Fr.*: May - Aug.

Specimen Cited: Alubari Belt, 2490 m, AP Das & PC Rai 0578, dated 16.10.1994; Tinsimana, 2900 m, AP Das & PC Rai 0799, dated 20.10.1994; Zero Point, 2285 m, AP Das & PC Rai 1387, dated 07.5.1995.

Status: Less Common.

Local Distrib.: Zero Point, Rechila Middle, Alubari, Lava. 1900-2500m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh).

Sabia parviflora Wallich *ex* Roxb., Fl. Ind. 2:310.1824; Cat. 28, n. 1001. 1829; Fl. Ind.1:210. 1855; FBI 2:2. 1876; FEH 2:74. 1971; EFPN 2:100. 1979; FB 2(1):81. 1991; FWB 1:474. 1997.

Local Name: Simali Lahara (Nep.).

Woody scrambler, evergreen. Leaves simple, lamina 6-9.3 (-11.9) x 1.45-3 (-4.9)cm, ovate-elliptic, acuminate, base rounded or cuneate, nearly glabrous, veins 5-9 pairs. Cymes solitary, axillary, 2-8 cm, many flowered. Flowers bisexual; sepals 5, to 0.31 x 0.1 cm, ovate-lanceolate, connate at base; petals 5, 0.3-0.45 x 0.1 cm, lanceolate, white or greenish-yellow; stamens 5, subequal, upto 0.2 cm; filaments flattened; style 0.1-0.15 cm, conical. Fruit 0.75-0.8 x 0.75-0.8 cm, subglobose or obovoid, somewhat fleshy.

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Above Machuki, 1400 m, AP Das & PC Rai 1774, dated 10.9.1997.

Status: Sparse.

Local Distrib.: Machuki, Sakam Forest, Chonkobhir. 1200-2000m.

General Distrib.: Himalayas (Garhwal-Arunachal Pradesh), Assam, Myanmar, Indonesia, Thailand.

ANACARDIACEAE Lindl.

Key to the Genera:

1. Leaves simple.....2
1. Leaves imparipinnate.....4
2. Phyllotaxy opposite.....*Dobinea*
2. Phyllotaxy alternate.....3
3. Flowers monoecious; panicles generally terminal; peduncle not enlarged in fruit; style 1.....*Mangifera*
3. Flowers dioecious; panicles both terminal and axillary; peduncle enlarged in fruit; styles 3.....*Semecarpus*
4. Evergreen trees.....*Chaerospondias*
4. Deciduous trees.....5
5. Fruits 2.5-5cm long; stone with connecting fibrous process.....*Spondias*
5. Fruits upto 1cm long; stone without connecting fibrous process.....*Rhus*

CHOEROSPONDIAS Burt & Hill

Choerospondias axillaris (Roxb.) Burt. & Hill in Ann. Bot. n. s. 1:254. 1937; FEH 1: 180. 1966; Bull. Dept. Med. Pl. Nep. 1:11. 1967; 2:22. 1969; 4:16. 1973; Acta Phyt. Geobot. 25.113. 1973; FEH 3:76. 1975; EFPN 2:100. 1979; Nam. Chang. Flr. Pl. 123. 1987; FB 2 (1): 60. 1991; FWB 1:479. 1997.

Spondias axillaris Roxb., Fl. Ind. 2: 453. 1832; FBI 2: 42. 1876; RBSI 4:104. 1910.

Local Name: Lapsi (Nep.).

Evergreen tree, 10 m high or more. Leaves alternate, odd-pinnate, 30-36 cm; petiolules 0.55-2cm; leaflets 2-6 pairs, 7.9-11 x 2.45-3 cm, ovate, acuminate, base rounded, entire, glabrous. Dioecious: male panicles upto 7.2 cm; flowers purple; calyx to 0.15 cm; petals 5, 0.3-0.4cm, oblong; stamens to 0.3 cm. Female flowers on 0.15 cm long peduncles; calyx 5-lobed, equal to male flower calyx; petals 5, equal to calyx in male flower; ovary 0.2-0.3 cm, superior; styles 5, short; stigma capitate. Drupes 3.4-3.6 x 2.4-2.5 cm, oblong or ovoid; stone 2-2.5 x 1.6-2 cm, with 5 oval depressions at apex.

Flr. & Fr.: Apr. - Jun.

Specimen Cited: Near Machuki, 0996 m, **AP Das & PC Rai** 1423, dated 08.10.1995.

Status: Less Frequent.

Local Distrib.: Sakam Forest, Machuki, Phaparkheti. 900-1550m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Thailand, C. and S. China, Japan.

Note: Fruits delicious.

DOBINEA *D. Don*

Dobinea vulgaris D Don, Prodr. Fl. Nep. 249. 1825; FBI 1: 696. 1875; FEH 1:186. 1966; EFPN 2:100. 1979; TBRI 50(4): 115. 1987; FB 2(1): 62. 1991.

Local Name: Sanglay (Nep.).

Medium sized shrubs, 2.5-5 m high with ascending branches. Leaves opposite; petioles 2-3cm long; lamina 9-15 x 3.5-5.2 cm, elliptic-lanceolate, acuminate, dentato-serrate, thinly hairy beneath. Panicles upto 53 cm long, terminal, pyramidal. Flowers unisexual, whitish, male ca 0.15cm, stamens 8, alternately short and long; female 0.1-0.15 cm, petals absent. Bracts upto 1.6 cm long, usually linear. Fruits ca 0.3 cm across, compressed, orbicular-obcordate, whitish.

Flr.: Aug. - Oct. *Fr.:* Oct. - Nov.

Specimen Cited: Near Pankhasari, 2120 m, **AP Das & PC Rai** 0371, dated 14.10.1994.

Status: Rare.

Local Distrib.: Sakam, Reshete, Pankhasari. 1120-2200 m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam.

MANGIFERA *L.*

Mangifera sylvatica Roxb. in Fl. Ind. 2:428. 1824; FBI 2:15. 1876; EFPN 2:101. 1979; FB 2(1):59. 1991.

Local Name: Chuchay Aanp (Nep.).

Trees upto 28 m high. Petioles 1.5-5.2 cm long; young leaves drooping; lamina 10-22 x 3-5.7cm, lanceolate or elliptic, acuminate, base cuneate, blackish, terminal glabrous. Panicles mostly terminal. Flowers monoecious; calyx 0.2cm; petals 0.5cm; fertile stamens 0.6cm long; styles 0.55-0.6cm. Fruit 6-7 x 2.5-3 cm, obovoid.

Flr. & Fr.: Apr. - Jun.

Specimen Cited: Near Phari at Samsing, 720 m, **AP Das & PC Rai** 1705, dated 17.5.1997.

Status: Not Common.

Local Distrib.: Phari, Samsing. 700-950m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Andaman Islands, Myanmar, Thailand, Indo-China.

Note: Fruits edible.

RHUS L.

Key to the species:

1. Leaflets densely tomentose beneath, crenate-dentate; rachis winged upwards
.....*R. semialata*
1. Leaflets glabrous, entire; rachis not winged.....*R. succedanea*

Rhus semialata Murray in Comm. Soc. Goetting 5: 27. t. 3. 1784; FBI 2:10. 1876; Man. Ind. Timb. 208. 1902; Ind. Tr. 197. 1906; JAA 9:3. 1928; Fl. Asm. 1(2): 331. 1935; Nam. Chang. Flr. Pl. 482. 1987; Fl. Meg. 1:276. 1987.

R. javanica L., Sp. Pl. 265. 1753; FEH 1: 186. 1966; Fl. Jow. 1: 147. 1981.

R. javanica var. *roxburghii* (DC.) Rehder and Wilson in Sargent, Pl. Wilson. 2:179. 1914; JBNHS 76: 554. 1979.

Local Name: Bhakimlo (Nep.).

Shrub to small tree, upto 12 m high. Bark warty and ashy-gray. Young parts pubescent. Branches lax, spreading. Leaves alternate, odd-pinnate; leaflets 3-6 pairs, 4-14 x 2-6 cm, variable in form, oblong-ovate or elliptic, margin crenate-dentate, acute, base rounded or sometimes truncate, thinly pubescent above, densely brown tomentose beneath, rachis winged upwards. Panicles about 40 cm long, pyramidal and terminal. Flowers 0.25-0.4 cm across, yellow or greenish-white; calyx very small with rounded lobes; petals about 0.15 x 0.075 cm, oblong, spreading, sometimes deflexed; stamens upto 0.15 cm; ovary about 0.15 cm, oblong, reduced to pistillode in male flowers, pubescent. Drupe 0.4-0.5cm across, subglobose, reddish when ripe and densely hairy.

Flr. & Frt.: Aug. - Jan.

Specimen Cited: Jaributti, 2000m, AP Das & PC Rai 0372, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Chouda Feri, Rechila Chowk, Rechila Durpinay, Sakam. 1400-2250m.

General Distrib.: Himalayas, Assam, Myanmar, Thailand, China, Formosa, Korea, Japan.

Note: A good vinegar is prepared from its fruits and often consumed as medicine.

Rhus succedanea L., Mant. Pl. 2: 221. 1771; FBI 2: 12. 1876; Trs. N. Beng. 45. 1929; Faun. & Fl. Nep. Him. 173. 1955; FEH 1:186. 1966; 3: 76. 1975; TBRI 50(4):125. 1987; FWB 1:483. 1997. var. *acuminata* (DC.) Hk. f. in FBI 2: 12. 1876; FB 2(1): 65. 1991.

R. acuminata DC., Prodr. 68. 1815.

Local Name: Rani Bhalayo (Nep.).

Shrub to small trees, upto 10.5 m. Stem gray-brown, glabrous, sap acrid, irritating and causing blisters on human skin. Leaves imparipinnate; petioles 0.2-0.9 cm long; leaflets 2-6 pairs, 5.5-12.2 x 1.5-4.5 cm, ovate or oblong, entire, caudate-acuminate, base variable, cuneate, some rounded or even oblique, glabrous both sides, green and glossy above, silvery white below, mid-rib well impressed above, lateral veins 13-24 pairs, slightly arched. Panicles axillary, 9-12 cm, slender. Flowers unisexual, small, yellowish green; sepals short, 0.1 cm, glabrous; petals larger than sepals, 0.2 x 0.45 cm, glabrous; stamens 5, short, 0.17 cm, reduced to staminodes in female flowers; ovary 0.15 cm, ovoid, smooth, reduced to pistillode in male flowers. Drupes drooping, 0.6 cm, subglobose, yellowish.

Flr.: Apr. - Jun. *Frt.:* Jun. - Aug.

Specimen Cited: Rechila-Hattidara, 2280-2549 m, **AP Das & PC Rai** 0627, dated 17.10.1994.

Status: Less Common.

Local Distrib.: Hattidara, Rechila Chowk, sakam Forest, machuki. 1100-2250m.

General Distrib.: Himalaya, Myanmar, Thailand, Indo-China, Japan.

Note: Sap causes irritating and itching blisters on skin.

SEMECARPUS *L. f.*

Semecarpus anacardium L. f., Suppl. Pl. 182. 1781; FBI 2: 30. 1876; FEH 1:187. 1966; 3:77. 1975; EFPN 2:102. 1979; FB 2(1):61. 1991.

Local Name: Kalo Bhalayo (Nep.).

Medium trees to 15 m, deciduous, young parts pale tomentose. Petioles 3.5-5.5 cm long. Leaves simple, lamina 18-38 x 11-20 cm, oblong-obovate, entire, pubescent beneath, coriaceous. Panicles slightly shorter or equalling leaves. Flowers 0.65-0.8 cm across, subsessile, dioecious; calyx obconic; petals 0.3-0.4 cm long, oblong, greenish white. Drupe upto 3.5 cm long, usually oblong or ovoid.

Flr.: May - Aug. *Frt.:* Nov. - Feb.

Specimen Cited: Samsing, 1280 m, **AP Das & PC Rai** 1725, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Machuki. 600-1300 m.

General Distrib.: Himalayas (Sirmore-Sikkim), Myanmar, Malaysia, N. Australia.

Note: Ethnobotanically much useful.

SPONDIAS L.

Spondias pinnata (L. f.) Kurz, Prelim. Rep. For. & Veg. Pegu Append. A. 44, App. B. 42. 1875; KB 21:8. 1967; EFPN 2:102. 1979; Nam. Chang. Flr. Pl. 534. 1987; FB 2 (1): 60. 1991.

Mangifera pinnata L. f., Suppl. Pl. 156. 1781.

Spondias mangifera Willd., Sp. Pl. 2: 751. 1799; FBI 2:42. 1876.

S. macrophylla Wallich ex Hk. f., FBI 2:43. 1876.

Local Name: Amaroo (Nep.).

Trees to 35 m high. Leaves alternate, odd-pinnate, 9.9-33 cm; leaflets 2-6 pairs, 6.8-14.5 x 3.1-5 cm, oblong-elliptic, acuminate, base rounded or cuneate, entire with a distinct intramarginal vein, glabrous. Panicles axillary or terminal. Flowers ± sessile, bisexual, borne on inflorescence branches; calyx 5-lobed, lobes to 0.05 cm; petals 5, 0.25-0.3 x 0.1-0.15cm, ovate-oblong, valvate; stamens 10, 0.1-0.18 cm; ovary to 0.075 cm, subglobose; styles 4-5, free, upto 0.06 cm. Drupe 2.7-4.8 x 2.4-3.4 cm, ellipsoid, 4-5 celled, orange-yellow on maturing; stone smooth, fibrous.

Flr. & Frt.: Mar. - Jun.

Specimen Cited: Near Machuki, 890 m, AP Das & PC Rai 1421, dated 08.10.1995.

Status: Less Frequent.

Local Distrib.: Phari, Machuki, Samsing. 600-1250m.

General Distrib.: Tropical Himalayas, Sri Lanka, Malaysia.

Note: Fruits eaten. Shoot also yields a gum called "Chop".

LEGUMINOSAE (FABACEAE nom. alt.)

CAESALPINIACEAE R. Br.

Key to the Genera:

- 1. Leaves simple.....*Buhinia*
- 1. Leaves compound.....2
- 2. Leaves bipinnate; petals unequal.....*Caesalpinia*
- 2. Leaves unipinnate; petals equal.....*Cassia*

BAUHINIA L.

Key to the species:

- 1. Liana.....2
- 1. Trees.....*B. variegata*
- 2. Stem twining.....*B. scandens*
- 2. Stem not twining, tendrillar.....*B. vahlii*

Bauhinia scandens L., Sp. Pl. ed. 1:374. 1753; EFPN 2: 108. 1979; FB 1(3):634. 1987.

Bauhinia anguina Roxb., Fl. Ind. ed. 2(2):328. 1832; FBI 2: 284. 1878.

Local Name: Gandagila (Beng.).

Glabrous tendrillar liana. Tendrils opposite, paired, unbranched. Leaves simple; petioles 0.55-0.8cm long, glabrate; lm. 7-10 x 5-7.5 cm, ovate, acuminate, base cordate, 1/3-1/2 part of lamina dissected, obcordate, glabrous both sides, nerves 5-9. Flowers and fruits not seen.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1425, dated 08.10.1995.

Status: Frequent in lower belt.

Local Distrib.: Phari, Samsing, Machuki, Gorubathan. 500-1200m.

General Distrib.: India: Tropical Himalayas, Sikkim; Malayasia.

Notes: Plant has the religious value.

Bauhinia vahlii Wight et Arnt., Prodr. 297. 1834; FBI 2:279. 1878; Trs. N. Beng. 55. 1929; Fl. Asm. 2:142. 1938; FEH 1:141. 1966; 3:57. 1957. 1975; EFPN 2:108. 1979; FB 1(3):634. 1987.

Local Name: Bharla (Nep.).

Large liana, woody with brown pubescent young shoot. Stem warted. Tendrils circinate, in opposite pairs. Petioles 1.5-2cm long. Leaves 12-20 x 14-22 cm, suborbicular, entire, lobed at apex, lobes rounded or obtuse, base cordate, densely pubescent, membranous, basally 10-13 nerved. Corymbose terminal, many-flowered. Bracteoles 0.6 x 0.15cm, acuminate, pubescent above. Peduncles long upto 14.5cm, terate. Pedicels 4-6cm long. Calyx 2 lobed, slender, pubescent; petals 2-3.5 x 0.55-0.75cm, obovate, whitish; with distinct midvein, pubescent outside; fertile stamens 2 or 3; filaments 2.5-3 cm long; anthers red; ovary shortly stalked; style coiled. Pods 20-30 x 6-8 cm, oblong, woody, brownish; seeds upto 12, oblong, smooth and brown.

Flr.: Apr. - Jul. *Frt.:* Nov. - Jan.

Specimen Cited: Phari, 900m, AP Das & PC Rai 1929, dated 30.10.1997.

Status: Abundant in low altitude forests.

Local Distrib.: Machuki, Phari, Kuwapaani, Sakam, . 700-2100m.

General Distrib.: E. Himalaya (Kumaon-Bhutan), India, Bihar.

Note: It has many ethbotanical uses.

Bauhinia variegata L., Sp. Pl. ed. 1:375. 1753; FBI 2:284. 1978; FEH 3:57. 1975; EFPN 2:109. 1979; FB 1(3): 634. 1987.

Local Name: Koiralo (Nep.).

Trees upto 18m tall, deciduous; branches pendulous. Leaves 8-18 x 7-15cm, broadly ovate, 1/4 to 1/3 part bifid at the apex, lobes obtuse, cordata at base, 9-11 veined. Flowers subsessile, fragrant, appearing before the emergence of leaves. Receptacle tube upto 3 cm long. Sepals upto 3 cm long; petals 4-5 cm, elliptic, pinkish white, claw c. 1.5cm; fertile stamens 5. Pods 16-22 cm, linear oblong; seeds to 1.5cm, ellipsoidal.

Flr.: Feb. - May *Fr.:* Jul. - Dec.

Specimen Cited: Near Phari, 900 m, AP Das & PC Rai 1430, dated 30.10.1997.

Status: Frequent.

Local Distrib.: Phapar Kheti, Samsing, Phari, Sakam, Machuki. 700-1600m

General Distrib.: Himalaya, India, Myanmar, China.

Note: It has many ethnobotanical uses.

CAESALPINIA L.

Caesalpinia bonduc (L.) Roxb., Fl. Ind. ed 2(2): 362. 1832 ; FEH 1:141. 1966; FEH 2: 109. 1979; FB 1(3): 623. 1987.

Guilandina bonduc L., Sp. Pl. 381. 1753.

G. bonducella (L) Flem. in Asiat. Research. 11:159. 1810; FBI 2:254. 1975; JASB. 66 (2):226. 1897.

Eng. Name: Fever nut.

Srambling shrub forming a dense hedge, much prickly. Stem terete, prickly. Petioles 0.8-1 cm long. Leaves evenly tripinnate, rachis upto 80cm long; pinnae 6-11 pairs, recurved prickly at base; petiolules upto 0.5cm, subopposite; lamina of pinnae 1.5-4 x 0.7-2.4cm, elliptic, acute, base rounded, entire, pubescent beneath. Stipules similar to leaflets. Racemes extra-axillary with peduncles upto 25-60cm long. Bracts upto 1cm, reflexed. Pedicels 0.7-0.85cm long. Flowers unisexual, anthers rudimentary in females and ovary rudimentary in males; sepals 5, 0.75-1 cm, oblong, brown pubescent; petals 0.4-0.7cm, oblanceolate, yellowish, claw to 0.3cm; stamens 10; ovary upto 0.8cm long, ovoid, bristly. Pods 7-9 cm, ellipsoid, covered with spiny bristles; seeds 1-2, subglobose, marked with concentric lines around hilum.

Flr.: Aug. - Sep. *Fr.:* Sep. - Nov.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1931, dated 30.10.1997.

Status: Frequent.

Local Distrib.: Suntalay, Gorubathan, Samsing, Phari. 500-1000m.

General Distrib.: Pantropic.

CASSIA L.

Cassia tora sensu Baker in FBI 2: 263. 1878; Beng. Pl. 1:438. 1903; Fl. Pres. Madr. 3:401. 1919; Bot. Bih. & Oris. 3:304. 1922; Fl. Meg. 1:320. 1985.

C. obtusifolia L., Sp. Pl. 377. 1753; KB 13: 248. 1958; BBSI 18: 94. 1979; Nam. Chang. Flr. Pl. 105. 1987.

C. tora var *obtusifolia* (L.) Haines, Bot. Bih. & Oris. 304. 1922.

Local Name: Tapray (Nep.).

An annual attaining a height of 1 m or more, pubescent at young stage. Stipules 0.75-1.2 cm, linear, subulate. Petiolules 0.2 cm long. Leaf rachis 4-6.3 cm long, almost puberulous with glands between 2 lowermost leaflet pairs; leaflets 3 pairs, smaller arranged downwards, 2.5-6.2 x 1-2.6 cm, obovate-oblong or obovate, obtuse or subacute, minutely mucronate, base unequal, pubescent beneath, main lateral nerves 6-9 on each side. Peduncles axillary. Pedicels 4.4-0.55 cm long, hirsute. Flowers 1.25 cm diam., yellow; calyx segmented, obtuse, glabrous with age; petals 0.82-1.3 cm long, obovate-oblong, distinctly veined; stamens 7 of which 3 reduced to staminodes. Pod 12.5-18 cm long, septate between seeds, nearly tetragonous. Seeds sub-cylindric.

Flr.: Jul. - Aug.

Fr.: Oct. - Dec.

Specimen Cited: Samsing, 720 m, AP Das & PC Rai 1723, dated 17.5.1997.

Status: Common.

Local Distrib.: Phari, Samsing, Gorubathan, Suntalay, Chel Khola. Upto 800m.

General Distrib.: Pantropic.

MIMOSACEAE R. Br.

Key to the Genera:

- 1. Climbing or scrambling plants; fruits jointed.....2
- 1. Erect trees; fruits not jointed.....*Albizia*
- 2. Plants tendrillar; flowers spicate; pods large (upto 50cm)*Entada*
- 2. Plants prickly; flowers in globose heads; pods only upto 11cm long..... *Mimosa*

ALBIZIA Duraz

Albizia lebbeck (L.) Benth in Hooker, Lond. Jour. Bot. 3:87. 1844; FBI 2:298. 1878; FEH 1:136. 1966; 2:61. 1971; EFPN 2: 104. 1979; FB 1(3): 644. 1987.

Mimosa lebbeck L., Sp. Pl. 516. 1753.

Local Name: Siris (Nep.).

Trees upto 28m tall, deciduous. Leaf rachis upto 14cm long, glandular at the base and apex, glands few, oval; pinnae 2-4 pairs, 7-15cm; leaflets upto 16 pairs, 2.5-5.5 x 1.2-3 cm, oblong to ovate, asymmetric, glabrous to thinly pubescent beneath, pale-green. Heads many flowered, solitary, axillary or many in supraaxillary lines often forming terminal raceme. Calyx 0.25-0.3cm, pubescent; corolla 0.7-0.85cm, segmented to middle; stamens greenish-white. Pods 10-28 x 3-4cm ; seeds 0.85-0.9 x 0.65-0.7cm, suborbicular, numbering upto 15.

Flr.: Apr. - Jun. *Fr.:* Sep. - Dec.

Specimen Cited: Samsing-Phari, 950m, AP Das & PC Rai 1458, dated 12.11.1995.

Status : Frequent in the lower belt.

Local Distrib.: Gorubathan, Samsing, Phaphar kheti. 700-1300m.

General Distrib.: Tropical Himalayas, India, Sri Lanka, S.E. Asia, China and also cultivated in Tropics and sub-Tropics areas.

Note: Timber plant as well as good firewood. Extensively planted in row in tea gardens for shades.

MIMOSA L.

Key to the species:

1. Plant very sensitive to external stimulus, straggling undershrub; stipules linear-lanceolate; stamens 4.....*M. pudica*
1. Plant not sensitive to external stimulus, scrambling shrub; stipules subulate; stamens 8.....*M. himalayana*

Mimosa himalayana Gamble, KB 1920:4. 1920; RBSI 11(1):92.1926; FB 1(3):639. 1987.

M. rubicaulis sensu FBI 2:291. 1878, p.p.; FEH 1:159. 1966; 3:67. 1975.

M. rubicaulis Lamk. subsp. *himalayana* (Gamble) Ohashi, EFPN 2:126. 1979.

Local Name: Arhari Kanra (Nep.).

4-5m high scrambling shrub, armed with recurved spines. Leaves bipinnate, 10-22cm; pinnae 6-9 pairs, upto 6 cm long; leaflets 12-20 pairs, oblong, 5-11 x 2.5-4cm, thinly appressed hairy beneath. Stipules 0.6-0.7cm long, subulate. Flower heads to 1.5cm across, pinkish, axillary clusters. Peduncles upto 4.1cm long. Calyx to 0.5cm; petals to 0.3cm, oblong; stamens 8, long to 0.8cm. Pods 7.5-10 x 1.2-1.5cm, 6-10 jointed; seeds ovoid, brownish.

Flr.: Aug. - Oct. *Fr.:* Nov. - Feb.

Specimen Cited: Phari, 920m, AP Das & PC Rai 1432, dated 08.10.1995.

Status: Frequent in lower hill belts.

Local Distrib.: Samsing, Suntalay, Phari. 600-1050m.

General Distrib.: Himalayas (Kashmir-Bhutan).

Note: Spinose twig of this plant is used in the death-ceremony (Anthesti kriya) in Hindu rituals.

Mimosa pudica L., Sp. Pl. 1, 518 1753; Fl. Asm. 2: 152. 1938; KB 1955:184. 1955; FEH 1: 159. 1966.

Local Name : Bhuwari Jhar (Nep.).

Highly sensitive, spreading and straggling understrub. Branches covered with bristles. Stem prickly. Stipules linear-lanceolate, margin bristly. Leaves sensitive, pinnae 4, digitate, 2.3-7.2 cm long; leaflets 11-19 pairs, 0.7-1.1 cm long, narrowly oblong acute, adpressed bristly beneath. Peduncles covered with spreading bristles Heads axillary, 1-1.4 cm across. Flowers pink or white; stamens 4, exerted. Pod 1.5-2.5 cm long, prickly along the sutures, joints 3-5.

Flr.: Jul. - Oct. *Fr.*: Oct. - Dec.

Specimen Cited: Samsing, 700 m, AP Das & PC Rai 1722, dated 17.5.1997.

Status : Common.

Local Distrib.: Phari, Samsing, Phaparkheti, Tiffin Dara. Upto 1400m.

General Distrib.: Pantropic.

PAPILIONACEAE Giseke

Key to the Genera:

1. Pods jointed, compressed, breaking into segments.....*Desmodium*
1. Pods not jointed, not breaking into segments.....2
2. Fruits inflated.....3
2. Fruits not inflated.....4
3. Stamens diadelphous, equal; fruits 1-2 seeded; style thickened at the top.....*Flemingia*
3. Stamens monadelphous, unequal; fruits many seeded; style not thickened at the top.....*Crotalaria*
4. Erect plants.....5
4. Woody climbers.....*Mucuna*
5. Prickly plants.....*Erythrina*
5. Plants not prickly.....6
6. Flowers numerous, small and clustered in heads; petals white.....*Trifolium*
6. Flowers solitary or paired, upto 1cm broad; petals blue.....*Parochetus*
7. Leaves imperipinnate... ..*Indigofera*
7. Leaves peripinnate.....8
8. Leaves with more than 3 leaflets.....9
8. Leaves simple or 1-3 foliolate.....10
9. Leaflets modified into tendrils.....*Vicia*
9. Leaflets not tendrillar.....*Smithia*
10. Pods 3 to many seeded; keel curled almost to a ring.....*Vigna*
10. Pods few seeded; keel not curled.....11
11. Fruits linear, hairy.....*Shuteria*
11. Fruits terete, constricted and glabrous.....*Dumasia*

CROTALARIA L.

Key to the species:

1. Stems winged; stipules triangular; racemes upto 5-flowered.....*C. alata*
1. Stems not winged; stipules lanceolate; racemes upto 8-flowered.....*C. ferruginea*

Crotalaria alata D. Don, Prodr. Fl. Nep. 241. 1825; FBI 2:71. 1876; FEH 3: 61. 1975; EFPN 2: 113. 1979; TBRI 50 (4): 110. 1987; FB 1(3): 735. 1987.

C. bilata Schrank, Pl. Rar. Hort. Monac. t. 13. 1819; FEH 1: 146. 1966; 2:63. 1971.

Small pubescent undershrubs, upto 60 cm high. Stem pale pubescent. Leaves 3-7 x 1.4-4 cm, elliptic-obovate, acute or obtuse, mucronate, base cuneate, appressed hairy. Stipules 0.55-0.7cm, triangular, decurrent on internodes as wings. Racemes upto 5-flowered. Calyx to 1.2 cm, toothed, upper teeth broader, brown silky; petals equal to calyx, elliptic, yellowish; wings oblong, broad; keel slightly curved at the middle. Pods 3-4 cm long, oblong, black on maturity, glabrous.

Flr.: Sep. - Feb. *Fr.:* Dec. - Apr.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1935, dated 30.10.1997.

Status: Common.

Local Distrib.: Phari, Samsing, Sakam, Kuwapaani. 500-1900m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, S.E. Asia, China, Malaysia.

Crotalaria ferruginea Benth. in Hk., Lond. Jour. Bot. 2:476. 1843; FBI 2:68. 1876; FEH 1:146. 1966; 2:63. 1971; EFPN 2:113. 1979; FB 1(3):735. 1987; TBRI 50(4):110. 1987.

Herbs to subshrubs, upto 1 m high, pubescent. Stem trailing, brownish pubescent. Leaves 4-7.5 x 1.2-3cm, elliptic-ovate, obtuse, mucronate, base cuneate or rounded, appressed sericeous. Stipules 0.5-0.75 cm long, lanceolate. Raceme upto 8-flowered, opposite to leaves. Bracts upto 0.45 cm, elliptic. Calyx upto 1.4 cm long, with lanceolate teeth, silky; petals equal to calyx length, yellow; standard elliptic. Pods 2-3 cm long, oblong, glabrous, blackish on maturity, many seeded.

Flr.: Sep. - Nov. *Fr.:* Oct. - Jan.

Specimen Cited: Phari, 900 m, AP Das & PC Rai 1429, dated 08.10.1995.

Status: Sparse.

Local Distrib.: Found only in Phari-Machuki. 900-1400 m.

General Distrib.: Himalaya (Nepal-Bhutan), India, S.E. Asia, Sri Lanka, China, Malaysia.

DESMODIUM Desv. (*nom. cons.*)

Key to the species:

1. Pods segments upto 7, deeply undulate along lower suture.....*D. multiflorum*
1. Pod segments 7-14; not deeply undulate.....2
2. Leaflets ovate-elliptic; stipules 1-1.5cm long.....*D. laxiflorum*
2. Leaflets rhombic-ovate; stipules 0.4-0.5cm long.....*D. sequax*

Desmodium laxiflorum DC., Ann. Sci. Nat. Ser. 1(4):100. 1825; FBI 2:164. 1876; FEH1:151. 1966; 3:63. 1975, incl. subsp. *laxiflorum* Ohashi, EFPN 2:118. 1979; TBRI 50(4):111. 1987; FB 1(3):678. 1987.

Upto 1.5 m tall shrubs, with gray-hairy branches. Stem angled. Leaves 3 foliate, 12-30cm; petioles 2-6cm long; leaflets 4.5-13 x 2.2-7cm, ovate-elliptic, acute to long acuminate, base cuneate or rounded, appressed pubescent beneath. Stipules upto 1.5cm long, triangular. Stipels upto 1 cm long, narrowly lanceolate. Racemes upto 28cm long. Calyx 0.35-0.45cm; petals longer than calyx, white, with obovate standard to 0.4cm. Pods 4-9.5cm, densely pubescent with hooked hairs, sutures shallowly indented, segmentation upto 10.

Flr.: Aug. - Oct. *Fr.*: Nov. - Jan.

Speciment Cited: Suntalay, 500m, **AP Das & PC Rai** 1937, dated 02.11.1997.

Status: Frequent in lower region.

Local Distrib.: Samsing, Phari, Suntalay, Gorubathan, Machuki. 500-1400m.

General Distrib.: Himalayas, India, S.E. Asia, China, Malaysia.

Note: Pods sticky on the clothes as well as on the wools of animals.

Desmodium multiflorum DC., Ann. Sci. Nat. Ser. 1(4):101. 1825; FEH 2:65. 1971; 3:63. 1975; EFPN 2:118. 1979; TBRI 50(4): 111. 1987; FB 1(3): 676. 1987.
D. floribundum (D. Don) G. Don, Gen. Syst. 2:241. 1832; FBI 2:167. 1876, excl. *syn.*

Shrubby, upto 2 m high. Leaves 3- foliate, coriaceous; petioles 2.5-5 cm long; leaflets 2-6 x 1.6-3.4 cm, elliptic-obovate, acute or obtuse, base rounded, appressed hairy beneath. Stipules upto 1 cm, lanceolate. Stipels 0.2-0.3cm, subulate. Racemes upto 10 cm. Calyx to 0.4cm; petals upto 0.75cm, purple blue. Pods 2-3.2cm, undulate at sutures, pubescent, segments upto 8.

Flr.: Jul. - Sep. *Fr.*: Oct. - Nov.

Specimen Cited: Ruka Hill, 2660m, **AP Das & PC Rai** 0928, dated 24.10. 1994.

Status: Frequent.

Local Distrib.: Sakam, Kolbong, Chitray, Ruka Hill. 1400-2700m.

General Distrib.: Himalayas (Kashmir-Bhutan), Assam, S.E. Asia, China.

Note: Pods sticky.

Desmodium sequax Wallich, Pl. As. Rar. 2:46, t. 157. 1831; FBI 2:170. 1876; FEH 1:154. 1966; 2:65 & 315, f. 46 b. 1971; 3:63. 1975; EFPN 2:118. 1979; TBRI 50(4):111. 1987; FB 1(3): 677. 1987.

D. sinuatum (Miq.) Baker, FBI 2: 166. 1876.

Similar to *D. multiflorum*. Shrubs upto 3 m high; leaves 3-10 x 1.8-6 cm, rhombic-ovate, acute to acuminate, base rounded, margin undulate, appressed pubescent. Stipules upto 0.5cm, linear. Stipels to 0.4cm, filiform. Pods 1.5-2.5cm, pubescent with hooked hairs, suture segmentation upto 14.

Flr.: Sep.- Oct. *Fr.:* Nov. - Jan.

Specimen Cited: Phari, 900m, AP Das & PC Rai 1939, dated 02.11.1997.

Status: Frequent.

Local Distrib.: Samsing, Sakam, Phari, Suntalay 500 -1250m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, S.E. Asia, Malaysia, China.

DUMASIA DC.

Dumasia villosa DC., Ann. Sci. Nat. Ser. 1(4):257, t. 44 & Prodr. 2: 241. 1825; FBI 2: 183. 1876; FEH 1:156. 1966; 3:63. 1975; EFPN 2:120. 1979; TBRI 50(4):112. 1987; FB 1(3): 696. 1987.

Dumasia congesta Grah. (in Wallich Cat. 190. n. 5524. 1831-1832, *nom. nud.*) ex Wight et Arnt., Prodr. Fl. Ind. Ori. 206. 1834.

Perennial twinner, herbaceous. Stem slender, pubescent with gray hairs. Leaves trifoliolate; petioles upto 9 cm long; terminal leaflets 2.5-5 x 1-3.4 cm, ovate, obtuse, mucronate, cuneate at base, pubescent beneath; lateral leaflets smaller, villous on both surfaces. Racemes upto 6.5 cm long, axillary in pairs. Bracts and bracteoles 0.35-0.4cm, truncate, setaceous. Flowers subsessile; calyx 0.75-0.9 cm, truncate; corolla 1.5-1.8cm, yellowish; standard 0.6-0.7cm, oblong, wings similar to standard in shape and size, keel small, appressed pubescent; stamens diadelphous, with erect filaments; ovary linear; style flattened at the top; stigma capitate. Pods 2-3 cm, flat, velvety pubescent; seeds 2-4, bluish-black.

Flr.: Aug. - Oct. *Fr.:* Sep.- Nov.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1941, dated 02.11.1997.

Status: Common.

Local Distrib.: Machuki, Sakam, Zero Point, Samsing, Phari. 700-2200m.

General Distrib.: Africa, Himalaya (Kashmir-Bhutan), India, Sri Lanka, S.E. Asia, Malaysia, China.

Note: A good fodder.

ERYTHRINA L.

Key to the species:

1. Flowering on leafy trees; calyx truncate or obscurely bilabiate.....*E. arborescence*
1. Flowering on leafless trees; calyx spathaceous and deeply divided.....*E. stricta*

Erythrina arborescens Roxb., Fl. Ind. ed. 2, 3:256. 1832; FBI 2:190. 1876; FEH 1:156. 1966; 3:63. 1975; EFPN 2:120. 1979; TBRI 50(4):113. 1987; FB 1(3): 684. 1987.

Local Name: Phaledo (Nep.).

Deciduous trees, 8-20m high, with spiny branches. Leaves pinnately 3-foliolate; petioles upto 23 cm long, often spiny; leaflets 9-20 x 7.5-17 cm, broadly ovate, acute to shortly acuminate, base shallowly cordate or rounded, pubescent beneath. Stipules to 0.35 cm, lanceolate. Racemes 20-30cm long, axillary. Peduncles long upto 30 cm. Flowers appearing before leaf emergence; calyx 0.75-1 cm, campanulate, shallowly bilabiate or truncate, thinly hairy; standard 3.5-4.5 x 1.5-2 cm, ovate-elliptic, orange-scarlet; wings 1-1.2 x 0.45-0.5 cm, oblong; keel upto 2 cm, white. Pods 10-26 x 1.7-2.5 cm, oblong-ellipsoid, narrowed towards both end; seeds 4-6, reniform, blackish.

Flr.: Jul. - Sep. *Frt.:* Oct. - Jan.

Specimen Cited: Mulkharka, 2460m, **AP Das & PC Rai** 1154, dated 29.4.1995.

Status: Frequent.

Local Distrib.: Kuwapaani, Sakam, Mechuki, Mulkharka, Lava. 1200-2460m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, Myanmar, China.

Note: Planted to assist regeneration of vegetation.

Erythrina stricta Roxb., Fl. Ind. 3: 251. 1832; FBI 2: 189. 1876; Man. Ind. Timb. 242. 1902; Ind. Tr. 227. 1906; Fl. Am. 2: 70. 1938; Fl. Meg. 1: 301. 1987.

Local Name: Phaledo (Nep.).

A large tree, upto 30 m tall. Bark deeply furrowed, yellowish-gray. Branches horizontally spreading, vertically fissured with conical thorns. Young shoots pubescent. Stipule falcate. Petioles 15-23 cm long terete thornless. Leaves upto 20-45 cm long; petiolules 0.87-1.25 cm long; leaflets 6.5-19 x 5.5-17.5 cm, rhomboid-orbicular or ovate, often broader than long, lateral leaflets oblique, shortly acuminate, base cuneate, truncate, glabrous and glossy above, glaucous and sparsely hairy on the nerves beneath, lateral nerves 6-8 on each half. Peduncles 10-15 cm long and 0.5 cm wide at base. Racemes 12-25 cm long. Bracts upto 5 cm long, linear or subulate, caducous and brown pubescent. Flowers 3.6-5.5 cm long, ornamental coral-red; calyx 1.25 cm long, spathaceous, hairy in bud condition; petals unequal; standard 3.5-4.8 x 2.5 cm, obovate or ovate, with mark of parallel lines within; keel upto 2.25 cm long, scarious; wings much smaller than standard,

truncate. Pods 8-18 cm, spindle-shaped, scarcely torulose; seeds 2-3, nearly reniform, black.

Flr.: Jan. - Mar. *Fr.*: Mar. - Jun.

Specimen Cited: Above Phari, 800 m, **AP Das & PC Rai** 1763, dated 25.8.1997.

Status : Frequent.

Local Distrib.: Samsing, Phari, Kuwapaani, Tiffin Dara. 600-1700m.

General Distrib.: Nepal, India, E. Tibet, Myanmar, Indo-China, China.

Note: Wood is used as timber.

FLEMINGIA Aiton

Flemingia paniculata Benth. in Miq., Pl. Jungh. 245. 1852; FBI 2:227. 1876; EFPN 2:121. 1979; FB 1(3):707. 1987.

Shrub, upto 1.5m high. Petioles upto 3.2cm long. Lamina 5-11 x 3.2-6.5cm, ovate, acute to acuminate, base rounded, sometimes cordate, glandular and pubescent beneath; stipules upto 1.5cm long, lanceolate. Bracts 0.45 x 0.2cm, ovate. Flowers both in terminal or axillary racemes and panicles; calyx teeth 0.4-0.45cm, lanceolate; petals pink, standard 0.5-0.7cm, wings oblong, keel 0.55-0.6 x 0.3cm, greenish. Pods 1-1.2 x 0.6-0.7cm, oblong.

Flr.: Jan. - Mar. *Fr.*: Apr. - Jun.

Specimen Cited: Samsing Phari, 650m, **AP Das & PC Rai** 1172, dated 03.5.1995.

Status: Sparse.

Local Distrib.: Gorubathan, Suntalay, Samsing Phari. 400-800m.

General Distrib.: Himalayas, Myanmar.

INDIGOFERA L.

Indigofera hebeptala Baker, FBI 2: 101. 1876; Bot. Not. 111. 572. 1958; FEH 3:65. 1975; EFPN 2:123. 1979; FB 1(3):666. 1987.

1-2m high shrubs. Leaves long upto 16 cm, leaflets 5-13; lamina 2.2-5.2 x 0.6-2.5 cm, elliptic, obtuse or emarginate, mucronate, cuneate to rounded at base, pubescent beneath. Stipules to 0.3cm, lanceolate. Racemes upto 17cm long. Bracts 0.45-0.55cm, boat-shaped, narrowing to subulate point. Calyx 0.25-0.3 cm, shortly toothed; petals crimson, standard 0.85-1x 0.65-0.7cm, obovate, wings and keels slightly smaller, light pink. Pods 2.5-5.5cm, straight; seds 8-10, glabrous.

Flr.: May - Jul. *Fr.*: Jul. - Nov.

Specimen Cited: Dhamdhamay Danra, 2560m, **AP Das & PC Rai** 0671, dated 18.10.1994.

Status: Rare.

Local Distrib.: Todey-Tangta, Dhamdhamay Danra, Chouda Feri. 2100-2600m.

General Distrib.: Himalayas (Kashmir-Bhutan).

MUCUNA Adans. (nom. cons.)

Mucuna macrocarpa Wallich ex Baker in FBI 2:186.1876; Trs. N. Beng. 49: 1929; FEH 2:67. 1971; EFPN 2:126. 1979; FPK 27. 1981; TBRI 50 (4):120. 1987; FB 1(3):686. 1987.

Local Name: Baldengra (Nep.).

Woody liana. Branches terete. Leaves imparipinnate, 3-foliolate; petioles 7-12.5 cm, glabrous; petiolules 0.5-3 cm long, thinly pubescent; leaflet lamina 6.3-15 x 2.9-9.5 cm, ovate cuspidate, entire, long pointed acuminate, base rounded or cuneate, both surfaces glabrous, subcoriaceous, lateral nerves 7 pairs. Racemes fascicled on old wood, over 14 cm long. Peduncled dense brown, velvety, 0.5-0.9 cm long. Pedicels 0.9-1.2 cm long, velvety. Flowers 3.5-4.5 cm long, greenish-white; calyx campanulate, 2.5 cm long, bilabiate, upper one shallowly (indistinctly) 2 lobed with ciliate margin, lower one 3-lobed, tube 1.2 cm long, covered with glazy brown irritating bristles, acute to narrowly rounded; standard large upto 3 cm, ciliate at the tip, greenish white; wings larger than standard, 3.2-4 cm, dark-purple, ciliate at the middle upper region; keel 4-4.5 cm, greenish purple; stamens (9)+1. Pods upto 20 x 4.5 cm; seeds 2.5-2.9 cm across. (**Plate I: 10**).

Flr.: Mar. - May *Fr.:* Jul. - Sep.

Specimen Cited: Mulkharka, 2070 m, **AP Das & PC Rai** 1405, dated 30.4.1995.

Status: Rare.

Local Distrib.: Neora Valley-Sikkim Border, Mulkharka. 1900-2100m.

General Distrib.: E. Himalaya (Nepal-Bhutan), India, S. E. Asia, China, Japan.

Note: Seeds crushed and paste is applied to mumps.

PAROCHETUS Hamilt.

Parochetus communis Hamilt. ex D. Don, Prodr. Fl. Nep. 240. 1825; FBI 2:86. 1876; FEH 1:160. 1966; EFPN 2:127. 1979; FPK 27. 1981; TBRI 50(4):121. 1987; FB(1) 3:728. 1987.

Slender perennial herbaceous runner. Stem slender with a few raised vertical lines, rooting from nodes. Leaves palmately trifoliolate; stipules 0.4-0.5 cm, lanceolate, membranous; petioles 1.8-7.4 cm, glabrous; leaflet lamina 0.5-2.2 x 0.4-2 cm, broadly ovobate, emarginate or crenate, entire, base cuneate, glabrous above, pubescent beneath, lateral nerves 3-5 pairs. Bracts 0.2-0.25 cm, almost linear, basally connate forming a ring almost at the middle of pdl. Flowers solitary, axillary, 1.3 cm long; calyx campanulate, 0.5-0.6 cm, brown hairy, vertically lined, 5-toothed, teeth unequal, 0.2-0.4 cm long;

standard bluish-purple, whitish at lower portion, broadly obovate, longer than wings and keel, upto 1.6 cm, wings and keel 0.9-1.2 cm; stamens (9)+1. Pods 1.5-2.7 x 0.2-0.4 cm, linear, greenish, glabrous; seeds 1.4 cm, rounded and black. (Plate I: 11).

Flr.: Mar. - Sep. *Fr.*: Jul. - Nov.

Specimen Cited: Jaributti-Rechila, 2195-2280m, AP Das & PC Rai 0397, dated 15.10.1994; PHE Source-Alubari, 2280-2155m, AP Das & PC Rai 0291, dated 17.6.1994.

Status: Abundant.

Local Distrib.: Jaributti, Alubari, Pankhasari, PHE Source, Chouda Feri, Reshete. 1600-2400m.

General Distrib.: Subtropical to alpine Himalayan ranges, Nilgiri, Sri Lanka, Myanmar, Java, etc.

***SHUTERIA* Wight et Arnott**

Shuteria involucrata (Wallich) Wight et Arnt., Prodr. Fl. Ind. Or. 207. 1834; FBI 2:182. 1876; Anders. ser. 2, 12:298. 1972; EFPN 2:130. 1979 var. *involucrata*; FB 1(3):695. 1987.

Glycine involucrata Wallich, Pl. As. Rar. 3:22, t. 241. 1832.

Shuteria glabrata Wight et Arnt., Prodr. Fl. Ind. Or. 207. 1834; FBI 2:181. 1876; RBSI 4:104. 1910; FEH 1:163. 1966; 3:55. 1975; EFPN 2:130. 1979.

S. vestita Wight et Arnt., Prodr. Fl. Ind. Or. 207. 1834; FBI 2:181. 1876.

Herbaceous wiry climber. Stem slender, patently hairy. Leaves 3-foliolate; petioles upto 7cm long; petiolules upto 14 cm with swollen base, lateral ones shorter, densely hairy; leaflets 3-6 x 2.5-3.5cm, ovate, subacute to acute, rounded-cordate at base, margin entire, thinly hairy on both surfaces. Bracts and bracteoles 0.4-0.5cm, persistent. Copious racemes many flowered. Peduncles upto 9.2cm. Pedicels upto 0.52 cm long. Calyx 0.35-0.4 cm, lanceolate, lobes 5, pubescent; petals 0.8-1.2cm long, red-brown; standard 0.5-0.6 cm broad, elliptic; wings oblong; keels 0.55 cm, recurved, pubescent. Pods upto 3.5cm long, linear-flat, brownish pubescent; seeds 4-6, reniform, gray.

Flr.: Sep. - Dec. *Fr.*: Nov. - Jan.

Specimen Cited: Phari, 600m, AP Das & PC Rai 1943, dated 02.11.1997.

Status: Abundant.

Local Distrib.: Samsing, Machuki, Phari, Gorubathan, Sakam. 600-1800m.

General Distrib.: Himalayas (Simla-Bhutan), India, Sri Lanka, S.E. Asia, Malaysia, China.

Note: A preferred fodder.

SMITHIA Ait. (*nom. cons.*)

Smithia ciliata Royle, Ill. Bot. Him. t. 35, f. 2. 1834; FBI 2:150. 1876; FEH 1:163. 1966; EFPN 2:130. 1979; TBRI 50(4):127. 1987; FB 1(3):711. 1987.

Spreading subshrubs, upto 60 cm. Leaves 2-3 cm, rachis terminating into a bristle; leaflets 3-8pairs, 0.4-0.8 x 0.25-0.4cm, linear, obtuse, ciliate, midrib bristly beneath. Stipules upto 0.5cm, lanceolate, unlobed. Racemes small. Flowers secund; calyx short, upper lip shortly toothed or truncate, ciliate, veins intermingling; petals 0.5-0.6cm long, white to bluish. Pods papillose, with 6-8 joints.

Flr.: Sep. - Oct. *Fr.:* Nov. - Dec.

Specimen Cited: Near Tangta, 2160m, AP Das & PC Rai 0815, dated 21.10.1994.

Status: Rare.

Local Distrib.: Todey, Tangta, Ruka. 2100-2550m.

General Distrib.: Himalayas (Simal-Bhutan), Meghalaya, S.E. Asia, China, Japan.

TRIFOLIUM L.

Trifolium repens L., Sp. Pl. 767.1753; EFPN 2:131. 1979; TBRI 50(4): 129. 1987; FB 1(3):731. 1987.

Local Name: Tin Pattay (Nep.).

Slender perennial herbaceous runner, rooting at nodes. Stipules 1.6-1.9 cm, oblong, upper half subulate, membranous; petioles 3-7 cm, glabrous; leaflets 3, palmate, 0.8-2 x 0.7-1.7 cm, broadly obovate, obscurely denticulate, emarginate, base cuneate, glabrous above, thickly pubescent beneath, lateral nerves V-shaped. Heads 1.9-2.3 cm across, globose. Peduncles ascending, longer than petals. Pedicels 0.2-0.35 cm, teeth 5, unequal, usually 0.3-0.38 cm, nearly lanceolate; corolla longer than sepals, 0.65-1 cm, white. Pods small, 0.38-0.48 cm long, oblong, 3-4 seeded.

Flr.: Apr. - Jul. *Fr.:* May - Sep.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 039, dated 13.6.1994.

Status: Abundant.

Local Distrib.: Jaributti, Pankhasari, Reshete, Machuki, Alubari. 1500-2300m.

General Distrib.: Native of Europe, N. Africa, W. & C. Asia.

VICIA L.

Vicia tetrasperma (L) Schreber, Spicil Fl. Lips. 26. 1771; FBI 2: 177. 1876; FEH 3:70. 1975; TBRI 50(4):130. 1987; FB 1(3):725. 1987.

Annual herbaceous climber. Stem branched, hairy. Tendrils much branched, pubescent. Leaves even-pinnate; petioles and petiolules very short; leaflets paripinnate, upto 4 pairs, cuneate at base, margin entire. Peduncles axillary, upto 4.2 cm long, 1-2 flowered. Sepals

4, 0.2-0.25cm; petals just double the length of sepals, lilac, purple. Pods 1.2-2 x 0.35-0.45 cm, linear-oblong; seeds 3-5, compressed.

Flr.: Mar. - May. *Fr.:* Jul. - Sep.

Specimen Cited: Below Chonkobhir, 1960m, **AP Das & PC Rai** 1370, dated 06.5.1995.

Status: Sparse.

Local Distrib.: Sakam, Chonkobhir, Jaributti. 1900-2200m.

General Distrib.: Himalayas and Europe.

VIGNA Sabi

Vigna vexillata (L) A. Rich., Hist. Fis. Pol. Nat. Isla Cuba 11:191. 1845; FBI 2:206. 1876; Trs. N. Beng. 50. 1929; KB 24:553. 1970; FEH 2:72. 1975; EFPN 2:133. 1979; TBRI 50 (4):101. 1987; FB 1(3):700. 1987.

Phaseolus vexillatus L., Sp. Pl. ed. 1:724. 1753.

P. puliniensis Wight, Icon. 1:t. 202. 1839.

Slender herbaceous annual climber, young shoots pubescent with deflexed hairs. Stems terete, glabrescent when mature. Leaves pinnately 3 foliate; petioles 2.5-5.5 cm, deflexed hirsute initially; leaflets 3.2-9 x 1.2-2.2 cm, ovate-lanceolate, acute-acuminate, base rounded, membranous, appressed pubescent. Stipules upto 0.6cm long, lanceolate. Racemes 1-3 flowered. Calyx 1-1.2 cm, toothed; petals white-purple; standard upto 1.6cm, keel 0.45cm broad. Pod 4.5-10 cm long, brown hirsute, becoming glabrescent later; seeds reniform, black.

Flr.: Jul. - Sep. *Fr.:* Oct. - Nov.

Specimen Cited: Near Machuki, 1300m, **AP Das & PC Rai** 1945, dated 02.11. 1997.

Status: Less Frequent.

Local Distrib.: Phari, Machuki, Sakam. 900-1550m.

General Distrib.: India, Sri Lanka, Tropics and Sub-Tropics of Asia, Australia, Africa.

ROSACEAE Juss.

Key to the Genera:

1. Carpels arranged on a torus.....2
1. Carpels in a concave or cup-like thalamus.....5
2. Herbaceous plants.....3
2. Shrubs or shrubby climbers.....*Rubus*
3. Plants with runners.....4
3. Plants without runners.....*Potentilla*
4. Torus of thalamus fleshy.....*Fragaria*
4. Torus of thalamus dry.....*Duchesnea*
5. Herbaceous plants.....6

5. Trees, shrubs or shrubby climbers.....	7
6. Rossete herbs.....	<i>Argimonia</i>
6. Much branched herb.....	<i>Sibbaldia</i>
7. Unarmed plants.....	8
7. Armed shrubs or shrubby climbers.....	<i>Rosa</i>
8. Achenes/free ovaries enclosed within hypanthium.....	9
8. Ovaries or fruits fused with the thalamus.....	14
9. Hypanthium become fleshy.....	10
9. Hypanthium become dry to form a follicular structure.....	13
10. Flowers paniced; ovary 5-celled.....	<i>Eriobotrya</i>
10. Flowers corymbose or fascicled.....	11
11. Lamina quite entire.....	<i>Cotoneaster</i>
11. Lamina toothed or serrate.....	12
12. Testa coriaceous and not forming a stone.....	<i>Photinia</i>
12. Seeds with stones.....	<i>Crataegus</i>
13. Flowers paniced.....	<i>Neillia</i>
13. Flowers corymbose fascicled.....	<i>Spirea</i>
14. Carpel 1.....	<i>Prunus</i>
14. Carpels 5.....	15
15. Lamina tomentose below; calyx densely tomentose.....	<i>Malus</i>
15. Lamina glabrous below; calyx below.....	<i>Pyrus</i>

AGRIMONIA L.

Agrimonia pilosa Lodebour in Ind. Sem. Hort. Derpat. Suppl. 1:1823; TBRI 50 (4):105. 1987 var. *nepalensis* (D. Don) Nakai in Bot. Mag. Tokyo 47:247. 1933; FEH 1:118. 1966; EFPN 2:133. 1987; FB 1(3):582. 1987.

A. nepalensis D. Don, Prodr. Fl. Nep. 229. 1825.

A. eupatorium L. *sensu* FBI 2:361. 1878, p.p.

Perennial erect pilose herbs with woody root-stock. Stem 40-95cm tall, covered with spreading hairs. Leaves interruptedly pinnate, 8-14cm; leaflets extremely variable in size, larger 6.5-10.5, suborbicular or elliptic-obovate, serrate, acute, base cuneate to rounded, glandular pilose, small leaflets 0.55-1.7 x 0.4-1cm. Stipules upto 3 x 2cm, ovate, adnate to petioles. Racemes many flowered, terminal; calyx tube to 0.25cm, with ovate lobes; petals 0.35-0.45cm, oblong; stamens 10; carpels 2, hooked in fruit. Fruiting calyx tube with 0.25-0.3cm long hook. (Plate XI).

Flr.: May - Aug. *Fr.:* Sep. - Nov.

Speciemen Cited: Below Chouda Feri, 2020m, AP Das & PC Rai 0335, dated 14.10.1994.

Status: Common.

Local Distrib: Alubari, Tinsimana, Ruka, Chouda Feri, Sakam. 1400-2900m.

General Distrib.: Himalayas(Kashmir-Bhutan), Meghalaya, S. Tibet, Myanmar, Indochina, China.

COTONEASTER Med.

Cotoneaster microphyllus Lindley, Bot. Reg. 13:t. 1114. 1827; FBI 2:387. 1878; FEH 1:119. 1966; 2:5. 1971; EFPN 2:135. 1979; FB 1(3):589. 1987.

C. congestus Baker in Saunders, Refug. Bot. 1: t. 51. 1869; FEH 1:119. 1966; TBRI 50(4):110. 1987.

C. thymifolius Baker in FBI 2:387. 1878.

Local Name: Broosh Jhar (Nep.).

Small rigid, ramose, low growing shrub. Stem racemosely branched, woody. Leaves simple; petioles to 0.35cm; lamina 0.55-1.2 x 0.25-0.55cm, elliptic-obovate, obtuse to subacute, base cuneate, glabrous above, appressed hairy beneath, dark green. Flowers solitary; calyx to 0.4cm, 5-lobed, pubescent; petals 5, suborbicular, 0.3cm, white, tinged pink; carpels adnate to calyx tube. Fruit 0.75-0.95cm, subglobose to globose, scarlet.

Flr.: Apr. - Jul. *Fr.:* Aug. - Dec.

Specimen Cited: Rechila Peak, 3100m, AP Das & PC Rai 0193, dated 15.6.1994.

Status: Abundant.

Local Distrib.: Chitray, Thosum Beat, Ruka, Alubari, Rechial Peak. 2280-3100m.

General Distrib.: Himalaya, S. W. China.

CRATAEGUS L.

Crataegus oxycantha L., Sp. Pl. 477. 1753; FBI 2:383. 1878; TBRI 50(4):100. 1987.

Large shrub to small tree, deciduous. Branches rigid and spinescent. Young parts softly pubescent. Leaves simple; petioles slender; lamina triangular-ovate, base cuneate, deeply pinnatifid into 3-5 lobes, lobes sharply dentate, sinus obtuse. Stipules small, leafy, serrate, deciduous. Flowers and fruits not collected.

Specimen Cited: Below Chitray, 2390m, AP Das & PC Rai 0582, dated 16.10.1994.

Status: Rare.

Local Distrib.: Seen only at Chitray.

General Distrib.: Europe, temperate Asia.

DUCHESNEA Sm.

Duchesnea indica (Andr.) Focke in Pfamilien. III, 3: 33. 1888; FEH 1: 120. 1966; Nam. Chang. Flr. Pl. 201. 1987; FB 1(3):579. 1987.

Fragaria indica (Andr.), Bot. Refxs. 7: t. 479. 1807; FBI 2: 343. 1878.

Potentilla indica (Andr.) Wolf in Asch. & Graebn. Syn. Mitt.-Eur. Fl. 6(1): 661. 1904; Blumea 16: 344. 1968.

Silky pubescent herb. Rootstock perennial, slender. Petioles slender 3 cm long. Stipules foliaceous and adnate to petioles. Leaflets digitately trifoliolata, 2.3-3.7 cm long, obovate, margin toothed, base cuneate, nerves subparallel, pubescent. Peduncles as long as petioles. Flowers 1.2-2.5 cm across, solitary, axillary; calyx 5, persistent along with bracteoles; petals 5, abovate; stamens numerous, persistent; receptacle convex; carpels

many. Achenes comprised of numerous minute spherical fruits, black, borne on fleshy red receptacle.

Flr. & Frt.: Often throughout the year.

Specimen Cited: Pankhasari Forest, 2350 m, **AP Das & PC Rai** 1283, dated 05.5.1995.

Status: Fairly Common.

Local Distrib.: Alubari, Pankhasari, Forest, Jaributti, Tinsimana, Rechila Middle. 2100-2900m.

General Distrib.: Afganistan, Himalayas, India, east to China, Japan.

***ERIOBOTRYA* Lindl.**

Key to the genera:

- 1. Leaves 14-30cm long, oblong-elliptic; stipules upto 1.5cm, lanceolate; calyx-tube obconic.....*E. petiolata*
- 1. Leaves 8.5-15.5cm long, oblanceolate; stipules upto 0.4cm, spathulate; calyx tube cup-shape.....*E. dubia*

Eriobotrya dubia (Lindl.) Decaisne, Nouv. Arch. Mus. Paris 10:145. 1874; FBI 2:371. 1878; RBSI 19 (2):40. 1966; EFPN 2:136. 1979; FB 1(3):601. 1987; TBRI 50 (4):113. 1987.

Photinia dubia Lindl., Trans. Lin. Soc. 13:104, t. 10. 1822.

Small evergreen tree, 12cm. Leaves simple; lamina 8-15.5 x 2.2-4.2cm, oblanceolate, coarsely serrate, acuminate, base attenuate, gradually narrowing to short petiole, glabrous, coriaceous, veins upto 16 pairs. Stipules 0.35-0.4cm, spathulate, deciduous. Panicles 6-10cm, terminal; calyx upto 0.3cm, tube cup-shaped, lobes 5; petals 5, white; stamens 15-20; ovary inferior; styles 2, connate at base. Pome to 1cm.

Flr.: Sep. - Nov. *Frt.:* Nov. - Apr.

Specimen Cited: Near Chouda Feri, 1920m, **AP Das & PC Rai** 0281, dated 17.6.1994.

Status: Rare.

Local Distrib.: Sakam, Chouda Feri. 1400-2000m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Eriobotrya petiolata Hk. f., FBI 2:370. 1878; Adansonia n.s. 5:552, t. 1, f. 4. 1965; FEH 3:51. 1975; TBRI 50 (4):113. 1987; FB 1(3):602. 1987.

Local Name: Maya (Nep.).

Tree, 8-15m high, with spreading branches. Leaves simple; petioles 4-5.5cm long; lamina 14-30 x 7-10.5cm, oblong-elliptic, acuminate, base cuneate, margin entire to shallowly serrate above middle, glabrous, lateral veins upto 18 pairs. Stipules 1-1.5cm, lanceolate,

deciduous. Panicles upto 16cm, tomentose. Calyx tube 0.35-0.45cm, obconic, lobes 5, to 0.2cm diam.; petals 0.65-0.8cm, obovate, contorted; stamens 20; styles 4-5, basally united. Pomes 1-1.5cm across, subglobose, with persistent calyx lobes.

Flr.: Mar. - Jun. *Fr.:* May - Aug.

Specimen Cited: Jaributti, 2160m, AP Das & PC Rai 0417, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Lava, Jaributti, Alubari, Chouda Feri. 1800-2300m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Assam, E. India.

FRAGARIA L.

Key to the species:

1. Perennial herbs; petiolules 0.15-0.3cm long; leaflets 10-16 toothed; petals white.....*F. nubicola*
1. Annual herbs; petiolules only upto 0.1cm long; leaflets margin 4-6 toothed; petals blotched reddish.....*F. daltoniana*

Fragaria daltoniana Gay in Ann. Sci. Nat. Ser. 4, 8:204. 1857, *e typo*; FBI 2:345. 1878; FEH 1:121. 1966; EFPN 2:137. 1979; FB 1(3):578. 1987.

F. sikkimensis Kurz., JASB 44 (3):206. 1876.

F. rubiginosa Lacaita in Journ. Lin. Soc. 43:467. 1916, *e typo*; SFSH 78. 1963; TBRI 50 (4):114. 1987. (3): 206. 1876.

Small prostrate herb. Petioles 2-4cm, pale brown; petiolules 0.15-0.3cm long. Leaflets 1.2-2.6 x 0.8-2cm, obovate, obtuse, margin 4-6 toothed, appressed hairy beneath. Calyx lobes ovate or triangular, usually entire, sometimes toothed near apex; epicalyx coarsely toothed; petals 0.45-0.85cm, light blotched reddish. Fruiting receptacle 2-2.5cm across, globose, turning to conical on ripening, pinkish white.

Flr.: May - Jul. *Fr.:* Jul. - Aug.

Specimen Cited: Tinsimana, 2900m, AP Das & PC Rai 0773, dated 24.10.1994.

Status: Less Common.

Local Distrib.: Chitray, Ruka Hill, Thosum, Tinsimana. 2400-3000m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Fragaria nubicola Lindley *ex* Lacaita in Journ. Lin. Soc. 43:467. 1916; FEH 1:121. 1966; EFPN 2:137. 1979; FPK 30. 1981; TBRI 50(4):114. 1987; FB 1(3):578. 1987.

F. vesca var. *nubicola* Hk.f. in FBI 2:344. 1878.

Perennial herb with a woody root-stock. Leaves 3-foliolate, sometimes with two additional minute lower pinnules giving pinnate nature; stipules upto 1.2 cm long, adnate, brownish; petioles upto 4 cm, spreading, pubescent; petiolules upto 0.1 cm; lamina 0.5-

1.4 x 0.4-1 cm, serrate with 10-16 teeth, obtuse, cuneate, thinly appressed whitish-hairy above, densely silky pubescent beneath, nerves strongly impressed beneath. Scapes usually 1-flowered, longer than leaves, upto 6 cm; bracts 2, medianly placed on scapes, 0.3-0.45 cm. Flowers 1.7 cm in diam.; calyx-cup 0.35-0.5 cm across, externally pubescent, lobes 5, triangular, entire, 0.3-0.5 x 0.15-0.2 cm; epicalyx segments 5, 0.3-0.4 cm, elliptic-lanceolate, alternating with sepal lobes, acuminate, spreading and persistent in fruits; petals 5, free, 0.55-0.7 x 0.5-0.6 cm, broadly obovate, white, glabrous; stamens numerous, 0.2-0.25 cm long; anthers to 0.01 cm long, 2-celled; filament 0.15-0.2 cm, glabrous; carpels many, free; style short. Achenes 0.1-0.15 cm, many borne on fleshy receptacle, matured receptacle 1-1.3 cm, globose, red, sweet flavoured. (**Plate 14**).

Flr.: Apr. - Jun. *Frt.*: Jun. - Aug.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 0248, dated 16.6.1994; Lava-Rechila Chowk, 2118-2280 m, **AP Das & PC Rai** 0332, dated 18.6.1994;

Status: Abundant.

Local Distrib.: Rechila Chowk, Jaributti, Chouda Feri, Lava, Tinsimana, Rechila Peak. 1900-3100m.

General Distrib.: Himalayas (Kashmir-Bhutan), N. Myanmar, W. China.

Note: Ripe thalamus edible.

***MALUS* Mill.**

***Malus baccata* (L.) Borkhausen**, Theor.-prekt. Handb. Forstbot. 2:1280. 1803; EFPN 2:138. 1979; FB 1(3):604. 1987; TBRI 50 (4):119. 1987. var. *himalaica* (Maxim.) Schneider, Ill. Handl. Laubh. 1:721. 1906; Faun. & Fl. Nep. Him. 149. 1955. *Pyrus baccata* L. *sensu* Hk. f., FBI 2:373. 1878.

3-5m high deciduous shrub or tree. Branches slender, tomentose. Leaves simple; petioles 1-4cm, slender; lamina 4-8.5 x 2-5.5cm, elliptic-lanceolate, closely serrate, acute or acuminate, base cuneate, mucronate, veins sparsely pubescent beneath. Stipules 0.35-0.5cm, subulate. Pedicels 2-3.5cm, slender. Flowers on terminal corymbs; calyx tube 0.35-0.45cm, lobes 5, lanceolate; petals 5, 1-1.5cm long, white, often with pink tinges; styles 5. Pomes 0.7-0.85 x 0.4-0.55cm, ellipsoid, reddish.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 010, dated 13.6.1994.

Status: Only few trees seen; probably planted.

Local Distrib.: Seen only in Alubari.

General Distrib.: Siberia-Manchuria, himalayas, meghalaya, etc.

NEILLIA G. Don

Key to the species:

1. Suffrutescent undershrub; stem ramose; lamina shallowly 3-lobed; stipules dentate-serrate; flowers in terminal thyse, rarely axillary; petals white.....*N. thyrsoflora*
1. Shrubs; stem not ramose; lamina deeply 3-lobed; stipules entire; flowers in 2.5-7cm long raceme; petals white or light pink.....*N. rubiflora*

Neillia rubiflora D. Don, Prodr. Fl. Nep. 229. 1825; FBI 2: add. 1879; SFSH 99 & 100. 1963; FEH 1:122. 1966; 2:52. 1971; EFPN 2: 138. 1979; FB 1(3):537. 1987.

Large shrub with slender branches. Leaves 4.5-10.5 x 3-5 cm, deeply 3-lobed, base deeply cordate, coarsely toothed; stipules usually entire. Racemes 2.5-7 cm long, narrow. Flowers upto 0.6 cm; sepal-cup 0.35-0.5cm, broad campanulate, brownish red, pubescent, lobes 0.2 cm; petals 0.35-0.55 cm, white or light pink. Persistent sepal-cup glandular.

Flr.: Jun. - Aug. *Fr.:* Aug. - Nov.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 027, dated 13.6.1994.

Status: Less Common.

Local Distrib.: Rechila Middle, Chitray, Alubari, Thosum Hill. 2200-2800m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), W. China.

Neillia thyrsoflora D. Don, Prodr. Fl. Nep. 228. 1825; FBI 2: add.1: 1879; Trs. N. Beng. 59. 1929; FEH 1: 122. 1966; EFPN 2: 138. 1979; FPK 30. 1981; TBRI 50 (4): 120. 1987; FB 1(3): 536. 1987.

Local Name: Jhikray (Nep.).

Low suffrutescent undershrub, 0.5-2 m, young shoots hairy; branches slightly drooping. Stem ramose, angular. Leaves simple, alternate; stipules 0.6-0.9 x 0.2-0.25 cm, ovate-lanceolate, dentate serrate, acuminate; petiole 1.2-1.6 cm; lamina 3.2-10 x 1.5-6.5 cm, ovate, shallowly 3-lobed, double or irregularly serrate, acuminate, shallowly cordate or rounded, dark green and pubescent above, pale and thinly hairy beneath mainly along the nerves, basally 3-nerved, lateral nerves 6-9 on either sides. Flowers in terminal thyse, rarely axillary, upto 7 cm long. Peduncle pubescent. Bracteoles 0.5-0.65 cm, ovate-lanceolate, entire, persistent. Pedicels upto 0.2 cm long, slightly wooly. Calyx tube 0.5-0.7 x 0.45-0.55 cm, campanulate, persistent, pubescent externally, lobes 5, 0.25-0.35 cm, triangular; petals 5, 0.3-0.5 cm, elliptic, white; stamens 8-10; filament 0.1-0.15 cm; carpel 1, 0.25 cm, ovoid; style long upto 0.3 cm. Follicle covered within calyx tube, fruiting calyx-tube capitate, glandular; seeds small, 8-10, brown.

Flr.: May - Aug. *Fr.:* Nov. - Dec.

Specimen Cited: Alubari-Jorpokhari, 2280-3040 m, AP Das & PC Rai 0156, dated 18.6.1994.

Status: Less Common.

Local Distrib.: Lava, Alubari, Ruka Hill, Reshete. 2100-2700m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Meghalaya, N. Myanmar, W. China.

PHOTINIA Lindl.

Photinia integrifolia Lindl. in Trans. Lin. Soc. 13: 103. 1821; FBI 2:381. 1878; Trs. N. Beng. 63. 1929; FEH 1:122. 1966; EFPN 2:138. 1979; TBRI 50 (4):122. 1987; FB 1(3): 600. 1987.

Local Name: Kursimla, Phalame, Chamray Kaath; Jangali Chiyapati (Nep.).

Glabrous, evergreen shrub to small tree. Bark of young twigs silvery white. Leaves simple; petioles 0.6-1.5 cm; lamina 3.5-12 x 2.2-4 cm, oblanceolate or elliptic, entire, acuminate, cuneate, coriaceous, glabrous, light green beneath, mid-rib impressed above, prominently raised and thick beneath. Corymbs 7.5-11.5 cm long, glabrous, spreading, much branched. Flowers very small, 0.25-0.3 cm across; calyx-cup 0.2-0.25 cm with triangular lobes, turbinate, persistent; petals 5, equal or slightly longer than sepals, white; stamens numerous; ovary inferior, tip wooly; styles 2, glabrous. Fruit a pome, 0.3-0.4 cm in diam., subglobose, glabrous.

Flr.: Apr. - May *Frt.:* Oct. - Nov.

Specimen Cited: Mulcharka-Rechila Middle, 2120-2490 m, AP Das & PC Rai 1149, dated 29.4.1995; Chouda Feri, 2285 m, AP Das & PC Rai 1258, dated 05.5.1995.

Status: Common.

Local Distrib.: Chouda Feri, Mulkharka, Chitray, hattidara. 2100-2600m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Meghalaya, N. Myanmar, W. China.

Notes: Foliage used as substitute of tea-leaf (Jangali chiyapati).

POTENTILLA L.

Key to the species:

1. Leaves pinnate or imparipinnate with 4-8 pairs of lateral leaflets; leaflets usually alternating.....2
1. Leaves palmate, 3-5 foliate.....*P. sundaica*
2. Leaflets 0.6-1.5cm long, sharply serrate, densely silky white beneath.....*P. lineata*
2. Leaflets upto 3cm long, bluntly serrate, pilose hairy beneath.....*P. polyphylla*

Potentilla lineata Trevir. ex Reich., Iconogr. Bot. 1:7, tab. 8. 1824; Lin. Syst. Veg. ed. 16, 2:534. 1825; Rosa. Ind. 4:93. 1999.

Small perennial herb, stout rootstock 12-28 cm tall, whitish hairy. Radical leaves interruptedly pinnate with 4-8 pairs of lateral leaflets, minor leaflets alternating; stipules

of cauline leaves 1-2 x 1-1.5 cm, resembling leaflet; radical leaf stipule 2-2.5 x 0.5-0.7 cm, ovate-lanceolate, brownish; leaflets 0.6-1.5 x 0.5-1 cm, elliptic or narrowly obovate, sharply serrate, obtuse, base cuneate or rounded, dark green and less pubescent above, dense silky silvery white beneath, veins impressed above. Cymes corymbose, open; pedicels silvery white, sericeous, lower longer to 2 cm. Flower 1.2 cm across; sepals 5, basally connate, lobes 0.4-0.5 x 0.2 cm, ovate-acute, externally sericeous; petals 5, yellow, 0.45-5.5 x 0.35-0.5 cm, glabrous, rounded, emarginate, reticulately nerved; stamens numerous, glabrous; anthers 2-celled, 0.1-0.05 cm; filament 0.2-0.25 cm long. Achenes 0.1-0.17 cm, ovoid, glabrous.

Flr.: Jun. - Aug. *Fr.*: Aug. - Sep.

Specimen Cited: Alubari Belt, 2280-2424 m, AP Das & PC Rai 0571, dated 16.10.1994.

Status: Common.

Local Distrib.: Alubari, Helipad, Chitray, Ruka Hill, Chouda Feri. 2200-2600m.

General Distrib.: India (Jammu and Kashmir, Utter Pradesh, Sikkim, Meghalaya, Arunachal Pradesh, Manipur, Nagaland), Nepal, Bhutan, China (Tibet) and Myanmar.

Potentilla polyphylla Wallich *ex* Lehm., Nov. *et* Min. Cong. Strip. Pugill. 3:13. 1831; EFPN 2:141. 1979; TBRI 50 (4):123. 1987; FB 1(3):571. 1987.

P. moonianana Wight, Ic. Pl. Ind. Or. 1: t. 233. 1840; FBI 2:349. 1878; FEH 1:124. 1966.

Perennial rosette herb upto 30 cm. Stem yellowish pubescent, hairs spreading, silky when young. Leaves interruptedly imparipinnate with 4-8 pairs leaflets, alternate; stipules of cauline leaves upto 2 x 1 cm, leafy, basal leaf stipules 2.5 x 0.6 cm, ovate or narrowly lanceolate; leaflet sharply unequal, 0.8-3 x 0.5-2 cm, broadly elliptic-obovate, bluntly toothed, obtuse, base cuneate, more densely pilose hairy beneath. Flowers and fruits not collected.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 020, dated 13.6.1994; Thosum Beat-Jorpokhari, 2780-3040m, AP Das & PC Rai 1211, dated 03.5.1995.

Status: Common in open places.

Local Distrib.: Thosum Beat, Alubari, Rechila Middle, Jorpokhari. 2200-3050m.

General Distrib.: Himalayas (Kumaon-Sikkim), Meghalaya, Sri Lanka.

Potentilla sundaica (Bl.) Kuntz, Rev. Gen. 1:219. 1891; FB 1(3): 567. 1987.

Potentilla kleiniana Wight *et* Arnt. in Wallich, Ill. Ind. Bot. 1: t. 85. 1831; FBI 2:359. 1878.

Rosetted herb, 1-25 cm, branches sarmentose, longitudinally ridged when mature, appressed pubescent, hairs silky-white. Leaves palmate, 3-5 foliate; stipules 1-1.3 cm, long, adnate, veined, sparsely long white-hairy; petioles 0.5-2.2 cm, white pubescent; leaflet lamina 0.5-2.1 x 0.3-1.4 cm, obovate, serrate, rounded, base cuneate, glabrous above, thinly silky pubescent beneath along nerves. Cymes terminal. Flowers 2-5 in cymes, yellow; calyx 5-lobed, lobes unequal, teeth 0.2-0.3 cm, acute, thinly white hairy

outside; epicalyx lobes 5, alternating with calyx-lobes; petals 0.3-0.45 x 0.15-0.2 cm, obovate, yellowish. Achenes 0.1 cm or less, ellipsoid, glabrous.

Flr.: Oct. - Dec. *Fr.*: Dec. - Mar.

Specimen Cited: Neora River Bank-Jaributti, 2195-2280 m, **AP Das & PC Rai** 043, dated 14.6.1994; Lava-Rechila Chowk, 2118-2280 m, **AP Das & PC Rai** 0331, dated 18.6.1994; Jaributti-Alubari, 2195-2280 m, **AP Das & PC Rai** 0463, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Lava, Jaributti, Alubari, Thosum Beat. 2100-2800m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya, S. China, Java.

PRUNUS L.

Key to the species:

1. Leaves 6-14 x 3.5-6.5cm, long acuminate; flower upto 3.7cm diam., pink, fading to white.....*P. cerasoides*
1. Leaves 3.5-8.6 x 1.3-3cm, acute to short acuminate; flowers 0.7-0.9cm across, white.....*P. napaulensis*

Prunus cerasoides D. Don, Prodr. 239. Feb. 1825; Fl. Asm. 2:180. 1938; Brittonia 4:89. 1941; Journ. Jap. Bot. 51:9. 1976; EFPN 2:141. 1979; Fl. Jow. 1:182. 1981; Fl. Meg. 1:354. 1987; Nam. Chang. Flr. Pl. 458. 1987; FB 1(3):540. 1987.

Cerasus puddum Seringe in DC., Prodr. 2:537. Nov. 1825.

Prunus puddum (Wallich) Roxb. ex Brandis, For. Fl. Brit. Ind. 194. 1874; FBI 2:314. 1878; Man. Ind. Timb. 313. 1902.

Maddenia podicellata Hk. f., FBI 2: 318. 1878.

Local Name: Painyun (Nep.).

A large deciduous tree upto 20m high. Bark peeling off in strips, lenticellate, dark brown or grey-brown. Branches spreading. Stipules linear and glandular-fimbriate. Petioles 1-1.6cm, channeled and with 1-2 glands at tip. Leaves simple, 6-14 x 3.5-6.5cm, ovate-elliptic or ovate-lanceolate, margin glandular serrate, long acuminate, base truncate or rounded, lateral nerves 7-12 on either half. Corymb or fascicles 1-3 flowered. Pedicels 0.75-1.5cm long. Flowers upto 3.7cm diam., pink, often fading to white; calyx-tube 1cm long, campanulate, lobes 0.25-0.35cm, ovate, acute, greenish; petals 0.75-1cm long, obovate; stamens many; ovary glabrous; style exerted. Drupes 2-2.5cm, ellipsoid or oblong, yellow, sometimes tinged with red.

Flr. & Fr.: Oct. - Jun.

Specimen Cited: Above Aritar, 1800m, **AP Das & PC Rai** 1157, dated 29.4.1995.

Status: Frequent.

Local Distrib.: Pankhasari, Aritar, Sakam Forest, Rechila Middle. 1600-2400m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Naga Hills, Manipur, N. Myanmar, W. China.

Note:

1. Branchlets are used to make handles of khukuri, sickle (traditional weapons of Nepali community) etc.
2. Twigs are also used as walking stick.
3. Highly ornamental as its bloom adds scenic beauty to its habitat

Prunus napaulensis (Seringe) Steud., Nom. Bot. ed 2, 2: 403. 1841; FBI 2:316.1878; Trs. N. Beng. 59.1929; FEH 1: 126. 1966; EFPN 2: 142. 1979; FPK 31. 1981; TBRI 50(4): 124. 1987; FB 1(3):540. 1987.

Local Name: Arupate (Nep.).

Large deciduous trees upto 20 cm. Leaves simple, alternate; petiole 0.5-1.2 cm, with two glands at apex; lamina 3.5-8.6 x 1.3-3cm, narrowly elliptic-lanceolate, finely serrate, acute to short acuminate, base rounded or obscurely subcordate, glabrous and deep green above, glaucous and light white beneath, nerves impressed above, prominent beneath, lateral vein axils beneath either with or without hair-tufts. Racemes on new shoot, elongate, leafy at base, 6-11 cm long; rachis pubescent. Pedicels 0.25-0.4 cm long. Flowers 0.7-0.9 cm across, white, usually alternately placed; calyx green, gray-pubescent, 0.2-0.3 cm, 5-lobed, teeth 0.1-0.15 cm long, obtuse-subacute; petals 5, 0.35-0.45 cm, obovate; stamens numerous; anthers brown; filament whitish; carpel 1, glabrous; style simple. Drupe 1.2-1.45 x 1-1.2 cm, ovoid; seeds smooth.

Flr.: Apr. - May *Frt.:* May - Aug.

Specimen Cited: Rechila-Tinsimana, 2490-2900 m, AP Das & PC Rai 1225, dated 04.5.1995; Chouda Feri-Rechila, 2285-2490 m, AP Das & PC Rai 1251, dated 05.5.1995.

Status: Common.

Local Distrib.: Lava, Chitray, Ruka Hill, Rechila Chowk, Chouda Feri. 2100-2700m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), Meghalaya, Manipur, N. Myanmar, W. China.

PYRUS L.

Pyrus communis L., Sp. Pl. ed. 1, 1: 479. 1753; FBI 2: 374. 1878; FEH 1:127. 1966; FB 1(3):606. 1987.

Local Name: Naspati (Nep.).

Deciduous tree to 12 m. Leaves long petiolate (petiole upto 1.5-4 cm), lamina 5-9 x 3.5-6.2 cm, broadly ovate, margin crenately serrate, apex abruptly acute, base rounded, sometimes slightly notched inward at the middle, glabrous except mid-vein beneath, leaf buds golden wooly. Corymbs terminally borne on short scarred shoots, few flowerd. Pedicels long, glabrous. Calyx lobes lanceolate, pubescent within, persistent; petals obovate, white. Pome 4-6.5 cm across, pyriform or obovoid, yellowish green.

Flr.: Sep. - Oct.

Fr.: Oct. - Nov.

Specimen Cited: Rechila Chowk, 2280 m, **AP Das & PC Rai** 1018, dated 23.4.1995.

Status: Introduced.

Local Distrib.: Seen only in one place of Rechila Park. 2280m.

General Distrib.: Native of Europe and W. Asia; commonly cultivated and naturalised.

Note: Fruits edible.

ROSA L.

Key to the species:

1. Stem always with recurved prickles; leaflets ovate-elliptic, margin closely serrate; petals white, sometimes pink.....*R. brunonii*
1. Stem naked, rarely prickly; leaflets oblong, margin serrate only at apical part; petals yellow.....*R. sericea*

Rosa brunonii. Lindley, Ros. Monogr. 120, t. 14. 1820; Bot. Mag. t. 4030. 1843; Pl. Wilson 2:306. 1915; JAA 10:87. 1929; Man. ed. 2, 446. 1940; Bibl. 312. 1949; Faun. & Fl. Nep. Him. 156, f. 30. 1955; FEH 1:127. 1966; EFPN 2:143. 1979; FB 1(3):586. 1987; TBRI 50 (4):125. 1987.

4-8m high shrubby scrambler. Stem with stout and recurved prickles. Leaves pinnate, leaflets 2.2-6 x 1.2-3.2cm, ovate-elliptic, acute to acuminate, base rounded, margin closely serrate, pubescent beneath. Stipules upto 1.6cm long, adnate to petioles. Inflorescence corymbose, many floewred, not prickly. Flowers fragrant; calyx tube 0.6-0.75cm, turbinate, pubescent, glandular, lobes upto 2cm, lanceolate, sometimes with pinnate lateral appendages; petals 1.6-3 x 1-2.4cm, obovate, white, sometimes pink; styles upto 1cm long, united into a club-shaped column, exerted beyond the calyx tube.

Flr. & Fr.: May - Sep.

Specimen Cited: Rechila, 2200m, **AP Das & PC Rai** 1847, dated 12.9.1997.

Status: Rare.

Local Distrib.: Found only in one place.

General Distrib.: Himalayas, China.

Rosa sericea Lindley, Monogr. Ros.105, t. 12.1820; FBI 2:367. 1878; Trs. N. Beng. 61. 1929; FEH 1:127. 1966; FB 1(3):586. 1987.

Local Name: Jangali Gulab (Nep.); Sisi Chungchung (Lep.).

Erect shrub to 4 m, sometimes scrambling; stem naked or with straight or slightly curved prickles of 0.4-0.6 cm. Stipules 0.8-1.35 x 0.15-0.25 cm; leaflets 5-11, pinnate, 1-3.2 x

0.4-1.3 cm, terminal ones largest, oblong, serrate on apical 1/4th-1/2nd part, other entire, rounded or even acute, base cuneate, glabrous or sparsely pubescent above, sericeous and pale green beneath, mid nerve faintly white. Pedicels 1.3-2.2 cm. Flowers 4.5 cm across, showy, slightly drooping, borne on short lateral shoots; calyx tubes 0.5-0.7 x 0.3-0.45 cm, wide in the middle, tapering towards apex and base, turbinate, lobes 4, 1-1.4 cm, greenish, nearly sericeous, persistent; petals 4, 1.7-2.5 cm, broadly obovate, yellow; stamens numerous; anthers 0.1-0.15 cm, brownish; filament upto 0.45 cm long, white to creamy white; styles upto 0.15 cm, free. Fruits 0.75-1.2 cm, subglobose or obovoid, reddish, persistent sepals erect. (Plate II: 16).

Flr.: Apr. - May *Fr.*: Jun. - Aug.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0164, dated 15.6.1994; Tinsimana, 2900 m, AP Das & PC Rai 0750, dated 20.10.1994; Rechila Middle, 2490m, AP Das & PC Rai 1000, dated 23.4.1995.

Status: Abundant in open places.

Local Distrib.: Rechila Middle, Tinsimana, Alubari. 2200-2900m.

General Distrib.: Himalayas (Kumaon-Bhutan), Tibet, Manipur, N. Myanmar, W. China.

Note: Fruits edible.

RUBUS L.

Key to the species:

1. Plants with prickles.....2
1. Plants without prickles3
2. Small creeping perennial herb or undershrubs; nodes rooting.....4
2. Bushy shrubs; nodes not rooting.....5
3. Medium shrubby scrambler, branchlets eglandular.....*R. lineatus*
3. Large subscandent shrubs, branchlets with gland-tipped hairs.....*R. splendidissimus*
4. Stipules oblong; calyx lobes triangular, laciniate.....*R. gigantiflorus*
4. Stipules ovate; calyx lobes ovate, serrate.....*R. calycinus*
5. Prickles scattered, deflexed.....6
5. Prickles hooked, flattened.....7
6. Terminal petiolules upto 1.1cm long; leaflets ovate, doubly serrate.....*R. niveus*
6. Terminal petiolules upto 1.8-3cm long; leaflets elliptic-obovate to suborbicular, singly serrate.....*R. ellipticus*
7. Stipules 0.5 to 1.2cm long.....8
7. Stipules 1.3-1.6cm long.....9
8. Leaves 5-11 foliolate, imparipinnate; stipules 0.5-0.6cm long, linear lanceolate
.....*R. indotibetanus*
8. Leaves simple; stipules upto 1.2cm long, oblong-lanceolate.....*R. paniculatus*
9. Stipules segmented, segments linear.....*R. thomsonii*
9. Stipules pinnatifid, laciniate, ovate and foliaceous.....10
10. Pedicels 2-4.5cm; petals 0.9-1.2cm, orbicular.....*R. wardii*
10. Pedicels upto 0.65cm long; petals upto 0.8cm, obovate.....*R. rugosus*

Rubus calycinus Wallich ex D. Don, Prodr. Fl. Nep. 235. 1825; FBI 2:327. 1878; Trs. N. Beng. 60. 1929; FEH 1:128. 1966; EFPN 2:144. 1979; FPK 31. 1981; TBRI 50(4): 125. 1987; FB 1(3):549. 1987.

Local Name: Bin Ainselu (Nep.)

Creeping perennial herb (runner), rooting at nodes, bristly and distantly prickled. Leaves simple; stipule 0.6-1 x 0.45-1 cm, ovate, serrate; petioles 2.5-7.5 cm, pubescent, prickly; lamina 2.2-5 cm across, reniform to cordate-orbicular, denticulate, unlobed or shallowly lobed, apex rounded, base deeply cordate, both surfaces hirsute, veins prickly and hirsute beneath. Pedicels 1.5-3 cm, with scattered prickles. Flowers 2.2-3 cm across; calyx lobes 0.85-1.1 x 0.55-0.65 cm, ovate, serrate, obtuse, greenish; petals 0.75-0.9 x 0.5-0.65 cm, orbicular, white. Etario 1.65 cm, globose, berries red.

Flr.: Apr. - May

Fr.: Jun. - Jul.

Specimen Cited: Chouda Feri-Alubari, 2118-2280 m, **AP Das & PC Rai** 0309, dated 18.6.1994; Rechila Middle, 2490 m, **AP Das & PC Rai** 1267, dated 05.5.1995.

Status: Abundant in partially shady places.

Local Distrib.: Rechila Middle, Alubari, Chouda Feri, Jaributti. 2100-2500m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Meghalaya, Manipur, N. Myanmar, W. China.

Note: Fruits edible.

Rubus ellipticus Smith in Rees, Cyclop. 30: no.16. 1819; FBI 2:336. 1878; Trs. N. Beng. 61. 1929; FEH 1:129. 1966; EFPN 2:144. 1979; FPK 32. 1981; TBRI 50(4):125. 1987; FB 1(3):557. 1987.

Local Name: Ainselu (Nep.).

Medium bushy shrub; branches stout, green, angled, densely pubescent with flexuous stiff brown hairs of 0.25-0.4 cm; prickles deflexed, scattered. Stipules 0.45-0.6 cm, linear; petioles 3-7 cm, densely pubescent; lateral petiolules upto 0.35 cm, terminal petiolule longer to 1.8-3 cm; leaflets 3, pinnate, 3.2-9 x 2.4-7 cm, terminal one larger, elliptic-obovate to suborbicular, serrate, obtuse or subacute, base rounded, dark green and glabrate above, pale and thinly pubescent beneath along distantly prickled mid-nerve, veins thick and prominent beneath. Panicles both terminal and axillary, many flowered; calyx cup bristly, segments 5, 0.5-0.6 cm, ovate, acute, entire, persistent, softly pale pubescent; petals larger than sepals, obovate, white. Drupe succulent and sweet, orange-yellow, crowded on cylindrical hairy receptacle.

Flr.: Dec. - Feb.

Fr.: Mar. - May.

Specimen Cited: Mulkharka, 2070 m, **AP Das & PC Rai** 1159, dated 29.4.1995.

Status: Abundant.

Local Distrib.: Alubari, Pankhasari, Sakam Forest, Mulkkharka, Machuki. 1100-2100m.

General Distrib.: Himalayas (Sirmore-Arunachal Pradesh), Assam, Meghalaya, Sri Lanka, Myanmar, Indo-China.

Note: Fruits edible; also sold in market.

Rubus gigantiflorus Hara in Journ. Jap. Bot. 40:327. 1965; FEH 1:128. 1966; FPK 3. 1981; TBRI 50(4):125. 1987.

R. hookeri (non K. Koch 1853); Abh. Nat. Ver. Bremen 4:198. 1874; FBI 2:334. 1878; Trs. N. Beng. 60. 1929.

R. macrocarpus (non Benth. 1944, Nec Gardner 1847) King ex Clarke in J. Lin. Soc. 15:141. 1876.

Small undershrub with slender stem, sometimes creeping; prickles straight and few. Stipules oblong, leafy; leaflets 3, ovate, acuminate, margin dentate. Panicles axillary, few flowered. Calyx lobes triangular, bristly, laciniate, greenish; petals orbicular, white; stamens and carpels numerous. Fruits not collected.

Flr.: Mar. - Apr.

Specimen Cited: Middle Alubari, 2460m, AP Das & PC Rai 1218, dated 04.5.1995.

Status: Common.

Local Distrib.: Reshete, Dhamdhamay Dara, Alubari, Rechila Durpinay. 1900-2500m.

General Distrib.: Darjeeling, Sikkim, Myanmar and China.

Rubus indotibetanus Koidzumi, Fl. Symb. Or. As. 65. 1930; RBSI 18(1):46. 1959; EFPN 2: 145. 1979, Nam. Chang. Flr. Pl. 494. 1987; FB 1(3):562. 1987.

R. asper D. Non, Prodr. 234. 1925; FEH 1: 128. 1966 non J. & C. Presl. 1822.

R. rosaefolius auct. non Smith: Hk. f., FBI 2: 34. 1878 p.p.

Straggling or procumbent, prickly shrub with young parts mostly villous, often gland-tipped stiffly hairy. Stem green. Prickles many, straight or hooked. Petiolules very short. Stipules 0.5-0.65 cm, linear-lanceolate. Leaves 5-11 foliolate, imparipinnate, often leaflets number reducing at branch-ends and inflorescence. Leaflets 1.25-5.8 x 0.67 x 2.4 cm, ovate to oblong-lanceolate, often lobed, incise-serrate, acute or acuminate, base cuneate or rounded dark green, usually glabrous above, nerves glandular hairy beneath, midrib with prickles, lateral veins 9-13 pairs, nearly parallel and straight. Bracts linear-lanceolate. Flowers 1.5-2.5 cm diam., both terminal and axillary, solitary or in lax panicles; calyx deeply cleft with 0.62-0.82 cm long, ovate-lanceolate or oblong segments; petals equal or slightly longer than calyx-lobes, obovate-sub-orbicular, clawed, white; stamens many; carpels numerous. Drupes succulent, orange yellow. (Plate II: 15).

Flr.: Feb. - Jul.

Fr.: Mar. - Sep.

Specimen Cited: Above Sakam, 1900 m, AP Das & PC Rai 1499, dated 28.6.1996.

Status: Less Common.

Local Distrib.: Rechila Durpinay, Chitray, Ruka, Todey-Tangta, Sakam. 1900-2750m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Tibet, N. Myanmar, Tonkin, W. China.

Note:

Flowering and fruiting period remarkably vary according to the altitudes in which it is growing.

Rubus lineatus Bl., Bijdr. 1108.1826; FBI 2:333.1878; FEH 1: 130.1966; EFPN 2: 145. 1979; TBRI 50(4):125. 1987; FB 1(3):555. 1987.

Local Name: Ghempe Ainselu (Nep.)

Medium shrubby scrambler, eglandular, branches unarmed, young shoot silky. Stipules 1-1.4 cm, ovate-oblong, entire; petioles 1.5-3.5 cm; leaflets 3-5, more usually 3; lamina 3.5-9.5 x 1.8-2.3 cm, terminal one larger, lanceolate or rarely elliptic-oblong, sharply serrate, acuminate, cuneate, glabrous above, silvery-silky beneath, lateral nerves 18-32 pairs. Cymes axillary, short, few flowered; calyx lobes upto 1 cm, narrowly triangular, entire, remotely acuminate, silky; petals shorter than sepals, 0.45-0.5 cm, obovate, white. Drupe small, red forming a globose etario.

Flr.: Mar. - Jun. *Fr.:* Jun. - Sep.

Specimen Cited: Jairbutti-Rechila, 2195-2280 m, AP Das & PC Rai 0388, dated 15.10.1994.

Status: Abundant.

Local Distrib.: Alubari, Jaributti, Ruka Hill, Pankhasari. 2100-2700m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Myanmar, China, Malaysia.

Note:

1. Roots consumed to cure food-poisoning and stomach pain.
2. Shoot more commonly used to make fences.

Rubus niveus Thunb., Diss. Rubo. 9, f.3. 1813; FEH 1: 130. 1966; 2:58. 1971; EFPN 2: 146. 1979; TBRI 50(4): 125. 1987; FB 1(3):549. 1987.

Local Name: Kalo Ainselu (Nep.).

Medium shrub, branches scrambling, leafy, pubescent; prickles scattered, pale. Stipules 0.5-0.9 cm, linear, entire; petiole 1.5-5.5 cm; terminal petiolule upto 1.1 cm, lateral ones 0.15-0.2 cm; lamina 1.5-5 x 1-3 cm, ovate, doubly serrate, subacute-acute, base narrow rounded, thinly pubescent and veins impressed above, white tomentose beneath. Flower and fruits not collected.

Specimen Cited: Rechila Chowk, 2280m, AP Das & PC Rai 0130, dated 15.6.1994.

Status: Rare.

Local Distrib.: Rechila Chowk, Jaributti, Reshete. 1850-2280m.

General Distrib.: Himalayas (Kashmir-Sikkim), S. India, Myanmar, Indo-China, Malaysia.

Note: Fruits edible.

Rubus paniculatus Smith in Rees, Cyclop. 30:no. 41. 1819; FBI 2:329. 1878; Trs. N. Beng. 60. 1929; FEH 1:131. 1966; EFPN 2:146. 1979; FPK 32. 1981; TBRI 50(4): 125. 1987; FB 1(3):552. 1987.

A scrambling liana, densely pubescent; stems unarmed or with few hooked flattened prickles; twigs buff tomentose. Leaves simple; stipules upto 1.2 cm, oblong-lanceolate, apically lacinate; petioles 1.3-2.5 cm, with few scattered deflexed prickles, white tomentose; lamina 7.5-12 x 5-8 cm, serrate, acuminate, base cordate in lower leaves, nearly truncate on upper ones, pubescent above, densely white tomentose beneath, nerves prominent and pubescent beneath with scattered prickles. Panicles terminal and axillary, upto 16 cm, much branched, white tomentose. Bracts 0.7-0.95 cm, lanceolate. Pedicels upto 1.5 cm long. Flower 1-1.5 cm across; calyx 5-lobed, lobes 0.65-0.85 cm, triangular, entire, long acuminate, silky; petals much smaller than sepals, oblong, white. Drupes exposed, glossy black, succulent.

Flr.: Jun. - Aug.

Fr.: Aug. - Dec.

Specimen Cited: Thosum Beat, 2590-2780 m, AP Das & PC Rai 0913, dated 23.10.1994.

Status: Very Common.

Local Distrib.: Ruka Forest, Thosum beat, Helipad region, Reshete. 2100-2800m.

General Distrib.: Himalayas (Rajori-Sikkim), Meghalaya.

Note: Fruit edible.

Rubus rugosus Smith in Rees, Cyclop. 30: no.34. 1819; Trs. N. Beng. 60. 1929; FEH 3:53. 1975; EFPN 2:146. 1979; TBRI 50(4):125. 1987; FB 1(3):554. 1987.

Local Name: Ainselu, Kanray Paan (Nep.).

Much spreading large subscandent shrub. Stems brownish pubescent and with short scattered and hooked prickles, eglandular. Leaves simple; stipules 1.3-1.6 cm long, ovate, leafy, brownish, pinnatifid; petioles 4-9 cm, scattered-prickly, grayish-white tomentose; lamina 7-14 x 6-12 cm, broadly ovate or suborbicular, 3-5 lobed, sharply serrate, base cordate, lobes acute, dark green above, pale beneath, rugose, pilose both sides, basal nerves 5, main veins prickly beneath, nervules hairy, reddish brown. Panicles axillary and terminal, tomentose. Pedicels 0.3-0.65 cm long. Calyx lobes 0.8-0.9 cm, obscurely triangular, entire or minutely cleft at apex, erect in fruits; petals shorter than sepals, obovate, whitish. Drupes succulent, scarlet.

Flr.: Jun. - Aug. *Fr.*: Aug. - Oct.

Specimen Cited: Reshete, 2240 m, AP Das & PC Rai 1330 m, dated 06.5.1995.

Status: Common.

Local Distrib.: Alubari, Reshete, Helipad region, PHE Source. 2000-2350m.

General Distrib.: C. & E. Himalayas, Assam, Meghalaya, W. Ghats, Nilgiris, Myanmar, Malaysia.

Rubus splendidissimus Hara in Journ. Jap. Bot. 40:377. 1965; FEH 1:131. 1966; EFPN 2: 147. 1979; TBRI 50(4): 125. 1987; FB 1(3):555. 1987.

Local Name: Phusre Ainselu (Nep.)

Large subscent unarmd shrub to 3 m with gland-tipped hairs on branchlets. Leafy shoots whitish hairy. Leaves palmately trifoliolate; stipules 1.6-2 x 0.6-0.75 cm, elliptic-lanceolate, foliaceous, entire, brownish; petioles 4-8.5 cm, with gland-tipped hairs and sometimes a few short erect prickles; petiolules short, 0.1-0.2 cm, hairy; leaflets 6-13 x 2.4-6.1 cm, obovate-elliptic, 2 lateral leaflets usually oblique, biserrate, densely silvery-sericeous beneath, lateral nerves 16-26 pairs, prominent beneath, mid vein glandular-bristly. Panicles both axillary and terminal, with glandular bristles. Bracts smaller but stipule-like. Flower 1.5-2 cm across; calyx 1.1-1.5 cm, lobes triangular, entire, acuminate, whitish tomentose and glandular-hairy, erect in fruits; petals shorter than sepals, obovate, white. Drupe red, numerous.

Flr.: May - Aug. *Fr.*: Sep. - Dec.

Specimen Cited: Chouda Feri-Alubari, 2285-2280m, AP Das & PC Rai 0337, dated 14.10.1994; Alubari-Hattidara, 2280-2550m, AP Das & PC Rai 0635, dated 17.10.1994.

Status: Common.

Local Distrib.: Hattidara, Chouda Feri, Alubari, Tinsimana. 2100-2900m.

General Distrib.: E. Himalaya (Nepal-Sikkim).

Note: Fruits edible.

Rubus thomsonii Focke, Abh. Nat. Ver. Bremen 4:198. 1874; FBI 2:332. 1878; FEH 1:132. 1966; EFPN 2:147. 1979; TBRI 50(4):125. 1987; FB 1(3):556. 1987.

Small scrambling shrub, stem with slender prickles 0.1-0.2 cm. Stipules segments linear; petioles 1.2-3 cm; petiolules very short; leaflets 3, 3-7.5 x 1.8-3.2 cm, ovate, terminal one much bigger, serrate-doubly serrate, acute to acuminate, base narrow cuneate, thinly pubescent above, glabrous and glassy beneath. Flowers and fruits not recorded.

Specimen Cited: Rechila-Hattidara, 2280-2549 m, **AP Das & PC Rai** 0638, dated 17.10.1994; Tinsimana-Jorpokhari, 2900-3040 m, **AP Das & PC Rai** 0755, dated 20.10.1994.

Status: Less Common.

Local Distrib.: Jorpokhari, Tinsimana, Rechila. 2200-3050m.

General Distrib.: E. Himalaya.

Rubus wardii Merrill in Brittonia 4: 84.1941; Journ. Jap. Bot. 47: 142. 1972; FEH 3: 53. 1975; FB 1(3):559. 1987.

Local Name: Sufoyok Jhu (Lepcha).

Small scrambling or trailing shrub with few scattered prickles and gland-tipped bristles. Stipules 1.2-1.8 x 0.7-1.1 cm, ovate, foliaceous, lacinate, hairy; petioles 2-6.5 cm; petiolules 0.6-1.1 cm, laterals 1-3 cm, distantly prickled; leaflets pinnately lobulate, 3.5-10 x 2.2-7 cm, rhomboid-ovate, dentate and shallowly lobulate with triangular lobes, prickly, caudate acuminate, base rounded, pubescent along veins and thinly glandular both sides. Bracts foliaceous resembling stipules. Pedicels 2-4.5 cm, densely hairy. Flowers 3.5-5 cm across, solitary, axillary; calyx cup short, prickly, lobes 1.8-2.9 cm, ovate-caudate, lacinate, bristly, spreading in fruits; petals 0.9-1.2 cm, orbicular, white; stamens numerous; carpels many. Etario globose; drupelets many, red, fleshy.

Flr.: May - Jul. *Fr.:* Jul. - Oct.

Specimen Cited: Rechila Chowk, 2280 m, **AP Das & PC Rai** 005, dated 13.6.1994; Chouda Feri-Rechila Middle, 2285-2490 m, **AP Das & PC Rai** 1277, dated 05.5.1995.

Status: Sparse.

Local Distrib.: Chitray, Rechila Durpinay, Chouda Feri. 2000-2600m.

General Distrib.: E. Himalaya (Darjeeling-Sikkim), S.E. Tibet, N. Myanmar, W. China.

SIBBALDIA L.

Sibbaldia parviflora Edgew. in Trans. Lin. Soc. 20:44. 1846, non Willd. 1799; NRBGE 19:217. 1950; Faun. & Fl. Nep. Him. 160. 1955; FB 1(3):574. 1987.

S. cuneata Kuntze in Linnaea 20:59. 1847; Act. Inst. Bot. Acad. Sci. USSR, ser. 1, 2:231. 1931; FEH 1:132. 1966; TBRI 50 (4):127. 1987.

Potentilla sibbaldia Hk. f., FBI 2:345. 1878.

Much branched small herb, upto 10cm. Rootstock rigid. Branches prostrate, slender. Petioles 0.7-4.5cm, slender. Leaflets 3, 0.55-2.2 x 0.26-1.6cm, oblong-obovate, truncate, base cuneate to rounded, thinly hairy beneath. Stipules upto 1cm, linear-lanceolate. Flowers few at the branch tips, nearly subumbellate, pentamerous; calyx lobes 0.25-0.35cm, ovate, silky; petals 0.35-0.4 x 0.1-0.15cm, obscurely obovate, exceeding sepals, emarginate and deep yellow; stamens 5. Achenes glabrous.

Flr. & Fr.: Mar. - Aug.

Specimen Cited: Rechila Peak, 3100m, AP Das & PC Rai 0816, dated 21.10.1994.

Status: Rare.

Local Distrib.: Seen only in Rechial Peak; confined to grassy slopes.

General Distrib.: Afganistan, Pakistan, Himalayas, China and Formosa.

SPIRAEA L.

Spiraea micrantha Hk. f., FBI 2:325. 1878; Trs. N. Beng. 59. 1929; Man. ed. 2, 336. 1940; FEH 1:134. 1966; EFPN 2:149. 1979; TBRI 50 (4):127. 1987; FB 1(3):534. 1987.

Bushy small shrub, branched, 1-1.5m. Leaves simple; petioles upto 1cm long; lamina 3-14 x 2.5-4.5cm, ovate-lanceolate, acuminate, base cuneate, margin doubly inciso-serrate, glaucous hairy beneath. Panicles 10-20cm broad, lax. Calyx 5-lobed, lobes triangular; petals 5, white or pink. Follicles upto 0.2cm, ovoid, villous.

Flr. & Frt.: May - Sep.

Specimen Cited: Ruka, 2280m, AP Das & PC Rai 0942, dated 24.10.1994.

Status: Less Common.

Local Distrib.: Jaributti, Mulkharka, Rechila Midle, Tinsimana, Alubari. 2200-3100m.

General Distrib.: E. Himalaya, Meghalaya, Manipur, etc.

SORBUS L.

Key to the species:

1. Leaves pinnate; petioles upto 2.5cm long.....*S. foliolosa*
1. Leaves simple; petioles upto 0.5cm long.....2
2. Leaves crowded at apex, margin crenate-serrate.....*S. vestita*
2. Leaves not crowded, margin serrulate.....*S. thomsonii*

Sorbus foliolosa (Wallich) Hist. Nat. Veg. 2:96. 1834; Trs. N. Beng. 63. 1929; FEH 1: 133. 1966; EFPN 2: 148. 1979; TBRI 50(4): 127. 1987; FB 1(3): 598. 1987.

Pyrus foliolosa Wallich, Pl. As. Rar. 2:81, t.189.1831, p.p.; FBI 2:376. 1878, p.p.

Deciduous trees, upto 10 m tall; branches terminal, stout. Bark peeling in horizontal strips. Leaves pinnate; stipules 0.45-0.7 cm, lanceolate, serrate, teeth cuspidate; petioles upto 2.5 cm, slightly winged; rachis becoming flat, narrowly winged; laeflets 13-17, imparipinnate, 1.4-3 x 0.4-0.9 cm, narrowly oblong, serrate remotely in terminal 1/4 part, acute or mucronate, glabrous and deep green above, whitish and thin appressed white hairy along nerves beneath, lateral veins slightly impressed above. Corymbs upto 7 cm. Peduncles reddish-brown, tomentose, glabrous on fruiting. Pedicels 0.2-0.4 cm; calyx 0.2-0.25 cm, 5-lobed, greenish, teeth acute; petals 5, 0.3 cm long, nearly rounded, white; anthers brown; filament 0.2 cm long, whitish green; styles 4, thick, greenish. Fruits 0.35-0.55 x 0.3-0.4 cm, ovoid.

Flr.: May - Jun. *Fr.*: Jul. - Oct.

Specimen Cited: Alubari Belt, 2280 m, **AP Das & PC Rai** 017, dated 13.6.1994; Alubari, 2520 m, **AP Das & PC Rai** 0202, dated 15.6.1994.

Status: Common.

Local Distrib.: Dhamdhamay Dara, Rechila Durpinay, Alubari, Tinsimana. 2200-2900m.

General Distrib.: Endemic to E. Himalaya (Nepal-Sikkim).

Sorbus thomsonii (Hk.f.) Rehder in Sarg. Pl. Wilson. 2:277. 1915; EFPN 2:148. 1979; FB 1(3): 596. 1987.

Pyrus thomsonii Hk. f. in FBI 2:379. 1878.

Local Name: Pasi (Nep.).

Small trees to 8 m. Stem ash-coloured, sparingly lenticellate. Petiole upto 0.35 cm; lamina. 3.5-7.5 x 1.9-2.8 cm, ovate-elliptic, serrulate on upper half, acute to shortly acuminate, cuneate, glabrous, brown when dry, lateral nerves 8-10 pairs, thick and distant beneath. Corymbs upto 2.5-4 cm, erect, almost glabrous. Pedicels upto 0.5 cm, green glabrous. Flowers 0.5 cm across; calyx tube short, lobes ovate-triangular; petals 0.35-0.4 cm, obovate-elliptic, creamy white, scarcely pubescent within at base, stamen stout; style 2-4, stout, persistent. Fruit globose, white-spotted.

Flr.: Apr. - May *Fr.*: Oct. - Dec.

Specimen Cited: Rechila Middle, 2490 m, **AP Das & PC Rai** 1220, dated 04.5.1995; Pankhasari, 2550 m, **AP Das & PC Rai** 1289, dated 05.5.1995.

Status: Less Common.

Local Distrib.: Pankhasari, Rechila Middle, Lava. 2000-2500m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan), Myanmar, China.

Sorbus vestita (Wallich ex G. Don) Loddiges, Cat. Plants ed. 16:66.1838; N RBGE 14(2): 263. 1987; FB 1(3):595. 1987.

Pyrus vestita Wallich ex G. Don, Gen. Hist. 2:647. 1932.

P. cuspidata (Spach)Hedlung in Svensk. Vet. Acad. Handl. 35:89. 1901; FEH 1:133. 1966; 2:60. 1971.

Local Name: Seti kath; Tenga (Nep.).

Large shrub to tree, 4-10 m tall. Leaves simple, almost crowded at the apex, sessile to 0.5 cm long, stalked; lamina 10-18.5 x 4.8-10.8 cm, elliptic, crenate-serrate, acute, base cuneate, white wooly above when young, becoming glabrous with age, densely white tomentose beneath, lateral nerves 10-14 on either halves. Flowers not collected. Fruits 1-1.3 x 1-1.2 cm, globose, greenish, fruiting pedicels upto 1.2 cm, persistent style 0.5-0.6 cm long.

Flr.: Apr. - May *Fr.*: Oct. - Dec.

Specimen Cited: Rechila-Hattidara, 2280-2550 m, AP Das & PC Rai 0632, dated 17.10.1994; Jorpokhari-Tangta, 3040-2805 m, AP Das & PC Rai 0839, dated 21.10.1994.

Status: Common.

Local Distrib.: Jorpokhari, Hattidara, Rechila Chowk, Tangta. 2200-3050m.

General Distrib.: Himalaya (Garhwal-Sikkim).

Note: Fruit edible.

SAXIFRAGACEAE Juss.

Key to the Genera:

1. Leaves compound, usually ternately divided; leaflets ovate or elliptic, biserrate
.....*Astilbe*
1. Leaves simple, broadly ovate or sub-orbicular or reniform, crenate-serrate.....2
2. Plant fleshy; stems glabrous; stamens 8, inserted.....*Chrysosplenium*
2. Plants not fleshy; stem glandular pubescent; stamens 10; shortly exerted.....*Tiarella*

ASTILBE Ham.

Astilbe rivularis Hamilt. in D. Don, Prodr. Fl. Nep. 211. 1825; FBI 2: 389. 1878; FEH 1: 111. 1966; EFPN 2: 149. 1979; FPK 33. 1981; TBRI 50 (4): 106. 1987; FB 1(3): 488. 1987.

Local Name : Buro Okhati (Nep.).

Rhizomatous scapigerous perennial herb. Root-stock bulbous, woody. Stem very short, thinly brown fulvous. Stipules large, sheathing. Leaves large, bi- or tri-ternate; petioles long, slender, brown hairy with long (upto 1.5 cm) hairs at leaflet axils, base sheathing; leaflets 5.5-9.5 x 2.2-5.5 cm, ovate or elliptic, biserrate, acuminate, base rounded or subcordate, nerves prominent and appressed brown hirsute beneath. Panicles terminal, very long (upto 126 cm), branched. Peduncles brownish, pubescent. Bracts 0.15-0.2 cm, brown. Pedicels 0.2-0.25 cm; calyx deeply 5-lobed, lobes 0.15-0.2 cm, oblong, obtuse, green; corolla absent; stamens 5, 0.25-0.3 cm, antisepalous; carpels 2, connate below, divaricating when ripe. Capsules c 0.5 cm, ovoid; seeds many, ellipsoid.

Flr.: Jul. - Sep. *Fr.*: Oct. - Mar.

Specimen Cited: Rechila Chowk, 2490 m, AP Das & PC Rai 0349, dated 14.10.1994.

Status : Less Common.

Local Distrib.: Chitray, Rechila Chowk, Pankhasari, Chouda Feri. 2100-2600m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya, Manipur, Tyhailand, Tonkin, W. China.

- Note:* 1. Flowers edible
2. Root decoction is taken as tonic by post-natal women.

CHRYSOSPENIUM L.

Key to the species:

1. Leaves opposite, broadly ovate or suborbicular, crenate-serrate.....*C. nepalense*
1. Leaves alternate, reniform to rounded, shallowly crenate.....*C. nudicaule*

Chrysosplenium nepalense D. Don, Prodr. Fl. Nep. 210. 1825; FBI 2: 400. 1878; FEH 1: 112. 1966; EFPN 2: 150. 1979; FPK 33. 1981; TBRI 50(4): 109. 1987; FB 1(3): 489. 1987.

Small weak decumbent rhizomatous herbs of marshy areas, 7.5-16 cm., tufted. Stem glabrous, soft. Leaves simple, opposite; petioles 0.3-1 cm; lamina 0.4-1.3 x 0.4-1.5 cm, broadly ovate or suborbicular, crenate-serrate, obtuse, base truncate or abruptly narrowed, glabrous, nerves obscure. Cymes leafy, loose, both axillary and terminal. Flowers small, shortly pedicelled, greenish yellow; calyx 4-lobed, lobes 0.1-0.15 cm, rounded, glabrous; corolla absent; stamens inserted; filament short. Capsules 0.25-0.35 cm., with divergent lobes; seeds smooth. (**Plate II: 13**).

Flr.: Mar. - Jul. *Frt.:* May - Aug.

Specimen Cited : Chouda Feri-Alubari, 2200-2280 m, **AP Das & PC Rai** 0353, dated 14.10.1994; Jaributti-Alubari, 2195-2280 m, **AP Das & PC Rai** 0502, dated 15.10.1994.

Status : Abundant.

Local Distrib.: Alubari, Tinsimana, Jorpokhari, Jaributti, Chitray, Chouda Feri. 1900-3050m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Manipur, S. Tibet, N. Myanmar, W. China.

Chrysosplenium nudicaule Bunge in Ledeb., Fl. Altai 2: 114. 1830; Icon. Fl. Ross. 5: t. 405. 1834; Fl. USSR 9:202, t. 12, f. 2. 1939; Journ. Fac. Sci. Univ. Tokyo Bot. 7: 64, f. 13A. 1957; FEH 1: 112. 1966.

C. alternifolium L. *sensu* FBI 2: 400. 1878, p.p.

Small fleshy perennial herb, pubescent, upto 6 cm high. Root-stock 7 cm long. Stems short. Leaves closely alternate; petioles 1.1-1.7 cm long, densely shining hairy; lamina 1.9-2.9 x 1.5-2.5 cm, reniform to rounded, margin shallow-crenate and ciliate, blunt, base straight-rounded to hardly inwarded, glossy green, pubescent. Flowers in terminal dense cluster, greenish yellow, encircled by golden-brown involucre leaves; sepals 4, rounded; stamens 8.

Flr.: Jun. - Aug.

Specimen Cited : Jorpokhari, 3000 m, **AP Das & PC Rai** 0687, dated 19.10.1994.

Status : Less Common.

Local Distrib.: Chitray, Jorpokhari,, Tinsimana. 2600-3050m.

General Distrib.: Himalaya (Nepal-Bhutan), S. Tibet, W. China.

TIARELLA L.

Tiarella polyphylla D. Don, Prodr. Fl. Nep. 210. 1825; FBI 2: 399. 1978; Icon Pl. 16: t. 1584. 1887; Nova Fl. Jap. 3:118, f. 32. 1939; FEH 1: 117. 1966.

Perennial erect herbs, 15-30cm. Stem glandular pubescent. Petioles of radical leaves 2-7.5cm, densely-hairy, sheath brown; lamina 2-6 x 2-5.5cm, ovate, margin shallowly crenate-serrate, obtuse, deep cordate, densely hirsute above, glandular hairy beneath, basal nerves 3-4. Racemes terminal, pubescent. Pedicel 0.4-0.7cm, hairy. Calyx lobes 5, 0.25 x 0.1cm, ovate; petals 0; stamens 10, shortly exerted; carpels 2, 0.6cm or more when mature; styles shortly exerted. Fruit not seen.

Flr.: May - Jun.

Specimen Cited: Jaributti, 2195m, AP Das & PC Rai 044, dated 14.6.1994; Rechila Chowk, 2280m, AP Das & PC Rai 0205, dated 16.6.1994.

Status: Common.

Local Distrib.: Alubari, Rechila Chowk, Jaributti, Dhamdhamay Dara. 1900-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), E. Tibet, W. and C. China, Formosa, Japan.

HYDRANGEACEAE Dumort.

Key to the Genera:

1. Petals elliptic; styles 3-5.....*Dichroa*
1. Petals lanceolate, spreading; styles 2.....*Hydrangea*

DICHROA Lour.

Dichroa febrifuga Loureiro, Fl. Cochinch. 1 : 301. 1790; FBI 2: 406. 1878; SFSH f. 150. 1963; FEH 1: 114. 1966; EFPN 2: 157. 1979; TBRI 50 (4): 111. 1987; FB 1(3): 552. 1987.

Adamia cyamia Wallich, Tent. Fl. Nep. 2: 46, t. 36. 1826.

Local Name : Basak (Nep).

Small shrub upto 2m. Leaves opposite; petioles 0.7-1.1 cm; lamina 6.5-10 x 1.3-2 cm, elliptic-oblongate, serrate, acuminate, base cuneate or attenuate, surfaces sparsely pubescent, nerves distinct, puberulous. Panicles both axillary and terminal. Sepals 0.3-0.35 cm, lobes short, slightly triangular; petals 0.35-0.5 x 0.15-0.2 cm, elliptic; pale blue or purplish; stamens 0.45-0.55 cm, purple; styles 3-5, shorter than stamens. Berries 0.55-0.7 cm across, subglobose, bluish with persistent scales.

Flr.: May - Sep. *Frt.*: Jul. - Dec.

Specimen Cited: Mulkharka, 2120 m, AP Das and PC Rai 1173, dated 01..5.1995.

Status : Less Frequent.

Local Distrib.: Mulkharka, Ruka Forest, Pankhasari. 2000-2400 m.

General Distrib.: Himalayas, N. Assam, Manipur, Myanmar, Thailand, Indo-China, Malaysia, C. and S. China.

Note : Medicinal.

HYDRANGEA L.

Key to the species:

1. Shrubby epiphytic climber*H. anomala*
1. Bushy erect shrubs.....2
2. Lamina obovate, shallowly serrate.....*H. macrophylla*
2. Lamina ovate-lanceolate, finely double-serrate.....*H. aspera*

Hydrangea anomala D. Don, Prodr. Fl. Nep. 211. 1825; FBI 2: 405. 1878; FEH 1: 114. 1966; EFPN 2: 157. 1979; FB 1(3): 520. 1987; TBRI 50(4): 116. 1987.

H. altissima Wallich, Tent. Fl. Nep. 2 t. 50. 1826; FBI 2: 404. 1878.

Shrubby climber, generally epiphytic, otherwise a root climber. Branches rooting throughout. Young stem thinly pubescent, hairs fine, white. Brownish red bark peeling off in strips. Leaves opposite; petioles 0.3-0.5 cm; lamina 2.5-10.2 x 1.1-3.7 cm, ovate, serrate, teeth acute and pubescent above, acuminate, base cuneate or rounded, nerve axils thinly brown hairy beneath. Corymbs 20 cm across, terminal, branched, loose. Bracts 0.5-1 x 0.1-0.25 cm, elliptic, glabrous. Radiate flowers with entire rounded sepal lobes; fertile flowers with calyx upto 0.25-0.3 cm, lobes almost acute, glabrous; petals upto 0.25 cm and cohering in a conical cap; stamens 10, 0.38 cm; styles 2, 0.2 cm, thickened at top. Capsule 0.3-0.4 cm, subglobose, ribbed; seeds elliptic. (**Plate II: 12**).

Flr.: Mar. - Jun. *Fr.*: Jun. - Oct.

Specimen Cited: Thosum Beat-Jorpokhari, 2780-3040 m, AP Das & PC Rai 0832, dated 21.10.1984.

Status : Common.

Local Distrib.: Thosum Hill, Chitray, Ruka Hill, Mulkharka, Left Hill ridge of Reshete. 2200-3050 m.

General Distrib.: Himalayas (Garhwal-Bhutan), N. Assam, Myanmar, W. and C. China, Formosa.

Hydrangea aspera D. Con, subsp. *robusta* (Hk. f. & Thoms.) Mc Clintock in JAA 37: 373. 1956; FB 1 (3): 520. 1987.

H. robusta Hk. f. & Thoms. in Journ. Linn. Soc 2: 76. 1885; FBI 2: 404. 1878; FEH 1:115. 1966.

Local Name: Bhogatay (Nep.).

Large erect shrub. Young twigs densely pubescent. Leaves long petiolate (petioles 2-12 cm, pubescent); lamina 12-28 x 6-15.5cm, broadly ovate-lanceolate, margin finely double-serrate, teeth acuminate, alternately large and small, pilose, acute, base rounded to even cordate. Bracts upto 1.4cm, lanceolate, deciduous. Fertile flowers light orange yellow; sepals upto 0.16cm long, lobes acute; petals free, 0.4 cm, lanceolate, spreading; stamens 8, 0.45-0.75cm; styles upto 0.2cm, broadened above, apex nearly kidney-shaped. Capsule 0.35cm long, truncate above; seeds ellipsoid. Sterile flowers with ovate-elliptic calyx lobes, white.

Flr.: Jul. - Sep. *Fr.:* Oct. - Jan.

Specimen Cited : Alubari, 2280 m, **AP Das & PC Rai** 0258, dated 16.6.1994; PHE Source, 2155m, **AP Das & PC Rai** 1043, dated 26.4.1995.

Status: Common.

Local Distrib.: Rechila Chowk, PHE Source, Alubari, Zero Point, Sakam. 1700-2300m.

General Distrib.: Himalayas (Garhwal-Bhutan), E. Tibet, N. Myanmar, Tonkin, W. and C. China, Formosa.

Hydrangea macrophylla (Thunb.) Seringe in DC., Prodr. 4:15. 1830; Journ. Jap. Bot. 30:277. 1955; EFPN 2:157. 1979; FB 1(3):521. 1987; TBRI 50(4): 116. 1987.

Viburnum macrophyllum Thunb., Fl. Jap. 125. 1784.

Medium bushy shrub, glabrous. Branches many. Leaves opposite; lamina 6-12 x 5.2-7 cm, obovate, shallowly serrate, teeth obtuse, abrupt acuminate, base cuneate, glabrous above, vein axils brownish hairy beneath, nerves 7-9 pairs. Flowers in cymosely branched corymbs, bisexual, fertile flowers: calyx to 0.2cm, lobed; petals 0.35cm, lanceolate, purple or whitish, recurved; stamens equal to petals; styles to 0.15cm; sterile flowers many, calyx 0.15cm, lobed, lobes broadly ovate or elliptic, bluish or white.

Flr.: Jun. - Aug. *Fr.:* Aug. - Oct.

Specimen Cited: Below Pankhasari, 1920 m, **AP Das & PC Rai** 0372, dated 15.10.1994.

Status: Not Common; cultivated as ornamental plant.

Local Distrib.: Chouda Feri, Sakam, Machuki. 1050-2050m.

General Distrib.: Native of Japan.

GROSSULARIACEAE DC.

RIBES L.

Ribes glaciale Wallich in Roxb., Fl. Ind. 513. 1824 p.p.; FBI 2: 410. 1878 p.p.; FB 1(3): 525. 1987.

R. takare D. Don, Prodr. 208. 1825; EFPN 2: 159. 1979.

R. acuminatum Wallich ex G. Don, Gen. Hist. 3: 187. 1834; FEH 1: 115. 1966.

Tall shrub to 5 m with shining glabrous stem. Petioles 1.4-2.3 cm, coarsely short-hairy; lamina 2-5 x 1.5-4 cm, cordate-ovate, shallowly 3-5 lobed, lobes sharply inciso-serrate, middle lobe elongate, acute or acuminate, base sub-cordate to cordate, a few scattered white hairs above; glabrous beneath, nerves distinct and pubescent beneath. Racemes 2-5 cm, elongate, erect to slightly pendent, many flowered, shortly white pubescent. Bracts 0.3-0.7 cm, generally exceeding pedicels, linear lanceolate, glabrous, brownish. Pedicels upto 0.5 cm, glabrous, greenish or upper half faded red. Sepals minutely pubescent; petals 5, reddish brown, glabrous; stamens 5, short; styles bifid. Berries 0.6-0.7cm, globose, red when ripe.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Chitray Bunglow, 2740 m, AP Das & PC Rai 1228, dated 04.5.1995.

Status: Frequent.

Local Distrib.: Chitray Bunglow, pankhasari, Left hill patch of middle Rechila, Thartharay. 2100-2750.

General Distrib.: Himalaya (Kashmir-Bhutan), S. Tibet, N. Myanmar, W. & C. China.

HAMAMELIDACEAE R. Br.

EXBUCKLANDIA R. Br.

Exbucklandia populnea (Griff.) R.W. Brown in Journ. Wash. Acad. Sci. 36: 348. 1946; FEH 2:49. 1971; EFPN 2:166. 1979; Fl. Jow. 1:195. 1981; Fl. Meg. 1:374. 1985; FB 1(3):470. 1987; TBRI 50 (4): 114. 1987.

Bucklandia populnea Griff. in Asiat. Res. 19: 95, t. 13 &14. 1836; FBI 2: 429. 1878.

Symingtonia populnea (R. Brown ex Griff.) Van Steenis in Act. Bot. Neerl. 1:144. 1952; FEH 1: 118. 1966.

Local Name: Peepli (Nep.).

Large evergreen tree, glabrous. Leaves alternate; stipules 2-3.9 x 1-1.9 cm, obovate-oblong; petioles 1.5-5 cm; leaf lamina 7-22 x 3.5-14 cm, ovate-cordate, entire, acuminate, base truncate or shallowly cordate, glabrous, 5-veined at base. Peduncles cymose-branched, 1-2.5 cm. Flower heads 2-4 in each axil, many flowered, polygamous, female ones with 5 truncate lobed sepals, 0.7-1 cm in diam., with rudimentary petals; bisexual heads 1.4-1.9 cm in diam.; petals 4-6, linear; stamens 10-14, creamy white; filament extrorse. Capsules in compact heads, 1.5-2.1 cm in diam., sub-globose, woody.

Flr.: Apr. - May *Frt.:* Jun. - Aug. to year ahead.

Specimen Cited: Middle Rechila, 2490 m, AP Das & PC Rai 0998, dated 23.4.1995.

Status: Less Common.

Local Distrib.: Chouda Feri, Zero Point, Middle Rechila Chowk. 1900-2500m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, Manipur, W. China, N. Myanmar, Thailand, Malaysia, Sumatra.

Note: Good quality timber; now on plantation.

CALLITRICHACEAE Link

CALLITRICHE L.

Callitriche stagnalis Scopoli, Fl. Carn. ed 2(2): 251. 1771; FBI 2: 434. 1878; FEH 1: 184, f. 23. 1966; EFPN 2: 167. 1979; TBRI 50(4): 108. 1987.

Branched diffuse annual herb, growing in marshy and damp habitat. Branches slender, weak, soft and glabrous. Slender long roots emerging from nodes. Leaves opposite; petiole 0.2 - 0.3 cm, thick; lamina 0.3 - 0.6 x 0.2 - 0.35 cm, obovate - spatulate, entire, hairy below, veins indistinct. Flowers minute, solitary, axillary, unisexual, monoecious, achlamydous. Male flowers with one stamen. Fruit indehiscent, coriaceous.

Flr.: Jun. - Sep. *Frt.:* Aug. - Oct.

Specimen Cited: Rechile Durpinay, 2300 m, AP Das & PC Rai 1372, dated 06.5.1995.

Status: Sparse.

Local Distrib.: Phaparkheti, Kuwapaani, Rechila Durpinay. 1700-2300 m.

General Distrib.: Agrica, Europe, C. Asia, Himalaya, India, Sri Lanka, East to West China, Australia, N. America.

COMBRETACEAE R. Br.

Key to the Genera:

- 1. Trees; petals absent.....*Terminalia*
- 1. Shrubby climbers/liana; petals present.....*Combretum*

COMBRETUM Loefl. (*nom. cons.*)

Key to the species:

- 1. Flowers 4-merous; fruits 4-winged.....*C. wallichii*
- 1. Flowers 5-merous; fruits 5-winged.....*C. decandrum*

Combretum roxburghii Sprengel, Syst. Veg. 2:331. 1825; BBSI 5:106. 1964; EFPN 2:167. 1979; Nam. Chang. Flr. Pl. 140. 1987.

C. decandrum Roxb., Pl. Corom. 1:43, t. 59. 1795; FBI 1:425. 1878; FEH 1:220. 1966; FB 2(1): 306. 1991.

Local Name: Kali Lahara (Nep.).

Large evergreen liana with pendent branches, young parts silky villous. Petiole 0.3-1.2cm long. Lamina 6-16 x 3.5-7cm, obovate or oblong-elliptic, acuminate, base rounded-

truncate, veins pilose beneath. Spikes upto 8cm long, dense, densely pubescent. Flowers 5-merous; calyx 0.5 –0.55 cm, villous, 5-lobed, lobes to 0.5cm, triangular; petals 5, equal or exceeding calyx lobes, oblong, acute, hairy. Fruits 0.2-0.25 x 0.1-0.15 cm, winged, brownish.

Flr.: Nov. - Feb. *Fr.:* Feb. - May

Specimen Cited: Phari, 750m, **AP Das & PC Rai** 1764, dated 25.8.1997.

Status: Abundant at low altitude places.

Local Distrib.: Phari, Gorubathan, Samsing, Suntalay. 600-1000m.

General Distrib.: Himalayas (Punjab-Sikkim), India, Myanmar, W. China.

Combretum wallichii DC., Prodr. 3:21. 1828; FBI 2:456. 1878; EFPN 2: 168. 1979; FB 2(1) 307. 1991.

Climbing shrub. Petioles 0.6-1.1cm long. Lamina 5.5-12 x 3.5-6.5cm, elliptic-oblong, acute to acuminate, base cuneate to rounded, glabrous above, hairy on veins and vein axils and with whitish scales below. Spikes 8-9.5 cm long. Flowers 4-merous; calyx to 0.55 cm long, infundibular above constriction, peltate scaly, lobes 4, upto 0.15cm; petals 4, equal to calyx lobe, obovate. Fruit 2.2-2.5 x 3 -3.5cm, glandular with leciniate scales and 4-wings.

Flr.: Jan. - Apr. *Fr.:* Apr. - Jun.

Specimen Cited: Below Sakam, 1250m **AP Das & PC Rai** 1465, dated 14.11.1995.

Status: Less Frequent.

Local Distrib: Todey-Tangta, Machuki, Sakam. 1100-1600m.

General Distrib.: Himalayas (Nepal-Bhutan).

TERMINALIA L.(*nom. cons.*)

Key to the species:

- 1. Deciduous trees; fruits smooth or with 5-ridges, glabrous.....*T. chebula*
- 1. Evergreen trees; fruits 2-winged, hairy.....*T. myriocarpa*

Terminalia chebula Retz., Obs. Bot. 5:31. 1789; FBI 2:446. 1878; FI. Gen. Ind. Chin. 2:752. 1920; FEH 1:220. 1966; EFPN 2:168. 1979; FB 2(1): 304. 1991.

Local Name: Harra (Nep.).

Deciduous tree to 22m high; young parts with reddish brown indumentum. Leaves simple; petiole to 3.1cm with two apical outgrowths; lamina 9-19.5 x 6.5-11.5cm, elliptic or ovate-oblong, acute, base rounded to cuneate, entire, coriaceous, glabrescent, veins hairy. Spikes axillary or terminal 6-14cm, paniced; rachis hairy. Calyx 0.3-0.35cm,

glabrous, lobes to 0.05cm. Disc densely hairy. Drupe 2.9-4.6x1.6-2.4cm, subglobose, indistinctly 5-ridged, glabrous.

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Near Samsing, 750m, **AP Das & PC Rai** 1535, dated 04.6.1996.

Status: Less Frequent.

Local Distrib.: Kuwapaani, Phari, Samsing. 700-1600m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, Sri Lanka, Myanmar, Malaysia.

Note: Fruits edible and generally consumed medically for cough. Its wood essentially used as good firewood.

Terminalia myriocarpa Heurcket Muell.-Arg., Obs. Bot. 215. 1870-71; FBI 2: 448. 1878; Fl. Males.4:554. 1954; FEH 1: 220. 1966; EFPN 2:168. 1979; FB 2 (1): 305. 1991.

Local Name: Paani Saaj (Nep.).

Gigantic tree to 42 m high, with young growth reddish pubescent. Leaves simple; petioles 0.5-1.5 cm long, bearing stalked glands; lamina 8-23 x 3.5-11.2cm, oblong to oblong-elliptic, acute or shortly acuminate, base slightly unequal, truncate to subcordate, margin subentire to serrulate, glabrous or rarely pubescent on lower surface. Spikes paniced, 9.5-17 cm, densely flowered, pinkish. Calyx to 0.3 cm, 5-lobed, usually pubescent below, lobes to 0.1 cm, triangular; petals 0. Disc sparsely hairy or glabrous. Nut 2-winged, hairy and yellow to yellowish brown.

Flr.: Oct. - Nov. *Frt.:* May.

Specimen Cited: Above Chel Khola, 1150m, **AP Das & PC Rai** 1791, dated 14.9.1997.

Status: Less Common.

Local Distrib.: Machuki, Chel Khola, Phari. 900-1200m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Myanmar, Thailand, Indo-China, W. China.

Note: Durable timber, used in building of houses.

MYRTACEAE Juss.

SYZYGIUM Gaertn.

Key to the species:

1. Lamina mostly elliptic, sometimes ovate or obovate; petals upto 0.2cm, creamy; obliquely obovoid.....*S. cumini*
1. Lamina oblanceolate-elliptic; petals 0.25-0.3cm, whitish; fruits globose
.....*S. tetragonum*

Syzygium cumini (L.) Skeels in U.S. Dept. Agr. Bur. Pl. Ind. Bull. 248:25. 1912; EFPN 2:169. 1979; Nam. Chang. Fl. Pl. 550. 1987; FB 2(1):284. 1991.

Myrtus cumini L., Sp. Pl. 471. 1753.

Eugenia jambolana Lamk., Ency. 3:198. 1789; FBI 2:499. 1879.

Local Name: Jamuna (Nep.).

Tree upto 22m tall. Leaves opposite; petioles 1.6-2.1cm long; lamina 6-14x 3.2-6.5cm, elliptic, rarely ovate or obovate, acuminate, base cuneate, coriaceous, veins numerous. Cymes many flowered, developed from leaf axils, to 8cm across. Peduncles 0.6-9.9cm. Flowers sessile; calyx tube 0.3-0.5 x 0.2-0.3cm, funnel-shaped, tapering, persistent; petals 0.2cm, creamy; stamens 0.25-0.5cm; styles 0.2-0.4cm. Fruit 1 x 0.62cm, obliquely obovoid, blackish on ripening.

Flr. & Frt.: Feb. - Sep.

Specimen Cited: Chel Khola, 1150m, AP Das & PC Rai 1787, dated 14.9.1997.

Status: Frequent at lower region.

Local Distrib.: Chel Khola, Samsing, Machuki, Phari. Upto 1300m.

General Distrib.: Subtropical Himalaya, India, Sri Lanka, Malaysia, Australia.

Note: A valuable timber species.

Syzygium tetragonum (Wight) Walpers, Repert. 2:180. 1843; EFPN 2:169. 1979, p.p.; TBRI 50(4):128. 1987; FB 2(1): 285. 1991.

Eugenia tetragona Wight., Ill. Ind. Bot. 2:16. 1850; FBI 2:497. 1878.

Local Name: Chamlanay (Nep.).

Evergreen tree to 10m high, glabrous. Lamina 7.5-2. x 5-8.5cm, oblanceolate-elliptic, acuminate, base cuneate, thickly coriaceous, lateral veins 8-18 pairs, deeply impressed beneath. Cymes axillary. Flowers sessile, 3.5-7cm, fragrant; calyx funnel-shaped, tube to 0.25-0.3cm, narrowing to stout base; petals 0.35-0.45cm, whitish, shading as a cap; stamens 0.25-0.3cm long. Fruits 0.55-0.75 cm, globose.

Flr.: Oct. - Dec. *Frt.:* Mar. - May

Specimen Cited: Near Machuki, 1200m, AP Das & PC Rai 1812, dated 09.9.1997.

Status: Frequent.

Local Distrib.: Phari, Machuki, Pankhasari, Sakam. 700-2100m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, W. China.

MELASTOMATACEAE Juss.

Key to the Genera:

1. Succulent herbs, usually stemless; ovary depressed.....2
1. Stout shrubs or erect herb; ovary without depression.....3
2. Petals 4; stamens 8.....*Sarcopyramis*
2. Petals 3; stamens 3.....*Sonerilla*
3. Ovaries hairy at apex; seeds curved.....4
3. Ovaries glabrous throughout; seeds straight.....*Oxyspora*
4. Calyx with scaly hairy appendages; stamens equal.....*Osbeckia*
4. Calyx scaly hairy with fimbriate margins; stamens unequal.....*Melastoma*

MELASTOMA L.

Key to the species:

1. Plants softly hairy; leaf surfaces not having row of white cells; calyx not fimbriate.....*M. normale*
1. Plants scabrous; leaf surfaces with a row of white cells at base of hairs above; calyx fimbriate.....*M. malabathricum*

Melastoma malabathricum L., Sp. Pl. ed. 1(1):390. 1753 -*ut malabathrica* FBI 2:523. 1879; FEH 1:221. 1966; EFPN 2:170. 1979; TBRI 50(4): 119. 1987; FB 2(1):296. 1991.

Local Name: Chulasi (Nep.).

Bushy shrub, upto 4m high, young parts densely appressed hairy. Stem and petioles strigose and with subulate-echinate scales. Leaves opposite; lamina 6.5-13 x 2.6-4cm, lanceolate-elliptic, acuminate, base rounded or cuneate, 5-veined, row of white cells at the hair-base above, shortly hairy below. Flowers clustered at branch ends; calyx 1.7-2cm, fimbriate, tube scaly hairy, lobes 0.65-0.7cm, oblong; petals 2.5-3cm, ovate, mauve-purple. Fruit 0.85-1 x 0.8-0.9cm, subglobose, apically truncate.

Flr.: Feb. - Jul.

Fr.: Sep. - Jan.

Specimen Cited: Above Phari, 1100m, AP Das & PC Rai 1807, dated 09.9.1997.

Status: Common.

Local Distrib.: Samsing, Phari, Suntaly, Gorubathan. 600-1200m.

General Distrib.: Tropical Himalayas, India, China, Sri Lanka, Myanmar, Malaysia, Australia.

Melastoma normale D. Don, Prodr. 220. 1825; FBI 2: 524. 1879. Man. Ind. Timb. 367. 1902; Fl. Asm. 2: 2298. 1938; FB 2(1): 296. 1991.

Melastoma nepalensis Lodd, Bot. Cab. T. 707.1824, Fl. Jow. 1: 202. 1981, Fl. Meg. 1: 407. 1987; Nam. Chang. Flr. Pl. 365. 1987.

A large erect shrub to 4-6 m high. Stems densely hairy and usually with subulate bristles at nodes. Branches shaggy. Young parts silky. Petioles 0.6-2 cm long, bristly hairy and

with scales; leaf lamina 6.5-17 x 3-6 cm., variable in form, ovate-lanceolate, oblong-lanceolate or elliptic-lanceolate, acute to shortly acuminate, base rounded, truncate, pubescent above with long adpressed hairs under surface, densely villous or silky, basal nerves 3-7. Bracts upto 1.2 cm long, ovate or linear-lanceolate, caducous, hairy. Pedicels upto 1cm long, densely covered with serrulate scales. Flowers 5-6.5 cm diam., 4-10 in terminal fascicles, rose-purple; calyx 1.2 - 1.8 cm long, densely silky, lobes 0.5-0.75 cm, thinly hairy. Fruits 0.65 - 0.85 cm diam, truncate, rather warty and transversely dehiscent.

Flr. & Frt.: Jun. - Dec.

Specimen Cited: Above Aritar (Near Sikkim boundary), 1800 m, AP Das & PC Rai 1156, dated 29.4.1995.

Status: Fairly Common.

Local Distrib.: Aritar, Pankhasari, Reshete, Jaributti, Chouda Feri, Machuki. 1400-2200m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Thailand, China, S. Japan, Malaysia, N. Australia.

OSBECKIA L.

Key to the species:

1. Plants with spreading hairs; young branches tetragonous; lamina elliptic-lanceolate; calyx appendage dark-purple.....*O. sikkimensis*
1. Plants with appressed hairs; branches not tetragonous; lamina ovate to oblong-lanceolate; calyx appendage with tufted stellate hairs, greenish.....*O. stellata*

Osbeckia sikkimensis Craib in NRBGE 10:56. 1917; RBSI 11(1):97. 1926; EFPN 2:170. 1979; Nam. Chang. Flr. Pl. 405. 1987; TBRI 50(4):121. 1987; FB 2 (1):294. 1991.

O. crinita auct. non Benth.: Clarke in FBI 2:517. 1879 p.p.

O. stellata var. *crinita* Hansen in Gankgoana 4:31. 1977 p.p.

Small shrub, with tetragonous young branches. Stem with dense spreading hairs. Leaves opposite; lamina 5-12 x 2-4cm, elliptic-lanceolate, entire, acute, base cuneate, both surfaces bristly. Corymbs terminal. Flowers 4-merous, rarely 5-merous as well, purplish, calyx deciduous, tube subglabrous to densely hairy with brownish stellate hairs, appendages often dark purple, lobes 4; petals 4, 1.5-2.5cm, obovate, ciliate; stamens 8, equal. Fruits 1.7-2.4cm, ovoid, abruptly narrowing to a cylindric neck.

Flr.: Jul. - Oct. *Frt.:* Sep. - Nov.

Specimen Cited: Below Machuki, 1930m AP Das & PC Rai 1809, dated 09.9.1997.

Status: Common.

Local Distrib.: Alubari, Jaributti, Machuki, Sakam, Choudha Feri. 1200-2200m.

General Distrib.: Himalayas (Punjab-Arunachal Pradesh).

Osbeckia stellata Ker-Gawl. in Edgw. Bot. Reg. 8: t. 674. 1822; Fl. Asm. 2: 292. 1938; Balakrishnan, Fl. Jow. 1:206. 1981; Nam. Chan. Flr. Pl. 405. 1987.

O. crinita Naud. in Ann. Sci. Nat. Bot. Ser. III, 14: 72. 1850; FBI 2: 517. 1879 p.p.

A small shrub to 150 cm tall. Stem much branched, hairy. Petioles 0.55-1cm; lamina 5-10 x 2.6 -3.7cm, ovate to oblong-lanceolate, acuminate, base narrowed or subcordate to rounded, adpressed hairy both sides, nerves 5-7. Bracts ovate, often suborbicular, densely hairy on the margin. Pedicels upto 0.58 cm long. Flowers 2.5-3cm across, 4-merous, or very rarely 5-merous, calyx-tube upto 1.3 cm long with dense tufts of stellate hair, lobes subulate; petals 1.4-1.8 cm long, obovate; stamens 8; anthers with incurved beaks and tubercled connective; ovary bristly.

Flr.: Jul. - Oct. *Fr.*: Nov. - Jan.

Specimen Cited: Suntalay (Near Samsing), 555 m, **AP Das & PC Rai** 1528, dated 04.6.1996.

Status: Common.

Local Distrib.: Phari, Machuki, Suntalay, Asala Khola. 500-1500m.

General Distrib.: Himalayas, Assam, Myanmar and China.

***OXYSPORA* A. DC.**

Oxyspora paniculata (D. Don) DC., Prodr. 3:123. 1828; FBI 2:525. 1879; FEH 1:222. 1966; 2:89. 1971; EFPN 2:171. 1979; TBRI 50 (4): 121. 1987; FB 2(1): 297. 1991.

Arthrostemma paniculatum D. Don. in Mem. Wern. Nat. Hist. Soc. 4:299. 1822.

Local Name : Tulashi (Nep.).

Shrub to 2 m, spreading. Branches drooping, stellately pubescent. Leaves opposite; petiole 1-3.2 cm, white-hairy but densely tufted at apex; lamina 11.5-20 x 3.4-7.1 cm, ovate to ovate-elliptic, obscurely dentate, acute to shortly acuminate, base rounded, coarse and dark green above, pale and rusty stellate beneath mainly on veins; nerves 5, impressed above, prominent and elevated below, mid-rib thick, lateral nerves parallel, numerous, distinct. Panicles upto 16.5 cm long, terminal, drooping, rachis glabrous, branches decussate. Bracts linear, minute, glabrous. Pedicels upto 2 cm. Flowers 1.8 cm long, pendulous; calyx 4-toothed, pink, tube 0.5-0.7 cm, stellately hairy, teeth 0.15 cm, triangular; petals upto 1.2 cm, ovate-oblong, deep pink, deciduous; stamens 8, upto 1.8 cm long, 4 shorter with anthers from 0.35-0.4 cm, 4 longer with slightly curved filaments; anthers from 0.8-1.1 cm; styles 0.7-0.9 cm, apically curved. Capsule 1 x 0.7 cm, almost ellipsoid.

Flr.: Aug. - Oct. *Fr.*: Oct. - Dec.

Specimen Cited: Mulkharka, 2120 m, **AP Das & PC Rai** 1164, dated 29.4.1995.

Status: Common.

Local Distrib.: Sakam Forest, Chonkobhir, Mulkharka. 1600-2200m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Assam, W. China.

SARCOPYRAMIS Wallich

Sarcopyramis napaulensis Wallich, Tent. Fl. Nep. 32. t. 23. 1826; FBI 2:541. 1879; FEH 1:222. 1966; EFPN 2: 171. 1979; TBRI 50(4):126. 1987; FB 2(1): 299. 1991.

Erect herbs upto 18.5 cm tall. Stem weak, quadrangular, usually unbranched, subglabrous, translucent. Leaves grouped near the tip; petioles 1.8-3.2 cm long, sparsely hairy; lamina 4-9 x 3.3-5.5 cm, ovate to ovate-lanceolate, finely serrulate, acute, obliquely cuneate, upper surface thinly hairy, hairs white and 0.2 cm, sparsely hairy beneath, 5 nerved at base. Flowers in both terminal and axillary small clusters; sepals upto 0.45 cm, obpyramidal, tube glabrous, 4-lobed, lobes 0.1-0.16cm, minutely hairy at teeth-base; petals 4, larger than sepals, upto 0.7cm, ovate, rose-purple; stamens 8, shorter than petals, about 0.35 cm. Fruits 0.8 x 0.5 cm, obpyramidal; seeds many, brownish-red, nearly triangular.

Flr.: Jul. - Sep.

Fr.: Oct. - Dec.

Specimen Cited: Chouda Feri-Alubari, 2200-2280 m **AP Das & PC Rai** 0367, dated 14.10.1994.

Status: Common.

Local Distrib.: Alubari, Chouda Feri, Chitray, Thosum Beat. 1900-2800m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Assam, Myanmar, Malaysia, C. and S. China.

SONERIA Roxb. (nom. cons.)

Soneria kurzii Clarke in FBI 2:539. 1879; TBRI 50(4):127. 1987; FB 2(1): 298. 1991.

Small herb with no distinct stem. Petioles 1.8-2.8cm. Leaves opposite; lamina 1.5-2.6 x 1.3-2.3cm, ovate to suborbicular, serrate, obtuse, base cordate, ciliate and pilose. Peduncles upto 5.2 cm long. Calyx 0.3-0.35cm, tubular, lobes very short; petals 0.55-0.7cm, elliptic, rose-purple; stamens 0.65-0.8cm; anthers to 0.3cm. Capsule 0.3-0.45cm, obconical.

Flr.: Aug. - Sep. *Fr.:* Sep. - Oct.

Specimen Cited: Near Machuki, 1200m, **AP Das & PC Rai** 1808, dated 09.9.1997.

Status: Rare.

Local Distrib.: Tiffin Dara, Kuwapaani, Machuki, Sakam. 1200-2100m.

General Distirb.: E. Himalaya (Darjeeling-Sikkim).

SONNERATIACEAE Engl. et Gilg.

DUABANGA Hamilton

Duabanga grandiflora (Roxb. ex DC.) Walp., Repert. 2:114. 1843; JAA 48:96.1967; Nam. Chang. Flr. Pl. 200. 1987; FB 2 (1): 287. 1991.

Lagerstoemia grandiflora Roxb. ex DC., Mem. Soc. Hist. Nat. Geneve 32:84. 1826.

Duabanga sonneratioides Buch.-Ham. in Trans. Lin. Soc. 17:177-178. 1835; FBI 2:579. 1879.

Local Name: Lampate (Nep.).

Large tree to 29m high, with drooping branches. Leaves opposite, simple; petioles 0.35-0.62cm; lamina 16-31x6.5-13.5cm, ovate-oblong, acuminate, base cordate, dark green above, pale beneath, veins conspicuous beneath and parallel. Corymbs terminal and drooping, usually 4-22 flowered. Pedicels to 3cm, stout. Flowers actinomorphic, bisexual, with pungent odour; calyx-cup 2-3 cm across; funnel-shaped, tubular base adnate to ovary-base, lobes 1.6-2cm, triangular, greenish; petals free, 3-4 x 2-2.5cm, obovate, showy; stamens numerous, free and inserted on calyx tubes; anthers versatile; ovary superior; style 7-8cm; stigma capitate; ovules many and axile. Capsule 4-4.5cm diam., subglobose, 6-8 valved; seeds many 0.4-0.55cm, filiform.

Flr. & Frt.: Dec. - Apr.

Specimen Cited: Near Chel Khola, 1100m, **AP Das & PC Rai** 1788, dated 14.9.1997.

Status: Frequent in lower areas, specially on spring and river side.

Local Distrib.: Phari, Machuki, Chel Khola, Samsing. 600-1200 m.

General Distrib.: Himalaya (Kumaon-Bhutan), Assam, S.E. Tibet, Myanmar, China, Malaysia.

Note: Fast growing and valuable timber trees.

ONAGRACEAE Juss.

Key to the Genera:

1. Inflorescence a paniced raceme; sepals 2; fruits one-seeded.....*Circaea*
1. Inflorescence racemed or clustered or flower solitary; sepals 4-5; fruits many seeded.....2
2. Flowers racemed; fruits 3-8cm, elongate.....*Epilobium*
2. Flowers solitary or clustered; fruits 0.8-1.5cm, cylindrical.....*Ludwigia*

CIRCAEA L.

Circaea repens Ascherson et Magnus in Bot. Zeit. 28.761. 1870; FEH 1:223. 1966; EFPN 2:174. 1979; TBRI 50(4):109. 1987; FB 2(1):313. 1991.

C. lutetiana L. sensu FBI 2:589. 1879.

C. alpina L. var. *himalaica* C.B. Clarke, FBI 2:589. 1879.

Small erect herb, 35-45 cm. Stem covered with falcately recurved hairs. Leaves opposite; petioles 1.3-5.5cm long; lamina 3.2-8 x 2-5cm, ovate to orbicular-ovate, acute, base rounded or often cuneate, margin denticulate, dark green. Inflorescence a paniced raceme, terminal, pubescent. Pedicels stipitate-glandular hairy. Sepals 2; petals 2, 0.22-0.26 cm, lobed to half length, pinkish-white; stamens 2. Fruits 0.25-4.5 x 1-1.5cm, clavate, stiff hooked hairy.

Flr.: Jun. - Nov. *Fr.*: Oct. - Dec.

Specimen Cited: Reshete, 2160m, AP Das & PC Rai 1320, dated 06.5.1995.

Status: Frequent.

Local Distrib.: Pankhasari, Alubari, Rechila Middle, Rechila. 1900-2450 m.

General Distrib: Himalayas (Kumaon-Arunachal Pradesh), Myanmar, W. China.

***EPILOBIUM* L.**

Key to the species:

1. Leaves petiolate; inflorescence suberect to erect.....*E. cylindricum*
1. Leaves sessile; inflorescence nodding.....2
2. Clumpy herbs, soboles fleshy3
2. Herbs not forming clumps, soboles foliaceous*E. wallichianum*
3. Stigma capitate.....*E. sikkimense*
3. Stigma subcapitate.....4
4. Slender herb, upto 16cm high; stem branched; lamina ovate-elliptic, obscurely serrulate.....*E. clarkeanum*
4. Ascending or erect herb, 15-24cm high; stem simple or rarely branched above; lamina narrowly ovate to lanceolate, serrulate with 13-16 teeth.....*E. royleanum*

Epilobium clarkeanum Hausskn., Monog. Epil. 220, t. 9, f. 53. 1884; FB 2(1): 321.1991.
E. alpinum non L., Cl. in FBI 2: 586. 1879.

Small slender herb to 16 cm. Stem with leafy soboles leaving brown scales at base, less branched, appressed stiffly hairy. Leaves subsessile or shortly petioled (petiole 0.1-0.15 cm); lamina 1-1.4 x 0.5-0.9 cm, ovate to elliptic, obscurely serrulate, obtuse to subacute, cuneate or subrounded, both surfaces almost glabrous, veins appressed stiffly hairy. Pedicel 0.3cm. Hypanthium tubular and hairy ring within. Sepals 0.2-0.25 x 0.1-0.15cm, keeled; petals 0.5-0.6 x 2.5-0.3 cm, light red or white, apical notch 0.1cm, ovary stiffly hairy; style 0.3 cm; stigma subcapitate. Capsules 3-4 cm, seeds narrow obovoid, reticulate, papillose.

Flr. & Fr.: Aug. - Sep.

Specimen Cited: Tangta, 2805 m, AP Das & PC Rai 0836, dated 21.10. 1994.

Status: Rare.

Local Distrib.: Alubari, Tangta, Reshete, Rechila Middle. 2200-2800m.

General Distrib.: Endemic to Sikkim and Darjeeling.

Epilobium cylindricum D. Don, Prodr. Fl. Nep. 222.1825; FEH 1:224. 1966; EFPN 2:174. 1979; TBRI 50(4): 113. 1987; FB 2(1): 317. 1991.

E. roseum var. *cylindricum* (D. Don) C.B. Cl. in FBI 2: 585. 1879.

Erect herb to 32 cm, much branched above. Stem glabrescent or thinly appressed stiffly hairy. Leaves shortly petiolate; lamina 1.2-2.5 x 0.4-0.9 cm, narrowly lanceolate, serrulate, acute, attenuate, subglabrous except nerves. Pedicels 0.3 – 0.7 cm. Flowers axillary; sepals 0.25-0.5 x 0.1-0.15 cm, with appressed stiff hairs; petals 0.4-0.6 x 0.2 – 0.35 cm, rose; ovary appressed hairy; styles 0.25-0.3 cm; stigma clavate or capitate. Capsules 3.7-6 cm long, fruiting pedicel elongated; seeds obovoid, minutely papillose.

Flr.: Jun. - Sep.

Fr.: Aug. - Oct.

Specimen Cited: Rechila Middle, 2490m, AP Das & PC Rai 0686, dated 09.10.1994.

Status: Frequent.

Local Distrib.: Rechila Middle, Reshete, Ruka Hill, Zero Point. 2000-2750m.

General Distrib.: Afganistan, Himalayas (Kashmir-Bhutan), Tibet, W. and C. China.

Epilobium royleanum Hausskn. in Oesterr. Bot. Zeitschr. 29:55. 1879; FB 2 (1): 318. 1991.

E. roseum var. *indicum* Cl. in FBI 2: 584. 1879.

E. roseum var. *dalhousieanum* Cl. in FBI 2 :584. 1879.

Small erect or ascending herb, 15-24 cm. Stem with scales/scars of basal soboles, simple or less-branched above, appressed stiffly hairy, occasionally subglabrous. Leaves petiolate (petiole 0.2-0.35 cm), lamina slightly clasping, 1-2.5 x 0.2-0.65 cm, narrowly ovate to lanceolate, serrulate with 13-16 teeth on each side, acute, attenuate to cuneate, appressed hairy along margin beneath, lateral nerves not much distinct. Pedicels 0.5-1cm. Flower erect, hypanthium elongated, hairy within; sepals 4, basally connate, 0.3-0.4 x 0.1-0.15 cm; petals 4, 0.4-0.6 x 0.2-0.25 cm, rose-purple; ovary stiffly appressed pubescent; stigma subcapitate. Capsules 4-6 cm, appressed hairy; seeds obovoid, papillose.

Flr. & Fr.: Aug. - Nov.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 0421, dated 15.10.1994.

Status: Common.

Local Distrib.: Pankhasari, Sakam Forest, Alubari, Hattidara, Dhamdhamay Dara. 1600-2700m.

General Distrib.: Temperate Himalayas (Kashmir-Darjeeling).

Epilobium sikkimense Hausskn. in Oesterr. Bot. Zeitschr. 29:52. 1879; EFPN 2:175. 1979. ssp. *sikkimense*; FB 2(1): 320. 1991.

E. alsinifolium auct. non. Vill.: Cl. in FBI 2: 586. 1879 p.p.

Small clumped herb with persistent brown scales; soboles fleshy. Stem branched subglobular to appressed hairy. Leaves shortly petioled, lamina 0.5-1.1 x 0.3-0.5 cm, ovate to oblong-lanceolate, obscurely serrulate, subobtuse to acute, cuneate or rounded, appressed hairy along margin and veins, submembranous. Pedicels 0.4-0.9 cm. Flowers suberect, hypanthium hairy within; sepals 0.4 x 0.15 cm, keeled; petals 0.7 x 0.4 cm, rose-purple or pink, apically notched; ovary glandular and stiff-hairy; style 0.4 cm; stigma capitate. Capsules upto 5 cm long, glandular, appressed hairy; fruiting pedicels elongated; seeds obovoid, coarsely papillose.

Flr.: Jul. - Sep.

Fr.: Aug. - Nov.

Specimen Cited: Near Jorpokhari, 2900m, AP Das & PC Rai 0727, dated 19.10.1994.

Status: Less Common.

Local Distrib.: Chitray, Jorpokhari, Thosum Beat, Ruka Hill. 2400-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), South Tibet, West China.

Epilobium wallichianum Hausskn. in Oesterr. Bot. Zeitschr. 29:52. 1879; EFPN 2:175. 1979, FB 2(1):319. 1991.

E. tetragonum non L.: Cl. in FBI 2: 586. 1979 p.p.

Suberect to erect leafy herb with leafy soboles, ± 28 cm tall. Stem with 4 appressed stiffly hairy angles. Leaves subsessile to sessile, 1.4-2 x 0.6-1 cm, lamina oblong to elliptic, sometimes subovate, serrulate, obtuse, rarely acute, cuneate, both surfaces glabrous, nerves impressed above, prominent beneath and thinly appressed stiffly hairy. Pedicels 0.4-1 cm. Flowers nodding; sepals 0.4-0.6 x 0.1-0.15 cm; petals 0.5-1 x 0.25-0.4 cm, rose or purple, notched at apex; ovary long, stiffly appressed hairy; style 0.4-0.7 cm, basally few haired; stigma capitate or broadly clavate. Capsule upto 4.2 cm; seeds oblong-obovoid, minutely papillose.

Flr.: Jul. - Sep. *Fr.*: Aug. - Nov.

Specimen Cited: Thosum Beat, 2780-2590m, AP Das & PC Rai 0903, dated 23.10.1994.

Status: Common.

Local Distrib.: Ruka Forest, Thosum Beat, Chitray, Tinsimana, Jorpokhari. 2500-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, S. E. Tibet, Western China.

LUDWIGIA L.

Ludwigia perennis L., Sp. Pl. ed. 1(1):119. 1753; FEH 1:225. 1966; EFPN 2:176. 1979; FB 2(1):312. 1991.

L. parviflora Roxb., Fl. Ind. ed. Carey 1:440.1820; FBI 2:588. 1879.

Annual small herb upto 90 cm high, with puberulous young parts. Petioles 0.55-1.5cm long, winged. Leaves 4.5-9.5 x 1.5-3 cm, lanceolate, entire, acute, base cuneate. Flowers

borne singly or clustered, axillary; sepals 4, 0.25-0.35 cm, triangular; petals 0.25-0.35cm, elliptic, yellowish; stamens 4, sometime more; style upto 1.5 cm. Capsules 0.9-1.5 cm, loculicidal, with ellipsoid-rounded seeds .

Flr.: Sep. - Jan. *Fr.:* Oct. - Mar.

Specimen Cited: Phari, 840m, AP Das & PC Rai 1815, dated 09.9.1997.

Status: Frequent only in the lower range of the park.

Local Distrib.: Samsing, Phari, Machuki. Upto 1300m.

General Distrib.: Africa , Afganistan, India, east to Japan, Malaysia, Australia.

PASSIFLORACEAE Juss.

PASSIFLORA L.

Passiflora geminiflora D. Don, Prodr. Fl. Nep. 223. 1825; FB 2(1):229. 1991.

P. napaulensis Wallich, Tent. Fl. Nep 20 t. 11. 1824; FBI 2:600. 1879; FEH 3:85. 1975; EFPN 2:177. 1979; TBRI 50(4): 121. 1987 *ut nepalensis*.

Small slender, glabrous climber with angular stem. Leaves simple; petiole 2.5-5cm, often glandular; lamina 4.2-7.5 x 3.5-4.5cm, ovate, acute, base cuneate or obscurely cordate, glabrous, with 1-4 rounded gland on both sides of midrib. Stipules 0.45-0.6cm, linear. Flowers many, white; calyx tube 0.5-0.6cm long, cylindric, lobes 0.85-1cm long; petals equal to calyx lobes. Corona in rows, filiform, coronal filaments and androgynophore 0.3-0.4cm. Fruits 1.2-1.5cm across, globose.

Flr.: Jul. - Sep. *Fr.:* Aug. - Oct.

Specimen Cited: Below Chouda Feri, 1820m, AP Das & PC Rai 0355, dated 14.10.1994.

Status: Sparse.

Local Distrib.: Sakam, Kuwapaani, Chouda Feri. 1250-1900m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Myanmar.

CUCURBITACEAE Juss.

Key to the Genera:

1. Flowers racemed or paniced; stamens 5.....2
1. Flowers (mainly females) usually solitary; stamens 3.....3
2. Leaves simple; fruits ellipsoid, tubercled.....*Momordica*
2. Leaves pedately 3-5 foliate; fruits globose.....*Gymnostemma*
3. Calyx and corolla fimbriate.....4
3. Calyx and corolla entire.....5
4. Lamina cordate-ovate, shallowly lobed, coarsely hairy.....*Herpetospermum*
4. Lamina sub-orbicular, deeply lobed, densely scaly beneath.....*Trichosanthes*

5. Corolla 1.5-2.2cm long; seeds ovoid.....*Thladiantha*
5. Corolla 1-1.5cm long; seeds oblong.....*Edgaria*

EDGARIA Clarke

Edgaria darjeelinsis Clarke, Jour. Lin. Soc. 15:113. 1876; FBI 2:632. 1879; FEH 1:322. 1966; EFPN 2:178. 1979; Fasc. Fl. Ind. 11:49. 1982; TBRI 50(4):112. 1987; FB 2(1): 268. 1991.

Large annual climbing herb, monoecious, densely glandular-hairy. Tendrils 2-fid. Petioles 2.5-5.5cm long; lamina 7-11 x 4.5-7.5cm, ovate, denticulate or undulate, shallowly lobed, cordate, acuminate, pubescent. Male peduncles 2, one with solitary flower 2-3 cm, others racemed 10-12 cm. Calyx tube 1.5-2cm, teeth 0.15-0.2cm, glabrous; corolla rotate, yellow, lobes 1.2-1.5cm, ovate, limb 4-5cm diam; stamens 3; anthers 0.45-0.5cm, connate. Female flowers solitary; calyx and corolla as in male; ovary ellipsoid; stigma bilobed. Fruit 5.5-6.5 x 3.5-4 cm, trigonous; seeds 1-1.2cm, oblong.

Flr.: Jun. - Aug. *Fr.*: Sep. - Nov.

Specimen Cited: Helipad, 2300m, AP Das & PC Rai 1095, dated 27.4.1995.

Status: Abundant at middle hill zones, on open bushes.

Local Distrib.: Lava, Alubari, Ruka, Helipad. 1700-2750m.

General Distrib.: Himalayas (Garhwal-Bhutan).

GYMNOSTEMMA Blume

Gymnostemma pentaphylla (Thunb.) Makino in Bot. Mag. Tokyo 16:179. 1902; En Sperm. Jap. 2: 80. 1952; FEH 1: 323. 1966; EFPN 2: 179. 1979; TBRI 50(4): 115. 1987; FB 2(1): 270. 1991.

Vitis pentaphylla Thunb., Fl. Jap. 105. 1784.

G. pedata Blume, Bijdr. 23. 1825; FBI 2: 633. 1879; Fasc. Fl. Ind. 11:56. 1982.

Perennial, dioecious pubescent climbers with simple tendrils. Leaves pedately 3-5 foliate; petioles 3-6cm; petiolules 0.15-0.4cm; leaflets 4.2-10.2 x 2.2-5.3cm, ovate, acuminate, base attenuate, margin serrate, subglabrous. Flowers dioecious, in diffuse panicles, greenish. Male panicles 15-30cm, pubescent. Calyx lobes 0.05-0.1cm, triangular, corolla greenish white, lobes 0.2-0.25cm, lanceolate-subulate, denticulate. Female panicles shorter. Fruits 1.5-2 cm across, globose; seeds 0.25-0.3cm, trigonous, compressed.

Flr.: Aug. - Oct. *Fr.*: Sep. - Nov.

Specimen Cited: Middle Rechila Chowk, 2490m, AP Das & PC Rai 1075, dated 26.4.1995.

Status: Less Common.

Local Distrib.: Pankhasari, Lava, Rechila Chowk. 1400-2500m.

General Distrib.: Himalayas, India, Sri Lanka, Myanmar, east to China, Japan, Malaysia.

HERPETOSPERMUM *Hk. f.*

Herpetospermum pedunculosum (Seringe) Baill, Hist. Pl. 8:445. 1886; FEH 1:323. 1966; EFPN 2: 179. 1979; TBRI 50 (4):116. 1987; FB 2(1): 267. 1991.

Bryonia pedunculosa Seringe in DC., Prodr. 3:306. 1828.

H. caudigerum Clarke in FBI 2: 613. 1879.

Climbing herbs. Stem pubescent. Tendrils branched, lateral to petiole and bifurcated into 2, ultimately coiling towards tips. Leaves simple; petioles longer upto 1-9 cm; lamina. 4-18 x 1.5-8 cm, cordate-ovate, often indistinctly and shallowly lobed, serrate-denticulate, acuminate, base cordate, coarsely hairy on both sides. Single male peduncle 1 flowered, other 5-10 flowered, long upto 8 cm, pubescent. Flowers ebracteate, unisexual, large, bright yellow; sepals tubular, 5 lobed, elongate, tube 1.6-2 cm, cylindric, 0.4-.5 cm broad at apex, teeth shorter, upto 0.4cm, linear; petals 5, bright yellows, lobes 2 x 1.4 cm, ovate, 3-nerved; anthers 0.3-.04 x 0.22 cm, conduplicate; female peduncle shorter, 1-2.5 cm; female flower solitary; ovary oblong, 3-celled; style slender; stigma bifid; ovules 1-4 in each cell. Fruit to 8 cm long, ellipsoid, stiffly hirsute; seeds compressed, oblong, dark brown.

Flr.: Aug. - Oct. *Fr.*: Sep. - Nov.

Specimen Cited: Lava-Chouda Feri, 2100-2285m, AP Das & PC Rai 0957, dated 27.10.1994.

Status: Less Frequent.

Local Distrib.: Chouda Feri, Reshete, Hattidara, Rechila Middle. 2000-2500m.

General Distrib.: Himalayas (Kulu-Bhutan), Assam, S. Tibet, S.W. China.

MOMORDICA *L.*

Momordica charantia L., Sp.Pl. ed. 1, 1009. 1753; FBI 2: 616. 1879, Cogniaux *et* Harms in Pfl.-reich IV-275. II, 24, f. 3-A-C. 1924; RBSI 17:88. 1959; FEH 1: 324. 1966; FB 2 (1): 253. 1991.

Local Name: Karela (Nep.).

Perennial climbers with puberulous stem. Lamina 4.5-9 x 4-8.5 cm, suborbicular, 5-7 lobed; lobes usually oblong, sometime ovate also, tendril simple. Male flower peduncles 3.5-5 cm long; bracts 0.6-1.4 cm, suborbicular; calyx lobes 6.5 x 2.8 cm, ovate, basally connate; corolla yellowish, lobes 1.4 x 3.9 cm, oblong, united in lower third part. Female flower peduncles 6-10 cm, female flowers bracteate at base; ovary 0.65 cm long, ovoid. Fruits 9-1.8 cm, ellipsoid, tubercled; seeds 1.1 x 0.55 cm, oblong, partly compressed, ornamented.

Flr. & Fr.: Apr. - Sep.

Specimen Cited: Samsing, 710 m, AP Das & PC Rai 1706, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Phari, Suntalay, Gorubathan, Samsing. Upto 1300m.

General Distrib.: Wild as well as cultivated throughout world tropics.; native of Tropical Asia.

Note: Fruits and leaves are widely used as vegetable and medicine.

***THLADIANTHA* Bunge**

Thladiantha cordifolia (Blume) Cogniaux in DC., Monogr. Phan. 3:424. 1881; EFPN 2:180. 1979; Fasc. Fl. Ind. 11: 102. 1982; FB 2(1): 251. 1991.

Luffa cordifolia Blume, Bijdr. 929. 1826.

T. cackarata Clarke in Journ. Lin. Soc. 15:126. 1876; RBSI 17:125. 1959; TBRI 50(4): 129. 1987.

T. dubia auct. non Bunge: FBI 2:631. 1879.

Local Name: Ban Karela (Nep.).

Large spreading climber, dioecious. Tendrils simple. Petioles upto 7.2cm long. Lamina 8-17.5 x 7-11.5cm, ovate, acuminate, base deeply cordate, denticulate, pubescent beneath. Bracts 0.85-0.95 x 0.6-0.65cm, oblong. Male flowers borne in axillary peduncles ca 6-8cm, calyx tube 0.7-0.8cm, lobes linear-oblong; corolla yellow, lobes 1.6-2.2 x 0.75-0.8cm, ovate; anther 0.4cm long. Female flowers ebracteate, ovary 1.2-1.4cm, ellipsoid, pubescent; styles upto 0.75cm long. Fruits 2.5-2.8 x 1.5-1.8cm, oblong; seeds ovoid.

Flr.: May - Aug.

Fr.: Jul. - Oct.

Specimen Cited: Below Machuki, 1020m, **AP Das & PC Rai** 1771, dated 26.8. 1997.

Status: Sparse.

Local Distrib.: Jaributti, Sakam, Samsing, Machuki. 700-2050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), India, Myanmar, Malaysia.

***TRICHOSANTHES* L.**

Trichosanthes lepiniana (Naudin) Cogniaux in DC., Monogr. Phan. 3:377. 1881; RBSI 17: 44. 1959; FEH 1:325. 1966; Fasc. Fl. Ind. 11:116. 1982; TBRI 50(4): 129. 1987; FB 2(1): 266. 1991.

T. tricuspidata Lour., Fl. Cochinch. 589. 1790; EFPN 2: 180. 1979; Fl. Meg. 1: 422. 1987; Nam. Chang. Flr. Pl. 573. 1987.

T. palmata Roxb., Fl. Ind. 3: 704. 1832; FBI 1: 606. 1879.

T. bracteata (Lamk.) Voigt. Hort. Sub. Calc. 58. 1845.

Local Name : Indreni (Nep.).

A large spreading climber. Stem angular-sulcate, woody below and lenticellate, pale gray. Tendrils 3 or 2-fid, upto 2.5-5 cm. Petioles 2.5-7.5 cm long, pubescent or glabrous. Lamina 7.5-17.5 cm across, palmately 3-7 lobed, sub-orbicular, cordate, 3-7 nerved from base; lobes serrate, acute or acuminate. Racemes 16-29 cm long, elongated. Bracts 2.5-3.7 cm., obovate, fimbriate. Flowers 4-5 cm diam., female flowers on short peduncles. Calyx tube upto 3.5 cm long, lobes lanceolate; petals 2.5 cm long, fimbriate. Fruits 4-6.2 cm diam., globose or ellipsoid; seeds numerous, reddish brown.

Flr.: Jun. - Sep. *Fr.*: Oct. - Nov.

Specimen Cited: Near Mulkharka, 2140m, AP Das & PC Rai 1186, dated 03.5.1995.

Status: Sparse.

Local Distrib.: Phari, Mulkharka, Sakam. 1000-2200m.

General Distrib.: E. Himalaya, India, east to China, Japan, Malaysia.

Note: Fruits and seed highly poisonous.

BEGONIACEAE C.A. Agardh.

BEGONIA L.

Key to the species:

1. Rootstock rhizomatous; capsules 2-celled; wings unequal.....2
1. Rootstock tuberous; capsules 3-celled; wings equal.....3
2. Bracts oblong; flowers yellow.....*B. flaviflora*
2. Bracts ovate; flowers red.....*B. sikkimensis*
3. Leaves coarsely serrate; an epiphyte.....*B. gemmipara*
3. Leaves finely serrate or denticulate; terrestrial plants.....4
4. Lamina base cordate.....5
4. Lamina base rounded.....*B. josephii*
5. Stamens united into a column; hairs not warted at base.....*B. ovalifolia*
5. Stamens forming a globose mass; hairs warted at base.....6
6. Styles 3, united at base.....*B. picta*
6. Styles 2, usually free and with convolute branches.....*B. palmata*

Begonia flaviflora (Clarke) Hara in Journ. Jap. Bot. 45:91. 1970; FEH 2:84. Pl.3b.1971; TBRI 50(4):106. 1987; FB 2(1): 245. 1991.

Begonia laciniata Roxb. var. *flava* Clarke in FBI 2: 645. 1879.

Herbs, 20-55cm, densely tomentose. Rootstock creeping, rigid. Lamina 8-22 x 6-14 cm, ovate, acuminate, base obscurely cordate, margin deeply lobed, lobes 1-3 cm, serrate. Stipules lanceolate. Peduncles 8-16cm long, tomentose. Bracts upto 2.8cm long, oblong, yellowish. Flowers yellow. Perianth segments 1.5-2cm, ovate, pilose outside; stamens clustered forming a compact mass; styles 2, branched. Capsules 2-2.5cm, winged, wings variable in size, smaller ones 0.4-0.55cm, largest 1.6-2 cm. (Plate III: 26).

Flr.: Jul. - Aug. *Fr.*: Aug. - Sep.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0373, dated 15.10.1994.

Status: Less Frequent.

Local Distrib.: Jaributti, Pankhasari, Alubari. 2000-2400m.

General Distrib. : E. Himalaya (Darjeeling - Sikkim).

Begonia gemmipara Hk. f., Ill. Himal. Pl. t. 14. 1855; FBI 2:641. 1879; FEH 2: 84. 1971; EFPN 2:181. 1979; TBRI 50(4): 106. 1987; FB 2(1): 242. 1991.

Putzevsia gemmipara Klotzsch in Abh. Akad. Berl. 135. 1855.

Small erect epiphytic herb, 10-15cm. Rhizome tuberous. Stem erect. Petioles 3-4 cm long. Leaves 4.5-9.5 x 3-4.5 cm, ovate, acuminate, base asymmetric, truncate or cordate, margin coarsely serrate, glabrous. Pedicels bracteate. Flowers pendulous, white or pink; perianth segments 0.4-0.5cm, suborbicular; stamens grouped in globose mass; styles 3. Capsules 0.75-1.2cm, wings subequal and inflated.

Flr.: Aug. - Oct. *Fr.*: Oct. - Dec.

Specimen Cited: Middle Rechila, 2440m, AP Das & PC Rai 1061, dated 26.4.1995.

Status: Common.

Local Distrib.: Alubari, Chouda Feri, Pankhasari, Rechila. 1900-2500m.

General Distrib.: E. Himalaya (Nepal - Sikkim).

Begonia josephii A. DC. in Ann. Sci. Nat. Ser. 4(11):126. 1859; Prodr. 15(1): 313. 1864; FBI 2:639. 1879; FEH 1:214. 1966; 2:84. 1971; EFPN 2: 181. 1979; TBRI 50(4): 106. 1987; FB 2(1): 240. 1991.

Herbs with very short stem. Rootstock tuberous. Petioles upto 20 cm long. Leaves all basal; lamina 5-12.5 x 2.2-8 cm, oblong-ovate, acuminate, base rounded, peltate, finely serrate, sometimes 3-5 lobed, glabrous above, pubescent on veins beneath. Peduncles 8-32cm long. Bracts to 0.5cm, ovate. Male flowers: whitish or pink, outer perianth segments 0.6-1cm, suborbicular, inner smaller, elliptic; stamens 0.25cm long. Female flowers: perianth equal or slightly smaller; styles 0.2-0.3cm, branched. Capsules 0.85-1 x 0.55-0.6cm, ellipsoid, glabrous with one larger wing equalling 1.1cm and two smaller wings equalling 0.1-0.2 cm.

Flr.: Jul. - Sep. *Fr.*: Oct. - Dec.

Specimen Cited: Below Alubari, 2050m, AP Das & PC Rai 0301, dated 17.6.1994.

Status: Frequent.

Local Distrib.: Lava, Jaributti, Dhamdhamay Dara, Alubari. 1800-2550m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya.

Begonia ovalifolia A. DC. in Ann. Sci. Nat. Ser. 4, 11:132. 1859; Prodr. 15(1):328. 1864; FBI 2:642. 1879; FEH 3:86. 1975; EFPN 2:182. 1979; FB 2(1):241. 1991.

Succulent herbs with tuberous rootstock. Stem upto 5.5cm, or often stemless. Leaves alternate, simple; petioles 1.6-5.8cm; lamina 3-6.1x3-5.1cm, broadly ovate, acute to ± rounded apically, base rounded or cordate, margin obscurely crenulate-serrulate, thinly

hairy above, hairy along veins beneath. Peduncles upto 10.2cm, bearing upto 10 flowers. Perianth segments to 0.5 x 0.41cm, pink or white; stamens 0.1cm, united on column. Capsules to 0.95-1 x 0.55-0.6cm, winged, wing acute, largest wing being 1-1.2cm, smaller wings upto 0.35-0.7cm; styles persistent in the fruit.

Flr. & Frt.: Aug. - Sep.

Specimen Cited: Near Chel Khola, 1150m, AP Das & PC Rai 1785, dated 14.9.1997.

Status: Less Frequent.

Local Distrib.: Asala Khola, Chel Khola, Samsing, Machuki, Phari. 400-1250m.

General Distrib.: Subtropical E. Himalaya (Nepal-Bhutan), Assam.

Begonia palmata D. Don, Prodr. Fl. Nep. 233. 1825; FEH 1: 215. 1966; 2:84. 1971; EFPN 2:182. 1979; TBRI 50(4):106. 1987; FB 2(1): 245. 1991.

B. laciniata Roxb., Fl. Ind. ed. 2(3):649. 1832; FBI 2:645. 1879.

Shaggy herbs, 15-25 cm, pubescent. Rootstock rhizomatous, creeping, rigid. Stems short, shaggy-pubescent. Petioles long, 4-24cm. Stipules 1-1.4 cm long, triangular. Leaves 6-9.5 x 5.5-18 cm, broadly ovate or suborbicular, acutely toothed or lobed, densely pubescent. Flowers whitish or pink. Bracts 0.75 x 0.65 cm, obovate; perianth segments 0.8-1.2 x 0.7-0.8 cm, pubescent outside; stamens numerous in globose mass of 0.7 cm diam.; styles 2, branches convolute. Capsules 2-3 x 0.55-0.7 cm, with largest wing *ca* 2.5-2.8 cm, smaller wings 2, *ca* 0.55-0.65 cm.

Flr.: May - Jul. *Frt.:* Jun. - Sep.

Specimen Cited: PHE Source, 2190 m, AP Das & PC Rai 0282, dated 17.6.1994.

Status: Common.

Local Distrib.: Alubari, Pankhasari, PHE Source, Reshete. 1700 - 2300m.

General Distrib.: E. Himalaya (Nepal -Bhutan), Meghalaya, Myanmar, China.

Begonia picta Smith, Exot. Bot. 2: t. 101. 1805; FBI 2:638. 1879; FEH 1:215. 1966; 2:84. 1971; EFPN 2:182. 1979; TBRI 50(4): 106. 1987; FB 2(1):242. 1981.

Small herb with tuberous rootstock, upto 20cm high, rarely stemless. Petioles 2-11 cm long. Leaf usually solitary, basal, with another cauline leaf, 4.5-14.5 x 3.5-8.5 cm, ovate, base obliquely cordate, margin finely serrate, coarse pubescent both sides. Perianth 2-seriate, outer ones 1-1.5 x 0.9-1 cm, elliptic, white or pink, inner ones 0.5-0.65 x 0.25-0.3cm; stamens many in globose mass of 0.55cm diam.; styles 3, united at base. Capsules 1-1.4cm, ellipsoid, pubescent, with triangular largest wing 2-2.5 cm.

Flr.: Aug. - Sep. *Frt.:* Sep. - Nov.

Specimen Cited: Below Machuki, 1200m, AP Das & PC Rai 1749, dated 18.5.1997.

Status: Abundant.

Local Distrib.: Gorubathan, Alubari, Samsing, Phari, Machuki, Chonkobhir, Phaparkheti. 700-2000m.

General Distrib.: Himalayas (Punjab-Bhutan), Assam.

Begonia sikkimensis A. DC. in Ann. Sci. Nat. Ser. 4, 11:134.1859; Prodr. 15(1):349. 1864; FBI 2:646. 1879; FEH 1:215. 1966; EFPN 2:182. 1979; FB 2(1): 241. 1991.

Rootstock rhizomatous. Stems 15-40cm. Leaves simple; petioles 6-19cm; stipules 1-2cm, linear-lanceolate; lamina 15-31 cm across, symmetrical, suborbicular, irregularly lacinated with acuminate segments, margins coarsely toothed, nearly glabrous. Peduncles 10-16cm. Bracts to 2cm, broadly ovate, reddish and deciduous. Perianth 1-1.5cm, elliptic, red; stamens numerous in a glabose mass of 0.55cm diam.; styles 2, basally connate, with tortuous branches. Capsules 0.9-1 x 0.38-0.4cm, inverted, wings 0.1-0.2cm (smaller ones) to 1.2- 1.5cm, obovate and finely striate.

Flr. & Frt.: Aug. - Nov.

Specimen Cited: Near Ghanti Danra, 1620m, **AP Das & PC Rai** 1786, dated 14.9.1997.

Status: Common.

Local Distrib.: Tiffin Dara, Ghanti Dara, Sakam Forest, Alubari. 1200-2300m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Note: A potential ornamental plant.

DATISACEAE Lindl.

TETrameLES R. Br.

Tetrameles nudiflora R. Br. in Bennett, Pl. Jav. Rar. 79, t. 17.1838; FBI 2:657. 1879; FEH 2:83. 1971; EFPN 2:183. 1979; FB 2(1): 237. 1991.

Local Name: Maina Rukh (Nep.).

Large decoduos trees, 20-42m tall. Leaves simple, alternate; petioles 4.5-11cm; lamina 9.5-26.5 x 8.9-20.2cm, broadly ovate, acuminate, base cordate, sometime truncate, margins dentate, pubesent beneath, almost glabrous above. Male flowers in axillary panicles, 16-21cm, floral cup with sepals 0.16cm diam; petals 0; stamens 4, exerted; filaments 0.4cm. Female flowers in pendulous spikes measuring 16-21cm, arranged in whorls of 3-8, sessile, 0.45cm including ellipsoidal sepals; ovary superior, unilocular; styles to 0.1cm, exerted; stigma 3, club-shaped. Capsule 0.5-0.62 x 0.42-0.45cm, obovoid and ribbed.

Flr. & Frt.: Apr. - May.

Specimen Cited: Near Samsing, 700m, **AP Das & PC Rai** 1419, dated 08.10.1995.

Status: Less Common.

Local Distrib.: Phari, Samsing, Machuki, Suntalay. 500-1200m.

General Distrib.: Tropical Himalayas (nepal-Bhutan), India, Myanmar, Sri Lanka, China, Malaysia.

Note: Fast growing tree species having high timber value.

UMBELLIFERAE Juss.

Key to the Genera:

1. Stoloniferous herbs; carpophore absent.....*Oenanthe*
1. Non-stoloniferous herbs; carpophore present.....2
2. Bract margin white; fruits oblong ovoid.....*Selinum*
2. Bract margin greenish; fruits not ovoid (except *Sanicula elata*).....3
3. Plants tall erect herbs; fruits winged, bivittate.....*Heracleum*
3. Plants small prostrate herbs; fruits not vittate.....4
4. Peduncles repeated dichotomous; leaves palmately 3-5 partite.....*Sanicula*
4. Peduncles unbranched; leaves simple or pinnate or palmately 6-7 lobed.....5
5. Bracts upto 0.2cm long; petals valvate.....*Hydrocotyle*
5. Bracts over 0.3cm long; petals imbricate.....6
6. Plants aromatic; lamina spathulate, margin spinose-toothed.....*Eryngium*
6. Plants not aromatic; lamina variable, margin serrate.....*Pimpinella*

CENTELLA L.

Centella asiatica (L.) Urban in Martius, Fl. Brasil 11:287, t. 78, f.1.1879; FEH 1:229. 1966; EFPN 2:188. 1979; TBRI 50(4):109. 1987.

Hydrocotyle asiatica L., Sp. Pl. ed. 1(1):234. 1753; FBI 2:669. 1879.

Local Name: Ghor Topray (Nep.).

Small perennial herb, branches runner. Petioles 4.5-8.5cm long; lamina 1.5-5 cm diam., reniform, crenate, cordate. Peduncle upto 0.8 cm long. Bracts 0.5-0.65cm, ovate, partially subtending the flowering umbels. Flowers sessile, 3-6, pinkish, petals upto 0.15 cm long, imbricate, obtuse. Fruits 0.5-0.6 cm, reticulate-rugose, with elevated ridges.

Flr.: Apr. - May *Frt.:* May - Aug.

Specimen Cited: Near Chouda Feri, 2160m, AP Das & PC Rai 0357, dated 14.10.1994.

Status: Rare.

Local Distrib.: Samsing, Chuda Feri, Jaributti. Upto 2200m.

General Distrib.: Tropical and sub-tropical world-wide.

Note: An important medicinally useful plant.

ERYNGIUM L.

Eryngium foetidum L., Sp. Pl. 232. 1753; Fl. Asm. 2:340. 1938; Candollea 19:219. 1966; Mat. Fl. Arun. Prad. 1 (2):537. 1996.

Highly aromatic, perennial herb. Shoot erect, glabrous. Petioles basally sheathing. Leaves alternate; lamina 5-10 x 1.2-2.4 cm, spatulate, margin spinous-toothed. Bracts stellate, spinulose. Flowers in heads, whitish; calyx-teeth ridged, acute; petals white. Fruits ellipsoidal with semi terete seed.

Flr.: May - Jun. *Fr.:* Cold season.

Specimen Cited: Above Samsing, 750 m, AP Das & PC Rai 1720, dated 17.5.1997.

Status: Rare.

Local Distrib.: Samsing, Phari, Machuki. 700-1300m.

General Distrib.: A native of South America; now naturalised in different parts of India.

HERACLEUM L.

Key to the species:

- 1. Slender herbs; leaflets upto 6.5cm long, margin serrate, glabrous beneath excepting nerves.....*H. candicans*
- 1. Stout and rigid herbs; leaflets 4.5-13cm long, margin crenate-serrate, sparingly to densely pubescent beneath.....2
- 2. Petals emarginate; fruits orbicular.....*H. nepalense*
- 2. Petals not emarginate, bilobed; fruits obovate.....*H. wallichii*

Heracleum candicans Wallich ex DC., Prodr. 4:192. 1830; FBI 2:714. 1879; Cat. Pl. Kumaon 74. 1906; Fl. Siml. 214. 1921; Fl. Nainital. 146. 1968; Mat. Fl. Arun. Prad. 1 (2):537. 1996.

Tall, erect, perennial herbs, pubescent on young parts. Petioles upto 5cm; lamina 16-25cm, pinnately lobed, and dissected; pinnae 5.5-13 x 3.5-9.5cm, sessile or shortly stalked, elliptic-ovate, crenate-serrate, obtuse, dotted and sparingly pubescent above, thickly white-villous beneath. Primary rays many; secondary umbels 2.4 cm in diam. Bracteoles linear-lanceolate. Sepals teeth linear; petals white, outer ones 2-lobed and usually larger. Fruits 0.8-1.3 cm long, flattened obconic, laterally broad winged and dorsally ribbed (2-vittate).

Flr. & Fr.: Jun. - Sep.

Specimen Cited: Chouda Feri, 2285m, AP Das & PC Rai 0348, dated 14.10.1994.

Status: Rare.

Local Distrib.: Lava, Chouda Feri, Kuwa Paani. 1600-2300m.

General Distrib.: Kashmir to Kumaon, Darjeeling.

Heracleum wallichii DC., Prodr. 4:195. 1830; FBI 2:712. 1879; FEH 1:299. 1966; EFPN 2:186. 1979.

H. diversifolium Wallich, Cat. 18, n. 574. 1829, *nom. nud.*

H. sublineare C.B. Cl., FBI 2:713. 1879; JBNHS 55:257. 1958; RBSI 9(2):4. 1966.

Slender perennial herb. Stem 28-60 cm tall, white-hirsute below nodes. Upper leaves 3-partite or unipinnate; leaflets 3-5, 2-6.5 x 1.6-3.5 cm, lanceolate, serrate, acute-acuminate, base narrowly oblique, pilose above, glabrous beneath except nerves. Umbel rays 6-8, glabrous. Bract 1, small, linear, deciduous. Bracteoles 0-5, linear and more prominent. Pedicels 0.8-1.3 cm. Sepal teeth linear; petals to 0.75 cm long, 2-lobed, white or pinkish. Fruit 0.7 x 0.45 cm, obovate, glabrous, brownish, provided with broad lateral wings, obscurely ridged.

Flr. & Frt.: Jun. - Aug.

Specimen Cited: Tinsimana, 2900m, AP Das & PC Rai 0747, dated 20.10.1994.

Status: Less Common.

Local Distrib.: Middle Rechila, Chitray, Tinsimana. 2400-2900m.

General Distrib.: Himalayas (Nepal-Bhutan).

Heracleum nepalense D. Don, Prodr. Fl. Nep. 185. 1825; FBI 2: 714. 1879; FEH 1: 229. 1966; EFPN 2: 186. 1979; TBRI 50(4): 116. 1987.

H. nepalense var. *bivittata* Clarke in FBI 2: 714. 1879; FEH 1: 229. 1966.

Local Name: Chimphing (Nep.).

Herbs with rigid root-stock. Lower leaves pinnately divided, upper ones trilobed; petioles sheathing; leaflets 4.5-13.5 x 3-7.5 cm, serrate, acute, sparingly to thickly pubescent. Umbel rays 15. Flowers upto 15 per ray; sepals 5-toothed, teeth linear; petals obovate, emarginate, whitish. Fruits almost orbicular, compressed dorsally, broadly winged, bivittate.

Flr.: Jun. - Jul. *Frt.:* Aug. - Dec.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0232, dated 16.6. 1994.

Status: Less Common.

Local Distrib.: Chitray, Alubari, Chouda Feri, Ruka Hill. 1950-2600m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya.

Note: Fruits medicinal; also eaten as pickles. Sold in the market.

HYDROCOTYLE L.

Key to the species:

1. Minute prostrate herbs; petioles much shorter (upto 1.6cm), greenish; lamina shallowly lobulate, crenate.....2
1. Comparatively larger shrubs; petioles much longer (upto 8cm), light red and fleshy; lamina serrate.....*H. nepalensis*
2. Leaves glabrous; nerves 3-4; flowers sessile.....*H. sibthrioides*
2. Leaves pubescent above; nerves 7-9; flowers pedicellate.....*H. himalaica*

Hydrocotyle himalaica P.K. Mukherjee in For. 95: 470. t. 1. 1969; EFPN 2: 186. 1979; TBRI 50(4): 116.1987.

H. javanica var. *podantha* (Molk.) Clarke in FBI 2: 668. 1879.

H. javanica Thunb. *sensu* Hara, SFSH f. 174. 1963.

H. podantha auct. non Molkenb; FEH 1: 230. 1966.

Local Name: Golpatta (Nep.).

Small prostrate perennial herb rooting at nodes. Stem branched, pubescent. Petiole to 1.6 cm, pubescent; lamina broader than long, 0.8-3.2 x 1.1-3.7 cm, reniform, crenate, deeply cordate, pubescent and glossy above; glabrous to sparsely pubescent beneath, nerves 7-9 from base. Umbels solitary, many flowered, 0.6-0.9 cm across. Peduncles longer than petioles, pubescent, leaf-opposed. Bracts 0.15-0.2 cm, brown, membranous. Pedicels upto 0.3 cm, glabrous. Petals white, valvate, acute. Fruits. 0.1 x 0.1-0.15cm, compressed.

Flr.: Jun. - Oct.

Frt.: Jul. - Dec.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 033, dated 13.6.1994; Jaributti, 2195m, **AP Das & PC Rai** 0398, dated 15.10.1994.

Status: Abundant.

Local Distrib.: Reshete, Alubari, Hattidara, Thosum Hill, PHE Source. 1900-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya.

Note: Extracts of leaves used medicinally in dysentery and stomach disorders.

Hydrocotyle nepalensis Hk., Exot. Fl. 1: t. 30. 1823; FEH 1: 229 & 643. 1966; EFPN 2: 186. 1979; TBRI 50(4): 116. 1987.

H. polycephala Wight & Arnt., Prodr. Fl. Ind. 1:366. 1834.

H. javanica auct. Non Thunb.: Clarke in FBI 2: 667. 1879, P.P.

Similar to *H. himalaica* but comparatively larger. Leaves 1.5-4 x 1.8-6.2 cm; petioles 1.3-8 cm long, thick, fleshy, light red when young; lamina palmately 6-7 lobed, usually serrate, broadly cordate, greenish and hairy above, light green beneath, veins greenish white to light red. Peduncles 1.8-2.5 cm long, aggregated. Petals light-green; stamens upto 0.7 cm long.

Flr.: May - Jul.

Frt.: Jul. - Dec.

Specimen Cited: Rechila Durpinay, 2300m, **AP Das & PC Rai** 1349, dated 06.5.1995.

Status: Less Common.

Local Distrib.: Lava, Rechila Durpinay. 1900-2300m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Tibet, Myanmar.

Note: Leaf extract commonly used to cure diphtheria, throat-pain and pneumonia.

Hydrocotyl sibthorpioides Lamarck, Encycl. Meith. 3:153. 1789; FEH 1:230.1966; EFPN 2:187. 1979; TBRI 50(4):116. 1987.

H. rotundifolia Roxb. ex Dc., Prodr. 4:64. 1830; FBI 2:668. 1879.

Minute prostrate herb forming mess. Branches small, rooting at nodes. Stem filiform. Lamina 0.55-1cm across, orbicular, cordate, shallowly lobulate, each lobe toothed, base narrowly cordate, glabrous, glossy. Peduncles upto 1.6 cm long. Flowers sessile, white; petals to 0.8cm, valvate, acute. Fruit 0.15-0.2 cm, broadly orbicular, smooth.

Flr.: Apr. - Jul. *Fr.:* Jun. - Aug.

Specimen Cited: Pankhasari, 2260m, **AP Das & PC Rai** 1307, dated 06.5.1997.

Status: Abundant in open places.

Local Distrib.: Alubari, Pankhasari, Machuki. Upto 2300m.

General Distrib.: S.E. Asia, Australia.

OENANTHE L.

Oenanthe thomsonii C.B. Clarke in FBI 2: 697. 1879; FEH 1: 230. 1966; EFPN 2: 187. 1979; TBRI 50(4):121. 1987.

Stoloniferous annual, diffuse, weak herbs. Branches upto 120 cm, glabrous. Leaves 3-4 pinnate, segments linear, minute. Peduncles short with 4-8 rays. Pedicels 0.1-0.18 cm, glabrous. Petals emarginate, white; carpels dorsally compressed. Fruits 0.15-0.22 x 1-1.6 cm, greenish, on maturation golden yellow.

Flr.: May - Oct. *Fr.:* Sep. - Dec.

Specimen Cited: Tinsimana Area, 2900m, **AP Das & PC Rai** 0782, dated 20.10.1994; Ruka Hill, 2480m, **AP Das & PC Rai** 0930, dated 24.10.1994.

Status: Common.

Local Distrib.: Alubari, Ruka Hill, Tinsimana, Jaributti, Chouda Feri. 2000-2900m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Myanmar, China.

PIMPINELLA L.

Pimpinella diversifolia DC., Prodr. 4: 122. 1830; FBI 2: 688. 1879; FEH 1:230. 1966; EFPN 2:188. 1979; TBRI 50 (4):123. 1987.

Variable perennial herbs. Root-stock rigid. Stolons long, many. Leaves much variable in shape and size, lower cauline often simple, ovate, upper ones usually pinnate; petioles long, scarcely hairy to glabrous; caluline leaves shallowly 3-5 lobed; leaflets variable, rounded or ovate, sometimes lobed or deeply dissected, finely serrate, often lacinate. Peduncles 6-16 rayed. Bracts linear. Flowers small, shortly pedicelled; petals emarginate white. Fruits obscurely ridged and compressed laterally, blackish. (Plate XII).

Flr.: Jul. - Sep.

Fr.: Sep. - Nov.

Specimen Cited: Rechila Chowk, 2280 m, AP Das & PC Rai 0115, dated 14.6.1994; Tinsimana, 2900m, AP Das & PC Rai 0751, dated 20.10.1994; Thosum Beat, 2780m, AP Das & PC Rai 0843, dated 22.10.1994.

Status: Common.

Local Distrib.: Rechila Peak, Tinsimana, Thosum Beat, Rechila Chowk. 2000-3100m.

General Distrib.: Afganistan, Himalayas, Meghalaya, Myanmar, China, Japan.

SANICULA L.

Sanicula elata Hamilt. ex D. Don, Prodr. Fl. Nep. 183. 1825; FEH 1: 231. 1966; EFPN 2: 189. 1979; TBRI 50(4):126. 1987.

Sanicula europea L. var. *elata* (Ham.)Wolff in Engl., Pfl.-reich 4-288, Ht. 61: 63. 1913.

Perennial, 15-24 cm long erect herbs with stout root-stock, shade-loving. Leaves palmately 3-5 partite; radical ones larger, glabrous; petioles 2-5cm, glabrous ; lamina dissected, serrate, glabrous. Peduncles frequently dichotomous. Bracts sessile, leafy. Flowers unisexual, males shortly pedicellate; sepal-tube echinate, villous, teeth lanceolate; petals imbricate, whitish. Fruit small, ovoid, covered with hooked bristles.

Flr.: Apr. - Jul.

Fr.: Aug. - Oct.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0315, dated 18.6.1994; Tinsimana, 2900 m, AP Das & PC Rai 0554, dated 19.10. 1994.

Status: Common.

Local Distrib.: Lava, Tinsimana, Lava, Reshete, Chouda Feri. 2000-2900m.

General Distrib.: Kashmir-Bhutan, Khasia Hills, Myanmar, Sri Lanka, Indochin and China, Malaysia.

SELINUM L.

Selinum candollii DC., Prodr. 4:165. 1830; FBI 2: 700. 1879; EFPN 2: 189. 1979; Nam. Chang. Flr. Pl. 517. 1987.

S. wallichianum (DC.) Raizada & Saxena in IF 92: 323. 1966; FWP 20:119. 1972; EFPN 2: 189. 1979.

S. tenuifolium Wallich ex Cl. in FBI 2: 700. 1879.

S. tenuifolium var. *filicifolia* (Edgew.) Cl. in FBI 2: 700. 1879.

Perennial herb, branched, glabrous or so. Root-stock stout, long. Leaves 10-20 cm, cauline larger, tripinnate, sheathing at base, pinnules 1-2 pinnatifid. Umbels 5-8 cm across, hairy, rays numerous, large, involuval bracts 4, linear. Bracteoles as long as flowers, linear lanceolate, white margined. Sepals teeth linear; petals white; carpels longer than broad, dorsally compressed. Fruit 2 x 1 cm, oblong ovoid, compressed, ribs winged.

Flr. & Frt.: Jul. - Sep.

Specimen Cited: Rechila Peak, 3100m, AP Das & PC Rai 0556, dated 21.10.1994.

Status: Rare.

Local Distrib.: Tinsimana, Rechila Peak. 2800-3100m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Tibet.

ARALIACEAE Juss.

Key to the Genera:

1. Perennial rhizomatous herbs.....*Panax*
1. Shrubs, trees or climbers.....2
2. Large shrubs or small trees.....3
2. Woody root climber.....*Hedera*
3. Plants armed.....*Brassaiopsis*
3. Plants unarmed.....4
4. Leaves palmately 3-5 foliate; umbels 5-7 cm across.....*Gamblea*
4. Leaves pinnately 3 or 3-5 foliate; umbels 2-3.5cm across.....5
5. Trees, sometimes epiphytes or scrambler as well; rachis pubescent; petals greenish or yellowish.....*Pentapanax*
5. Mostly trees, rarely shrubby climber; rachis glabrous; petals whitish or greenish white.....6
6. Bracts subulate; styles free.....*Aralia*
6. Bracts ovate; styles connate.....7
7. Plant shrubby climber or small tree; lamina elliptic-oblongate or oblong, entire; fruits subglobose or ellipsoid.....*Schefflera*
7. Plants always tree; lamina ovate-elliptic, serrate; fruits ovoid.....*Macropanax*

ARALIA L.

Aralia cachemirica Decaisne in Jacq., Voy. Ind. 72, t. 81. 1844; FBI 2:722. 1879; FEH 1:225.1966; FB 2(1): 336. 1991.

Panax decompositum Wallich ex DC., Prodr. 4:255. 1830; non *Araliade composita* Reinw. ex de Vries 18.6-57.

P. tripinnatum Wallich ex G. Don, Gen. Hist. 3:384. 1834; non *Aralia tripinnata* Blanco.-1837.

A. macrophylla Lindley in Bot. Reg. 1844: Misc. 73. 1844.

Shrub to 2-3 m high. Leaves 35-62cm, pinnate; leaflets lamina 4.8-15.5 x 3.1-6.2cm, ovate, acuminate, base cordate or rounded, serrate, glabrous. Panicles to 42cm, branched. Bracts 0.3-0.5 cm, subulate .Umbels 1.6-2.6 cm across. Pedicels pubescent, usually articulated at base of flower. Flowers creamy; calyx minutely 5-toothed; petals 5, imbricate; styles 5, almost free. Fruit 0.4-0.5cm, subglobose, 5-celled, dark purple; seeds 5, compressed.

Flr. & Frt.: Jul. - Aug.

Specimen Cited: Neora Boundary near Sikkim, 2700m, **AP Das & PC Rai** 1152, dated 29.4.1995.

Status: Sparse; growing on wet and cold places.

Local Distrib.: Neora-Sikkim Border, Mulkharka. 2400-2700m.

General Distrib.: Afganistan and Temperate Himalayas (Kashmir-Darjeeling).

BRASSAIOPSIS *Decaisne et Planch.*

Key to the species:

1. Panicles upto 48cm long; petals 0.3-0.4cm, creamy white.....*B. mitis*
1. Panicles shorter (upto 20cm); petals to 0.25cm, greenish.....*B. hainla*

Brassaiopsis hainla (Hamilt.)Seemann in Journ. Bot:2:291. 1864; FBI 2:735. 1879; Sargentia 2:52. 1942; FEH 1:226. 1966.

Hedera hainla Hamilt. ex D. Don, Prodr. Fl. Nep. 187. 1825.

Local Name: Chuletro (Nep.).

Small armed trees to 3-10m. Stems and branches spiny. Leaves palmately lobed; petioles 9-32cm; lamina 10-36 cm x 9.5-35 cm, ovate or suborbicular, shallowly 3-7 lobed, acuminate, base cordate, serrate, glabrous, rarely stellate-pubescent beneath. Flowers in umbels borne in panicles, 16-20 cm, stellate-pubescent; calyx teeth minute; petals 5, valvate to 0.25cm, ovate, greenish; anthers ovoid; ovary 2-locular; styles 2, 0.15 cm, apically connate. Fruits upto 0.65 cm diam., globose; seeds 2, obscurely compressed.

Flr. & Frt.: Feb. - Apr.

Specimen Cited: Near Tiffin Dara, 1950 m, **AP Das & PC Rai** 1794, dated 14.9.1997.

Status: Frequent.

Local Distrib.: Chitray, Tiffin Dara, Chouda Feri, Chonkobhir. 1900-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, S. W. China.

Brassiopsis mitis C.B. Clarke in FBI 2:736. 1879; FEH 1:226. 1966; 3:86. 1975; EFPN 2:191. 1979; TBRI 50 (4):107. 1987; FB 2(1):343. 1991.

Local Name: Chuletro, Phootta (Nep.).

Tall shrubs, 4-8m high, with spiny and few branches. Petioles 12-45cm long, bristly pubescent, often prickly. Leaves 18-48cm across, suborbicular, incised into many lobes, lobes further segmented towards base, linear-lanceolate, acuminate, stellately pubescent undersurface. Panicles upto 48cm long; umbels 6-8cm im diam., numerous. Calyx teeth minute, rusty tomentose; petals 0.3-0.4cm, creamy white, glabrous. Fruits to 0.5cm across, globose.

Flr.: May - Jul. *Fr.:* Aug. - Oct.

Specimen Cited: Hattidara, 2380m, AP Das & PC Rai 0631, dated 17.10.1994.

Status: Frequent.

Local Distrib.: Lava, Pankhasari, Chitray, Kuwapaani. 1360-2380m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Note: Foliage is good fodder for cattle.

GAMBLEA Clarke

Gamblea ciliata C.B. Clarke in FBI 2:740. 1879; EFPN 2:191. 1979; FB 2(1):340. 1991.

Local Name: Kursimla (Nep.).

Medium sized trees to 12m tall, unarmed. Petioles 10-18cm long, initially brownish tomentose. Leaves palmate, usually 3-foliolate, rarely 5-foliolate; leaflets 7-20 x 4-10cm, ovate or elliptic, entire, ciliate, acuminate, base cordate, sometimes cuneate, thinly hairy along veins on both sides. Panicles upto 22cm long; umbels 5-7cm across, 10-18 flowered. Calyx with minute teeth; petals 0.3-0.35cm, ovate, greenish, slightly recurved. Fruits 0.8-1cm, subglobose-globose; seeds 3-5.

Flr.: Jun. - Jul. *Fr.:* Aug. - Oct.

Specimen Cited: Near Chitray, 2600m, AP Das & PC Rai 1242, dated 04.5.1995.

Status: Less Frequent.

Local Distrib.: Pankhasari, Alubari, Chitray. 2200-2650m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Myanmar, S. Tibet.

HEDERA L.

Hedera nepalensis K. Koch, Hort. Dendr. 284. 1853; FEH 1:226. 1966; 3:86. 1975; EFPN 2:191. 1979; TBRI 50 (4): 116. 1987; FB 2(1):346. 1991.

H. helix sensu FBI 2:739. 1879, *non* L.

H. himalaica Tobber, Gatt. Hedera 67, Abb. 31-38. 1912.

Local Name: Lekh Bohori, Doodhay Lahara (Nep.).

Woody root-climber, unarmed and adhering to rocks and tree trunks. Leaf lamina 5-10 x 3.5-5.5cm, ovate-elliptic, slightly lobed (unlobed in flowering stem), entire, acuminate, usually glabrous. Umbels paniculate; panicles 3-5cm long, terminal. Flowers whitish-green, stellately hairy; calyx truncate; petals 0.3-0.35cm, ovate, acute. Fruits 0.7-0.8cm diam., globose, yellowish on ripening; seeds 3-5, ovoid.

Flr.: Oct. - Dec. *Fr.*: Jan. - May.

Specimen Cited: Below Pankhasari, 2120m, **AP Das & PC Rai** 0684, dated 18.10.1994.

Status: Sparse.

Local Distrib.: Near Algarah, Chitray. 2000-2400m.

General Distrib.: Afganistan, Himalayas (Kashmir-Bhutan), Meghalaya, Myanmar, China.

Note: The species is of medicinal and ornamental value.

MACROPANAX Miq.

Macropanax dispermus (Blume) Kuntze, Rev. Gen. Pl. 271. 1891; FEH 1:227. 1966; 3:86. 1975; EFPN 2:191. 1979; TBRI 50 (4):101. 1987; FB 2(1):344. 1991.

Aralia disperma Blume, Bijdr. 872. 1826.

M. oreophilus Miq., Fl. Ind. Bot. 1(1):764. 1855; FBI 2:738. 1879.

Trees upto 12m tall, unarmed. Petioles 11-15cm long. Leaves 3-5 foliate, lamina 8-18 x 3-6.5cm, ovate-elliptic, serrate, acuminate, base cuneate or rounded, glabrous. Petiolules upto 5cm long. Panicles 20-40cm, stellate tomentose. Umbels 2.5-3cm across, many flowered. Calyx minute, toothed; petals 0.25-0.3cm, ovate. Fruits 0.55-0.6cm long, ovoid, ribbed with persistent style.

Flr.: Aug. - Sep. *Fr.*: Dec. - Feb.

Specimen Cited: Below Lava, 1780m, **AP Das & PC Rai** 0325, dated 18.6.1994.

Status: Common.

Local Distrib.: Lava, Near Algarah, Pankhasari. 1600-2300m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar, W. and C. China, Malaysia.

PANAX L.

Panax pseudo-ginseng Wallich, Trans. Med. Phys. Soc. Calcut. 4:117. 1829; Pl. As. Rar. 2:30 t. 137. 1831; Bull. Phys.-Math. Acad. St.-Pet. 1:340. 1843; J. Bot. 6:54. 1868; TBRI 50 (4):121. 1987; FB 2 (1):340. 1991.

Aralia pseudo-ginseng (Wallich) Clarke, FBI 2:721. 1879. subsp. *himalaicus* Hara, Journ Jap. Bot. 45:208, f. 2b. 11 c-e & 12 a. 1970; FEH 2:90. 1971; EFPN 2:192. 1979.

Local Name: Jarra Okhati, Paanch Pattay (Nep.).

Perennial rhizomatous herbs, 8-55cm tall. Rhizomes with nodular rings. Stem erect, unbranched. Leaves palmate or whorled at stem tip; petioles 3-10cm long; leaflets 3-6, more usually 5, lamina 3-11 (-14) x 1-3 (-6) cm, ovate or lanceolate, acuminate, base cuneate or obliquely rounded, margin finely serrate or coarsely dentato-serrate to deeply incised-pinnatifid, lobes further irregularly dentato-serrate, thinly scattered hirsute throughout or along veins on both sides. Peduncles 5-11cm long, umbellate, terminal. Male umbels 1-1.5cm across; female umbels upto 1.5-3cm across. Flowers shortly pedicellate, polygamous; calyx small (ca 0.1cm), 5-toothed; petals 5, larger than calyx (0.2-0.3cm), elliptic, acute and whitish; stamens 5, alternately placed with petals; anthers ovoid; styles 2, connate at base; ovary 2-celled. Fruits 0.4-0.6cm, subglobose, red on ripening; seeds 2-3.

Flr. & Frt.: May - Sep.

Note: The different varieties of this species is equally used as the substitutes of *Panax ginseng*, the crucial medicinal herb of Korea and China. In this Himalayan belt, rhizomes are believed to contain a 10% of active principles of the drugs for vitality, and are collected and marketed. Local people also call this herb *Paanch Pattay* and collect for preparing various types of folk medicines.

Key to the varieties and forma of *Panax pseudo-ginseng*:

1. Leaflets unlobed, finely dentato-serrate2
1. Leaflets pinnatifid to pinnatisectly lobed.....3
2. Leaflets obovate-elliptic, dentate-serrate, densely hairy
.....*P. pseudo-ginseng* var. *angustifolius* f. *angustifolius*
2. Leaflets oblong-lanceolate, finely serrate and hairy
.....*P. pseudo-ginseng* var. *angustifolius* f. *serratus*
3. Leaflets pinnatisectly lobed, pinnae 0.2-0.5cm broad
.....*P. pseudo-ginseng* var. *bipinnatifidus* f. *bipinnatifidus*
3. Leaflets pinnatifidly lobed; pinnae 0.55-0.85cm broad
.....*P. pseudo-ginseng* var. *bipinnatifidus* f. *neoraensis*

Panax pseudo-ginseng var. *angustifolius* (Burkil) Li in Sargentia 2:118. 1942; FEH 1:227. 1966; 2:90. 1971; EFPN 2:192. 1979; FB 2 (1):341. 1991.
f. *angustifolius*.

Dark green herbs upto 12.5cm, rhizomatous. Rhizomes nodular, with small space in between nodules, each nodule representing one year's growth. Petioles 2-6cm long; leaflets 4-9 x 1.5-2.8cm, elliptic lanceolate or elliptic obovate, margin unlobed but dentato-serrate, acuminate, densely pilose throughout. Pedicels upto 0.52cm long. Seeds not compressed. (Plate IV: 32, 35; Plate XIV, Plate XVIII).

Flr.: Jul. - Sep. *Frt.:* Sep. - Nov.

Specimen Cited: Rechila Chowk, 2270m, AP Das & PC Rai 0333, dated 14.10.1994.

Status: Very rare.

Local Distrib.: Jaributti, Pankhasari, Rechila Chowk. 1800-2300m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Thailand, W. China.

Panax pseudo-ginseng var. *angustifolius* f. *serratus* PC Rai, RB Bhujel et AP Das
forma nov.

Differt a forma typical foliolis (5-9 x 1.6-1.8cm), oblongo-lanceolatis, regulariter serratis, gradatione longe acuminatis, pilosis solum in venis, petiolis 6-8cm, pedicello florifero 0.1-0.3cm.

The *forma nov.* is distinct from the type by virtue of its oblong-lanceolate (5-9 x 1.6-1.8cm), finely serrate, gradually long acuminate leaflets also being pilose only on veins; petioles 6-8cm; flowering pedicel 0.1-0.3cm. (**Plate IV: 33, Plate XV**).

Flr.: Jul. - Aug.

Specimen Cited: Holotypus: Jaributti, Neora Valley National Park, 2130m, **AP Das & PC Rai** 0995 (A), dated 23.4.1995 (N.B.U.); *Isotypus:* Jaributti, Neora Valley National Park, 2130m, **AP Das & PC Rai** 0995 (B), dated 23.4.1995 (N.B.U.).

Status: Very rare.

Distrib.: Endemic to Darjeeling Hills; seen at Jaributti area of Neora Valley National Park only.

Panax pseudo-ginseng var. *bipinnatifidus* (Seeman) Li in *Sargentia* 2:118. 1942; FEH 1:227. 1966; 2:90. 1971; EFPN 2:192. 1979; FB 2 (1):341. 1991.
f. *bipinnatifidus*.

Plant not dark green, with weak and slender stem. Nodules of rhizome with longer gaps of ± 2.7 cm in between. Leaflets 3-6.5cm, pinnatisect; pinnae alternately larger and smaller, incise-serrate again, larger lobes upto 0.55cm broad. Fruits not seen. (**Plate IV: 34, Plate XVI**).

Flr.: Jun. - Aug.

Specimen Cited: Jaributti, 2140m, **AP Das & PC Rai** 1005, dated 23.4.1995.

Status: Extremely rare.

Local Distrib.: Seen only in a small patch in the Jaributti area of Neora Valley National Park.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, S. E. Tibet, Myanmar, W. and C. China.

Panax pseudo-ginseng var. *bipinnatifidus* f. *neoraensis* PC Rai, RB Bhujel et AP Das,
forma nov.

Differt a forma typica foliolis vade lobatis ad pinnatifidus, lobis gradatione et uniformiter alternis, 0.65-0.9cm latis.

The *forma nov.* is distinctive from the type by its leaflets being shallow to pinnatifidly lobed, lobes 0.65-0.9cm broad, gradually and uniformly alternate. (Plate XVII).

Flr.: Aug. - Sep. *Frt.*: Not observed.

Specimen Cited: **Holotypus**: Near Jaributti, Neora valley National Park, 2190m, AP Das & PC Rai 0407 (A), dated 15.10.1994 (N.B.U.); **Isotypus**: Near Jaributti, 2190m, AP Das & PC Rai 0407 (B), dated 15.10.1994 (N.B.U.).

Status: Rare.

Distrib.: Endemic to Neora Valley National Park.

PENTAPANAX Seemann.

Key to the species:

1. Leaves 12-30cm long; petals *ca* 0.2cm long, greenish; fruits oblong
.....*P. fragrans*
1. Leaves 35-48cm long; petals over 0.3cm, yellowish; fruits subglobose
.....*P. racemosus*

Pentapanax fragrans (D. Don) Ha in Fl. Ser. Vetnama Autoref. Diss. 1872; FB 2 (1):338. 1991.

P. leschenaultii (DC.) Seeman in Journ. Bot. 2:296, cum fig. 1864; FBI 2:724. 1879; FEH 1:227. 1966; 3:87. 1975; EFPN 2:192. 1979; TBRI 50 (4):122. 1987.

Hedera fragrans D. Don, Prodr. Fl. Nep. 187. 1825.

Panax leschenaultii DC., Prodr. 4:254. 1830.

Local Name: Chinday (Nep.).

Shrubs to small trees, upto 10m tall, sometimes growing as epiphyte. Leaves 12-30cm, pinnately 3 to 5, foliolate; leaflets 6-15 x 3-6.2cm, ovate-elliptic, serrate, acuminate, base rounded or often cordate, glabrous above, pubescent along veins beneath. Umbels 2-3cm across, globose; rachis upto 16cm long, pubescent. Bracts lanceolate. Flowers bisexual, 0.3-0.4cm in diam., pedicellate, greenish; calyx lobes minute, glabrous; petals *ca* 0.2cm long, deciduous; styles united. Fruit 0.45-0.55cm across, oblong, ribbed. (Plate XIII).

Flr.: Apr. - Jul. *Frt.*: Aug. - Dec.

Specimen Cited: Near Helipad, 2300m, AP Das & PC Rai 1042, dated 25.4.1995.

Status: Frequent.

Local Distrib.: Chitray, Pankhasari, Helipad. 1900-2500m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar, China.

Note: Fruits and leaves edible.

Pentapanax racemosa Seeman in Journ. Bot. 2:295. 1864; FBI 2:724. 1879; FEH 1:228. 1966; EFPN 2:192. 1979; TBRI 50 (4):122. 1987; FB 2 (1):338. 1991.

Trees to 11m or more or scrambler. Leaves 35-48cm, imparipinnate, 5-foliolate; leaflets 10-18 x 6-11cm, broadly ovate to elliptic, serrate, acuminate, abse rounded, glabrous. Inflorescence upto 45cm long, pubescent, raceme branches 3-8cm. Flowers polygamous; calyx truncate; petals 0.3-0.4cm long, ovate, yellowish; styles recurved. Fruits 0.45-0.65cm across, subglobose.

Flr.: Jun. - Aug. *Frt.*: Jul. - Sep.

Specimen Cited: Near Chitray, 2480m, AP das & PC Rai 1244, dated 04.5.1995.

Status: Less Common.

Local Distrib.: Chouda Feri, Durpinay, Chitray, Alubari. 2000-2500m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, W. China.

SCHEFFLERA Forster

Key to the species:

1. Trees to 5-11m tall; petioles 12-32cm long; nerves much impressed above
.....*S. impressa*
1. Shrubby climber, sometimes epiphytic too; petioles only upto 15cm long; nerves not prominent above.....*S. venulosa*

Schefflera impressa (Clarke) Harms. in Engl., Pfl.-fam. 3(8):38. 1894; FEH 1:228. 1966; 3:87. 1935; EFPN 2:193. 1979; TBRI 50 (4):126. 1987; FB 2 (1):345. 1991.

Heptapleurum impressum Clarke, FBI 2:728. 1879.

Local Name: Bhalu Chinday, Bhalu Phootta (Nep.).

Small unarmed trees, 5-11m tall. Petioles 12-32cm long. Leaves digitate; leaflets 5-8; lamina 10-25 x 5-8.5cm, elliptic-oblongate, entire, acuminate, base cuneate, glabrous above, stellate wooly beneath, nerves well impressed above. Panicles 30-45cm, branched, tomentose. Umbels upto 3.5cm; petals 0.3-0.4cm, greenish white; styles upto 1.5cm, connate. Fruits 0.45-0.6cm across, subglobose.

Flr.: Jul. - Sep. *Frt.*: Sep. - Dec.

Specimen Cited: Near Chitray, 2480m, AP Das & PC Rai 0739, dated 19.10.1994.

Status: Frequent.

Local Distrib.: Chouda Feri, Tiffin Dara, Chitray. 1800-2500m.

General Distrib.: Himalayas (Kumaon-Bhutan), S. W. China.

Schefflera venulosa (Wight et Arn.) Harms. in Engl., Pfl.-fam. III, 8:39. 1894; Sargentia 2:34. 1942; BBSI 2:376. 1960; FEH 1:228. 1966; EFPN 2:193. 1979; Nam. Chang. Flr. Pl. 509. 1987. var. *venulosa*: TBRI 50 (4):126. 1987.

Heptapleurum venulosum (Wight et Arn.) Seemen in Journ Bot. 3:80. 1865; FBI 2:729. 1879, excl. *syn.*

S. elliptica Harms *sensu* Hand.-Mzt., Symb. Sin. 7:691. 1933.

Local Name: Kursimla Lahara (Nep.); Kuntiong-rik (Lep.).

Large climbing shrubs with adventitious roots, frequently epiphytic. Leaves digitately 5-7 foliate; petioles 8- 15cm long; petiolules 2-4cm; leaflets 7-17 x 4-7.5cm, elliptic-oblong, acuminate, glabrous. Panicles 15-20cm long, stellate pubescent. Umbels many flowered, upto 2cm long. Bracts ovate, caducous. Calyx truncate; petals 0.25-0.3cm long, obovate-oblong, whitish. Fruits 0.4-0.5cm across, ellipsoid, prominently 5-ribbed, orange-crimson.

Flr.: Sep. - Dec. *Fr.:* Dec. - Mar.

Specimen Cited: Samsing-Phari, 990m, AP Das & PC Rai 1753, dated 18.5.1997.

Status: Frequent.

Local Distrib.: Above Pareng, Samsing-Phari, Machuki. 700-1500m.

General Distrib.: Himalayas (Punjab-Bhutan), Meghalaya, Myanmar, S. and W. China, Malaysia.

CORNACEAE Dum.

Key to the Genera:

1. Trees; leaves ovate to ovate-elliptic, entire; flowers bisexual; fruit a subglobose drupe.....*Swida*
1. Shrubs; leaves oblong or elliptic-oblong, serrate; flowers unisexual; fruit an ovoid berry.....*Aucuba*

AUCUBA Thunb.

Aucuba himalaica Hk. f. et Thoms. ex Hk. f., Iu. Himal. Pl. T.12. 1955; FBI 2: 747. 1879, Pfl.-reich IV-299, Hk. 41: 41. 1910; SFSH 141 & 142. 1963; FEH 1: 232 & 644. 1966; FB 2(1): 331. 1991.

Local Name : Kali Kaath (Nep.).

Shrub, usually 2-4m, with dichotomous branching. Petioles 1-2.3 cm long; leaves opposite, 11-17 x 2.5-5 cm, elliptic-oblong or oblong, long acuminate, base cuneate, margin serrate to denticulate, coriaceous, glabrous above, tomentose, beneath at young stage. Male panicles 5-13 cm. Male flowers upto 0.4 cm, calyx 4-toothed; petals 4, upto 0.35 cm, ovate; stamens 4, subsessile. Female panicles 3.5-4 cm. Female flowers upto 0.72 cm long; petals 0.35 cm, ovate; ovary unilocular; style short. Fruit 1.2 x 0.65 cm, ovoid, 1-seeded, bright scarlet.

Flr. & Fr.: Apr. - Jul.

Specimen Cited: Pankhasari Forest, 2320 m, AP Das & PC Rai 0376, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Pankhasari Forest, Rechila Middle, Ruka Forest. 2100-2650m.

General Distrib.: E. Himalaya (Sikkim - Manipur).

SWIDA Opiz

Swida macrophylla (Wallich) Sojak in Nov. B.H.B. Univ. Carol. Prag. 1960:10.1960; EFPN 2:193.1979; FB. 2(1) : 330. 1991.

Cornus macrophylla Wallich in Roxb., Fl. Ind. 1:433.1820; Prodr. Fl. Nep. 141.1825; FBI 2:744. 1879.

Local Name: Patmero/Bangi Kath (Nep.).

Tree to 12m high. Leaves opposite; petiole 1-3.3cm; lamina 10-19 x 5.5-10.4cm, ovate to ovate-elliptic, acuminate, base truncate to rounded, whitish puberulent beneath, with medifixed hairs on both sides. Inflorescence erect. Flowers bisexual; calyx small, obscurely toothed, teeth to 0.05cm; petals 4, upto 0.45 cm, ± oblong, spreading; stamens 4, equal to petals; anthers cordate with recurved tips; ovary 2-elled; style simple with capitate stigma. Drupe 0.6 x 0.6 cm, subglobose and black.

Flr. & Frt.: May - Jul.

Specimen Cited: Near Tiffin Dara, 1950m, AP Das & PC Rai 1790, dated 14.9.1997.

Status: Frequent.

Local Distrib.: Middle Rechila Chowk, Tiffin Dara, Machuki, Sakam Forest. 1600-2350m.

General Distrib.: Afganistan, Himalayas (Kashmir-Bhutan), Meghalaya, Myanmar, east to China, Japan.

HELWINGIACEAE Decaisne

HELWINGIA Willdenow

Helwingia himalaica Hk.f. & Thoms., FBI 2: 726. 1879; FEH 1: 232, 645 & 662, t.49. 1966; 2: 92. 1971; 3: 88 & 393-413, t. 5a, b. 1975; EFPN 2: 191. 1979; TBRI 50(4): 166. 1987; FB 2(1): 331. 1991.

Shrub. Stem woody, branched, glabrous. Leaves alternate; petioles 0.5-2.6 cm long, glabrous; lamina 4.5-13 x 1.1-3.6 cm, lanceolate, bristly-serrate, acuminate, base cuneate, glabrous, mid-rib strong, lateral nerves arched, mostly 6 to 8 on either half. Umbels sessile, borne on middle of midvein on lamina. Pedicels 0.15-0.2 cm, slender, glabrous. Flower unisexual, minute, greenish; males many; sepals truncate; petals and stamens 3-5; ovary 3-4 celled; styles basally connate. Fruits 0.018-0.15 x 0.015-0.12 cm, ovoid, red, fleshy.

Flr.: Apr. - May

Frt.: Jun. - Sep.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 0220, dated 16.6.1994; Chitray, 2740m, **AP Das & PC Rai** 0733, dated 19.10.1994; Mulkharka Area, 2300m, **AP Das & PC Rai** 1143, dated 29.4.1995; Chouda Feri, 2285m, **AP Das & PC Rai** 1255, dated 05.5.1995.

Status: Very Common in semiopen places

Local Distrib.: Mulkharka, Ruka Hill, Pankhasari, Left Hilltop of Reshete, Chitray. 2250-2800 m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Myanmar, W. China..

Note: The plant has a great ornamental value and is of botanical interest.

ALANGIACEAE DC.

ALANGIUM Lamk.

Alangium chinense (Lour.) Hams. in Ber. Deuts. Bot. Ges. 15: 24. 1897; BBSI 10: 31. 1968; FEH 1: 219. 1966; Nam. Chang. Fl. Pl. 19. 1987. FB 2(1): 332. 1991.

Stylidium chinense Lour., Fl. Cochinch. 1: 221. 1790.

Marlea begoniaefolia Roxb., Cor. Pl. 3: 80 t. 203. 1819; FBI 2: 743. 1879; Pfreich. 41: 20. 1910.

Local Name: Akhane (Nep.).

A small tree with gray or brown warty bark. Branches spreading, zigzag. Leaves alternate; petioles 0.9-5 cm long, pubescent; lamina 5-16.5 x 3-9 cm, shape very variable, ovate to suborbicular or broadly subquadrate, margin entire to angular lobed, lobes often acuminate, tip long acuminate, base usually oblique, truncate or deeply cordate, glabrous above except nerves, undersurface pubescent and with tufts of hair on the vein axils, basal nerves 3-5. Inflorescence axillary. Pedicels pubescent, jointed at top. Flowers 1.2-1.9 cm long, white; calyx minutely dissected, with few scattered hairs; petals 6-8, strap-shaped; stamens as many as petals, alternate to petals; filament with long silky hairs; anthers exceeding the filament; ovary 2-celled. Fruits 1-1.3 x 0.5-0.6 cm, ovoid, dark purple when ripe, glabrous, succulent.

Flr.: Mar - May

Fr.: Jul. - Oct.

Specimen Cited: Chouda Feri, 2285m, **AP Das & PC Rai** 1300, dated 05.5.1995; Reshete, 2240m, **AP Das & PC Rai** 1319, dated 06.5.1995.

Status: Frequent.

Local Distrib.: Reshete, Chouda Feri, Pankhasari, Machuki. 1600-2300m.

General Distrib.: Tropical Africa, Himalayas (Nepal-Bhutan), Myanmar east to China, Malaysia.

NYSSACEAE Dumort.

NYSSA L.

Nyssa javanica. (Bl.) Wang. in Pfreich. 41: 15.1909, FM 4: 29. 1948; Nam. Chang Flr. Pl. 396-97. 1987; FB 2(1): 333. 1991.

Agathisanthes javanica Bl., Bijdr. 645. 1825.

Nyssa sessiliflora Hk. f. & Thoms., Gen. Pl. 1: 952. 1967; FBI 2: 747. 1879.

Local Name : Lekh Chilaunay (Nep.).

A large tree, upto 25 m high. Leaves alternate, simple; petioles 1-2.5 cm long; lamina 6-14 x 3.5-6 cm, oblong-elliptic, margin entire or denticulate, acute to shortly acuminate, base cuneate or rounded, sparsely hairy, pinnately veined. Heads 1-1.2 cm diam., subglobose, capitate. Peduncles 1.4-2.3 cm long. Male and female flowers alike in shape, axillary; calyx about 0.3 cm, appressed hairy, 4-5 lobed; petals usually 5, 0.3 x 0.14 cm, almost oblong; stamens 10; style simple, often bifid; ovary unilocular; ovule solitary and pendulous. Fruit 1-1.2 x 0.5 - 0.6 cm, obovoid.

Flr. & Frt.: May - Aug.

Specimen Cited: Near Kuwapaani, 1950 m, AP Das & PC Rai 1640, dated 05.5.1996.

Status : Less Frequent.

Local Distrib.: Mulkharka, Kuwapaani, Phaparkheti. 1300-2000 m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya, Malaysia, Java, Sumatra, Borneo.

SAMBUCACEAE Link

Key to the Genera:

1. Leaves compound.....*Sambucus*
1. Leaves simple.....*Viburnum*

SAMBUCUS L.

Sambucus hookeri Rehder in Sarg. Pl. Wilson 1:308. 1913; FEH 1:319. 1966; Bull. Dept. Med. Pl. Nep. 1:19. 1967; EFPN 2:197. 1979; FPK 42. 1981; TBRI 50(4):126. 1987.

S. javanica auct. non Reinwardt: FBI 3:2. 1880; FEH 1:319. 1966.

Medium shrubs to 3m high; branches weak and narrow. Stipules minute. Leaves upto 48cm long, imparipinnate; petioles 0.6-1.2cm long; leaflets 5-9, lamina 5.5-16 x 3.5-5.5 cm, oblong-lanceolate, serrate, acuminate, glabrous. Corymbs 1-1.5cm across, terminal, villous. Pedicels pointed. Calyx 3-5 toothed, teeth 0.2-0.3 cm long; corolla 0.45-0.6cm across, campanulate, whitish or pink, lobes upto 0.4cm, ovate and obtuse. Drupes 0.35-0.45 cm, globose, enclosed by persistent calyx, orange on ripening.

Flr.: May - Aug. *Frt.*: Aug. - Nov.

Specimen Cited: Above Tangta, 2580 m, AP Das & PC Rai 0820, dated 20.10.1994.

Local Distrib.: Chitray, Thosum Hill, Todey, Ruka Hill. 1900-2800m.

General Distrib.: Himalayas (Nepal - Bhutan), Maghalaya, S. Tibet, W. China.

VIBURNUM L.

Key to the species:

1. Leaves and stems glabrous; lamina entire.....*V. cylindricum*
1. Leaves and stems hairy; lamina serrate/toothed.....2
2. Inflorescence corymbose, upright.....3
2. Inflorescence elongated thyrses, drooping.....4
3. Calyx stellate hairy.....5
3. Calyx glabrous.....*V. nervosum*
4. Petioles upto 0.9cm; lamina ovate-elliptic, base obtuse.....*V. erubescens*
4. Petioles 1.5cm; lamina elliptic, base cuneate.....*V. grandiflora*
5. Lamina stellate hairy beneath.....*V. mullaha* var. *mullaha*
5. Lamina glabrous except nerves beneath.....*V. mullaha* var. *glabrescens*

Viburnum cylindricum Hamilt. ex D. Don, Prodr. Fl. Nep.142. 1825; Trs. N. Beng. 74. 1929; Bibl. 605. 1949; FEH 3:106. 1975; EFPN 2:198. 1979; Nam. Chang. Flr. Pl. 587. 1987.

V. coriaceum Blume, Bijdr. 656. 1826; FBI 3:5. 1880; Reinwardt. 1:115. 1951; FEH 1:319. 1966; 2:127. 197; TBRI 50(4):129. 1987.

Local Name: Ghora Khari (Nep.).

Shrub to small tree, upto 10.5 m high. Stem glabrous. Leaves opposite; petiole upto 2.5 cm long; lamina 7-14 x 3.5-7.2cm, oblong-lanceolate, acuminate, entire, coriaceous, glabrous above, hairy beneath on vein axils. Cymes umbellate, 6-10.5 cm diam., pupescent. Flowers scented; calyx glabrous; corolla whitish, tube upto 0.4 cm with short lobes; stamens exerted. Drupes 0.55-0.65cm, ovoid, fleshy; seeds 2-angled.

Flr.: Jun. - Aug. *Frt.:* Aug. - Oct.

Specimen Cited: Chonkobhir, 2180 m, AP Das & PC Rai 1364, dated 06.5.1995.

Status: Common.

Local Distrib.: Kuwa Paani, Chonkobhir, Choudha Feri. 1600-2350m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), Sri Lanka, Myanmar, Thailand, W. China, Malaysia.

Viburnum erubescens Wallich ex DC., Prodr. 4:329. 1830; FBI 3:7. 1880; FEH 1:230. 1966; EFPN 2:198. 1979; TBRI 50(4):130. 1987. var. *erubescens*

Local Name : Asaray (Nep.).

Large deciduous shrub to 3.5 m. Leaves opposite; petioles upto 0.9 cm; lamina 3-15 x 1.5-7 cm, ovate-elliptic, toothed (reddish), acute, base obtuse, lower surface fading, upper

greenish, nerves beneath pilose. Cymes paniced; panicles long, drooping, terminal and on short leafy lateral branchlets. Flowers 1.1 cm long; calyx teeth short, oblong, pubescent; corolla tube slender with rounded spreading lobes upto 0.6cm, white to creamy, glabrous; stamens 5, inserted within the corolla tube; anthers dark purple; ovary 2-3 celled; ovules 1 in each chamber; style short. Drupe 0.6 x 0.4 cm, ellipsoid, red, crowned with thick style. (Plate IV: 41).

Flr.: Apr. - May

Fr.: Jun. - Sep.

Specimen Cited: Jaributti, 2195m, AP Das & PC Rai 1016, dated 23.4.1995; Mulkharka Pokhari, 2200m, AP Das & PC Rai 0559, dated 16.10.1994.

Status: Common.

Local Distrib.: Right hill Patches of Alubari, Ruka Hill, Mulkharka Pokhari, Jaributti. 2000-2600 m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), Meghalaya, Myanmar, S. Tibet, W. and C. China.

Note: Fruits edible.

Viburnum grandiflorum Wallich ex DC., Prodr. 4: 329. 1830; EFPN 2:198. 1979.

V. nervosum auct. non D. Don: FBI 3: 8. 1880

Large deciduous shrub to 3 m or a small gnarled tree. Branchlets pilose. Petiole upto 1.5 cm; lamina 8-21.5 x 3.9-5.2 cm, elliptic, crenate-serrate, acuminate, base cuneate, greenish and thinly pubescent above, veins scarcely hairy beneath, greenish above, light white beneath. Flowers and fruits not recorded.

Specimen Cited: Tinsimana, 2900m, AP Das & PC Rai 0747, dated 20.10.1994.

Status: Rare.

Local Distrib.: Tinsimana and its lower Hill patch. 2500-2900 m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, S. Tibet, Myanmar, W. China.

Viburnum mullaha Ham. in D. Don, Prodr. 141. 1825; FEH 1: 320. 1966; EFPN 2: 198. 1979; TBRI 50(4):130. 1987. var. *glabrescens* (Cl.) Kitam. in Faun. & Fl. Nep. Him. 235. 1955; FEH 2:128. 1971; EFPN 2:199. 1979.

V. stellulatum var. *glabrescens* Cl. in FBI 3:4. 1880.

Medium shrub to small tree, deciduous. Petiole 0.5-1.1 cm; lamina 4.5-11 x 1.8-3.1 cm, elliptic-lanceolate, toothed, acuminate, base cuneate, glabrescent except on prominent nerves beneath. Corymbs terminal, pubescent with scattered hairs. Bracts linear. Pedicels upto 0.25 cm, hairy. Calyx lobes ovate, stellately hairy; carolla white, lobes round, hairy, longer than tube; style short. Drupe oblong, bright red and shiny.

Flr.: Jun. - Aug.

Fr.: Aug. - Oct.

Specimen Cited: Jaributti, 2195m, **AP Das & PC Rai 057**, dated 14.6.1994.

Status: Common.

Local Distrib.: Reshete, Left Hilltop of Ruka, Jaributti, Rechila Middle. 1900-2500 m.

General Distrib.: Himalayas (Punjab-Bhutan).

Viburnum mullaha Ham. in D. Don, Prodr. 141. 1825; FEH 1:320. 1966; EFPN 2:198. 1979; TBRI 50(4):130. 1987. var. *mullaha*.

V. stellulatum Wallich ex DC., Prodr. 4: 327. 1830; FBI

Local Name: Ghora Khari (Nep.).

Shrub to 5m, deciduous. Bark dark gray. Leaves opposite; petioles upto 1 cm long; lamina 4.5-9 x 1.7-2.7 cm, ovate-elliptic to lanceolate, margin toothed stellately, acuminate, base obtuse or cuneate, surfaces rarely hairy, nerves prominent below and thinly pubescent. Bracts membranous, hairy. Flowers in terminal corymbs; calyx tube ovate, stellate-hairy; corolla rotate, white, tubes short, lobes spreading; style short. Drupe oblong, light red.

Flr.: Jun. - Aug.

Frt.: Sep. - Nov.

Specimen Cited: Pankhasari, 2550m, **AP Das & PC Rai 0359**, dated 14.10.1994, Jaributti, 2195m **AP Das & PC Rai 0381**, dated 15.10.1994.

Status: Very Common.

Local Distrib.: Tinsimana, Hattidara, Jaributti, Pankhasari. 1900-2900 m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya, China.

Viburnum nervosum D. Don, Prodr. 141. 1825 (*non* FBI 3:8. 1880); FEH 3: 107. 1975; EFPN 2: 199. 1979.

V. cordifolium Wallich ex DC., Prodr. 4: 327. 1830; FBI 3: 6.1880.

Local Name : Bara Asaray (Nep.).

Shrub to small tree. Stem brownish. Petiole 1-4 cm, stellately wooly, white when young, glabrous on maturity; lamina 4-30 x 2.5-8.2cm, elliptic cordate to ovate, sharply serrate, acute to acuminate, base cordate to rounded, thinly stellate-hairy above, dense beneath on the nerves, both sides glabrous when old. Pedicels upto 0.8 cm, stellate pubescent. Flowers fragrant in lax or compact stellately pubescent umbels, emerging with or before new leaves; calyx stellately wooly; petals 0.3-0.5 x 0.25-0.3 cm, ovate, white tinged pink; anthers black. Berry ellipsoid, red. (Plate IV: 42).

Flr.: Apr. - Jun.

Frt.: Jun. - Aug.

Specimen Cited: Rechila Chowk, 2280m, **AP Das & PC Rai 0716**, dated 19.10.1994.

Status: Very common below *Rhododendron* zone.

Local Distrib.: Rechila Chowk, Below Jorpokhari, Right Hill patches of Alubari. 2200-3000 m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, S. E. Tibet, N. Myanmar, W. China.

CAPRIFOLIACEAE Juss.

Key to the Genera:

1. Leaves serrate or dentate; stem hollow; ovary 5-8 chambered.....*Leycesteria*
1. Leaves entire; stem solid; ovary 2-3 chambered.....*Lonicera*

LEYCESTERIA Wallich

Key to the species:

1. Leaves and stems densely clothed with white wool.....*L. stipulata*
1. Leaves and stems glabrous or sparsely hairy.....2
2. Lamina lanceolate, entire to sinuate-toothed; ovary 7-8 celled.....*L. gracilis*
2. Lamina broadly ovate-lanceolate, entire to dentate-serrate; ovary 5-celled
.....*L. formosa*

Leycesteria formosa Wallich in Roxb., Fl. Ind. ed. Carey 2:181. 1824; FBI 3: 16. 1880; FEH 1: 317. 1966; 2: 124. 1971; EFPN 2: 195. 1979; TBRI 50(4):118. 1987.

Local Name: Dhongray (Nep.)

Small shrub to 3m. Branches and semiscandant stems fistular. Leaves opposite, distichous; petioles 0.4-2 cm; lamina 3-9 x 1-3.3 cm, broadly ovate-lanceolate, entire to dentate-serrate, acute-acuminate, base rounded, glabrous, whitish beneath. Spikes small, pubescent; bracts cordate, leafy, purplish brown. Calyx 5-lobed, brown, persistent; petals upto 1 cm long, funnel-shaped, purplish-yellow; stamens 5; ovary brown; style slender, glabrous; ovules many. Berries subglobose and light red. (Plate IV: 40).

Flr.: May - Jun.

Frt.: Sep.- Nov.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0183, dated 15.6.1994.

Status: Common.

Local Distrib.: Jaributti, Alubari, Reshete. Thartharay. 1900-2400 m.

General Distrib.: Himalayas (Kashmir-Bhutan), India: Meghalaya, Khasia Hills; S.E. Tibet, N. Myanmar.

Leycesteria gracilis (Kurz) Airy Shaw in Hk., Icon. Pl. Ser. 5. 2:t. 3166. 1932; FEH 1:317. 1966; 2:124. 1971; EFPN 2:195. 1979.

Lonicera gracilis Kurz in Journ. Asia. Soc. Beng. 39 (2):77. 1870.

Leycesteria glaucophylla Hk. f. *sensu* FBI 3: 16. 1880, p.p.

Local Name: Dhongray (Nep.).

Slender shrub with flexous branches. Stem fistular. Leaves opposite; petiole upto 0.7 cm long; lamina 5-12 x 2-4 cm, lanceolate, entire to sinuate toothed, acuminate, base almost rounded, glabrous, whitish below, veins more prominent below, mid-vein sparsely hairy beneath. Spike axillary, drooping few flowered, 3 cm long. Bracts shorter, ovate-subulate, brown. Flowers 1cm long; pedicellate; calyx unequally 5-lobed, 0.3 cm long; persistent; corolla infundibuliform extending upto 1.4 cm, limb 5-merous, white; stamens 5, inserted on the corolla-throat; ovary brown; style slender; ovules many, arranged in 2 rows in each chamber. Berry in groups of 6-12, dark red; seeds numerous, ellipsoidal and shining.

Flr.: Sep. - Dec.

Fr.: Feb. - Jun.

Specimen Cited: Rechila-Jorpokhari, 2490-3040 m, **AP Das & PC Rai** 0954, dated 27.10.1994; Jaributti-Rechila, 2160-2490 m, **AP Das & PC Rai** 1013, dated 23. 4. 1995.

Status: Common.

Local Distrib.: Jorpokhari, Rechila Chowk, Chitray, Below Tinsimana, PHE source. 2000-3000 m.

General Distrib.: E. Himalaya (Nepal-Bhutan), N. Myanmar, W. China.

Leycesteria stipulata (Hk. f. et Thoms.) Fritsch in Engl. Pfl.-fam. 4. 4: 169. 1891; FEH 1: 318. 1966; 2: 125. 1971; TBRI 50 (4):118. 1987.

Lonicera stipulata Hk. f. & Thoms. in Journ. Lin. Soc. 2:165. 1858.

Pentaptyxis stipulata (Hk. f. & Thoms.) Hk. f., FBI 3: 17. 1880.

Erect, small shrub with 5-20m long flexous or semiscandant branches. Leaves opposite, distichous; stipules large, leafy, orbicular; petiole upto 0.3 cm; lamina 4-9 x 1-3.5 cm, ovate-lanceolate, coriaceous, sinuate-toothed, caudate-acuminate, base rounded, coriaceous, glossy and glabrous above, densely wooly below, veins deeply impressed beneath. Peduncles upto 1 cm long, wooly. Bracts and bracteoles short, green, very stout. Flowers clustered in axillary spikes, upto 2 cm, wooly, white; calyx 5-cleft, lobes 0.5 cm, hairy, persistent; petals upto 2.2 cm, funnel shaped, limb 5-lobed, white, hairy; stamens 5, epipetalous; ovary 5 celled, green; style slender; stigma capitate; ovules numerous. Berries hairy; seeds many, ellipsoid.

Flr.: Apr. - May

Fr.: Jun. - Sep.

Specimen Cited: PHE Source-RechilaMiddle, 2155-2490 m, **AP Das & PC Rai** 1051, dated 26.4.1995; Jaributti-Alubari, 2195-2280 m, **AP Das & PC Rai** 073, dated 14.6.1994; Dhamdhamay Dara, 2520m, **AP Das & PC Rai** 0668, dated 18.10.1994

Status: Very Common.

Local Distrib.: Dhamdhamay Dara, Alubari, Jaributti, PHE Source. 1900-2500m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), N. Myanmar, W. China.

LONICERA L.

Key to the species:

1. Stems densely pilose; petiole upto 0.8cm long; calyx tube glabrate
.....*L. acuminata*
1. Stems glabrous when young; petiole upto 0.4cm long; calyx tube slightly hairy.....*L. glabrata*

Lonicera acuminata Wallich ex Roxb., Fl. Ind. ed. Carey, 2:176. 1824; FBI 3: 10. 1880; FEH 1: 318.1966; EFPN 2: 195. 1979.

Climbing shrub. Stem fistular, golden yellow, densely pilose, branches twining. Leaves opposite; petiole upto 0.8cm, yellowish, hairy; lamina 2-7.5 x 0.8-2.8 cm, cordate-oblong, entire, acuminate, coriaceous, brown and pilose on both sides, mid-rib thick and densely pilose, yellowish brown. Inflorescence terminal and axillary, few flowered. Peduncles 1 cm long. Flowers 1.7 cm long; calyx-tube 0.3 cm long, ovoid, glabrate, persistent, limbs 5, short, hairy; corolla yellow, upto 1.7 cm long, tubular, lobes hirsute in bud; stamens 5, inserted; ovaries 2-celled; style slender; ovules numerous in 2 rows in each cell. Berries 0.3-0.7 cm, globose, violet-black.

Flr.: Jun. - Jul.

Fr.: Aug. - Dec.

Specimen Cited: Jaributti-Alubari, 2195-2280m, AP Das & PC Rai 0146, dated 14.6.1994; Rechila Chowk, 2280m, AP Das & PC Rai 0266, dated 16.6.1994; Tinsimana, 2900m, AP Das & PC Rai 0762, dated 20.10.1994.

Status: Abundant.

Local Distrib.: Rechila Middle, Tinsimana, Jaributti, Reshete. 1900-2900 m.

General Distrib.: Temperate Himalayas, Myanmar, Malaysia, W. China.

Lonicera glabrata Wallich in Roxb., Fl. Ind. ed. Carey, 2: 175. 1824; FBI 3:10. 1880; FEH 1: 318. 1966; 2: 125. 1971; EFPN 2: 195. 1975. 1979; TBRI; 50(4):118. 1987.

Shrub, scandent to twining. Stem light red and glabrous when young. Leaves opposite; petiole upto 0.4 cm. ; lamina 3.5-7 x 1.7-4 cm, cordate, ovate-oblong, entire, acute, glabrous above, sparsely villous beneath, nerves pilose. Cymes axillary and terminal. Peduncle 0.4-1cm. Bracts lanceolate. Flowers sessile in close-set pairs, floral leaves gradually reduced in flowering shoot; calyx tube slightly hairy, unequally 5-lobed, teeth extending upto 0.5 cm, lanceolate; corolla 2-lipped, 1.1 cm, creamy white, glabrous. Berries globose, gray-black, crowned with calyx-teeth.

Flr.: Jul. - Sep. *Fr.:* Aug. - Oct.

Specimen Cited: Jaributti, 2195m, AP Das & PC Rai 0453, dated 15.10.1994; Chouda Feri, 2285m, AP Das & PC Rai 1269, dated 05.5.995.

Status: Common.

Local Distrib.: Reshete, Left Hill ridge of Helipad region, Chouda Feri, Chitray. 2100-2600 m.

General Distrib.: India: Temperate Himalayas, Assam, Manipur, Meghalaya; Myanmar, W. China.

RUBIACEAE Juss.

Key to the Genera:

1. Plants climbing.....2
1. Plants not climbing.....5
2. Twinners; leaves not dcabrid.....3
2. Scramblers; leaves scabrid.....4
3. Entire plant much foetid.....*Paederia*
3. Plants not foetid.....*Hedyotis*
4. Fruits drupaceous with fleshy pericarp.....*Rubia*
4. Fruits capsular.....*Galium*
5. Woody plants, herbs/shrubs/trees.....6
5. Herbaceous plants.....12
6. Flowers in compact globose heads with ovaries fused together.....*Morinda*
6. Flowers not in compact heads.....7
7. One sepal or one bract (of the inflorescence) generally petaloid.....8
7. Sepals or bracts never petaloid.....9
8. Plants epiphytic; bracts petaloid.....*Neohymenopogon*
8. Plants terrestrial; sepals petaloid.....*Mussaenda*
9. Fruits capsular.....11
9. Fruits berries or drupes.....10
10. Calyx truncate; trees.....*Canthium*
10. Calyx not truncate; small shrubs.....*Coffea*
11. Flowers in stout annulated spikes; ahuge epiphyte.....*Hymenodictyon*
11. Flowers in crowded spikes; a small shrub.....*Spermadictyon*
12. Herbs perennial with their bases on lower part of stem.....13
12. Herbs annual.....14
13. Ovules numerous in each cell.....*Ophiorrhiza*
13. Ovules solitary in each cell.....*Knoxia*
14. Ovules numerous in each cell.....15
14. Ovules solitary in each cell.....18
15. Minute delicate annuals with one whorl of leaves.....*Argostemma*
15. Larger annuals with many leaves in separate nodes.....16
16. Seeds angular; cymes laxly paniculate.....*Hedyotis*
16. Seeds globose.....17
17. Cymes large with numerous flowers.....*Mycetia*
17. Cymes very small with few flower.....*Neanotis*
18. Flowers in terminal cymes.....*Psychortia*
18. Flowers axillary.....*Borreria*

AGROSTEMMA Wallich.

Key to the species:

1. Herb upto 20cm with branched runners; lamina 3-5.5cm diam., orbicular, thinly pubescent; flowers 4-merous.....*A. sarmentosum*

1. Herbs upto 12cm; lamina upto 9cm long, lanceolate, glabrous; flowers pentamerous.....*A. verticillatum*

Argostemma sarmentosum Wallich in Roxb., Fl. Ind. ed. Carey, 2:324. 1824; FBI 3:42. 1880; FEH 1:307. 1966; EFPN 2:199. 1979; TBRI 50(4):106. 1987.

Small tender annual herb, upto 20cm, with branched runners. Leaves opposite, sometimes in whorls; lamina 3-5.5cm diam., orbicular, entire, thinly pubescent, membranous. Umbels simple, few to many flowered, terminal. Pedicels upto 1.3cm long. Flowers 4-merous; calyx pubescent, teeth 0.25-0.3cm, ovate; corolla to 1cm across, rotate, white, lobes upto 0.55cm, oblong; stamens 4. Capsules 2-celled, granular.

Flr.: Jun. - Aug. *Fr.:* Aug. - Oct.

Specimen Cited: Near Machuki, 1260m, **AP Das & PC Rai** 1420, dated 08.10.1995.

Status: Less Common.

Local Distrib.: Samsing, Phari, Gorubathan, Machuki, Sakam. 700-1800m.

General Distrib.: Himalayas (Mussoorie-Bhutan), Meghalaya, Myanmar.

Argostemma verticillatum Wallich in Roxb., Fl. Ind. ed. Carey, 2:325. 1824; FBI 3:43. 1880; FEH 1:307. 1966; EFPN 2:200. 1979; TBRI 50(4):106. 1987.

Minute delicate herb, annual, 6-12cm. Leaves sessile, whorled (4 in a whorl), lamina unequal, 3-9 x 1.2-2cm, lanceolate, long acuminate, base unequal, glabrous. Umbels upto 4.8cm long, terminal, sometimes branched. Flowers 0.75-1cm across, 5-merous; calyx 0.25-0.3cm, with acute teeth; petals to 1cm long, valvate, whitish; stamens 5, free; anthers linear, apiculate. Capsules 2-celled.

Flr.: Jun. - Aug. *Fr.:* Sep. - Oct.

Specimen Cited: Below Rechila Durpinay, 1920m, **AP Das & PC Rai** 1342, dated 06.5.1995.

Status: Sparse.

Local Distrib.: Pankhasari, Alubari. 1900-2300m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar, China.

BORRERIA *G.F.W. Mey*

Borreria latifolia Schumann in Mart., Fl. Braz. 6 (6):61. 1888; FEH 1:307. 1966; TBRI 50(4):107. 1987.

B. alata (Aubl.) DC., Prodr. 4:544. 1830; EFPN 2:200. 1979.

Spermococce alata Aubl., Hist. Pl. Guien. 1:60. T. 22. F. 7. 1775.

Local Name: Bakkhu Jhar (Nep.).

Perennial ramous herb with stout root-stock. Stem procumbent. Branches upto 40cm, quadrangular, glabrous; angles obscurely winged. Lamina 3-4.5 x 2-2.5cm, ovate, acuminate, entire. Stipules with long setae ca 0.3cm. Flowers crowded in dense fascicles, upto 0.35cm, purple-white; corolla tube short; styles bifid from the middle. Capsules 2, single seeded.

Flr.: Aug. - Oct. *Frt.*: Oct. - Dec.

Specimen Cited: Near Samsing, 700m, **AP Das & PC Rai** 1459, dated 12.11.1995; Asala Khola, 500m, **AP Das & PC Rai** 1529, dated 04.6.1996.

Status: Common weed.

Local Distrib.: Gorubathan, Samsing, Phari, Asala Khola, Machuki. Upto 1200m.

General Distrib.: Tropical America, naturalised in tropical and subtropical Asia. in tropical and subtropical Asia.

CANTHIUM Lamk.

Canthium dicoccum (Gaertn.) T. & B. in Cat. Hort. Bogor. 113. 1866; Fl. Asm. 3: 64. 1938; Fl. Jow. 1: 239. 1981; Fl. Meg. 2: 468. 1987; Nam. Chang. Flr. Pl. 97. 1987.

Psydrx dicoccus Gaertn., Fruct. t. 26. 1788.

Canthium didymum Roxb., Fl. Ind. 1: 535. 1832; FBI 3: 239. 1880; Man. Ind. Timb. 418. 1902; Ind. Trs. 385. 1906.

Trees or stout large evergreen shrubs, upto 20 m tall. Branches spreading and drooping. Bark vertically fissured, warty, dark gray to dark brown. Stipules cuspidate. Leaves bifarious, variable; petioles 0.8-1.25 cm; leaf lamina 6-16 x 3.1-5.8 cm, elliptic or ovate-lanceolate, acuminate, base rounded or cuneate, glabrous, coriaceous, glossy. Flowers pentamerous, 0.75-1 cm long, white, fragrant; calyx truncate or obscurely toothed; corolla-tube campanulate, lobes lanceolate, rotate, reflexed; stamens emerging on corolla mouth; stigma filiform. Fruits 0.9-1.4 cm across, globose, black or purple.

Flr. & Frt.: May - Dec.

Specimen Cited: Above Samsing at Asola Khola, 740 m, **AP Das & PC Rai**, 1562 dated 06.6.1996.

Status: Less Frequent.

Local Distrib.: Phari, Samsing, Asala Khola, Machuki. 400-1200m.

General Distrib.: Himalayas (Sikkim, Darjeeling, Khasia Hills), Western Peninsula, Sri Lanka and S. China.

COFFEA L.

Coffea bengalensis Roxb., Fl. Ind. 1: 540. 1820; FBI 3: 153. 1880; Man. Ind. Timb. 422. 1902; Ind. Trs. 390. 1906; Fl. Asm. 3:75. 1939; FEH 1:308. 1966; Fl. Meg. 2: 471. 1987.

Local Name: Kafi (Nep.).

A deciduous shrub upto 5 m tall. Branches spreading, sub-scandent. Bark dark brown. Stipules stiff, subulate, persistent. Leaves variable; petioles upto 3.7 cm long; leaf lamina 6-15 x 2-6 cm, elliptic or oblong-lanceolate to ovate-lanceolate, entire, caudate-acuminate, base rounded to acute, glabrous except nerves beneath, dull green. Flowers usually at the end of small branchlets, 2-2.5 cm long, showy, whitish and fragrant; calyx truncate with minute teeth; corolla salver-shaped, tube short and twisted in bud; anthers dorsifixed, apiculate. Drupe ovoid or subglobose, blackish at ripening; seeds grooved.

Flr. & Frt.: Feb. - Nov.

Specimen Cited: Phari, 950 m, **AP Das & PC Rai** 1437, dated 08.10.1995.

Status: Less Frequent.

Local Distrib.: Samsing, Phari. 600-1000m.

General Distrib.: Subtropical Himalayas (Kumaon-Bhutan), Assam, Bengal, Myanmar.

GALIUM L.

Key to the species:

1. Leaves 6 or 3-6 in each whorls.....2
1. Leaves 4 in each whorls.....3
2. Lamina margin recurved; corolla lobes lanceolate.....*G. acutum*
2. Lamina margin not recurved; corolla lobes ovate.....*G. asperifolium*
3. Stem scabrid; lamina ovate-round; corolla white.....*G. elegans*
3. Stem not scabrid; lamina linear; corolla greenish white.....*G. hirtiflorum*

Galium acutum Edgew. in Trans. Linn. Soc. 20.61.1846; FBI 3:208. 1881; FEH 1:308. 1966; EFPN 2:200. 1979.

G. himalayense Koltzsch in Bot. Erg. Reis. Pr. Waldem. 88, t. 73. 1862

Small decumbent or subseect herb, glabrous with short internodes. Leaves 6 in each whorl, sessile, 0.3-1 x 0.1-0.2 cm, elliptic-lanceolate, entire and slightly recurved, acute, base narrow pointed, mid nerve strong beneath, veins obscure. Peduncle shorter than leaves. Calyx tube small; petals 4-lobed, segment 0.1-0.12 cm, lanceolate, acuminate; stamens 4; filaments short; stigma 2, capitate. Fruit small, black glabrous.

Flr.: Jun. - Oct. *Frt.:* Sep. - Dec.

Specimen Cited: Tinsimana-Jorhphokhari, 2900-3040 m, **AP Das & PC Rai** 0766, dated 21.10.1994.

Status: Common.

Local Distrib.: Jorpokhari, Chitray, Alubari, Tinsimana, Dhamdhamay Dara. 2200-3050m.

General Distrib.: Himalayas (Kumaon-Bhutan), S. Tibet.

Galium asperifolium Wallich ex Roxb., Fl. Ind. 1: 391. 1820; FEH 1: 308. 1966; EFPN 2: 201. 1979; FPK 43. 1981; TBRI 50(4):114.1987.

G. mollugo L. sensu FBI 3: 207. 1881. var *sikkimense* (Gandoger) Cufodontis in Oesterr. B. Zeits. 89: 241. 1940.

G. sikkimense Gandoger in Bull. Soc. Fran. 66: 307. 1920.

Highly variable, perennial scandent herb. Stem much shortly branched, slightly scabrid, filiform. Leaves in whorls of 3-6, sessile to minutely stalked; lamina 0.4-1 x 0.15-0.3cm, linear or narrowly linear-obovate, entire, acute or obtuse, glabrous to slightly scabrid both surfaces, mid-vein strong beneath, nervules obscure. Cymes axillary and terminal, many flowered, divaricately branched. Pedicels recurved in fruits. Corolla white, minute and lobed with ovate segments. Fruit small, granulated, black.

Flr.: Jun. - Sep.

Fr.: Oct. - Dec.

Specimen Cited: Rechila Chowk, 2280m, AP Das & PC Rai 082, dated 14.6.1994.

Status: Very Common.

Local Distrib.: Jaributti, Rechila Chowk, Pankhasari, Chouda Feri, Chitray. 1900-2600m.

General Distrib.: Himalayas (Punjab-Bhutan), Sri Lanka, Myanmar, W. and C. China.

Galium elegans Wallich ex Roxb., Fl. Ind. 1: 382. 1820; FEH 1: 308. 1966; FPK 43. 1981; TBRI 50(4):114. 1987.

G. rotundifolium L. sensu FBI 3:204. 1881.

Small trailing diffuse herb. Stem scabrid, usually unbranched or less branched, white pubescent. Leaves in whorl of 4, sessile or sub sessile to 0.15cm; lamina 0.9-1.6 x 0.5-1 cm, ovate to almost rounded, entire, acute or mucronate, base broad rounded or narrow, hirsute and scabrid both sides, basally 3-nerved, convergent, pubescent. Cymes slightly longer than leaves and with divaricate branching corolla, white, small. Fruits with adpressed hooked hairs.

Flr.: Jun. - Aug.

Fr.: Jul. - Dec.

Specimen Cited: Rechila Chowk, 2280m, AP Das & PC Rai 038, dated 13.6. 1994; Zero Point, 2150m, AP Das & PC Rai 0307, dated 18.6.1994.

Status: Abundant.

Local Distrib.: Middle Rechila Chowk, Alubari, Jaributti, Thosum Hill, Ruka Forest. 2100-2850m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Assam, Myanmar, Thailand, China.

Galium hirtiflorum Requin ex DC., Prodr. 4: 600. 1830; FBI 3:206. 1881; FEH 1:309. 1966; EFPN2:201. 1979; TBRI 50(4):114. 1987.

Similar to *G. asperifolium* but stem being scandent but not scabrid and filiform; leaves in a whorl of 4; lamina upto 2.5 x 0.5 cm, linear, recurved, subacute. Cymes to 3 cm, horizontal; petals ovate, ciliate, greenish white; fruits to 0.2-0.25 cm across, pubescent with hooked hairs.

Flr.: Jun. - Sep. *Fr.*: Sep. - Dec.

Specimen Cited: Near Sakam, 1600m, **AP Das & PC Rai** 1867, dated 20.10.1997.

Status: Rare

Local Distrib.: Lava, Sakam, Rechila Park. 1600-2300m.

General Distrib.: Himalayas (Kumaon-Bhutan), S.Tibet.

HEDYOTIS L.

Key to the species:

1. Plants slender climber.....*H. scandens*
1. Erect diffuse or straggling herbs.....2
2. Branches rooting at nodes; stipules lacinate with minute teeth; leaves petiolate, lamina ovate.....*H. stipulata*
2. Branches not rooting; stipules irregularly lobed; leaves sessile, lamina elliptic-lanceolate.....*H. corymbosa*

Hedyotis corymbosa (L.) Lamk., Tab. Encyclo. Meth. 1:272. 1791; FEH 1:309. 1966; EFPN 2:202. 1979.

Oldenlandia corymbosa L., Sp. Pl. ed. 1 (1):119. 1753; FBI 3:64. 1880.

Small straggling or erect annual herb, to 30cm high. Stem 4-angled, scaberulous. Leaves opposite, sessile; lamina 2.2-4.2 x 0.4-0.6cm, elliptic-lanceolate, entire, contorted, acuminate. Stipules upto 0.25cm long, membranous, irregularly lobed. Peduncles upto 13cm long, solitary, 4-flowered. Calyx tube 0.15-0.2cm, with subulate 4 teeth; corolla funnel-shaped, whitish, tube to 0.25cm, lobes valvate and erect. Capsules 0.4-0.5cm.

Flr.: Jun. - Aug. *Fr.*: Aug. - Nov.

Specimen Cited: Suntalay, 500m, **AP Das & PC Rai** 1578, dated 07.6.1996.

Status: Common weed in open places.

Local Distrib.: Samsing, Phari, Suntalay, Gorubathan. 500-1050m.

General Distrib.: Himalayas, India, Sri Lanka, Tropical Asia, Africa, America.

Hedyotis scandens Roxb., Fl. Ind. 1:361. 1820; Prodr. Fl. Nep. 134. 1825; FBI 3:57. 1880; FEH 1:310. 1966; 2:123. 1971; EFPN 2:202. 1979; TBRI 50 (4):116. 1987.

Oldenlandia scandens (Roxb.) O. Kuntze, Rev. Gen. Pl. 293. 1891.

Local Name: Bokri Lahara (Nep.).

Slender climber with branched and puberulous stem. Leaves opposite; lamina 5.5-10.5 x 2.5-3cm, elliptic-lanceolate, acute to acuminate, glabrous, pale beneath. Stipules ciliolate. Cymes terminal and puberulous. Calyx tube swollen above, lobes 4, to 0.15cm, ovate, acute; corolla 4-lobed, whitish, lobes 0.45-0.5cm, oblong, slightly recurved; filaments pubescent. Capsule 0.35-0.45cm, globose, enclosed within persistent calyx; seeds numerous.

Flr.: Sep. - Dec. *Fr.*: Dec. - Mar.

Specimen Cited: Near Phari, 900m, AP Das & PC Rai 1613, dated 07.6.1996.

Status: Abundant.

Local Distrib.: Samsing, Phari, Machuki, Suntalay. 600-2000m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Myanmar, China.

Hedyotis stipulata R. Br. ex Hk. f. in FBI 3: 63. 1880; FPK 44. 1981; TBRI 50 (4): 116. 1987.

Local Name: Guyelo (Nep.).

Diffuse small hairy herb with decumbent branches, rooting from nodes. Stipules upto 0.4 cm long, externally long-bristled, membranous, lacinate with 0.2-0.3 cm long teeth. Petioles 0.15-0.45 cm long, pubescent; lamina 0.6-1.8 x 0.4-1.2 cm, ovate, entire, acute, base rounded, membranous, white pubescent both sides, mid-vein prominent beneath, nervules obscure. Cymes capitate, 0.65-0.9 cm across, sessile. Calyx persistent, teeth lanceolate; corolla lobes nearly oblong, white, glabrous. Fruits globose, indehiscent.

Flr. & Fr.: Aug. - Oct.

Specimen Cited: Alubari Belt, 2280-2424 m, AP Das & PC Rai 0574, dated 16.10.1994.

Status: Less Common.

Local Distrib.: Pankhasari, Sakam Forest, Rechila Middle, Machuki. 1400-2450m.

General Distrib.: Himalayas, Meghalaya, Java, Japan.

HYMENODICTYON Wallich

Hymenodictyon flaccidum Wallich in Roxb., Fl. Ind. ed. Carey, 2:152. 1824; FBI 3:36. 1880; FEH 1:310. 1966; EFPN 2:203. 1979; FPK 44. 1981; TBRI 50(4):116. 1987.

Large epiphytic much branched, deciduous shrubs to rarely tree, sending roots down to soil. Branches pendulous. Petioles 4-9.5cm long; lamina 9-15.5 x 6-9.5cm, obovate-elliptic, entire, suddenly acuminate, base narrowed into the petiole, pubescent beneath. Stipules broadly ovate, serrate, glandular, early deciduous. Racemes upto 24cm, dense flowered. Bracts ovate. Flowers minute, subsessile, whitish; calyx 0.25-0.3cm, cup-shaped; corolla 0.5-0.6cm, whitish; style exerted. Capsule upto 1.8cm, reflexed; seeds winged.

Flr.: Jun. - Aug. *Fr.*: Nov. - Feb.

Specimen Cited: Reshete, 2200m, AP Das & PC Rai 1335, dated 06.5.1995.

Status: Rare.

Local Distrib.: Lava, Rechila Durpinay, Reshete, Jaributti. 1800-2300m.

General Distrib.: Himalayas (Garhwal-Bhutan), Meghalaya, W. China.

***KNOXIA* L.**

Knoxia corymbosa Willd., Sp. Pl. 1:582. 1799; FBI 3:128. 1880; FEH 1:311. 1966; EFPN 2:203. 1979; TBRI 50(4):117. 1987.

Villous, slender annual herb, upto 1m, often suffruticose. Stem obscurely quadrangular, villous. Lamina 6-13 x 1.5-3.5cm, lanceolate, entire, acuminate, pubescent. Stipules hairy bristly. Cymes trichotomous. Flowers dimorphous, small, white; calyx toothed, teeth minute, triangular; corolla 0.25-0.3cm, hairy, whitish, inside violet. Fruit upto 0.15cm across, 4-angled.

Flr.: Aug. - Oct. *Fr.*: Oct. - Dec.

Specimen Cited: Phari, 900m, AP Das & PC Rai 1434, dated 08.10.1995.

Status : Abundant at placea.

Local Distrib.: Gorubathan, Machuki, Phari, Samsing. 600-1200m.

General Distrib.: Himalayas (Garhwal-Sikkim), Tropical India to China, Malaysia, Tropical America.

***MORINDA* L.**

Morinda angustifolia Roxb. Pl. Corom. 3 (2): t. 237. 1815; FBI 3: 156. 1880; Man. Ind. Timb. 422. 1902; Ind. Trs. 392. 1906; Fl. Asm. 3: 79. 1939; FEH 1: 312. 1966. Fl. Jow. 1:238. 1981.

A large shrub upto 10 m high. Bark grayish to reddish-brown, often peeling off into thin papery flakes. Stipules acute. Petioles 0.55-3.5 cm, highly variable in size, 6-25 x 2-9 cm, oblanceolate, oblong-elliptic or narrow-lanceolate, entire, long acuminate, base upper side becoming glabrescent with age, nerves much prominent beneath, lateral nerves 10-15 on each side, looped. Heads pedunculate, globose. Flowers 2-3 cm long, usually pentamerous, fragrant, whitish; calyx obscurely toothed or truncate; corolla salver-shaped, tube being 2.5 cm long. Drupes 0.2 - 0.3 cm across, turbinate, white.

Flr.: Feb. - May *Fr.*: Jun. - Sep.

Specimen Cited: Samsing, 700 m, AP Das & PC Rai 1729, dated 17.5.1997.

Status : Less Frequent.

Local Distrib.:Suntalay, Phari, Samsing. 500-950m.

General Distrib: Himalayas (Nepal-Bhutan), Myanmar, Meghalaya.

MUSSAENDA L.

Key to the species:

1. Branches straggling; lamina elliptic or oblong-lanceolate, pubescent beneath, acuminate; stipules recurved.....*M. macrophylla*
1. Branches not straggling; lamina elliptic-ovate, hairy both sides, acute; stipules not recurved.....*M. treutleri*

Mussaenda macrophylla Wallich in Roxb., Fl. Ind. 2:228. 1824; FBI 3:89. 1880; Man. Ind. Timb. 410. 1902; Ind. Trees 376. 1906; Fl. Asm. 3:45. 1939; EFPN 2:205. 1979; Fl. Jow. 1:237. 1981; TBRI 50(4):120. 1987; Fl. Meg. 2:590. 1987.

M. hispida D. Don, Prodr. Fl. Nep. 139. 1825.

Local Name: Dhobini Phul, Shitalu (Nep.).

Sub-scandent or erect shrub, 2-4m high. Branches straggling, hirsute or villous. Petioles 1-3cm long. Leaves 8-18 x 3-11cm, elliptic or oblong-lanceolate, entire, acuminate, base cuneate, pubescent beneath, lateral nerves 7-10 pairs, subparallel. Stipules ovate, bifid, recurved. Cymes trichotomous. Bracts foliaceous, laciniate. Flowers 2.5-3.5cm long; calyx 5-lobed, lobes foliaceous, petaloid, lobes 6-10 x 2.5-6cm, ovate; corolla tube 2-2.5cm long, orange yellow, hirsute, throat villous with 5 orbicular lobes; stamens 5, included at the throat; ovary 2-chambered; stigmas 2, linear. Berries globose, hairy; seeds minute.

Flr.: Jun. - Nov. *Fr.:* Oct. - Jan.

Specimen Cited: Near Sakam, 1600m, AP Das & PC Rai 1861, dated 20.10.1997.

Status: Less Frequent.

Local Distrib.: Machuki, Sakam, Zero Point. 1400-2000m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Myanmar, W. China.

Mussaenda treutleri Stapf in Bot. Mag. 135:t. 8254. 1909; FEH 1:312. 1966; EFPN 2:205. 1979; TBRI 50(4):120. 1987.

M. frondosa L. var. *grandiflora* Hk. f., FBI 3:90. 1980.

Local Name: Dhobini Kaath (Nep.).

2-3m high shrub with hirsute branches. Petioles upto 4.2cm long. Leaves 9-16 x 5.5-9.5cm, elliptic-ovate, entire, acute, base cuneate, hairy on both sides. Stipules bifid. Corymbs usually at the axils of uppermost leaf or often terminal, many flowered. Calyx teeth 0.75-1.5cm, herbaceous, linear-subulate, herbaceous, enlarged segment 10-12 x 5-6cm, bright white; corolla 2.5-3.5cm, orange yellow, pubescent within, lobes upto 1cm long, triangular. Berry 0.65-0.8cm, globose, glabrescent. (Plate III: 29).

Flr.: Jun. - Aug. *Fr.:* Sep. - Oct.

Specimen Cited: Near Jaributti, 2100m, **AP Das & PC Rai** 0450, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Lava, Kolbong, Chouda Feri, Machuki, Sakam. 1200-2300m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya.

MYCETIA Reinw.

Mycetia longifolia (Wallich) O. Kuntze, Rev. gen. 289. 1891; Fl. Asm. 3:49. 1939; FEH 1:312. 1966; EFPN 2:205. 1979; TBRI 50 (4):120. 1987; Fl. Meg. 2:491. 1987.

Rondeletia longifolia Wallich in Oxb., Fl. Ind. 2:137. 1824.

Adenosacme longifolia Wallich ex Hk. f., FBI 3:95. 1880; Man. Ind. Timb. 410. 1902; Ind. Trees 377. 1906.

Undershrub or shrubs, to 3m high; bark shining grey-yellow, smooth. Young parts pubescent. Petioles upto 2.5cm long; lamina 8-26 x 3-8cm, elliptic or elliptic-lanceolate, entire, long acuminate, base narrowed to the petiole, sparsely hairy both sides. Stipules oblong-lanceolate, 2-fid. Cymes 12-18cm across, subterminal. Flowers 0.4-0.65cm across, yellowish; calyx tube 0.3-0.35cm, lobes 0.3-0.35cm, subulate, foliaceous; corolla fleshy, lobes ovate; stamens 4-6. Berry 0.65-0.75cm, globose, white on ripening, spongy and with persistent calyx.

Flr.: May - Jul. *Frt.:* Nov. - Jan.

Specimen Cited: Phari, 850m, **AP Das & PC Rai** 1435, dated 08.10.1995.

Status: Frequent.

Local Distrib.: Samsing, Phari, Suntalay, Gorubathan. 600-1400m.

General Distrib.: Himalayas (Kumaon-Sikkim), Meghalaya, Assam, North Bengal, Malaysia

NEANOTIS W.H. Lewis

Key to the species:

1. Stipules deeply toothed; branches not rooting.....*N. wightiana*
1. Stipules not toothed; branches rooting at nodes.....2
2. Plant foetid; lamina glabrous; nerves puberulous; capsule 0.35-0.45cm across.....*N. ingrata*
2. Plant not foetid; lamina thin hairy; nerves glabrous; capsule upto 0.3cm long.....*N. gracilis*

Neanotis gracilis (Hk. f.) W. H. Lewis in Ann. Miss. Bot. Gard. 53:38. 1966; FEH 1:313. 1966; EFPN 2:205. 1979; TBRI 50(4):120. 1987.

Hedyotis wightiana Wallich ex Wight et Arnt., Prodr. Fl. Ind. Or. 410. 1834.

Anotis wightiana Wallich ex Hk. f., FBI 3:65. 1880.

Small diffuse herbs, perennial. Branches slender, prostrate, rooting at nodes. Lamina 2-4 x 1-2cm, ovate, entire, acuminate, membranous, thinly hairy, paler beneath. Cymes upto 7.5cm long, axillary and terminal, dichotomously forked. Heads 0.55-0.65cm across. Flowers clustered; sepals 0.25-0.3cm, lobes lanceolate; corolla slightly longer than sepals, tube broader, with obtuse lobes, white, glabrous. Capsule 0.25-0.3cm, laterally compressed.

Flr.: Jul. - Dec. *Fr.*: Oct. - Jan.

Specimen Cited: Below Jaributti, 1800m, **AP Das & PC Rai** 0100, dated 14.6.1994.

Status: Very Common.

Local Distrib.: Chouda Feri, Zero Point, Machuki, Sakam. 1500-2200m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya.

Neanotis ingrata (Wallich ex Hk. f.) W.H. Lewis in Ann. Miss. Bot. Gard. 53:39. 1966; FEH 1:313. 1966; EFPN 2:205. 1979; TBRI 50(4):120. 1987.

Anotis ingrata Wallich ex Hk. f., FBI 3:71. 1880.

Diffuse perennial, straggling herb with a small rigid root-stock, foetid, 40-70cm. Stem hairy, rooting at nodes. Lamina 3.5-6 x 1-1.5cm, ovate-lanceolate, inconspicuously crenate-serrate or entire, acuminate, nerves puberulous. Stipules 0.65-0.8cm, with many hairy bristles. Cymes terminal and subterminal. Flowers subsessile, crowded in cymes; sepals 4, upto 0.3cm long; corolla 0.35-0.45cm, white, lobes oblong. Capsule 0.35-0.45cm across, hemispheric, didymous; seeds many.

Specimen Cited: Below PHE Source, 1750m, **AP Das & PC Rai** 0472, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Machuki, Sakam, Chonkophhir, Kuwapaani. 1400-2100m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Meghalaya, S. Tibet, W. China.

Neanotis wightiana (Wallich ex Wight et Arnt.) W. H. Lewis in Ann. Miss. Bot. Gard. 53:40. 1966; FEH 1:313. 1966; EFPN 2:205. 1979; TBRI 50(4):12. 1987.

Hedyotis wightiana Wallich ex Wight et Arnt., Prodr. Fl. Ind. Or. 410. 1834.

Anotis wightiana Wallich ex Hk. f., FBI 3:65. 1880.

Small perennial diffuse herb, 20-40cm, tomentose. Branches prostrate or decumbent. Leaves sessile to subsessile; lamina 4-7 x 1.5-2cm, ovate, entire, acute, both surfaces pubescent. Stipules deeply toothed. Cymes terminal and axillary, capitate, involucrate. Heads 0.7-1cm across, capitate, few flowered. Flowers minute, white; calyx 0.2-0.3cm, lobes subulate; corolla longer than sepals, upto 0.4cm, bluish-purple to white. Capsule upto 0.5cm, orbicular, flattened; seeds rugose.

Flr.: May - Aug. *Fr.*: Aug. - Oct.

Specimen Cited: Rechila Park, 2200m, **AP Das & PC Rai** 0255 dated 16.6.1994.

Status: Frequent.

Local Distrib.: Chouda Feri, Reshete, Jaributti, Rechila Park, Jaributti. 1400-2300m.

General Distrib.: Himalayas (Nepal-Sikkim), India, Myanmar.

NEOHYMENOPOGON Bennet

Neohymenopogon parasiticus (Wallich) Benn. in IF 107: 436. 1981; Nam. Chang. Flr. Pl. 388. 1987.

Hymenopogon parasiticus Wallich in Roxb., Fl. Ind. 2: 157. 1824; Trs. N. Beng. 76. 1929; FBI 3:34. 1880; EFPN 2: 203. 1979; FPK 44. 1981.

Local Name: Lekh Biri (Nep.).

Deciduous small epiphytic shrub. Stipules persistent. Petioles upto 1 cm long; lamina 7.5-28 x 3-11 cm, oblanceolate, entire, ciliate, acute-acuminate, cuneate, both sides thinly hairy, lateral nerves upto 17 pairs, pubescent. Bracts narrow-oblanceolate, stalked, white, pinnately veined, petaloid, thinly pubescent. Pedicel long, short-hairy. Flowers in trichotomous cymes; calyx-lobes upto 1.1 cm, linear. Corolla tube long, slender, lobes 5, spreading, hairy. Capsule 1.3-1.7 cm, turbinate-cylindrical, with persistent sepals; seeds numerous. (Plate III: 30).

Flr.: Jun. - Aug. *Fr.:* Oct. - Jan.

Specimen Cited: Neora River Bank, 2280m, AP Das & PC Rai 0242, dated 16.6.1994; Alubari Belt, 2280-2424m, AP Das & PC Rai 0576, dated 16.10.1994.

Status: Common.

Specimen Cited: Alubari, Pankhasari, Chitray, Neora River Bank, Thosum Beat. 2100-2800m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar, China.

OPHIORRHIZA L.

Key to the species:

1. Perennial stout herbs; root-stock woody; bracteoles linear*O. treutleri*
1. Perennial suffrutescent herb; root-stock prostrate; bracteoles filiform.....2
2. Branches waxy green when young; lamina upto 10.5cm long, elliptic-lanceolate.....3
2. Branches reddish brown when young; lamina upto 6.7cm long, ovate-lanceolate.....*O. rugosa*
3. Cymes 1.5-2cm across; older stem prostrate and rooting below.....*O. thomsonii*
3. Cymes 2.5-3cm across, flat-topped; stem erect and not rooting.....*O. succirubra*

Ophiorrhiza rugosa Wallich in Roxb., Fl. Ind. 2:547. 1824; EFPN 2:206. 1979; TBRI 50(4):121.1987.

O. prostrata D. Don, Prodr. Fl. Nep. 136. 1825; FEH 1:314. 1966; 2:124.1971.

O. harrisiiana Heyne var. *rugosa* Wallich Hk. f., FBI 3:78. 1880.

Perennial, suffrutescent herb. Stem less branched, basally prostrate. Branches slender, reddish-brown when young. Leaves in unequal pairs; petioles 0.4-1.3cm; lamina 2.5-6.7 x 0.9-2.4 cm, ovate-lanceolate, entire, acuminate, base narrowed, glabrous to sparsely pubescent above, glabrous beneath, nerves shortly hairy. Cymes 4-7 flowered, pubescent. Peduncles 2-2.8cm, densely hairy. Bracteoles filiform, caducous. Pedicels 0.15-2 cm. Calyx teeth linear-subulate. Corolla tube 0.7-1.2 cm, tubular, creamy-white, short-haired. Fruit not collected.

Flr.: Jun. - Jul.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 008, dated 13.6.1994.

Status: Common.

Local Distrib.: Rechila Durpinay, Alubari, Reshete, Sakam Forest, PHE Source. 1600-2300m.

General Distrib.: Himalayas (Nepal-Bhutan), India, Sri Lanka, China, Malaysia.

Ophiorrhiza succirubra King ex Hk. f., FBI 3:82. 1882; FEH 1:314. 1966; EFPN 2:206. 1979; FPK 46. 1981; TBRI 50(4):121. 1987.

Perennial herb. Branches erect, glabrous. Root-stock woody and stout. Stem waxy green when young. Leaves opposite, unequal; stipules lanceolate; petiole 0.35-2 cm, almost glabrous; lamina 4.3-10.5 x 1.9-5 cm, elliptic-lanceolate, entire, acuminate, base cuneate, with scattered short hairs, greenish above, glabrous and red-purple beneath. Bract linear-lanceolate. Cymes 2.5-3 cm, flat-topped. Peduncle short, red-purple. Calyx tube broader, teeth triangular, obtuse; corolla 0.5-0.7 cm, glabrous, lobes short, glabrous. Capsule 0.5-0.7 x 0.25-0.3 cm, shortly hairy.

Flr.: May - Jun.

Frt.: Jul. - Sep.

Specimen Cited: Choudha Feri, 2285m, AP Das & PC Rai 034, dated 14.10.1995.

Status: Common.

Local Distrib.: Middle Rechila Chowk, Chouda Feri, Zero Point, Jaributti. 1850-2350m.

General Distrib.: Himalayas (Nepal-Bhutan).

Ophiorrhiza thomsonii Hk. f., FBI 3:82. 1880; FEH 1:314. 1966; TBRI 50(4):121. 1987.

Perennial herb, 15-30 cm. Older stem prostrate, pubescent and rooting below. Stipules filiform. Lamina 5-10 x 2.5-5 cm, elliptic-ovate, acute, entire, pubescent beneath. Cymes 1.5-2 cm across, both axillary and terminal. Bracteoles subpersistent, linear, glabrous. Calyx to 0.35 cm, with subulate lobes, corolla to 1 cm, infundibular, whitish, lobes ovate. Capsule 0.35-0.45 cm across, glabrous.

Flr.: Jul. - Sep.

Frt.: Aug. - Oct.

Specimen Cited: Jaributti, 2195m, AP Das & PC Rai 0422, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Alubari, Reshete, Sakam, Pankhasari. 1700-2300 m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan).

Ophiorrhiza treutleri Hk. f, FBI 3:83.1880; FEH 1:314. 1966; EFPN 2:206. 1979; TBRI 50(4):121. 1987.

Perennial stout pubescent herb, upto 30cm high, with woody base. Lamina 5-9.5 x 3.5-5cm, ovate-elliptic, entire, acuminate, base cuneate, pubescent on both surfaces. Stipules bifid, persistent. Cymes many flowered. Peduncles slender, drooping, whitish. Bracteoles to 1cm, linear. Calyx 0.25-0.3cm, with subulate lobes; corolla tube 1cm, infundibular, pink, with spreading lobes. Capsules 0.45-0.5cm across, pubescent.

Flr.: Aug. - Sep. *Fr.:* Sep. - Nov.

Specimen Cited: Near Reshete, 2240m, **AP Das & PC Rai** 1318, dated 06.5.1995.

Status: Less Common.

Local Distrib.: Reshete, Pankhasari, Sakam. 1600-2250m.

General Distrib.: Himalayas (Nepal-Sikkim), Meghalaya.

PAEDERIA L.

Paederia foetida L., Mant. Pl. 1: 52. 1767; Fl. Ind. 2:517. 1824; FBI 3:195. 1881; FEH 1:314. 1966; EFPN 2:206. 1979; TBRI 50(4):121. 1987.

Slender shrubby twinner, foetid. Leaves opposite, 7-11.5 x 3-4.5 cm, ovate-lanceolate, entire, acuminate, hairy on the axils of nerves. Panicles terminal or axillary, oppositely branched. Calyx tube to 0.3cm, campanulate, teeth triangular; corolla to 1.5-2 cm, infundibular, grey purple with red tinges, hairy within. Fruits 0.7-0.8 cm, ellipsoid, compressed; pyrenes distinctly separating from carpophore.

Flr.: Jul. - Oct. *Fr.:* Nov. - Jan.

Specimen Cited: Samsing, 600m, **AP Das & PC Rai** 1870, dated 24.10.1997.

Status: Common on low altitue bushes.

Local Distrib.: Phari, Samsing, Gorubathan, Suntalay. 500-1300m.

General Distrib.: Himalaya, C. and E. India-China and Malaysia.

Note: An important medicinal plant.

PSYCHORTIA L.

Psychortia erratica Hk. f., FBI 3:168. 1880; Man. Ind. Timb. 424. 1902; Ind. Trees 395. 1906; Trs. N. Beng. 79. 1929; FEH 1:315. 1966; EFPN 2:206. 1979; Fl. Jow. 1:241. 1981; TBRI 50(4):124. 1987; Fl. Meg. 2:499. 1987.

Evergreen bushy shrub upto 3.5 m high. Bark greyish or pale brown. Petioles upto 1.6 cm long; lamina 9-16 x 2-5.5cm, elliptic-lanceolate, oblanceolate, entire, acuminate, base cuneate, narrowing to the petiole, glabrous both sides. Cymes upto 7 cm long, 2-3cm diam., terminal, trichotomous. Flowers 0.3-0.35cm across, white or greenish-white; calyx 0.25-0.3 cm, lobes acute, glandular; corolla tube to 0.3cm, lobes just half the length of tube. Fruit 0.05-0.8 cm diam., globose, red to reddish-yellow.

Flr.: May - Aug. *Fr.:* Oct. - Jan.

Specimen Cited: Near Phari, 950m, AP Das & PC Rai 1436, dated 08.10.1995.

Status: Less Common

Local Distrib.: Sakam, Machuki, Phari, Zero point. 700-1950m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Meghalaya.

RUBIA L.

Key to the species:

1. Leaves sessile; lamina linear, sparingly scabrid.....*R. charaefolia*
1. Leaves petiolate; lamina ovate, scabrid.....2
2. Lamina 2-6 x 1.2-2.8cm long, scabrid; corolla rust-coloured; berries black purple.....*R. manjith*
2. Lamina comparatively larger and broader than above, much scabris sticky; corolla greenish white; berries deep black.....*R. wallichiana*

Rubia charaefolia Wallich ex G. Don, Gen. Hist. 3:643. 1834; FEH 1:315. 1966; EFPN 2: 207. 1979; TBRI 50 (4):101. 1987.

R. angustissima Wallich, *sensu* FBI 3: 203. 1881, p.p.

Highly branched scandent climber with perennial root-stock. Stems ribbed, scabrid. Leaves sessile, in whorls of 4-8; lamina 5-9 x 1.5-2cm, linear, keeled, sparingly scabrid. Cymes 3-4 flowered, on 2cm long peduncles. Calyx to 0.1cm; corolla lobes 0.2-0.3cm, ovate, acute. Fruits 0.5-0.6cm across, globose, didymous. (**Plate III: 28, Plate XIV**).

Flr.: Sep. - Oct. *Fr.:* Oct. - Mar.

Specimen Cited: Above Samsing, 980m, AP Das & PC Rai 1875, dated 24.10.1997.

Status: Frequent in lower belt of the valley.

Local Distrib.: Phari, Machuki, Sakam, Kuwapaani. 900-1500m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Rubia manjith Roxb. ex Flem. in Asia Res. 11: 177. 1810; FEH 1:315. 1966; EFPN 2: 207. 1979; TBRI 50(4):125. 1987.

R. cordifolia L. *sensu* Hk. f., FBI 3: 202. 1881, p.p.; Trs. N. Beng. 79. 1929.

Local Name: Majito (Nep.).

Perennial climber with herbaceous annual branches. Stem quadrangular, slender, lower old part armed with fine deflexed prickly-bristles on angles, nodes slightly swollen; stipules normal-leafy. Leaves whorled, usually 4 in a whorl (includes 2-stipules); petioles unequal, 0.5-6.3cm, lower minutely spiny; lamina very variable, 2.0-6.3 x 1.2-2.8 cm, ovate, entire, long-pointed, base cordate (rounded in terminal growing leaves), scabrid, rusty when young, basal nerves 3-5, convergent. Panicles axillary, spreading. Bracts small, leafy. Pedicel, 0.2-0.25 cm. Flowers 0.25-0.3 cm in diam., 5-merous. Corolla rust-coloured, lobes lanceolate, tips incurved. Berries globular, black purple, fleshy with red dye.

Flr.: Jul. - Sep.

Fr.: Sep. - Mar.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 019, dated 13.6.1994; Chitray, 2740m, **AP Das & PC Rai** 1189, dated 03.5.1995; Tinsimana, 2900m, **AP Das & PC Rai** 1232, dated 04.5.1995.

Status: Abundant.

Local Distrib.: Tinsimana, Alubari, Chitray, Reshete, Hattidara. 2000-2900m.

General Distrib.: Himalayas (Simla-Bhutan), Meghalaya.

Note: Red dye obtained from fruits is used as ink and as mehendi by teenagers. Also used as medicine in Ayurvedic system. Plant is indiscriminately collected and sold threatening its status.

Rubia wallichiana Decn., Recher. Garance 61. 1837; FEH 1:315. 1966; EFPN 2:207. 1979; TBRI 50(4): 125. 1987.

R. cordifolia L. *senu* Hk. f., FBI 3:202. 1881 p.p.

R. cordifolia var. *munjista* Miq. *sensu* Kitam., Faun. & Fl. Nep. Him. 231. 1955.

Local Name: Majito (Nep.).

Similar to *R. manjith* but leaves comparatively broader, much scabrid-sticky. Corolla slightly larger and greenish white. Berries deep black. Usually growing in semi-open places.

Flr.: Jun. - Oct.

Fr.: Oct. - Mar.

Specimen Cited: Rechila, 2280m, **AP Das & PC Rai** 0491, dated 15.10.1994.

Status: Abundant.

Local Distrib.: Chhila Durpinay, Alubari, Chitray, Ruka Hill. 2100-2750m.

General Distrib.: Himalayas (Punjab-Bhutan), Meghalaya.

SPERMADICTYON Roxb.

Spermadictyon suaveolens Roxb., Pl. Corom. 3:32. T. 236. 1815; FEH 1:316. 1966; EFPN 2:208. 1979; FPK 47. 1981; TBRI 50(4):127. 1987.

Hamiltonia suaveolens Roxb., Fl. Ind. ed. Carey, 2:223. 1824; FBI 3:197. 1880.

Local Name: Bhuin Champa (Nep.).

Erect undershrub, 1.5-3cm high. Leaves opposite; lamina 10-20 x 5-9cm, elliptic-lanceolate, entire, acute, base narrowed, pubescent. Panicles upto 32 cm long, terminal and trichotomously branched. Flowers fragrant, bluish white, in subglobose heads; aclyx 0.5-0.6cm long with linear teeth; corolla to 1.5cm, tube infundibular, wooly, with spreading lobes to 0.8cm. Capsules 0.4-0.5cm across, ellipsoidal.

Flr.: Oct. - Dec. *Fr.:* Dec. - Mar.

Specimen Cited: Phari, 850m, AP Das & PC Rai 1872, dated 24.10.1997.

Status: Less Frequent.

Local Distrib.: Confined to Samsing and Phari. 500-850m.

General Distrib.: Himalayas (Kashmir-Bhutan), India.

WENDLANDIA *Bartl.*

Key to the species:

1. Bark vertically splitting; petioles upto 2.2cm long; lamina elliptic to ovate-elliptic; corolla lobes recurved.....*W. tinctoria*
1. Bark not splitting; petioles upto 1.8cm long; lamina elliptic-lanceolate; corolla lobes not recurved.....*W. wallichii*

Wendlandia tinctoria (Roxb.) DC., Prodr. 4:411. 1830; FBI 3:38. 1880, EFPN 2: 208. 1979; FPK 47. 1981, Fl. Jow. 1:231. 1981; Fl. Meg. 2:511. 1987; TBRI 50(4):101. 1987.
Rondeletia tinctoria Roxb., Fl. Ind. 2: 134. 1824.

Local Name: Tilki (Nep.).

Small trees or shrubs, 2-8m high, with reddish and smooth bark. Branches spreading. Petioles upto 2.2 cm long; lamina 8-18 x 3-8 cm, elliptic to ovate-elliptic, shortly acuminate, base cuneate, pale and pubescent beneath. Stipules ovate, persistent and ciliate. Panicles upto 30 cm long, pyramidal, pubescent. Flowers white; calyx 0.2-0.3 cm, with ovate teeth; corolla 0.7-0.9 cm, tube slender, lobes to 0.3cm. Capsules to 0.2 cm across, globose, pubescent.

Flr.: Jan. - Apr. *Fr.:* May - Jun.

Specimen Cited: Samsing, 600m, AP Das & PC Rai 1873, dated 24.10.1997.

Status: Less Common.

Local Distrib.: Gorubathan, Phari, Samsing, Machuki. 500-1200m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Myanmar, China.

Wendlandia wallichii Wight et Arnt., Prodr. Fl. Ind. Or. 402. 1834; in note FBI 3: 38.1880; Ind. Trees 373. 1906; Trs. N. Beng. 76. 1929; Fl. Asm. 3:33. 1939; FPK 47. 1981; Fl. Meg. 2: 511. 1987; TBRI 50 (4):30. 1987.

Shrub to small tree, upto 6m high. Bark vertically splitting, reddish-brown. Branches puberulous. Leaves opposite; petioles 0.9-1.8cm long; lamina 8-16 x 3-7 cm, elliptic-lanceolate, entire, acute to acuminate, base cuneate, coriaceous, nerves upto 12 pairs, glabrescent beneath. Stipules ovate, recurved at tip, caducous. Panicles upto 18cm long, pubescent. Pedicels to 0.35cm, hairy. Flowers slightly fragrant; calyx 4-5 lobed, lobes to 0.2cm, triangular-lanceolate, acute; corolla 0.65-0.8cm long, tubular, white, lobes 4-5, recurved; stamens 4-5, exerted at throat; styles bifid. Capsule 0.25-0.35 cm across, globose, many seeded.

Flr.: Oct. - Mar. *Fr.:* Jan. - Jun.

Specimen Cited: Suntalay, 655m, AP Das & PC Rai 1513, dated 04.6.1996.

Status: Frequent.

Local Distrib.: Samsing, Phari, Suntalay, Gorubathan, Machuki. 400-1050m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya.

VALERIANACEAE Batsch.

VALERIANA L.

Valeriana hardwickii Wallich in Roxb., Fl. Ind. 1: 166. 1820; FBI 3: 213. 1881; FEH 1: 320. 1966; EFPN 2: 209. 1979; FPK 47. 1981; TBRI 50 (4) : 129. 1987.

Perennial erect, 30-80 cm tall glabrous herb with small root-stock; branching upwards, nodes pillose. Radical leaves with long petioles, cauline leaves pinnate with upto 5 cm long pubescent petioles; petiolules hairy, lateral ones 0.15-0.2 cm, terminal ones upto 0.4 cm; leaflets 3, lateral ones smaller (0.9-2.5 x 0.5-1.3 cm), terminal one larger (1.6-4.5 x 0.9-2.2 cm), ovate-lanceolate, remotely obscure-serrate, acuminate, base cuneate or rounded, thin to thickly white pubescent, usually shrivel at flowering time. Corymbs large, lax. Bracts 0.2-0.25 cm long, linear, glabrous. Bracteoles short. Pedicels 0.2 cm long. Flowers 0.3-0.35 cm long; sepals papery; petals white. Fruits 0.2 x 0.1 cm, dorsally ribbed and hairy; fruiting pedicels much elongated.

Flr.: Jun. - Oct. *Fr.:* Aug. - Dec.

Specimen Cited: Tinsimana, 2900 m, AP Das & PC Rai 0793, dated 20.10.1994.

Status: Abundant.

Local Distrib.: Jorpokhari, Hattidara, rechila, Jaributti, Pankhasari. 1900-3050 m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Myanmar, east to China, Java.

Note: Roots substitute valerian.

COMPOSITAE Giseke

Key to the Genera:

1. Capitula ligulate.....	2
1. Capitula with disc floret only.....	12
2. Florets homogamous.....	3
2. Florets heterogamous.....	11
3. Plants climbing.....	4
3. Plants not climbing.....	5
4. Lamina unlobed at base.....	<i>Cissampelopsis</i>
4. Lamina lobed at base.....	<i>Senecio intermedius</i>
5. Annual herbs.....	6
5. Perennial herbs or shrubs.....	9
6. Pappus absent; plants erect.....	7
6. Pappus present; plants diffuse or prostrate.....	8
7. Leaves simple.....	<i>Ageratum</i>
7. Leaves compound.....	<i>Bidens</i>
8. Capitula paniculate; receptacle conical.....	<i>Spilanthus</i>
8. Capitula solitary on an erect long peduncle; receptacle convex.....	<i>Tridax</i>
9. Rhizomatous and rosette herb.....	<i>Taraxacum</i>
9. Shrubs and undershrubs.....	10
10. Capitula \pm 2cm in diam.; stems perennial.....	<i>Synotis</i>
10. Capitula over 10cm in diam.; stems annual.....	<i>Tithonia</i>
11. Pappus of two straight subulate bristles.....	<i>Synedrella</i>
11. Pappus of many slender hairy bristles.....	<i>Inula</i>
12. Capitulum homogamous.....	13
12. Capitulum heterogamous.....	28
13. Plants with a basal rosette of leaves; annual or perennial herbs.....	14
13. Plants without any basal rosette of leaves; herbs, shrubs or climbers.....	19
14. A much spinescent plant.....	<i>Cirsium</i>
14. Plants not spinescent.....	15
15. Involucral bracts covered with numerous black or green glands.....	16
15. Involucral bracts glandular.....	18
16. Rays bluish purple; cypsella highly compressed.....	<i>Prenanthes</i>
16. Rays yellow; cypsella slightly compressed.....	17
17. Cypsella distinctly beaked.....	<i>Cicerbita</i>
17. Cypsella not beaked.....	<i>Sonchus</i>
18. Cypsella yellowish brown, with a distinct and stout terminal beak.....	<i>Lactuca</i>
18. Cypsella dark-reddish, without any beak.....	<i>Youngia</i>
19. Shrubs or climbers.....	20
19. Annual or perennial (including suffrutescent) herbs.....	21
20. Bushy much branched shrubs.....	<i>Eupatorium</i>
20. Climbers (twining).....	<i>Synotis tetrantha</i>
21. Annual herbs.....	22
21. Suffrutescent and perennial herbs.....	26
22. Corolla with sticky glands.....	<i>Adenostemma</i>
22. Corolla without sticky glands.....	23
23. Capitula white.....	<i>Anaphalis</i>
23. Capitula yellow, dirty-yellow or blackish.....	24

24. Cypsella many ribbed.....	25
24. Cypsella 4-angled or terete, tubercled.....	<i>Saussurea</i>
25. Ribs of cypsella faint but pubescent.....	<i>Crassocephalum</i>
25. Ribs of cypsella very prominent but glabrous.....	<i>Gynura</i>
26. Leaves large, nearly entire; capitula yellow.....	<i>Synotis alata</i>
26. Leaves either small or deeply dissected; capitula never yellow.....	27
27. Small suffrutescent plants; capitula white.....	<i>Anaphalis</i>
27. Tall suffrutescent plants; capitula green to brown.....	<i>Artemisia</i>
28. Plants with a basal rosette of leaves.....	29
28. Plants with normal cauline leaves.....	30
29. Aromatic herbs; corolla yellow or dirty yellow.....	<i>Blumea</i>
29. Non-aromatic herbs; corolla white.....	<i>Ainslea</i>
30. Entire plant clothed with white hairs.....	<i>Gnaphalium</i>
30. Plants not clothed with white hairs.....	31
31. Capitula upright, brownish-green or green.....	32
31. Capitula nodding, yellow.....	<i>Carpesium</i>
32. Capitula discoid.....	<i>Myriactis</i>
32. Capitula globular.....	<i>Dichrocephala</i>

ADENOSTEMMA Forst.

Adenostemma lavenia (L.) O. Kuntze, Rev. Gen. Pl. 1:304. 1891; FEH 1:329. 1966; EFPN 3: 9. 1982; TBRI 50 (4):104. 1987; FI 12:346. 1995. var. *latifolium* (D. Don) Panigrahi in KB 30:651. 1975; Name. Chang. Flr. Pl. 11. 1987.

A. latifolium D. Don, Prodr. 181. 1825.

A. viscosum var. *latifolium* (D. Don) Climber, Comp. Ind. 29. 1876; FBI 3: 242. 1882.

Chater (EFPN 3:9. 1982) treated this as synonym of the type variety.

Erect slender herbs to 30 cm. Stem unbranched, glabrous or glandular pubescent. Leaves opposite; petioles 0.4-1 cm long; lamina 2-4.8 x 1.4-3.6 cm, broadly ovate or cordate, serrate, acute, base round to shallow-cordate, glabrous or thinly pubescent, 3-nerved. Involucral bracts campanulate, oblong, obtuse, rarely acute, scabrid. Heads 0.5-0.8 cm in diam., in lax panicles or corymbs. Pappus hairs 3-5, clavate. Achenes warted, glandular.

Flr.: Aug. - Nov. *Frt.*: Sep. - Dec.

Specimen Cited: Below Chouda Feri, 2200 m, AP Das & PC Rai 0596, dated 16.10.1994.

Status: Frequent.

Local Distrib.: Reshete, Zero Point, Alubari, Rechila Durpinay. 1900-2300m.

General Distrib.: Pantropic, sometimes extending to 2000m.

AGERATUM L.

Ageratum conyzoides L., Sp. Pl. 839. 1753, FBI 3: 243. 1881; FEH 1:330. 1966; FI. Jow. 1: 258. 1981; Fl. Meg. 2:516. 1987; TBRI 50 (4):105. 1987; FI 12:348. 1995.

Herbs upto 95 cm high, hairy. Leaves 1.5-5.5 x 0.7-0.35 cm, ovate, ovate-rhomboid crenate, serrate, obtuse or acute, base subtruncate, 3-nerved. Heads 0.45-0.75 cm diam.,

discoid, bluish or violet or whitish. Involucral bracts 0.35-0.5 cm long, lanceolate. Achenes black-brown; pappus scales awn-tipped.

Flr. & Frt.: Jan. - Dec.

Specimen Cited: Above Samsing, 750 m, **AP Das & PC Rai** 1730, dated 17.5.1997.

Status: Common.

Local Distrib.: All the poen places upto 1800m.

General Distrib.: Pantropic weed.

Note: Young leaves crushed and the extract obtained is applied on cuts and injuries as homostatic.

AINSLIAEA DC.

Key to the species:

1. Scapes upto 40cm long; petioles of radical leaves upto 1.5cm long; lamina base cordate; heads cylindrical.....*A. aptera*
1. Scapes larger (upto 60cm), robust; petioles of radical leaves much larger (upto 5cm long); lamina base rounded; heads discoid.....*A. latifolia*

Ainsliaea aptera DC., Prodr. 7: 14. 1838; FBI 3: 388. 1881; FEH 1: 330. 1966; 2: 131. 1971; Fl. Muss. 1: 368. 1978; EFPN 3: 9. 1982; TBRI 50(4): 105. 1987; FI 13:165. 1995.

Erect perennial herbs to 40 cm tall. Stem long, leafless (naked) in spring, stout. Petioles upto 1.5 cm; lamina 2.5-5 x 1.5-3.5 cm, ovate or orbicular, sinuate toothed, acute, base cordate, glabrous, nerves distinct above. Spikes slender, stout, red-brown. Flower heads 1-1.8 cm long, cylindrical, sub-sessile. Disc-florets white or pinkish. Ray-florets 0. Involucral bracts lanceolate, thin, glabrous, inner larger than outer. Pappus feathery, brown. Achenes obscurely ribbed, hairy.

Flr.: Mar. - May *Frt.:* Oct. - Dec.

Specimen Cited: Rechila, 2280 m, **AP Das & PC Rai** 0742, dated 19.10.1994.

Status: Common.

Local Distrib.: Reshete, Pankhasari, Jaributti, Chouda Feri. 1900-2300m.

General Distrib.: Temperate Himalayas.

Ainsliaea latifolia (D. Don) Schulz-Bip., Pollichia 18-19: 169. 1861; Brittonia 4: 182. 1941; Faun. & Fl. Nep. Him. 243. 1955; FEH 1: 330. 1966; 2: 110. 1975; EFPN 3: 10. 1982; Nam. Chang. Fl. Pl. 19. 1987; TBRI 50 (4) : 115. 1987; FI 13:167. 1995.

Liatris latifolia D. Don, Prodr. 169. 1825.

Ainsliaea pteropoda DC., Prodr. 7: 14. 1838; FBI 3: 388. 1881.

An erect robust perennial herb upto 60 cm tall scapes. Root-stock stout, densely pubescent. Stem slender. Leaves mainly radical; petioles upto 5 cm long, broadly winged, wings narrowed towards base; lamina 2.5-5 x 1.2-3 cm, broadly ovate, finely toothed, acute, base rounded, pubescent both sides (white tomentose beneath in young stage), dark green, mid-vein thick and prominent; cauline leaves few, sessile, small, linear oblong or oblanceolate, toothed, pubescent. Flowering spikes long, slender, glabrous. Heads upto 1.3 cm long, discoid, arranged in alternate lateral clusters. Inner involucre bracts longer than outer, lanceolate, leafy. Florets 1-4, white or tinged with pink. Pappus feathery, pale brown. Achenes obscurely ribbed.

Flr.: Apr. - Jun *Fr.:* Jul. - Nov.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 0112, dated 14.6.1994; Rechila, 2280 m, AP Das & PC Rai 0745, dated 19.10.1994; Reshete Area, 2240 m, AP Das and PC Rai 1329, dated 06.5.1995.

Status: Common.

Local Distrib.: Rechila Chowk, Jaributti, Reshete, Pankhasari, Middle Rechila. 1800-2400m.

General Distrib.: Simla-Bhutan, Assam, Meghalaya, Manipur, Myanmar, Thailand, Indo-Chin, China and Philippines.

ANAPHALIS DC.

Key to the species:

1. Small herb to 7.5cm tall with flexuous stem.....*A. triplinervis*
1. Comparatively larger herbs, 30-74cm tall.....2
2. Lamina 3-9cm long, margin recurved.....3
2. Lamina 1-3cm long, margin inrolled.....*A. contorta*
3. Herbs upto 75 cm high; central florets brownish yellow; marginal florets pale yellow
.....*A. adnata*
3. Herbs upto 55cm high; florets white.....4
4. Stem unbranched, wooly hairy; involucre bracts elliptic.....*A. busua*
4. Stem much branched, not wooly; involucre bracts elliptic-ovate.....*A. margaritacea*

Anaphalis adnata DC., Prodr. 6:274. 1838; FBI 3:282. 1881; FEH 1:331. 1966; EFPN 3:10. 1982; TBRI 50(4):105. 1987; FI 13:53. 1995.

Erect whitish soft herb to 40-75cm tall. Leaves sessile, often clasping the stem; lamina 2.5-9 x 1-3cm, obovate-oblong, acute, base narrowed, broader above middle, entire, 3-nerved, dull green above, densely wooly beneath. Heads 0.65-0.82cm across, borne in terminal corymbs, sometimes axillary. Involucre bracts 0.4 x 0.15cm, elliptic-ovate, many seriate, membranous, outermost clawed. Central florets bisexual, upto 0.32cm long, brownish yellow; marginal florets pale yellow. Cypselas upto 0.15cm, oblong, those of marginal florets minutely hairy, and those of central florets glabrous with scattered glossy glands. Pappus numerous, 0.4-0.5cm long, silky white.

Flr.: Sep. - Dec. *Fr.:* Oct. - Feb.

Specimen Cited: Below Machuki, 1300m, AP Das & PC Rai 1700, dated 17.5.1997.

Status: Common.

Local Distrib.: Kuwa Paani, Tiffin Dara, Sakam Forest. 1200-1700m.

General Distrib.: W. and E. Himalayas, Bhutan, Meghalaya, Pakistan, Nepal, Myanmar, Philippines, Indo-Chin, China, Thailand, Taiwan, Sri Lanka.

Anaphalis busua (D. Don) DC., Prodr. 6: 275. 1838; FEH 1: 331. 1966; 2: 132. 1971; 3: 110. 1975; EFPN 3: 10. 1982; Nam Chang. Flr. Pl. 31. 1987; TBRI 50(4): 105. 1987; FI 13: 57. 1995.

Gnaphalium busua D. Don., Prodr. 173. 1825.

Anaphalis arancosa DC., Prodr. 6: 275. 1838; FBI 3: 283. 1881.

Local Name: Bukki Phool (Nep.).

Erect 30-70cm tall herb. Stems leafy, branched, hairy. Leaves numerous, decurrent, suberect or spreading, 3-6 cm, narrow lanceolate, basal ones often oblanceolate, margins recurved, entire, acute to acuminate, basal lobes decurrent, green and puberulous above, white woolly beneath, strongly 1-nerved medianly. Involucral bracts elliptic, blunt, erect. Flower heads in branched corymbs, subglobose; florets white. (Plate IV: 39).

Flr.: Jul. - Nov. *Fr.:* Sep.- Jan.

Specimen Cited: Chouda Feri, 2285m, AP Das & PC Rai 0361, dated 14.10.1994.

Status: Frequent.

Local Distrib.: Hattidara, Chouda Feri, Alubari, Rechila Middle. 2000-2500m.

General Distrib.: Himalayas, Meghalaya, Myanmar, Thailand, Philippines, China.

Anaphalis contorta (D. Don) Hk. f., FBI 3: 284. 1881; FEH 1: 331. 1966; 2: 132. 1971; 3: 110. 1975; EFPN 3: 10. 1982; TBRI 50(4): 105. 1987; FI 13: 59. 1995.

Antennaria contorta D. Don in Bot. Reg. t. 605. 1821; Prodr. Flr. Nep. 175. 1825.

Anaphalis hondae Kitamura in Act. Phytotax. Geobot. 15: 78. 1953; BBSI 15: 206. 1976.

Gnaphalium contortum Ham. ex Sprengel, Syst. Veg. 3: 479. 1826.

Local Name: Bukki Phool (Nep.).

Small perennial tufted herb. Stem slender, branched woolly haired. Leaves sessile, numerous and overlapping, 1-3 x 1-2 cm, upper linear to narrow lanceolate, basal obovate and densely clustered, margins inrolled, acute-blunt, green above, woolly white beneath, one-nerved, nerve thick and prominent beneath. Flowers heads 0.35 cm in diam., grouped in terminal compact corymbose clusters upto 1.6 cm in diam. Involucral bracts 0.1-0.2 cm, ovate, erect, blunt, papery and shining white. Disc florets whitish-yellow.

Flr.: Aug. - Jan. *Fr.:* Nov. - Mar.

Specimen Cited: Alubari, 228m, **AP Das & PC Rai** 028, dated 13.6.1994; Alubari, 2280m, **AP Das & PC Rai** 0387, dated 15.10.1994.

Status: Common.

Local Distrib.: Rechila Chowk, Reshete, Jaributti, Middle Rechila, Jaributti. 1600-2450m.

General Distrib.: Temperate regions of Afganistan, Himalayas, Meghalaya, Assam, China.

Anaphalis margaritacea (L.) Benth. & Hk. f., Gen. Pl. 2: 303.1873; FEH 1: 331.1966; 2: 132.1971; EFPN 3: 10.1982; Nam. Chang. Flr. Pl. 31. 1987; TBRI 50(4): 105.1987; FI 13:68. 1995.

Gnaphalium margaritaceum L., Sp. Pl. 850. 1753.

Anaphalis cinnamomea C.B. Clarke, Comp. Ind. 103. 1876; FBI 3: 281. 1881.

A. timmua D.Don, Prodr. 174. 1825; Fl. Jow. 1: 276. 1981.

Erect, usually unbranched, leafy herb. Stem 30-55 cm, wooly-haired. Leaves sessile; lamina 3-9 x 0.5-1 cm, lanceolate, entire, acute, base simple and narrow, glabrous to thinly hairy and bright green above, reddish or grey wooly beneath, 3-4 nerved. Involucral bracts small, elliptic-ovate, blunt, erect in flower. Heads 0.7 cm across, subglobose, grouped in dense domed clusters.

Flr.: Aug. - Nov. *Fr.:* Sep. - Dec.

Specimen Cited: Rechila, 2280m, **AP Das & PC Rai** 0360, dated 14.10.1994.

Status: Abundant.

Local Distrib.: Thosum Hill, Rechila Chowk, Helipad region, Jaributti. 2100-2750m.

General Distrib.: Kashmir-Bhutan, Meghalaya, Thailand, China, Japan, N. America.

Anaphalis triplinervis C.B. Clarke var. *monocephala* (DC.) Airy Shaw in Bot. Mag. 158: t. 9396. 1935; FEH 1: 332. 1966; EFPN 3: 11. 1982; Nam. Chang. Flr. Pl. 31. 1987; FI 13:77. 1995.

A. monocephala DC., Prodr. 6:272.1838.

A. nubigena auct. non DC. Hk. f., FBI 3:279.1881 var. *nubigena*.

Small robust herbs to 7.5cm. Stem 5.3 cm, flexuous, white hairy. Basal leaves petiolate (petiole upto 1 cm); stem leaves clasping, often sessile to shortly stalked; lamina 1-3 x 0.5-1.5 cm, obovate to elliptic, margin entire, blunt or acute, base narrow cuneate, green above, paler and wooly beneath, 3-nerved. Involucral bracts 0.4 cm, ovate-lanceolate. Heads 1cm across, solitary; florets yellowish-white. (**Plate IV: 38**)

Flr.: Jul. - Oct. *Fr.:* Sep. - Dec.

Specimen Cited: Tinsimana-Jorhpokhari, 2900-3040m, **AP Das & PC Rai** 0787, dated 20.10.1994.

Status: Very Common.

Local Distrib.: Tinsimana, Chitray, Dhamdhamay Dara, Rechila Middle. 2300-2900m.

General Distrib.: Himalayas (Kashmir-Bhutan).

ARTEMISIA L.

Key to the species:

1. Small suffrutescent plant with short branches; stem pale green; lamina pinnatisect and irregularly serrate; capitula in lax raceme.....*A. dubia*
1. Bushy shrub with long branches; stem whitish; lamina deeply pinnatisect or laciniate; capitula in long pyramidal panicles.....*A. indica*

Artemisia dubia Wallich ex Besser in Nouv. Memb. S. Imp. Nat. Mos. 3:39. 1834; FEH 1:332. 1966; EFPN 3:12. 1982; TBRI 50(4):106. 1987; FI 12:19. 1995.

A. umbrosa Tourcz ex DC., Prodr. 6:113. 1838.

A. lavandulaefolia DC., Prodr. 110. 1838, p.p.

Local Name: Titepaati (Nep.).

Aromatic tomentose small suffrutescent plant forming thickets. Root-stock woody. Stem paniculately branched, pale green, ribbed; branches shorter. Lamina to 8.2cm, sessile, pinnatisect, irregularly serrate, acute, pale underside. Capitula 0.25-0.35cm across, nodding, borne on lax racemes, reddish brown. Involucral bracts scarious. Receptacle naked. Outer florets female; corolla yellowish green.

Flr.: Aug. - Oct. *Fr.:* Oct. - Jan.

Specimen Cited: Below Machuki, 1300m, AP Das & PC Rai 1438, dated 08.10.1995.

Status: Frequent.

Local Distrib.: Alubari, Jaributti, PHE Source, Rechila Durpinay. 1300-2300m.

General Distrib.: Himalayas, Nepal, Bhutan, Tibet and China.

Artemisia indica Willd., Sp. Pl. 3:1846. 1803; FEH 1: 332. 1966; 2: 133. 1971; EFPN 3: 12. 1982; TBRI 50(4):106. 1987; Nam Chang. Flr. Pl. 48. 1987; FI 12: 27. 1995.

A. grata Wallich ex Bess. in Nouv. Mem. Soc. Nat. Mosc. 3: 57. 1834.

A. vulgaris auct. non. L., FBI 3: 325. 1881. p.p.; KB 42 (2): 447. 1987.

Local Name: Titepaati (Nep.).

Bushy aromatic shrubs to 2m high. Stem leafy, whitish hairy or rarely glabrescent. Leaves alternate, sessile, highly aromatic, 2.4-7 x 1.25-3.7 cm, ovate, lobed, laciniate or deeply pinnatisect, segments linear-lanceolate, acute, pubescent above, cottony white beneath; terminal leaves comparatively smaller, entire or 3-lobed. Heads 0.25-0.35cm diam., ovoid or subglobose, arranged in long pyramidal panicles. Involucral bracts ovate, ovate-oblong, villous, margins scarious. Anther-base obtuse, entire. Achenes oblong.

Flr.: Aug. - Dec. *Fr.*: Oct. - Feb.

Specimen Cited: Below PHE Source, 1950m, **AP Das & PC Rai** 1055, dated 26.4.1995; Samsing, 750m, **AP Das & PC Rai** 1731, dated 17.5.1997.

Status: Abundant.

Local Distrib.: Samsing, PHE Source, Sakam Forest, Chouda Feri Goth. 700-2250m.

General Distrib.: Subtropical-temperate regions of India, Myanmar, Thailand, China and Japan.

Note: An important plant used in the traditional system of medicine of Hill people and religious ceremonies of Hindu community. Also used as mosquito and insect repellent.

BIDENS L.

Bidens pilosa L., Sp. Pl. ed. 1. 832. 1753; FBI 3:309. 1881; FEH 1: 333. 1966; EFPN 3: 15. 1982; TBRI 50 (4): 107. 1987; FI 12:372. 1995.

Local Name: Kuro (Nep.)

An erect herb to 60 cm. Stem glabrous. Leaves opposite; petiole upto 2.5cm; lamina much variable, 3-lobed, 1-2 pinnatisect or undivided; leaflets 2-5 x 1-2.5cm, ovate, toothed, acute, narrow cuneate, pilose above, nerves distinct. Peduncles long upto 8cm, stout. Involucral bracts with scarious margin. Heads 0.9-1.4 cm across, elongating in fruits. Ray-florets ligulate, white. Achenes 1-1.5cm, linear, black. Pappus unequal of barbed bristles.

Flr.: Jun. - Jan. *Fr.*: Sep. - Mar.

Specimen Cited: Rechila Chowk, 2280m, **AP Das & PC Rai** 0701, dated 19.10.1994.

Status: Frequent.

Local Distrib.: Machuki, Phaparkheti, Rechila Chowk, Chouda Feri. Upto 2300m.

General Distrib.: Pantropic, also extending to temperate regions.

BLUMEA DC. (nom. cons.)

Key to the species:

- 1. Suffrutescent herbs.....2
- 1. Perennial scandent undershrub or shrub.....*B. riparia*
- 2. Stem erect, unbranched, rarely branched at apex; lamina serrate-dentate; heads in fascicles.....*B. hieraciifolia*
- 2. Stem straggling, branched; lamina irregularly toothed; heads in diuvaricate panicles.....*B. procera*

Blumea hieraciifolia (D. Don) DC. in Wight, Contr. 15. 1834; FBI 3:263. 1881; FEH 1:333. 1966; 2:134. 1971; EFPN 3:16. 1982; TBRI 50(4):107. 1987; FI 13:125. 1995.

Erigeron hieraciifolium D. Don, Prodr. Fl. Nep. 172. 1825.

B. sericans Hk. f., FBI 3:262. 1881.

Small erect herb, 25-70cm tall, densely villous. Stems usually unbranched or rarely branched at the apex. Lamina of radical leaves pubescent, 4.5-7 x 3-3.5cm, elliptic-oblong, acute, margins serrate-dentate, silky pubescent underside; cauline sessile. Heads 1-1.6cm across, globose and fascicled. Involucral bracts 0.3-0.95cm long, lanceolate to oblanceolate, recurved at maturation. Receptacle 0.25-0.45cm in diam., convex. Outer florets female, multiseriate; inner ones 0.4-0.45cm long, tubular, rosy-yellow, glabrous. Achenes 0.2cm, oblong, hairy, brown. Pappus 0.4-0.45cm long, white.

Flr.: Apr. - Jul. *Fr.*: May - Sep.

Specimen Cited: Near Sakam, 1200m, AP Das & PC Rai 1702, dated 17.5.1997.

Status: Common.

Local Distrib.: Phari, Sakam, Samsing, Machuki. 600-1400m.

General Distrib.: Subtropical-temperate regions of Nepal, Myanmar, Bangladesh, China, S.E. Asia, Philippines, New Guinea and Australia.

Blumea procera DC., Prodr. 5:445. 1836; Comp. Ind. 86. 1876; FBI 3:268. 1881; Rehder in *Blumea* 10:212. 1960; EFPN 3:17. 1982; FI 13:139. 1995.

Conyza procera Wallich, Cat. 105, n. 3050. 1831, *nom. nud.*

C. semivestita Wallich, Cat. 103, n. 2996 A. 1831, *nom. nud. p.p.*

B. semivestita DC., Prodr. 5:445. 1836.

Suffrutescent herbs with woody root-stock. Stem upto 3m high, branched, straggling or sometimes erect. Branches stout, terete, densely villous in younger parts. Lamina subsessile, 7-17.5 x 3-7.5cm, elliptic-oblong to oblong-obovate, acuminate, base tapering or rarely semiamplexicaul, irregularly toothed, densely villous on the lower surface. Heads 0.6-0.75cm across, in dense clusters of divaricate panicles. Involucral bracts two-seriate, outer ones upto 0.65cm long, oblong-ovate and acute; inner ones linear oblong, scarious and densely hirsute. Receptacle upto 0.25cm in diam., narrow, pubescent. Corolla 0.4-0.55cm long, tubular, yellowish, that of female florets filiform, hairy. Pappus upto 0.5cm long, white. Achenes ribbed, pale brown and silky.

Flr. & Fr.: Jan. - Jun.

Specimen Cited: Near Machuki, 1250m, AP Das & PC Rai 1444, dated 08.10.1995.

Status: Common

Local Distrib.: Phari, Gorubathan, Sakam, Tangta. 400-1300m.

General Distrib.: India (Tropical evergreen forests, Assam, Sikkim and Andaman and Nicobar Islands), Bangladesh, Myanmar, China, Nepal and Indo-Chin.

Blumea riparia (Bl.) DC., Prodr. 5:444. 1836; Comp. Ind. 85. 1876; FEH 2:134. 1971; EFPN 3:17. 1987; TBRI 50(4):107. 1987; FI 13:141. 1995.

Conyza riaria Bl., Bijdr. 899. 1826.

B. chinensis DC., Prodr. 5:444. 1836; FBI 3:268. 1881, *excl. syn. Conyza chinensis*.

Perennial scandent undershrubs or shrubs. Stem woody, blackish, branched. Branches terete, grooved. Leaves 4.5-9.5 x 4-4.5cm, elliptic-lanceolate, shortly acuminate, base rounded, subserrate, deep green, both surfaces glabrous or sometimes sparsely hairy. Capitula 0.9-1.2cm in diam., borne in paniculate terminal or axillary racemes. Peduncles upto 2.6cm long. Involucral bracts 0.55-0.62cm, acute, brownish, outer ones shorter, obtuse and coriaceous. Corolla of bisexual florets 0.45-0.55cm long, tubular and yellowish; corolla of female florets filiform and 2-4 lobed. Cypsela to 0.2cm, ribbed, pale brown and pubescent. Pappus 0.3-0.4cm long, whitish.

Flr.: Feb. - Jan. *Fr.*: Apr. - Jun.

Specimen Cited: Machuki, 1340m, AP Das & PC Rai 1703, dated 17.5.1997.

Status: Rare.

Local Distrib.: Machuki, Sakam. 1000-1350m.

General Distrib.: E. Himalaya, Malaya, China, Indo-China, Philippines, Indonesia, New Guinea, etc.

CARPESIUM L.

Carpesium trachelifolium Less. in Linnaea 6: 233. 1831; FBI 3: 301. 1881; FEH 1: 335. 1966; 3: 113. 1975; EFPN 3: 18. 1982; TBRI 50 (4): 108. 1987; FI 13: 11. 1995.

Slender herb. Stem pubescent or glabrate, 70-95 cm high. Lamina 4.8 - 6.5 x 2.8-4.6 cm, ovate-cordate, sinuate-toothed or lobulate; upper leaves sub-sessile, ovate or elliptic-lanceolate, serrate or entire. Capitula 0.4-0.6cm across, subracemose. Involucral bracts elliptic-spathulate, hairy, sometimes glabrous. Ray floret ligulate, yellowish. Disc floret 5-toothed, tubular. Achenes cylindrical, punctate at base and apex.

Flr.: Jun. - Aug. *Fr.*: Jul. - Oct.

Specimen Cited: Near Alubari, 2000m, AP Das & PC Rai 0581, dated 16.10.1994.

Status: Frequent.

Local Distrib.: Pankhasari, Ruka Forest, Chitray, Alubari. 2000-2650m.

General Distrib.: Himalayas (Kashmir-Bhutan), and China.

Note: Cypsela sticking to clothes of passerby.

CICERBITA Wallich

Cicerbita cyanea (D. Don) Beurverd in Bull. Soc. Bot. Genev. "Ser. 2", 2: 132. 1910; FEH 1:335. 1966; EFPN 3:19. 1982; TBRI 50(4):109. 1987; FI 12:268. 1995.

Sonchus cyaneus D. Don, Prodr. 164. 1825.

Lactuca hastata DC., Prodr. 7:139. 1838; FBI 3:407. 1887.

A slender robust herb, upto 45cm tall. Stem hard, round, usually unbranched, glabrous to glandular-hispid. Leaves alternate; petiole 1.3-4.5 cm, inflated at base; lamina 2.5-6.5 x 0.8-4 cm, variable in shapes, pinnatifid, margin toothed, terminal lobe broad and triangular, terminal upper leaves often lanceolate, glandular hispid both sides. Flower-heads 1-1.4cm long, grouped in long branched terminal cluster, 10-20 florets in each head. Peduncle drooping. Involucral bracts oblong-ovate, bristly-hairy. Pappus bristly, deciduous. Achenes beaked, flat and ribbed, black, beak slender.

Flr.: Oct. - Dec. *Fr.*: Dec. - Mar.

Specimen Cited: Rechila Chowk, 2289m, **AP Das & PC Rai** 0690, dated 19.10.1994; Chitray, 2500m, **AP Das & PC Rai** 0743, dated 19.10.1994.

Status: Common.

Local Distrib.: Chitray, Rechila Chowk, Helipad region, Reshete. 2100-2500m.

General Distrib.: Himalayas, Meghalaya, Assam and China.

CIRSIUM Mill.

Cirsium wallichii DC., Prodr. 6: 643.1838; EFPN 3: 20. 1982; Nam. Chang. Flr. Pl. 127. 1987; FI 12: 171. 1995.

Cnicus arachnoideus Wallich, Cat. 99.n. 2891.1831 (*nom. nud.*).

C. cernuus Wallich, Cat. 99 n 2892.1831 (*nom. nud.*).

Cirsium nepalensis DC., Prodr. 6: 642.1838.

Cnicus argyracanthus var. *nepalensis* (DC.) C.B. Climber, Comp. Ind. 218.1876.

C. wallichii (DC.) C.B. Clarke, Comp. Ind. 219.1876.

C. wallichii var. *nepalensis* (DC.) Hk. f., FBI 3:364.1881.

C. wallichii var. *cernua* Hk. f., FBI 3:364.1881.

C. wallichii var. *fasciculata* Hk. f., FBI 3:364.1881.

C. wallichii var. *platylepis* Hk. f., FBI 3: 364.1881.

A thistle-like plant, highly variable. Stems upto 3cm, hairy. Lamina sessile, upto 20 cm long, margin pinnately lobed with sharp whitish yellow spines, glabrous above, cottony beneath, mid nerve very thick. Flowers heads 2.5 – 3.9 cm across, solitary or clustered, sessile, white to purple white; florets upto 1.7 cm; involucral bracts lanceolate and terminating into spines; spines erect or recurved; inner involucral bracts swollen with lanceolate to ovate thin toothed tips. Fruits with pappus of feathery hairs. (**Plate IV: 39, Plate XX**).

Flr. & Fr.: Jun. - Sep.

Specimen Cited: Jaributti-Rechila Chowk, 2195-2280m, **AP Das & PC Rai** 0459, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Hatidara, Jaributti, Rechila Chowk, Ruka Hill. 1900-2700m.

General Distrib.: Himalayas (Nepal-Bhutan).

CISSAMPELOPSIS Miq.

Cissampelopsis volubilis (Bl.) Miq., Fl. Ind. Bot. 2:103. 1856; FI 13:200. 1995.

Cocalia volubilis Bl., Bijdr. 903. 1826.

Senecio walkeri Arn. in Nov. Act. Nat. Cur. 18 (1): 349.1836; Fl. Jow. 1: 267.1981; Nam. Chang. Flr. Pl. 518. 1987.

Senecio araneosus DC., Prodr. 6:364.1838; FBI 3:351.1881.

Small climber, usually glabrous. Stem vertically grooved. Leaves petiolate (petiole 2.2-4.2 cm), lamina 6-12 x 3.1-8.1 cm, cordate, distantly toothed or sinuate-toothed, acuminate, base shallow cordate, coriaceous, dark green above, light whitish green beneath, 5-7 nerved from base, finely reticulated. Capitula discoid, with small bracteole. Involucre campanulate. Bracts upto 0.6 x 0.15cm, linear-oblong, margin ciliate. Florets 0.75-1.1cm long, with tube to 0.55cm. Achenes ribbed, cylindrical, black; pappus elongated to 0.9cm, white. (Plate XXI).

Flr. & Frt.: Jan. - Mar.

Specimen Cited: Mulkharka, 2120m, AP Das & PC Rai 1154, dated 29.4.1995.

Status: Less Common.

Local Distrib.: Thartharay, Mulkharka, Jaributti. 1800-2350m.

General Distrib.: Sikkim-Mishmi Hills, Meghalaya, Nilgiri, Sri Lanka and Java.

CONYZA Less.

Key to the varieties:

1. Plant parts densely pubescent; lamina pinnatifid with acute-mucronate lobes; inner florets yellowish.....*C. stricta* var. *pinnatifolia*

1. Plant parts less pubescent; lamina not pinnatifid; inner florets yellowish white.....*C. stricta* var. *stricta*

Conyza stricta Willd., Sp. Pl. 3:1922. 1803; FBI 3:258. 1881; FEH 1:337. 1966; 3:114. 1975; EFPN 3:21. 1982; TBRI 50(4):110. 1987; FI 12:108. 1995. var. *stricta*.

Small annual erect and pubescent herb, 15-28cm tall. Stem leafy, corymbosely branched. Leaves sessile; lamina 5-7.8 x 2.2-4cm, linear-spathulate or spatulate-obovate, acute. Capitula upto 0.36cm in diam., numerous and borne in peduncled corymbose branches. Involucral Bracts ca 0.15cm long, narrowly lanceolate. Inner florets to 0.2cm long, yellowish-white. Cypselas 0.06-0.08cm, pubescent. Pappus to 0.15cm long, reddish.

Flr.: Apr. - Aug. Frt.: Jun. - Oct.

Specimen Cited: Machuki, 1300m, AP Das & PC Rai 1705, dated 17.5.1997.

Status: Common.

Local Distrib.: Phari, Samsing, Phaparkheti, Kuwapaani, Gorubathan. 500-1800m.

General Distrib.: India (Darjeeling, Jammu and Kashmir, Himachal Pradesh, Utter Pradesh), Africa, W. Asia and Myanmar.

var. *pinnatifida* (D. Don) Kitamura, FEH 1:337. 1966; 3:114. 1975; EFPN 3:21. 1982; TBRI 50(4):110. 1987; FI 12:109. 1995.

Erigeron pinnatifidum D. Don, Prodr. Fl. Nep. 172. 1825.

E. trisculum D. Don, Prodr. Fl. Nep. 172. 1825.

Conyza pinnatifida DC. in Wight, Contr. Bu. Ind. 16. 1834.

Small annual, erect herb, densely pubescent. Leaves deeply and narrowly pinnatifid with acute-mucronate lobes. Capitula very small; inner florets yellowish.

Flr.: Jun. - Nov. *Fr.:* Aug. - Dec.

Status: Common.

Specimen Cited: Near Jaributti, 2100m, AP Das & PC Rai 0476, dated 15.10.1994.

General Distrib.: India (Sikkim, West Bengal, Tamil Nadu, Karnataka, Kerala, Bihar, Andhra Pradesh), E. Africa, Myanmar, Thailand and China.

COTULA L.

Cotula hemispherica (Roxb.) Wallich ex Clarke, Comp. Ind. 150. 1876; FBI 3:316. 1881; EFPN 3:21. 1982; TBRI 50(4):110. 1987; FI 12:54. 1995.

Artemisia hemispherica Roxb., Fl. Ind. ed. 2 (3):422. 1832.

Small diffuse annual herb to 24cm tall. Lamina pinnatisect, 0.9-2.2cm long, linear, segments many, mucronate. Capitula solitary, ca 0.42cm across, subglobose, yellowish white, usually drooping in fruit. Involucral bracts to 0.32cm, long with scarious margin. Ray-florets in 2 series; corolla 0.2-0.22cm; disc florets shorter, slender, 2-winged. Cypsela very minute, flat and angled; cypsela of disc florets winged. Pappus to 0.2cm long, often adnate to cypsela.

Flr.: Oct. - Jun. *Fr.:* Dec. - Jul.

Specimen Cited: Machuki, 1300m, AP Das & PC Rai 1439, dated 08.10.1995.

Status: Fairly Common.

Local Distrib.: Samsing, Gorubathan, Phari, Sakam, Phari. Upto 1800m.

General Distrib.: India (Sikkim, West Bengal, Assam, Manipur, Meghalaya), China and Japan.

CRASSOCEPHALUM Moench.

Crassocephalum crepidioides (Benth.) S. Moore ni Journ. Bot. 1912: 211. 1912; FEH 1: 337.1966; 2: 136.1971; EFPN 3: 22.1982; J. Econ. Tax. Bot.3: 289.1982; Nam. Chang. Flr. Pl. 149.1987; TBRI 50(4):110.1987; FI 13:201. 1995.

Gynura crepidioides Benth. in Hk., Niger Fl. 468. 1849; RBSI 11(1): 24. 1926.

Erechtites valerianifolia sensu Fischer in RBSI 9: 98.1921; FPM 1882. 1936, *non* (Wolf) DC. 1838.

Local Name: Nowlay Jhar (Nep.).

Small erect herb to 30cm tall. Stem simple or branched, hairy. Leaves alternate; petioles 1-2 cm; lamina 5.5-10.5 x 2-6.5 cm, ovate, margins irregularly serrate, teeth acute, tip shortly acute, base cuneate round, greenish above, coarse and short hairy beneath, nerves distinct. Involucral bracts linear, glabrous. Heads 1-1.4cm long, narrow-oblong, grouped in dense or lax drooping clusters. Florets orange-red. Pappus white.

Flr.: Jun. - Dec. *Fr.:* Aug. - Mar.

Specimen Cited: Mulkharka, 2240m, AP Das & PC Rai 1406, dated 30.4.1995.

Status: Less Frequent.

Local Distrib.: Rechila Durpinay, Mulkharka, Alubari, Jaributti. 1900-2300m.

General Distrib.: Native of Tropical Africa; naturalised throughout the tropics.

DICHROCEPHALA DC.

Dichrocephala integrifolia (L.f.) Kuntze, Rev. Gen. Pl. 333. 1891. FEH 1: 338. 1966; 2: 136. 1971; 3: 115. 1975; FPK 61. 1981; Nam. Chang. Flr. Pl. 186. 1987; TBRI 50(4): 112. 1987; FI 12:114. 1995.

Hippia integrifolia L.f., Suppl. Pl. 389. 1781.

Dichrocephala latifolia DC. in W., Contrib. Ind. Bot. 11.1834; FBI 3: 245.1881.

Small erect herbs, 10-15cm high. Stem unbranched or branched upward, pubescent. Leaves alternate; petioles upto 0.5 cm long; lamina 0.7-1.5 x 0.4-0.8 cm, shapes variable, lyrate or pinnatifid, terminal lobe ovate, toothed, teeth acute, thinly hairy both sides, nerves distinct. Heads 0.25-0.4 cm in diam., on slender and divaricate peduncle, globose, not rayed, whitish. Pappus either absent or 2, minute, bristly in disc-florets.

Flr.: Jun. - Sep. *Fr.:* Aug. - Dec.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 021, dated 13.6.1994; Jaributti, 2195m, AP Das & PC Rai 042, dated 14.6.1994.

Status: Very Common.

Local Distrib.: Jaributti, Rechila Durpinay, Alubari, Zero Point, Sakam. 1600-2300m.

General Distrib.: Subtropical-temperate Asia and Africa.

ERIGEREON L.

Erigeron karvinskianus DC., Prodr. 5:85. 1836, Contree Gray Herb. n.s. 52: 30. 1917; Fl. Java 2:385. 1965; EFPN 3:27. 1982; Nam Chang. Flr. Pl. 218. 1987; TBRI 50 (4): 113. 1987; FI 12:122. 1995.

E. mucronatus DC., Prodr. 5: 285. 1836; FPM 682. 1921

Vittadenia triloba auct. DC: FEH 1:347. 1966.

Diffuse perennial tufted herbs. Stem much branched from base. Leaves sessile, alternate; lamina 0.8-1.9 x 0.2-0.5cm, lanceolate, (basal leaves larger and variable, often lobed), subentire, acute, base narrowed, hairy both sides, uninerved. Peduncles upto 8.5cm, thinly hairy. Heads upto 2cm across, radiate. Ray-florets usually 2 seriate, longer than disc florets, white or even pink. Disc florets 0.2- 0.35cm. Pappus hairs upto 0.25cm, light white. (Plate IV: 36).

Flr.: Mar. - Oct. *Fr.*: Jul. - Dec.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 0185, dated 15.06. 1994.

Status: Common.

Local Distrib.: Sakam Forest, Machuki, Tiffin Dara, Alubari. 1300-2200m.

General Distrib.: Native of New Zealand; naturalised in Subtropical-Temperate Central Asia.

EUPATORIUM L.

Key to the species:

1. Stem reddish, glandular; heads 0.5cm across; pappus less than 0.3cm, barbed.....*E. adenophorum*
1. Stem green, glabrous; heads 1.1-1.4cm across; pappus more than 0.6cm long, not barbed.....*E. odoratum*

Eupatorium adenophorum Spreng, Syst. Veg. 3: 420. 1826; Contree Gray Herb. n.s. 60: 85. 1919 (in obs.); Blumea 1:502. 1935; FEH 1:339. 1966; FEH 2:137. 1971; EFPN 3: 27. 1982; TBRI 50 (4) :114. 1987; FI 12:350. 1995.

E. glandulosum H.B.K. Nov. Gen. & Sp. 4: 122. 1820; *non* Michaux (1803); Journ. Bom. Nat. Hist. Soc. 64 (1): 83. 1967.

Local Name: Kalo Banmara (Nep.).

A perennial undershrub, about 1m tall. Stem reddish, covered with fulvous-glandular hairs, reddish. Leaves opposite; petioles 1.2-3.5cm; lamina 3-8 x 1.8-3.5cm, rhomboid-elliptic or almost triangular; crenate-serrate (entire at base), acute, base cuneate, dark green, coarse, almost glabrous above, glandular-hairy beneath. Heads 0.5 cm across, discoid, arranged in corymbs. Involucral bracts tri-seriate. Florets white, longer than involucre. Achenes 5-angled, linear-oblong, glabrous. Pappus less than 0.3cm long, hairs minutely barbed, ash white.

Flr.: Jun. - Sep. *Fr.*: Jul. - Oct.

Specimen Cited: Mulkharka, 2070m, **AP Das & PC Rai** 1157, dated 29.4.1995.

Status: Abundant.

Local Distrib.: Phaparkheti, Kuwapaani, Mulkharka, Samsing. 700-2000m.

General Distrib.: Pantropic weed. Native of Mexico.

Note: Dried leaves used extensively as potent manure in the cultivation of ginger.

Euaptorium odoratum L., Syst. Nat. ed.10:1205. 1759; FBI 3:244. 1881; FI 12:354. 1995.

Chromolaena odorata (L.) King & Robinson in Phytologia 20:204.1970; Nam. Chang. Flr. Pl. 124. 1987.

Erigeron bonariensis L., Sp. Pl. 836. 1753; Fl. Jow. 1:264.1981; Fl. Meg. 2:521. 1987.

E. linifolius Willd., Sp. Pl. 3:1955. 1804.

Local Name: Banmara (Nep.).

Herbs or undershrub to 1.5 m high. Stem branched, green, glabrous. Lamina 1.2-6 x 0.35-1.5 cm, linear lanceolate, elliptic or oblanceolate-spathulate, margin serrate-incised, entire, acute, base cuneate, adpressed hairy. Heads 1.1-1.4 cm diam., radiate. Involucral bracts lanceolate-elliptic. Receptacle glabrous. Ray florets oblong, whitish, often purple-tinged; disc florets yellowish; pappus more than 0.5cm, whitish and copious. Achenes minute.

Flr. & Frt.: Jun. - Dec.

Specimen Cited: Samsing, 750 m, AP Das & PC Rai 1732, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Gorubathan. Upto 1300m.

General Distrib.: Native of America; naturalised in Tropical Asia.

GNAPHALIUM L.

Key to the species:

1. Herbs upto 25cm tall; stem unbranched; heads 0.4cm across, consisting of only disc florets.....*G. luteo-album*
1. Herbs upto 48cm tall; stem with basal procumbent branches; heads *ca* 0.2cm across, consisting of both the ray and disc florets.....*G. purpureum*

Gnaphalium luteo-album L., Sp. Pl. 851. 1753; FBI 3:288. 1881. subsp. *affine* (D. Don) Koster in Blumea 4 (3):484. 1941; FI 13:87. 1995.

Gnaphalium affine D. Don., Prodr. Fl. Nep.173. 1825; FBI 7:288. 1881; FEH 1:339. 1966; 3:116. 1975; EFPN 3:29. 1982; TBRI 50(4):115. 1987.

G. multiceps Wallich *ex* DC., Prodr. 6: 222. 1838.

G. luteoalbum var. *multiceps* (Wallich *ex* DC.) Hk. f. in FBI 3: 288. 1881.

Annual erect herbs, 14-25 cm tall. Stem usually unbranched, woody, white hairy. Leaves sessile, half-clasping, 2-4.5 x 0.3-0.6 cm, oblong spathulate, entire, acute to rounded (lower ones usually blunt, upper narrow), gray or white woolly-haired, medianly uninerved. Flower-heads upto 0.4 cm across, globular, clustered in dense solitary or branched groups, terminal, bright shining yellow. Involucral bracts 0.25cm, oblong-blunt, glistening, papery. Ray florets absent. Disc florets tubular, outer female, inner ones bisexual. Style arms truncate.

Flr. & Frt.: Feb. - Oct.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 031, dated 13.6.1994; Rechila, 2490m, AP Das & PC Rai 1198, dated 03.5.1995.

Status: Abundant.

Local Distrib.: Jaributti, Alubari, Sakam Forest, Kuwapaani. 1400-2300m.

General Distrib.: Himalayas, Myanmar, Thailand, Indo-Chin, Java, China and Japan.

Gnaphalium purpureum L., Sp. Pl. 854. 1753; FBI 3:289. 1881; FI 13:92. 1995; TBRI 50 (4):115. 1987.

Erect annual herb to 48cm. Main stem erect, tomentose. Basal branches procumbent. Lamina sessile, 2-6 x 0.2-1cm, spathulate, base narrowed, entire, tip shortly mucronate or broadly rounded, pubescent above. Heads in spicate globose clusters, ca 0.2cm across. Peduncle 0.1cm long. Involucral bracts many-seriate, usually oblong-spathulate, brownish or occasionally pinkish at the ends. Ray florets female, to 0.1cm, with pinkish filiform corolla. Disc florets bisexual, to 0.2cm long. Achenes small (0.05cm), oblong. Pappus basally united and white.

Flr. & Frt.: Aug. - Jun.

Specimen Cited: Below Jaributti, 1990m, AP Das & PC Rai 0470, dated 15.10.1994.

Status: Abundant in lower and open areas.

Local Distrib.: Machuki, Tiffin Dara, Phari, Samsing, Gorubathan. 400-2000m.

General Distrib.: Himalayas, W. Ghats (Nilgiris, Jammu and Kashmir, West Bengal, Tamil Nadu, Maharashtra), Pakistan, N. and S. America.

GYNURA Cass.

Gynura cusimbua (D. Don) S. Moore in Journ. Bot. 1:212. 1912; FEH 1:340. 1966; EFPN 3:29. 1982; TBRI 50(4):115. 1987.

Cacalia cusimbua D. Don., Prodr. 179. 1825.

Gynura angulosa DC. Prodr. 6:298. 1837; FBI 3:334. 1881.

Erect herb, 50-150 cm tall. Leaves alternate, sessile; lamina 8-22 x 3-7 cm, oblong or oblanceolate, margin irregularly toothed, acuminate, base attached to stem (base of upper leaves often lobed), glabrous to sparsely hairy, mid-nerve prominent and impressed above, elevated beneath, lateral nerves upto 22 pairs. Corymbs both terminal and axillary. Involucral bracts uniseriate with scarious margins. Heads many, 1.2-1.8cm across, discoid. Pappus hairs whitish. Achenes ribbed and glabrous.

Flr.: Oct. - Jan. *Frt.:* Dec. - Mar.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0597, dated 16.10.1994.

Status: Frequent.

Local Distrib.: Reshete, Mulkharka, Chonkobhir, Rechila Middle, Alubari. 1900-2500.

General Distrib.: Nilgiri, Himalayas, Myanmar, Thailand and China.

INULA L.

Key to the species:

1. Heads in terminal corymbs, to 0.8cm across; ray florets 0.4-0.5cm; disc florets 0.4-0.5cm long.....*I. cappa*
1. Heads in clusters of 3-5 in axillary raceme, 1.5-1.8cm across; ray florets 0.8-1.1cm; disc florets 0.7-0.8cm long.....*I. rubricaulis*

Inula cappa DC., Prodr. 5:469. 1836; FBI 3:295. 1881; FEH 1:340. 1966; 2:138. 1971; EFPN 3:30. 1982; TBRI 50 (4):117. 1987; FI 13:13. 1995.

Conyza cappa Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 176. 1875.

Erect stout shrubs, tomentose. Stem upto 2m high, branched. Leaves subsessile or shortly petiolate (petioles 0.8cm), lamina 6-16 x 2-6.5cm, oblong-lanceolate, acute, base amplexicaul, margin irregularly toothed, hairy above, tomentose beneath. Heads ca 0.8cm across, in terminal corymbs, densely silky. Peduncles upto 13cm long. Involucral bracts many seriate, 0.45-0.7cm long, usually subulate and hairy. Ray florets 0.4-0.5cm, revolute and yellowish; disc florets upto 0.3-0.4cm long, tubular, 5-lobed, yellow. Cypsela 0.1-0.15cm long, silky hairy. Pappus 0.5-0.6cm long, whitish yellow.

Flr.: Oct. - Mar. *Fr.:* Dec. - Apr.

Specimen Cited: Above Phari, 1150m, AP Das & PC Rai 1440, dated 08.10.1995.

Status: Vary Common.

Local Distrib.: Suntalay, Gorubathan, Phaparkheti, Samsing, Phari. 400-1200m.

General Distrib.: India (Himalayas and N.E. region), Bhutan, Myanmar, China, Thailand and Indonesia.

Inula rubricaulis Clarke, Comp. Ind. 126. 1876; FBI 3:296. 1881; RBSI 19 (2):55. 1966; EFPN 3:31. 1982; TBRI 5094):117. 1987; FI 13:25. 1995.

Amphiraphis rubricaulis DC., Prodr. 5:343. 1936.

1-2m high glabrous shrubs. Root-stock woody. Stem flexuous, pubescent. Leaves sessile; lamina 9-14.5 x 3-4cm, elliptic-lanceolate, acuminate, serrate, glabrous, nerves parallel. Heads heterogamous, 1.5-1.8cm in diam., in a cluster of 3-5 borne in axillary racemes. Peduncles stout and tomentose. Involucral bracts upto 0.6-0.9cm long, lanceolate, acuminate, purple. Ray florets 0.8-1.1cm, revolute, yellow; ligules 0.5-0.6 x 0.2-0.3cm, trilobed. Disc florets 0.7-0.8cm long, tubular, yellow. Ray floret achenes upto 0.2cm long, cylindrical; disc floret achenes only upto 0.15cm long, glossy, silky hairy. Pappus 0.6-0.7cm long, white.

Flr.: Dec. - Feb. *Fr.:* Jun. - Apr.

Specimen Cited: Machuki, 1550m, **AP Das & PC Rai**, 1709, dated 17.5.1997.

Status: Less Common.

Local Distrib.: Tiffin Dara, Machuki, Kuwapaani, Sakam. 800-1600m.

General Distrib.: Indian part of Subtropical Himalayas and N.E. region, Nepal, Bhutan, Myanmar and China.

LACTUCA L.

Lactuca graciliflora DC., Prodr. 7:139. 1838; FBI 3: 406. 1881; EFPN 3:32. 1982; TBRI 50 (4):118. 1987; FI 12:289. 1995.

Lactuca rostrata (Bl.) O. Kuntze, Rev. Gen. Pl. 1:349. 1891, FEH 1:341. 1966.

An erect leafy herb upto 70 cm tall. Stem simple, sometimes branched above, stout at base. Leaves petiolate (petioles upto 3.2 cm long), lower ones pinnate or pinnatifid, terminal lobe triangular-ovate, irregularly toothed, upper ones sessile, ovate to lanceolate, glabrous both surfaces. Panicles very large, upto 45cm long, open. Peduncles slender. Heads many, upto 1 cm long, drooping, white, glabrous. Bracts 0.5-0.7cm, spatulate. Ray florets 0.55-0.75 cm, purple. Achenes narrowly oblong or often oblanceolate, smooth. Pappus 0.55-0.65cm white.

Flr.: Sep. - Dec. *Fr.:* Oct. - Apr.

Specimen Cited: Tangta, 2805m, **AP Das & PC Rai** 0822 dated, 21.10.1994.

Status: Less Common.

Local Distrib.: Zero Point, Rechila Durpinay, Middle Rechila, Todey-Tangta, Ruka. 1900-2800m.

General Distrib.: E. Himalya, China.

MYRIACTIS Less.

Myriactis nepalensis Less. in Linnaea 6: 128, t. 2. 1831; FBI 3:247. 1881; FEH 1:342. 1966; 2:139. 1971; 3:117. 1975; EFPN 3:35. 1982; TBRI 50(4):120. 1987; FI 12:134. 1995.

M. wallichii Less in Linnaea 6:129. 1831; FBI 3:247. 1881.

Erect branched herbs upto 80 cm high. Stem round. Leaves alternate; petioles upto 1.3 cm long, winged; lamina 2.2-10.5 x 0.8-3.5 cm, ovate or lanceolate, distantly irregular toothed, acute, base narrowed, dark green, sparsely hairy above, nerves prominent. Heads 0.7-1 cm across, paniced on long peduncles, radiate. Receptacle convex. Ray-florets whitish. Disc-florets yellowish. (**Plate XXII**).

Flr.: Apr. - Sep. *Fr.:* Jul. - Oct.

Specimen Cited: Thosum Beat, 2590-2780m, **AP Das & PC Rai** 0915, dated 23.10.1994.

Status: Abundant.

Local Distrib.: Ruka Hill, Thosum Beat, Chitray, Reshete, Chouda Feri. 1900-2800m.

General Distrib.: Iran, Turkey, afganistan, Pakistan, Himalayas, Thailand, Indo-Chin and China.

PRENANTHES L.

Prenanthes khasiana C.B. Clarke, Comp. Ind. 273. 1876; FI 12: 315. 1995.

Annual to biennial herbs, upto 100 cm tall. Stem erect, slender. Upper leaves 7-9.5 x 3-5.5 cm, lanceolate or oblong-lanceolate; lower ones oblong-ovate, deltoid, 3-lobed and with a pair of pinnules, margin with ciliate teeth, hairy. Inflorescence long paniced. Head 1.35 x 0.2cm, cylindric. Involucral bracts in two rows, outer shorter, ovate; inner 1.1 x 0.2 cm, linear or lanceolate, obtuse. Peduncles stout. Ligules purple. Achenes 0.55cm long, oblanceolate, brownish black. Pappus as long as achenes, dirty white.

Flr. & Frt.: Sep. - Nov.

Specimen Cited: On way to Rechila Chowk, 1980m, AP Das & PC Rai 0710, dated 19.10.1994.

Status: Less Common.

Local Distrib.: Pankhasari, Dhamdhamay Dara, Ruka Hill. 1800-2500m.

General Distrib.: E. Himalaya.

SAUSSUREA DC.

Key to the species:

1. Leaves auriculate, lower ones pinnately lobed; heads usually solitary, 2-4cm diam., involucral bracts linear to lanceolate; pappus in 2 rows.....*S. auriculata*
1. Leaves deltoid or triangular-ovate, not auriculate, lower ones lyrate-pinnatifid; heads many, 1.5-2.5cm diam., involucral bracts ovate; pappus single.....*S. deltoidea*

Saussurea auriculata (Spreng ex DC.) Sch. Bip. in Linnaea 19:331. 1846; FEH 2: 139. 1971; 3:117. 1975; EFPN 3:38. 1982; FI 12:192. 1995.

Cnicus auriculatus Wallich, Cat. 100 n. 2899. 1831.

Aplotaxis auriculata Spreng. ex DC., Prodr. 6: 541. 1838.

Saussurea hypoleuca Spreng. ex C.B. Clarke, Comp. Ind. 234. 1876; FBI 3: 374. 1881.

Erect perennial plants, 50-90 cm high. Stem leafy, usually unbranched or sparsely branched above. Leaves auriculate basally, lower ones larger than upper ones, 7-14 x 3-7 cm, auriculate, pinnately lobed, terminal lobe larger, triangular; lateral lobes backward-pointed, smaller and triangular, thinly hairy and rough above, white felted beneath. Flower heads 2-4cm diam., globular, usually solitary, consisting of disc florets only. Involucral bracts many, linear or nearly lanceolate, sometimes recurved, purple. Receptacle with bristly scales. Fruit with 2 rows of pappus, inner ones being longer and feathery, bases of pappus fused in a ring.

Flr.: Jul. - Sep. *Frt.:* Sep. - Jan.

Specimen Cited: Jorhpokhari, 3040m, AP Das & PC Rai 0729, dated 19.10.1994.

Status: Frequent.

Local Distrib.: Jorhpokhari, Thosum, Rechila Peak. 2700-3100m.

General Distrib.: Himalayas (Kumaon-Bhutan).

Saussurea deltoidea (DC.) C.B. Clarke, Comp. Ind. 235.1876; FBI 3: 374.1881; Act. Phytotax. Geobot. 19:13.1961; FEH 1: 342.1966; 2:140.1971; TBRI 50(4):126.1987; FI 12:197. 1995.

Aplotaxis deltoides DC., Prodr. 6:541. 1838.

An erect perennial herbs. Stem branched above, white hairy. Leaves petioled (petiole 0.3-0.6 cm), lamina 3-8 x 1.3-2.5 cm, very variable, upper deltoid or triangular ovate, lower lyrate-pinnatifid, sinuate-toothed, acute, base narrow, above glabrous and greenish, beneath white-tomentose, nerves prominent below. Flower heads 1.5-2.5 cm long, peduncled, scattered or nodding paniced. Involucral bracts ovate, often with lanceolate tips and purple margins. Pappus single. Achenes 4-5 angled, tubercled or scaly.

Flr.: Sep. - Dec. *Fr.:* Oct. - Jan.

Specimen Cited: Thosum Beat-Jorhpokhari, 2590-3040m, AP Das & PC Rai 0948, dated 25.10.1995.

Status: Less Common.

Local Distrib.: Tinsimana, Jorhpokhari, Thosum. 2000-3000m.

General Distrib.: Himalayas (Garhwal-Bhutan), Myanmar, S. China.

SENECIO L.

Key to the species:

1. Climber; stem zigzag; petioles simple; lamina hastate or ovate-hastate, margin entire or coarsely toothed; corymbs both lateral and terminal*S. intermedius*
1. Herbs; stem not zigzag; petioles winged, basally auricled; lamina lanceolate; margin pinnatifid with dentate triangular, lateral lobes; corymb terminal*S. biligulatus*

Senecio biligulatus W.W. Smith in JASB n.s. 7: 69.1911; FI 13: 243. 1995.

Rhizomatous perennial herbs, 70-100cm tall. Stem flexuous, hairy. Petioles winged and basally auriculate, auricles dentate; lamina 5.5-12 x 2.2-5.4 cm, lanceolate, margin pinnatifid and lobed into triangular, dentate lateral lobes, hairy above. Capitula densely arranged in terminal corymb. Involucral bracts upto 0.5cm long, linear, obtuse at apex. Ray florets 0.45-0.5 cm, linear-oblong, yellowish. Disc florets 0.35-0.4cm long, yellow. Achenes ribbed, glabrous. Pappus white.

Flr. & Fr.: Jun. - Sep.

Specimen Cited: Mulkharka, 2120 m, **AP Das & PC Rai** 1142, dated 29.4.1995.

Status: Less Frequent.

Local Distrib.: Neora Valley-Sikkim Border, Mulkharka, Dhamdhamay Dara, Reshete. 2100-2600m.

General Distrib.: Eastern Himalayas (Nepal-Bhutan), Myanmar.

Senecio intermedius Wight, Ic. t. 1135. 1846; FI 13:259. 1995.

Senecio scandens Hamilt. ex D. Don, Prodr. Fl. Nep. 178. 1825; FEH 1:344. 1966; 2:140. 1971; EFPN 3:42. 1982; TBRI 50(4):127. 1987.

Climber with zig-zag branches. Stem stout, grooved, glabrous. Leaves petiolate (petioles 0.4-1.3 cm), lamina 2.5-8.5 x 0.9-3cm, hastate or ovate-hastate, entire or coarsely toothed, acuminate, base oblique, green and glabrous above, thinly pubescent beneath, lateral nerves upto 7 pairs. Flower heads 0.7-0.9 cm long, bright yellow, clustered in lax lateral and terminal corymbs. Involucral bracts linear-oblong, acute, glabrous. Ray-florets 0.5 cm, ligulate. Achenes slender, 4-ribbed, hairy.

Flr.: Oct. - Jan. *Frt.:* Dec. - Mar.

Specimen Cited: Chouda Feri, 2285m, **AP Das & PC Rai** 0368, dated 14.10.1994.

Status: Common.

Local Distrib.: Thartharay, Rechila, Chouda Feri, Chitray. 1900-2600m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), Meghalaya, Myanmar, India, Sri Lanka, Thailand, S. China, Japan.

SIEGESBECKIA L.

Siegesbeckia orientalis L., Sp. Pl. ed 1:100. 1753; FBI 3:304. 1881; FEH 1:344. 1966; 2:140. 1971; EFPN 3:43. 1982; TBRI 50(4):127. 1987; FI 12:407. 1995.

Tall erect annual herbs upto 160cm, glandular, pubescent. Leaves long petioled; lamina 7-14cm across, triangular ovate, acute, crenate, base truncate, pubescent. Capitula ca 2 x 0.9-1.2cm, dull yellow. Involucral bracts 2-seriate, herbaceous, glandular, inner ca 0.2cm, spatulate and spreading, outer ones shorter and glandular. Ray florets female, to 0.2cm long, trilobed, yellowish. Disc florets bracteate (bract upto 1.5cm long), ca 0.2cm, glandular, with oblong anthers. Cypsela ca 0.4cm, incurved, obtuse.

Flr.: Jun. - Dec. *Frt.:* Sep. - Jan.

Specimen Cited: Near Chouda Feri, 2200m, **AP Das & PC Rai** 0959, dated 22.4.1995.

Status: Rare; comparatively more frequent below 500m.

Local Distrib.: Samsing, Gorubathan, Chouda Feri. 400-2200m.

General Distrib.: India, Nepal, Sri Lanka, China, Myanmar, Malaysia, Japan, Australia and other tropical and subtropical regions as well:

Note: Cypsela stick to travellers due to the glandular involucre.

SONCHUS L.

Key to the species:

1. Perennial herb; stem glabrous; cypsela smaller (upto 0.3cm), compressed; pappus shorter (0.6-0.7cm).....*S. wightiana*
1. Annual herb; stem glandular; cypsela 0.3-0.45cm, muricate between 3 ribs; pappus 0.6-0.9cm long.....*S. oleraceus*

Sonchus oleraceus L., Sp. Pl. ed. 1:174. 1753; FBI 3:414. 1881; FEH 1:345. 1966; 2:141. 1971; EFPN 3:43. 1982; TBRI 50(4):127. 1987; FI 12:321. 1995.

Annual, glandular hispid, subumbellately branched herb. Stems 30-120cm tall. Leaves rosette, semiamplexicauled; lamina 8-30 x 3-5cm, lanceolate, basal rosulate, spinulose-toothed, glabrous; auricle entire or pinnatifid. Capitula cylindric, many, all rayed, 1.3-2 x 1-1.8cm, homogamous, laxly subcorymbose. Peduncles long, densely pilose. Involucral bracts multiseriate, connate at base, greenish, outer upto 0.8 x 0.2cm, ovate-lanceolate; inner longer, oblong. Florets yellowish. Ligules yellow. Cypsela 0.3-0.45cm long, elliptic, brownish, muricate between 3 ribs. Pappus to 0.6-0.9cm long, white and copious.

Flr.: Apr. - Aug. *Fr.:* Jun. - Oct.

Specimen Cited: Near Machuki, 1330m, **AP Das & PC Rai** 1712, dated 17.5.1997.

Status: Common.

Local Distrib.: Chonkobhir, Thartharay, Sakam, Algarah, Kuwapaani. 1200-1650m.

General Distrib.: India (throughout subtropical and temperate regions), Nepal, Bhutan, Afganistan, Pakistan, China, Iraq, Iran, Europe, Australia, N. and S. America.

Sonchus wightianus DC., Prodr. 7:187. 1838; Ic. Pl. Ind. Or. 3:t. 1142. 1846; B. Bot. 125:295, 297. 1972; B. Not. 126:185. 1973; EFPN 3:43. 1982; TBRI 50 (4):127. 1987; FI 12:321. 1995.

S. arvensis auct non L., Clarke in Comp. Ind. 27. 1876, p.p.; FBI 3:414. 1881, p.p.; FEH 1:345. 1966; 2:140. 1971; 3:118. 1975.

Perennial herbs, 20-40cm, with creeping root-stock. Stem erect, leafy, glabrous, subumbellately branched above. Leaves 5-9.8 x 1.6-3.1cm, runcinate-pinnatifid, spinous-toothed; cauline leaves semiamplexicauled, auricles rounded. Capitula upto 1.5cm long, in lax corymbs, glandular hispid and dark yellow. Ray florets 0.65-0.7cm long, yellowish. Cypsela 0.24-0.3cm, narrow, compressed and ribbed. Pappus 0.6-0.7cm, white.

Flr.: Apr. - Oct. *Fr.:* Jul. - Dec.

Specimen Cited: Below Zero Point at Chouda Feri, 1700m, **AP Das & PC Rai** 1392, dated 07.5.1995.

Status: Common in open places, grasslands.

Local Distrib.: Kuwapaani, Sakam, Zero Point, Phari, Thartharay. 700-1750m.

General Distrib.: Throughout India, Nepal, Bhutan, Myanmar, China, Pakistan, Afganistan, Indonesia and Philippines.

***SPILLANTHES* Jacq.**

Spillanthes calva DC. in Wight, Contr. Bot. Ind. 19. 1834; Prodr. 5:625. 1836; FEH 2:141. 1971; EFPN 3:45. 1982; TBRI 50 (4):127. 1987; FI 12:409. 1995.

S. pseudo-acmella Murr., Syst. ed. 13:610. 1774, non L.

S. acmella var. *calva* (DC.) Clarke, Comp. Ind. 138. 1876; FBI 3:307. 1881.

Local Name: Kalijhar (Nep.).

15-35cm tall diffuse annual herbs. Leaves opposite; petioles upto 2cm long; lamina 4-7 x 1.5-2.8cm, ovate, acute, serrate, 3-nerved. Capitula 0.7-0.82cm in diam., either in solitary paniculate peduncles, yellow. Involucral bracts 2-seriate, 0.3-0.4cm long, ovoid. Peduncles upto 11cm long. Heads 0.6-0.85 x 0.8-1cm, ovoid. Receptacle conical. Ray florets uniseriate, ligulate (ligule 0.14cm), yellowish. Disc florets to 0.15cm, tubular. Cypselas small and smooth. Pappus usually absent.

Flr.: Jul. - Sep. *Fr.:* Aug. - Nov.

Specimen Cited: Near Machuki, 1330m, **AP Das & PC Rai** 1706, dated 17.5.1997.

Status: Abundant in low altitude.

Local Distrib.: Kuwapaani, TiffinDara, Samsing, Phaparkheti, Lava. 500-1500m.

General Distrib.: E. Himalaya (Darjeeling, Sikkim, Assam), Nepal, Sri Lanka, China, Myanmar, Indonesia, Malaysia.

***SYNEDRELLA* Gaertn.**

Synedrella nodiflora (L.) Gaertn., Fruct. et. Sem. 2:456. T. 171.f. 7. 1791; FBI 3:308. 1881; FEH 1: 345. 1966; Fl. Meg. 2: 531. 1987; FI 12: 413-415. 1995.

Pseudognaphalium luteo-album (L.) Hillard et Burt. in Bot. J. Lin. Soc. 82: 206. 1981, Fl. Meg. 2: 530 1987; Nam. Chang. Flr. Pl. 460. 1987.

Gnaphalium luteo-album L., Sp. Pl. 851. 1753; FBI 3: 288. 1881; Fl. Meg. 2: 531. 1987.

Verberina nodiflora L., Cent. Pl. 1: 28. 1755; Amoen. Acad. 4: 290. 1759.

Erect herb upto 1.3m tall. Stem terete, pilose; hairs white. Petioles to 2cm, winged; leaf lamina 3.2-9.8 x 1.35-1.5cm, ovate-elliptic; acute, base cuneate or rounded, sub-entire to serrate, trinerved, appressed hairy both sides. Heads 0.4-0.6cm across, clustered in radiate groups of 1-4, also arising from leaf axils. Outer involucral bracts to 1.5 x 0.4cm, foliaceous, greenish, inner ones 0.65 x 0.15cm, membranous. Receptacle convex. Ray-florets 6-8, corolla upto 0.4 cm long, yellowish; ovary flattened, oblong; style branched, pubescent. Disc florets to 0.4cm long with narrow tube, corolla pubescent, yellowish; anthers inconspicuous; ovary oblong with two apical awns; styles branched, pilose.

Achenes dimorphic with ray achenes upto 0.5 x 0.2cm, oblanceolate, narrowly winged. Disc achenes to 0.4cm long, tuberculate, pubescent and black.

Flr. & Frt.: Throughout the year.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1441, dated 08.10.1995.

Status: Common.

Local Distrib.: Samsing, Gorubathan. Upto 700m.

General Distrib.: India (Marshy places of West Bengal, Madhya Pradesh, Assam, Tamil Nadu, Kerala and Andaman and Nicobar Islands), Sri Lanka, China, Malaya, tropical America and West Indies.

SYNOTIS (C.B. Clarke) Jeffrey et Chen

Key to the species:

1. Climbing herb.....*S. tetrantha*
1. Plants herbs or undershrubs.....2
2. Lamina margin doubly serrate; petiole base auriculate; undershrub.....*S. cappa*
2. Lamina margin sinuate toothed or serrate; petioles simple or winged; herbs3
3. Herbs 45cm high; stem leafy; petioles winged.....*S. alata*
3. Herbs upto 28cm high; stem leafless; petioles not winged.....*S. wallichii*

Synotis alata (Wallich ex DC.) Jeffrey et Y.L. Chen, KB 39(2):308. 1984; FI 13:287. 1995.

Senecio alatus Wallich ex DC., Prodr. 6:368. 1838; FBI 3:353. 1881; FEH 1:343. 1966; 2:140. 1971; 3:118. 1975; EFPN 3:41. 1982; TBRI 50(4):127. 1987.

Small stout pubescent herb upto 45 cm tall. Stem simple, long, shaggy below. Leaves few; petioles long upto 9 cm, with toothed and dilated wings; lamina 8-14.5 x 5.5-11cm, ovate-cordate, upper stem leaves lanceolate, serrate, membranous, acuminate, base round-cordate, dark green, densely hairy, nerves distinct, lateral nerves upto 8 on either halves. Heads shortly pedicelled, ligulate, arranged in thyrsoid branched panicles. Involucral bracts linear, obtuse, hairy. Pappus white. Achenes slender, puberulous.

Flr.: Oct. - Jan. *Frt.:* Dec. - May.

Specimen Cited: Rechila, 2280m, AP Das & PC Rai 0406, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Chitray, Hattidara, Rechila, Ruka. 2200-2700m.

General Distrib.: Himalayas (Kumaon-Bhutan).

Synotis cappa (Buch.-Ham. ex D.Don) C. Jeffrey et Y.L.Chen in KB 39(2):319. 1984; FI 13:291. 1995.

Senecio cappa Buch-Ham. ex D.Don, Prodr. Fl. Nep. 179.1825; Fl. Jow. 1: 267. 1981; Fl. Meg. 2:525. 1987.

S. densiflorus Wallich ex DC. Prodr. 6:369. 1838; FBI 3: 355. 1881; Ind. Trees 403.1906; Fl. Asm. 3:123. 1939.

S. densiflorus Wallich ex DC. var. *lobbii* Hk. f. , FBI 3:355. 1881.

A perennial undershrub, 1-2 m high, often looking gregarious. Stem stout, somewhat wooly, all young parts gray-white. Petioles upto 1.6cm long, often auricled at base, white felted; leaf lamina 10.5-20.5 x 4-8.2 cm, obovate, oblanceolate-elliptic or elliptic, margin doubly serrate, acute, base narrow, harsh above with stiff hairs above, adpressed gray or white cottony hairy beneath, lateral nerves 13-19 on either halves, raised and prominent on undersurface. Flower heads 0.6-0.9 cm in axillary and terminal paniced corymbs; involucre white, involucral bracts wooly, linear, acute; florets yellow, ray florets 8-10; anthers tailed, yellow. Achenes brown, obscurely 5-angled; pappus fibrous and bright white.

Flr.: Nov. - Dec. *Frt.*: Feb. - Apr.

Specimen Cited: Mulkharka-Rechila Middle, 2000-2350 m, **AP Das & PC Rai** 1151, dated 29.4.1995.

Status: Frequent.

Local Distrib.: Rechila, Mulkharka, Thartharay, Lava. 1800-2350m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Myanmar, W. China.

Synotis tetrantha (DC.) C. Jeffrey et Y.L. Chen, KB 39(2):308. 1984; FI 13:299. 1995.

Senecio tetranthus DC., Prodr. 6:370. 1838; FEH 1:344. 1966; TBRI 50(4):127. 1987.

Climbing herb. Branches terete, glabrous. Leaves alternate; petiole upto 2.5cm long, pubescent; lamina 5.5-8 x 3.5-5 cm, ovate-cordate, serrate, acuminate, base cordate, almost glabrous both sides, dark green, nerves much prominent beneath. Capitula thyriform panicle. Involucral bracts upto 0.55cm long, cylindrical, glabrous. Peduncles densely pubescent. Bracts 4-6, upto 0.65cm long, oblong with scariou margins. Ray florets 0.45-0.55cm, linear, tube 0.23-0.26cm long. Disc florets 2, longer than ray florets (upto 0.75cm long), exerted. Achenes upto 0.25cm long, puberulous; pappus 0.5-0.55cm long, reddish white. (**Plate XXIII**).

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 0197, dated 15.6.1994.

Status: Sparse.

Local Distrib.: Alubari, Dhamdhamay Dara. 2200-2550m.

General Distrib.: E. Himalaya.

Synotis wallichii (DC.) C. Jeffrey et Y. L. Chen, KB 39 (2):305. 1984; FI 13:302. 1995.

Senecio wallichii DC., Prodr. 6:364. 1838; FBI 3:353. 1881; TBRI 50 (4):127. 1987.

Small herbs to 28 cm tall, pubescent. Stem (scape) woody below, leafless, flowering stem hairy and wooly above. Leaves radical, whorled; petioles 2-12cm long, hairy; lamina 2.8-9 x 2.1-7.3cm, broadly ovate-cordate, margins wavy and sinuate-toothed, membranous,

acute-acuminate, base deep cordate, green and thinly hairy above, nerves distinct, hairy beneath. Flower heads upto 1cm, with 2 ray-florets and a few disc-florets. Involucral bracts 0.2 cm broad, oblong and blunt. Ligules 2. Pappus white. Achenes glabrous.

Flr. & Frt.: Sep. - Nov.

Specimen Cited: Tinsimana, 2900m, AP Das & PC Rai 0772, dated 20.10.1994.

Status: Common.

Local Distrib.: Tinsimana, Jaributti, Hattidara, Todey-Tangta. 2100-2900m.

General Distrib.: Himalayas.

TARAXACUM *F.H. Wiggers*

Taraxacum officinale Weber in Wiggers, Prim. Fl. Holset 56. 1780; FBI 3:401. 1881; EFPN 3:46. 1982; TBRI 50 (4):128. 1987; FI 12:252. 1995.

Small scapigerous rosette perennial herb, 20-30cm high. Root-stock woody and deep seated. Leaves rosette, sessile, lamina 4-6 x 1.2-2.5cm, oblanceolate-linear, runcinate-pinnatifid below, sinuate above with acute lobes. Capitula to 1cm in diam., solitary, homogamous, borne on long leafless peduncles (6-11cm). Involucral bracts multiseriate, herbaceous, subequal, linear-oblong, usually erect or sometimes reflexed. Florets all rayed, yellowish; ligules 0.45-0.55 x 0.2-0.35cm, 5-lobed; anthers sagittate; style arms exerted. Cypselas to 0.2cm, usually 4-5 angled, obovoid, ribbed, glabrous; contracted beak above upto 0.3cm long. Pappus unequal.

Flr.: May - Nov. *Frt.:* Jun. - Jan.

Specimen Cited: Near Lava, 2040m, AP Das & PC Rai 0324, dated 18.6.1994.

Status: Common in open places.

Local Distrib.: Sakam, Tiffin Dara, Lava, Kuwapaani. 1500- 2050m.

General Distrib.: Himalayas.

TITHONIA *Desf. ex Juss.*

Tithonia diversifolia (Hemsl.) A. Gray in Proc. Amer. Acad. 19:5. 1883; FEH 1:346. 1966; EFPN 3:47. 1882; TBRI 50 (4):129. 1987.

Mirasonia diversifolia Hemsl., Bibl. Centr. Amer. Bot. 2:168. 1881.

Local Name: Titeni (Nep.).

Shrubby forming thickets, to 1.5-3m high, young parts tomentose. Root-stock woody. Stem dark brown. Leaves alternate; lamina 7-15 x 4.5-8cm, pinnatifid with serrate lobes, white hairy beneath, base narrowed into the petioles. Capitula upto 3.6cm in diam., solitary, borne on axillary and terminal peduncles, peduncles long upto 8cm, hollow. Involucral bracts many, 1-1.4 x 0.4-0.5cm, obovate-lanceolate, acute, margin scarious. Ray florets uniseriate, 5-7 x 0.8-1.4cm, oblong to spatulate, bright yellow. Disc florets

1-1.2cm long, tubular, yellowish. Cypsela 0.5-0.6cm, tapering towards base. Pappus nil. Flower bracts 5 to many, membranous.

Flr.: Oct. - Feb. *Fr.*: Dec. - Mar.

Specimen Cited: Above Suntalay, 850m, **AP Das & PC Rai** 1716, dated 17.5.1997.

Status: Abundant upto 1500m.

Local Distrib.: Phari, Samsing, Machuki, Gorubathan. 450-1500m.

General Distrib.: Native of Mexico. Widely naturalised in Darjeeling Hills.

TRIDAX L.

Tridax procumbens L., Sp. Pl. ed. 1:900. 1753; FBI 3:311. 1881; FEH 1:346. 1966; 2:141. 1971; 3:118. 1975; EFPN 3:47. 1982; TBRI 50 (4):129. 1987; FI 12:418. 1995.

Perennial herbs, 20-60cm high. Stem rooting, hispid with straggling and procumbent branches. Leaves opposite; petioles 0.5-1.5cm long; lamina 1.5-5.5 x 0.8-1.6cm, elliptic-ovate to lanceolate, acute, irregularly serrate, base cuneate. Heads 1-1.7cm across, radiate, solitary, heterogamous. Peduncles straight, hirsute. Involucral bracts 2-3 seriate, outer 0.5-0.65 x 0.2-0.25cm, ovate-lanceolate, densely glandular hairy, inner longer than outer ones, oval, cuspidate and thinly hairy. Ray florets 0.55-0.8cm long, white, outer bifid, inner trifid. Disc florets numerous, 0.35-0.55cm, yellowish to purple tinged, 5-lobed; styles branched and revolute. Achenes 0.15-0.2cm long, oblong or obconical, silky. Pappus many, 0.4-0.6cm long, feathery-bristly.

Flr.: Jun. - Sep. *Fr.*: Jul. - Dec.

Specimen Cited: Above Phari, 1150m, **AP Das & PC Rai** 1442, dated 08.10.1995.

Status: Common among grass in lower altitude.

Local Distrib.: Samsing, Phari, Machuki, Todey, Gorubathan. 450-1300m.

General Distrib.: Pantropic weed of S. American origin.

VERNONIA Schreb.(*nom. cons.*)

Vernonia cinerea (L.) Less in Linnaea 4:291. 1829; FBI 3:233. 1881; FEH 1:346. 1966; EFPN 3:56. 1982; FI 13:367. 1995.

Conyza cinerea L., Sp. Pl. 862. 1753.

Small, erect annual or perennial herbs to 75cm tall. Stems terete, pubescent and ribbed. Branches glandular. Leaves sessile or shortly stalked, upto 8 x 3cm, variable shape, acute or obtuse, margin undulate or entire, usually glabrous. Heads in loose corymbose panicles. 0.4-0.5cm across, many flowered. Involucral bracts many seriate, lanceolate, outer ones much shorter (*ca* 0.15cm) than inner ones. Achenes upto 0.15cm long, terete, silky. Pappus hairs biseriate, whitish.

Flr. & Fr.: Throughout the year.

Specimen Cited: Above Samsingi, 870m, AP Das & PC Rai 1723, dated 17.5.1997.

Status: Common.

Local Distrib.: Machuki, Sakam, Samsing, Gorubathan, Asala Khola, Phari. 450-1900m.

General Distrib.: Africa, Asia, Australia.

YOUNGLIA Cass.

Youngia japonica (L.) DC., Prodr. 7:194. 1838; FEH 1:347. 1966; 2:142. 1971; EFPN 3:49. 1979; TBRI 50 (4):130. 1987; FI 12:329. 1995.

Prenanthes japonica L., Mant. Pl. 107. 1767.

Crepis japonica Benth., Fl. Hongk. 194. 1861; FBI 3:395. 1881.

Puberulous annual herb. Stems 20-70cm tall, hollow, grooved. Branches arising from rootstock. Leaves rosulate, radical lyrate-runcinate, 6-16 x 1.7-5cm, obovate or oblanceolate, sinuate-toothed; cauline leaves smaller and shorter, linear to lanceolate. Heads 0.45-0.6cm across, in cymose corymbs. Peduncles slender, dichotomously branched, bracteolate. Involucral bracts 6-8, ovate. Flowers all ary florets, 0.45-0.55cm long, yellowish. Cypsela ca 0.2cm long, compressed, reddish brown. Pappus upto 0.4cm long, soft and whitish.

Flr.: Mar. - Jun. *Fr.:* May - Aug.

Specimen Cited: Rechila Durpinay, 2300m, AP Das & PC Rai 1368, dated 06.5.1995:

Status: Abundant in open and semiopen places.

Local Distrib.: Samsing, Phari, Chonkobhir, Rechila, Lava. 700-2300m.

General Distrib.: W. Pakistan, Himalayas (Kashmir-Bhutan), India, east to China, Japan, Malaysia.

CAMPANULACEAE Juss.

Key to the Genera:

1. Plants suberect to erect herbs; fruits indehiscent.....2
1. Plants perennial twinner; fruits dehiscent; corolla campanulate.....*Codonopsis*
2. Flowers purple; pericarp fleshy.....*Campanula*
2. Flowers white; pericarp membranous.....*Peracarpa*

CAMPANULA L.

Campanula pallida Wallich in As. Res. 13:375. 1820; EFPN 3:50. 1982; TBRI 50 (4): 108. 1987.

C. colorata Wallich in Roxb., Fl. Ind. ed. Carey, 2: 101. 1824; FBI 3:440. 1881; FEH 1:326. 1966.

Small herb, suberect, 30cm tall. Branches numerous, flexous. Stem terete, dense silky hairy on upper part. Leaves alternate; lamina 0.3-1.6 x 0.2-0.8cm, ovate-lanceolate, dentate, acute, pilose on both surfaces, veins prominent below, hairs crowded on lines of

veins beneath and light yellow. Flowers pedicellate, 1.3 x 0.5 cm, purple; sepals 5-toothed, nerved, hairy, teeth lanceolate, upto 0.6cm; petals lobed, purple upto 1cm long, hairy. (Plate V: 49).

Flr.: Jun. - Sep. *Fr.*: Aug. - Nov.

Specimen Cited: Dhamdhamay Dara, 2520m, AP Das & PC Rai 0665, dated 18.10.1994.

Status: Common.

Local Distrib.: Hattidara, Lava, Thartharay, Thosum Hill. 2000-2850m.

General Distrib.: Afganistan, Himalayas, S. Tibet, India, Myanmar, W. China.

CODONOPSIS Wallich

Codonopsis affinis Hk. f. and Thoms. in Journ. Lin. Soc. 2:12. 1857; FBI 3:43. 1881; FEH 1:326. 1966; EFPN 3:50. 1082; TRBI 50(4): 110. 1987.

Local Name: Syal ko Moot (Nep.).

Perennial twinner with tuberous rootstock, strongly foetid. Stem soft. Petioles 1.5-2.5 cm long. Lamina 5.5-9.5 x 3-5cm, ovate, sub-entire, acute, base cordate, villous beneath, thinly pilose above. Peduncles 3.5-7.5cm. Flowers solitary, axillary, very foetid; sepals 0.8-1cm, oblong, distant, pilose; corolla 1.5-1.8cm, greenish or purplish, lobes triangular, mouth upto 1.5 cm across; stamens 5, free; stigma trilobed. Capsules 1.5-2cm, hemispherical, with 0.45-0.5 cm long beak; seeds ellipsoid.

Flr.: Aug. - Oct. *Fr.*: Sep. - Nov.

Specimen Cited: Middle Rechila, 2420 m, AP Das & PC Rai 0973, dated 23.4.1995.

Status: Less Frequent.

Local Distrib.: Alubari, Durpinay, Rechila, Lava. 1900-2500m.

General Distrib.: E. Himalaya (Nepal - Sikkim).

PERACARPA Hk. f. et Thoms.

Peracarpa carnososa (Wallich) Hk. f. et Thoms. in Journ. Lin. Soc. 2:26. 1857; FBI 3: 437. 1881; FEH 1:328. 1966; 2:129, f. 8. 1971; EFPN 3:53. 1982; TBRI 50 (4):122. 1987.

Campanula carnososa Wallich in Roxb., Fl. Ind. ed. Carey, 2:102. 1824.

Small, weak, highly variable herb with prostrate bases, 6-17 cm tall. Lower leaves alternate, upper ones opposite; petiole 0.3-1cm long; lamina 0.4-2.2 x 0.4-1.6cm, ovate, crenate, acute, glabrous when immature, sparsely scabrid below when matured, mid vein thick and prominent below. Pedicels upto 2.5cm long. Flowers upto 0.5cm, solitary, axillary, white; sepal 5 toothed, 0.3cm long, persistent; petals upto 0.4cm long, 5 lobed, campanulate, white; stamens 5, free; ovary 3 chambered. Fruits assymetric, white, pericarp membranous.

Flr.: Apr. - Jul. *Fr.*: Jun. - Oct.

Specimen Cited: PHE Source, 2180m, AP Das & PC Rai 0277, dated 17.6.1994; Alubari, 2280m, AP Das & PC Rai 0212, dated 16.6.1994; Dhamdhamay Dara, 2520m, AP Das & PC Rai 0685, dated 18.10.1994.

Status: Common.

Local Distrib.: Dhamdhamay Dara, Alubari, PHE Source, Chouda Feri, Ruka Hill, Thosum Beat. 2000-2850m.

General Distrib.: Himalayas (Garhwal-Bhutan), Meghalaya, N. Myanmar, N. Thailand, China, New Guinea.

LOBELIACEAE R. Br.

Key to the Genera:

1. Fruits capsular, subglobose.....*Lobelia*
1. Fruits berry, globose or ellipsoid.....*Pratia*

LOBELIA L.

Lobelia pyramidalis Wallich in As. Res. 13:376. 1820; FBI 3:426. 1881, p.p.; FEH 1: 327. 1966; EFPN 3:52. 1982; TBRI 50 (4):118. 1987.

Upto 1m tall annual herb, branched upward. Stem almost terete, glabrous. Leaves mostly alternate, opposite in few nodes, upper ones sessile, lower shortly petioled; lamina 2-5.5 x 0.3-1.2cm, linear-lanceolate, serrulate, acute to acuminate, narrow-cuneate, almost glabrous, nerves impressed above, prominent beneath. Recemes both terminal and axillary, only a few flowered, even axillary solitary on lower twigs. Sepal tube 0.6cm, bell-shaped, light brown, hairy, teeth 5, 1cm long, green, leafy with distinct mid-rib, narrowed upward to pointed acuminate, broad and wide below, linear with distantly glandular tipped teeth, pubescent both sides; corolla 1.5cm long, oblique, bilabiate, with a few white vertical lines; anthers black, pilose on the back, some tipped with shiny bristles. Capsule subglobose; seeds ellipsoid.

Frt.: Mar. - Jun. *Frt.:* May - Aug.

Specimen Cited: Thosum Beat, 2780m, AP Das & PC Rai 0842, dated 22.10.1994.

Status: Less Common.

Local Distrib.: Thosum Beat, Ruka Hill, Todey-Tangta, Above Machuki. 1600-2800 m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), Meghalaya, Myanmar, China.

PRATIA Gaudich.

Key to the species:

1. Plants prostrate, densely pubescent; berry ellipsoid.....*P. nummularia*
1. Plants erect, glabrous to sparsely hairy; berry globose.....*P. montana*

Pratia montana (Reinw.) Hasskarl in Flora 25, Beibl. 1:23. 1842; FBI 3:423. 1881; FEH 1:328. 1966; EFPN 3:53. 1982; TBRI 50(4):124. 1987.

Lobelia montana Reinwardt ex Blume, Bijdr. 728. 1826.

Erect herb. Stem rigid, glabrous to sparsely hairy, green to reddish. Root-stock rhizomatous. Leaves alternate; petioles 0.3-1.2cm; lamina 6.2-14.2 x 1.3-3.5cm, lanceolate, finely serrate, long acuminate, base acute, both sides glabrous, dark green above, nerves distinct, thick, lateral veins 4-8 pairs. Flowers axillary, solitary; sepals 5-toothed, teeth linear; corolla green with purple markings, bilabiate, hairy within.; anthers 5, yellowish. Berry with persistent calyx, 1.2cm in diam., pendent, globose, deep red, fruiting pedicel 1-2.1cm; seeds ellipsoid, numerous. (Plate III: 31).

Flr.: Jun. - Sep. *Fr.*: Aug. - Nov.

Specimen Cited: Mulkharka, 2070m, AP Das & PC Rai 1162, dated 29.4.1995; Mulkharka-Rechila Middle, 2240-2490m, AP Das & PC Rai 1169, dated 01.5.1995.

Status: Less Common and found in partially shaded places.

Local Distrib.: Rechila, Mulkharka, Left Hill crest of Hattidara.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Myanmar east to W. China, Malaysia.

Pratia nummularia (Lamk.) A. Br. et Ascherson, Ind. Sem. Hort. Berol 1861, app. 6: 1861; FEH 1 : 328. 1966; EFPN 3:53. 1982; TBRI 50(4): 124. 1987.

Lobelia nummularia Lamk., Encyclimber Meth. 3:589. 1791-92.

Pratia begonifolia (Wallich) Lindley in Bot. Reg. t. 1373. 1830; FBI 3: 422. 1881.

Small creeping, much branched hairy herb, rooting at nodes, densely pubescent, greenish. Leaves alternate; petioles upto 0.25cm, hairy; lamina 0.4-1 x 0.3-0.6cm, ovate, denticulate, acute, oblique and unequal or cordate, both sides pubescent, veins almost indistinct above, impressed beneath. Pedicels 0.5cm, pubescent. Flowers axillary, solitary, hairy; calyx bulbous, greenish, teeth 5, upto 0.45cm long, linear, persistent; corolla bilabiate, pinkish; anthers 5, blackish, white hairy on upper half. Berry ellipsoid, purplish red, crowned with persistent calyx; seeds many, ellipsoid, smooth;

Fr.: Apr. - Sep. *Fr.*: Aug. - Nov.

Specimen Cited: Zero Point, 1985 m, AP Das & PC Rai 1397, dated 07.5.1995.

Status: Rarely found in few open places of the Valley.

Local Distrib.: Zero Point, Mulkharka, Ruka, Todey-Tangta. 1950-2350 m.

General Distrib.: Himalayas, Meghalaya, Myanmar, east to China, Malaysia.

VACCINIACEAE S. F. Gray

Key to the Genera :

1. Flowers pendulous; corolla cylindrical.....*Agapetes*
1. Flowers not pendulous; corolla urn-shaped.....*Vaccinium*

AGAPETES L.

Key to the species:

1. Corolla yellow.....2
1. Corolla red.....3
2. Stem base swollen; lamina ovate-lanceolate, base obscurely subcordate.....*A. hookeri*
2. Stem base not swollen; lamina elliptic-obovate, base cuneate.....*A. smithiana*
3. Pendent epiphytes; flowers solitary, axillary.....*A. serpens*
3. Erect epiphytes or terrestrials; flowers in axillary racemes.....*A. saligna*

Agapetes hookeri (Clarke) Sleumer in Bot. Jahrb. 70:106. 1939; FB 2 (1):402. 1991.

A. incurvata (Griff.) Sleumer var. *hookeri* (Clarke) Airy shaw in KB 1958:486. 1959; EFPN 3:54. 1982; TBRI 50(4):105. 1987.

Pentapterigium hookeri Clarke in FBI 3:450. 1882.

Local Name: Gujru Ganta (Nep.)

Epiphytic shrub to 55cm. Stem base swollen. Leaves sessile, alternate, lamina 3.5-8 x 0.8-2.8cm, ovate-lanceolate, crenate-serrate, acuminate, base insignificantly sub-cordate, coriaceous, nerves prominent, pubescent below, impressed veins above rugose. Pedicels 1.5-2.4cm, thick and hairy at the apex. Flowers in axillary fascicles, usually 2-4, pendulous; sepal lobes upto 0.6 cm, ovate, green; petals tubular, long upto 1.9cm, yellow, ribs hairy; anthers 0.5cm, spurred; ovary pinkish green. Fruit not seen.

Fr.: Jun. - Sep.

Specimen Cited: Rechila-Hattidara, 2280-2549m, AP Das & PC Rai 0615, dated 17.10.1994.

Status: Frequent.

Local Distrib.: Rechila Chowk, Chitray, Right Hill patch of Alubari, Jaributti, Hattidara. 1900-2600 m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan).

Agapetes saligna (Hk. f.) Bentham et Hk. f., Gen. Pl. 2:571. 1876; FBI 3:444. 1881; FEH 1:233. 1966; EFPN 3:54. 1982; TBRI 50 (4): 105. 1987; FB 2(1): 403. 1991.

Vaccinium salignum Hk. f., Ill. Him. Pl. t. 15A. 1955.

Local Name: Angaray/Amilay (Nep.)

Erect shrub to 2m. Stem brownish-gray. Petioles upto 0.5cm; leaf lamina 5-10.5 x 1.1-3.4 cm, lanceolate, entire, acuminate, base cuneate, yellowish green below, dark green above, glabrous. Racemes 6-9 flowered, 3-5cm long. Peduncles 2-4cm, glabrous. Pedicels upto 0.5cm, widened at apex becoming cup-like. Sepals 0.4-0.5cm, 5-toothed, lanceolate, teeth hairy, greenish inside, red-brown outside (in old ones), young ones greenish red; petals tubular, 5-lobed, 0.5-1cm, pinkish green (old ones), yellowish green (young ones); stamens 10, short, free, yellowish; anthers elongated; ovary greenish; style 1, simple. Berry 0.4-0.75 cm, subglobose, slightly 5-lobed; seeds ellipsoid, numerous.

Flr.: Feb. - May *Fr.:* May - Oct.

Specimen Cited: Rechila-Dhamdhamay Dara, 2280-2520m, AP Das & PC Rai 0659, dated 18.10.1994.

Status: Frequent.

Local Distrib.: Hattidara, Dhamdhamay Dara, Rechila Chowk, Chitray. 2200-2600m.

General Distrib.: North-east India, Myanmar.

Agapetes serpens (Wight) Sleumer in Engl., Bot. Jahrb. 70:105. 1939; FEH 1:233. 1966; EFPN 3:54. 1982; TBRI 50(4):105. 1987; FB 2(1):401. 1991.

Agapetes serpens Wight in Calc. Journ. Nat. Hist. 8:171. 1847.

Pentapterigium serpens (Wight) Klotzsch in Linnaea 24:47. 1851; FBI 3:449. 1882.

Local Name: Bhandaray (Nep.).

Pendent shrub growing on rock crevices and tree trunks, 50-100cm long, dense-bristly hairy. Leaves sessile, 0.7-1.8 x 0.4-0.7cm, ovate-lanceolate, margin recurved, entire to remotely serrate, subacute, base rounded, thick, leathery. Pedicels 0.7-1.1cm, glandular hairy. Flower 2.5-3cm, axillary, solitary, pendulous; sepal tube upto 1cm long, 5-angled with distinct 5 reddish nerves and dissected into 5 on terminal apex, lobes lanceolate, blunt, glandular hairy; petals 2-2.5 x 0.4-1.1 cm, tubular, beautifully lined with transverse deep red waves-like markings/rings, red, nerves hairy, lobes 5, 0.3-0.4cm, recurved; stamens 10, free; filaments shorter; anthers 0.6-0.8cm, elongated, apical tube unspurred; ovary 5-celled, inferior; style simple. Berries globose, 5-winged; seeds ellipsoid, numerous. (Plate III: 23).

Flr.: Dec. - May *Fr.:* Apr. - Jun.

Specimen Cited: Jaributti-Rechila, 2160-2490m, AP Das & PC Rai 0999, dated 23.4.1995.

Status: Common.

Local Distrib.: Rechila Middle, Reshete, Pankhasari, Jaributti, Thartharay. 1900-2500 m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh).

Note: Fruits edible.

Agapetes smithiana Sleumer in Engl. Bot. Jahrb. 70:106. 1939; Kew Bull. 13:489. 1959; FEH 1:234. 1966; 2:94. 1971; EFPN 3:54. 1982; FB 2(1): 401. 1991.

Pentapterigium sikkimense W.W. Smith in RBSI 4:268. 1911, non *A. sikkimensis* Airy Shaw 1935; RBSI 11(1): 100. 1926.

Evergreen epiphytic pendent shrub, 1.5m high. Leaves 2.2-3.6 x 1-1.8cm, elliptic-obovate, margin slightly recurved, apex rounded, base cuneate, coriaceous. Pedicels upto 0.5cm long. Flowers in corymbose inflorescence or often solitary; sepals 0.35-0.5cm; corolla 1.3-1.5 cm, mouth 0.35-0.5cm across, yellowish, lobes short; anthers 0.45-0.6 cm. Berries upto 1 cm long.

Flr.: Jan. - Mar. *Fr.:* Mar. - Oct.

Specimen Cited: Dhamdhamay Dara , 2520m, AP Das & PC Rai 0919, dated 23.10.1994.

Status: Less Common.

Local Distrib.: Chitray, Ruka Hill, Thosum Beat, Hill cliff left to Thosum. 2300-2800 m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan).

VACCINIUM L.

Key to the species:

- 1. Leaves shortly petiolate (upto 0.25cm), entire, base attenuate; flowers pinkish white.....*V. retusum*
- 1. Leaves sessile, crenate-serrate, base nearly round; flowers greenish yellow.....*V. vacciniaceum*

Vaccinium retusum (Griffith) Hk. f., FBI 3:451. 1882; FEH 1:241. 1966; EFPN 3:59. 1982; TBRI 50(4):129. 1987; FB 2(1):397. 1991.

Thibaudia retusa Griffith, Not. 4:300. 1854.

Local Name: Ratay (Nep.).

Small shrub growing on rocks, or as epiphyte, 1-2m. Young branches densely hirsute. Leaves alternate; petiole very short (upto 0.25cm); lamina 1-2.5 x 0.7-1.2cm, obovate, margins recurved down, entire, shallowly retuse, base attenuate, glabrous, lower surface faint white. Recemes terminal, usually 9-20 flowered, 2.5 -5cm, pubescent. Pedicels 0.2-0.6cm. Bracts compact and conspicuous, 0.4-0.7 cm, elliptic, pinkish white, caducous. Bracteoles 0.3-0.5cm, scaly. Flowers pinkish white; sepal teeth very short, obtusely triangular; petals 0.25-0.4 x 0.2-0.3 cm, ovoid with tubular base and constricted towards apex, pinkish white, glabrous, shortly lobed, lobes pinkish; stamens 10, free; anther tips 0.1cm and tubular, dorsally spurred; filament with long hairs. Fruits 0.3 x 0.35cm, sub-globose, surrounded by persistent sepals. (**Plate III: 22**).

Flr.: Apr. - Jun. *Fr.:* Jun. - Sep.

Specimen Cited: Jaributti-Alubari, 2195-2280m, AP Das & PC Rai 064, dated 14.6.1994; Chodha Feri-Rechila, 2285-2490m, AP Das & PC Rai 1253, dated 05.5.1995.

Status: Frequent.

Local Distrib.: Ruka Forest, Mulkharka Pokhari, Jaributti, Chonkobhir. 1900-2500 m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Meghalaya, N. Myanmar.

Vaccinium vacciniaceum (Roxb.) Sleumer in Bot. Jahrb. 71:479. 1941; FEH 1:242. 1966; 2:99. 1971; EFPN 3:60. 1982, TBRI 50(4):129. 1987; FB 2(1):399. 1991.

Ceratostema vacciniacea Roxb., Fl. Ind. ed. 2(2): 412. 1832.

V. serratum (G. Don) Wight, Icon. 4: t. 1184. 1848; FBI 3:452. 1882.

Local Name : Rukh Tamarkay (Nep.).

Small epiphytic shrub, 1-2 m. Stem glabrous. Leaves sessile, whorled; lamina 5-10.5 x 1.2-3cm, lanceolate (sometimes much variable, even obovate-elliptic and upto 4 cm broad), crenate-serrate, acute, base almost round, glabrous. Racemes many flowered, both terminal and axillary, 4-8cm long. Pedicels 0.5-1.3cm, widening above towards the apex, erect. Bracts 0.3-0.4cm, lanceolate-triangular, caducous. Bracteoles 0.1-0.15cm, linear, persistent. Sepals shortly 5-toothed, teeth upto 0.1cm, triangular; petal 0.5-0.8 x 0.3-0.4cm, urn-shaped, upward shortly recurved 5-lobed, greenish yellow; stamens 10, free; anthers with 2 tubular tips of 0.1 cm; ovary inferior, style simple. Berry 0.3-0.4cm, globose, enclosed by persistent sepals; seeds ellipsoid.

Flr.: Mar.- May *Fr.:* Apr. - Jul.

Specimen Cited: Mulkharka Busty, 2240m, AP Das & PC Rai 1411, dated 30.4.1995.

Status: Frequent.

Local Distrib.: Below Tinsimana, Mulkharka, Thartharay, Hattidara, Zero Point.2900-2900m.

General Dsitrib.: E. Himalaya (Nepal-Arunachal Pradesh), Meghalaya, N. Myanmar.

ERICACEAE Juss.

Key to the Genera:

1. Dwarf, stunted, evergreen shrub, 15-35cm high.....*Cassiope*
1. Trees or woody shrubs, more than 35cm high.....2
2. Flowers pendulous, clustered, axillary.....*Enkianthus*
2. Flowers not pendulous, terminal or axillary.....3
3. Leaves entire.....4
3. Leaves serrate to serrulate.....5
4. Flowers in axillary raceme; corolla urceolate or cylindrical.....*Lyonia*
4. Flowers in terminal corymbs; corolla campanulate.....*Rhododendron*
5. Racemes unbranched; leaves uniformly distributed.....*Gaultheria*
5. Racemes branched; leaves clustered at branch ends.....*Pieris*

CASSIOPE D. Don

Cassiope fastigiata (Wallich) D. Don in Edinb. New Philos. Journ 17:157. 1834; FBI 3:459. 1882; Man. ed. 2, 731. 1940; SFSH 12. 1963; FEH 1:234.1966; FB 2(1):392. 1991.

Andromeda fastigiata Wallich in As. Res.13:394. 1820.

Dwarf evergreen shrub, 15-35cm. Leaves imbricate, scale-like, lamina 0.29-0.5 x 0.1-0.2cm, ovate-oblong; margins ciliate and membranous. Pedicels 0.2-0.58 cm, wooly. Flowers solitary, axillary and nodding; sepals 5, free, 0.2-0.4cm, elliptic, with ciliate and membranous margins, tinged red; corolla campanulate, 5-lobed, whitish; stamens 10, inserted at corolla base; anthers with 2 slender deflexed horns; filaments glabrous or pilose; ovary superior, 5-chambered. Capsule 0.25- 0.41 x 0.25-0.3cm; globose.

Flr. & Frt.: May - Sep.

Specimen Cited: Rechila Peak, 3100m, AP Das & PC Rai 0204, dated 15.6.1994.

Status: Less Frequent.

Local Distrib.: Tinsiman, Rechila Peak, Thosum Beat. 2800-3100m.

General Distrib.: Himalayas (Kashmir-Bhutan).

ENKLIANTHUS Lour.

Enkianthus deflexus (Griff.) Schneider, Ill. Handb. Laubh. 2:521. 1911; FEH 1:234. 1966; EFPN 3:55. 1982; FB 2(1):394: 1991.

Rhodora deflexa Griff., Itin. Not. 148 & 187. 1848.

E. himalaicus Hk. f. & Thoms. in Hk. Journ. Bot. Kew. Gard. Misc. 7:125, t. 3. 1855; FBI 3:461. 1882

Local Name: Khorsanay (Nep.)

Shrub to small tree, 4-6 m tall. Stem terete, grey-brown. Leaves in terminal clusters; petioles 0.5-1.2 cm ; lamina 2-7.5 x 0.5-2.3 cm, ovate-elliptic, finely toothed, acute, base acute, hairy beneath at young stage. Inflorescence 6-12 flowered umbels. Pedicels 2-3.5 cm , long, slender, clustered amongst leaves, greenish white. Flowers pendulous, light pink-orange ; sepals 5, united at base, 0.2-0.3 cm , triangular, greenish; petals 5, united, 0.8-1.2 x 0.6-1 cm, bell-shaped, lobes short and blunt, glabrous, lower sides greenish white, terminal margins light pinkish with red vertical lines (veins) beneath on petal tubes; stamens 10, epipetalous; anthers 2-spurred, ash white, dorsifixed; filaments thin haired, whitish green; ovary 5-celled superior; style long upto 0.6cm, hairy. Capsule with persistent calyx, 5-partite, 0.6-0.8 x 0.5-0.7 cm on maturation, whitish green when young, light brown when ripe.

Flr.: Apr. - Jun. *Frt.:* Jun. - Nov.

Specimen Cited: Rechila, 2280m, AP Das & PC Rai 0179, dated 15.6.9194; Alubari-Dhamdhamay Dara, 2280-2549m, AP Das & PC Rai 0622, dated 17.10.1994; Thosum Beat, 2590-2780m, AP Das & PC Rai 1296, dated 05.5. 1995.

Local Distrib.: Helipad, Dhamdhamay Dara, Reshete, Rechila Chowk, Thosum. 2200-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, N. Assam, N. Myanmar.

GAULTHERIA L.

Key to the species:

1. Plant erect, shrubby.....2
1. Plant creeping and semi-erect undershrubs forming thick mats.....*G. nummularioides*
2. Young shoot glabrous.....3
2. Young shoot hairy.....4
3. Lamina elliptic-oblong, bristly and distantly serrate, lateral veins 4-6 pairs
.....*G. griffithiana*
3. Lamina ovate-lanceolate, lamina sharply and closely serrate, lateral veins 2-5 pairs
.....*G. fragrantissima*
4. Leaves gland-dotted and bristly; sepals triangular; bracts upto 0.5cm.....*G. hookeri*
4. Leaves neither gland-dotted, nor bristly; sepals lanceolate; bracts much shorter (upto 0.1cm).....*G. semi-infera*

Gaultheria fragrantissima Wallich in As. Res. 13. 397, fig. 1820; FBI 3: 457. 1882; FEH 1: 234. 1966; EFPN 3:55. 1982; TBRI 50 (4): 115. 1987; FB 2(1):388. 1991.

Local Name: Masino/Lek ko sano Bilounay, Basak (Nep.).

Medium sized erect and bushy shrub, 1.5-3cm. Branches glabrous. Leaves alternate; petioles short, 0.3-0.6 cm; lamina 2-9 x 0.9-2.8cm, ovate-lanceolate, margins distantly and bristly serrate, acute, base cuneate, lateral veins 2-5 pairs, glabrous both sides. Pedicels 0.2-0.4 cm, pubescent. Bracts small to 0.2cm, white. Bracteoles short (0.1cm). Flowers numerous in 2.5-5cm long pubescent axillary racemes, fragrant, white; sepals 5, fused, 0.15cm, triangular, greenish; petals 5, fused, 0.2-0.45 x 0.2-0.35 cm, tubular, white, lobes minute; stamens 10; anthers 4-spurred; ovary 5-angled and 5-celled, green; style simple, green. Capsule 0.4-0.5 x 0.3-0.4 cm, sub-globose, fleshy, blue-violet, covered with enlarged calyx; seeds small, triangular and numerous.

Flr.: Mar. - Jun. *Fr.:* Sep. - Dec.

Specimen Cited: Rechila-Hattidara, 2280-2549m, **AP Das & PC Rai** 0612, dated 17.10.1994; Jaributti-Rechila Middle, 2160-2490m, **AP Das & PC Rai** 0976, dated 23.4.1995.

Status: Common.

Local Distrib.: Hattidara, Rechila Chowk, Rechila Middle, Thosum Hill, Jaributti. 1900-2850m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Meghalaya, N. Myanmar.

Gaultheria griffithiana Wight in Calcut. Journ. Nat. Hist. 8:176. 1847; FBI 3:458. 1882; FEH 1: 234. 1966; EFPN 3: 55. 1982; TBRI 50(4): 115. 1987; FB 2(1): 388. 1991.

Medium shrub to 1.5-2.5cm, some often appearing to be scrambler. Stem round, glabrous and greenish. Leaves alternate, shortly petiolate (0.3-0.6cm), lamina 6.5-14.7 x 1.9-4.8cm, elliptic-oblong, margin sharply and closely serrate, caudate-acuminate, base rounded, coriaceous, glabrous, whitish beneath, lateral veins 4-6 pairs. Racemes 2-7cm, axillary and terminal, many flowered. Pedicels 0.3cm long, pubescent. Bracts 0.2-0.3cm, ovate. Bracteoles small (upto 0.2cm). Flowers pale greenish white; sepals 5, fused at base, 0.2cm, teeth triangular, margin thin papery, sparsely hairy; petals 5, 0.3-0.5 x 0.2-0.4cm, united, bell-shaped, lobes short 0.1-0.15cm; stamens 10; filaments short; anthers shortly 4-spurred, brownish yellow; ovary 5-angled, green; style simple, arising from mid ovary Pl. As. Rar.t, green, persistent; stigma swollen at tip. Capsule 0.3-0.6 x 0.3-0.5 cm, 5-Pl. As. Rar.tioned, enclosed by enlarged fleshy sepals; seeds many, glazy. (Plate II: 20).

Flr.: May - Jul. *Fr.:* Oct. - Feb.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 007, dated 13.6.1994; Hattidara, 2249m, AP Das & PC Rai 0617, dated 17.10.1994; Dhamdhamay Dara, 2480m, AP Das & PC Rai 1126, dated 28.4.1995; Rechila Middle, 2490m, AP Das & PC Rai 1250, dated 05.5.1995.

Status: Common.

Local Distrib.: Hattidara, Chouda Feri, Dhamdhamay Dar, Alubari. 2000-2700m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, N. Assam, Myanmar.

Gaultheria hookeri C.B. Clarke, FBI 3:458. 1882; EFPN 3:35. 1982; TBRI 50(4):115. 1987; FB 2(1):390. 1991.

G. hookeri var. *angustifolia* Clarke in FBI 3:458. 1882.

Small shrub, 1-2 m high. Branches spreading, bristly hidpid. Leaves alternate; petioles 0.35-0.5 cm long; lamina 4.5-8.5 x 2.2-4.2 cm, acute, base rounded, margin serrate, bristly glandular beneath. Racemes upto 5cm long, 10-15 flowered, pubescent. Bracts 0.45-0.55 cm long, elliptic. Sepals 0.2-0.35 cm, triangular; corolla 0.4-0.55 cm, ovoid-obconic, pink or greenish white, mouth 0.25-0.3 cm across; stamens 10, spurs 4, small. Capsules 0.6-0.7 cm, embedded in fleshy calyx.

Flr.: Apr. - Jul. *Fr.:* Sep. - Jan.

Specimen Cited: Dhamdhamay Dara, 2500 m, AP Das & PC Rai 0677, dated 18.10.1994.

Status: Abundant.

Local Distrib.: Alubari, Jaributti, Reshete, Chouda Feri, Dhamdhamay Dara. 1900-2700m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan), N. Assam, W. China.

Gaultheria nummularioides D. Don., Prodr. Fl. Nep. 150. 1825; FBI 3:457. 1882; FEH 1:235. 1966; EFPN 3:55. 1982; TBRI 50 (4):115. 1987; FB 2(1): 391. 1991.

Procumbent, prostrate under shrub with closely branched leafy shoot. Stem brownish, densely hirsute. Leaves alternate; petioles 0.1-0.25cm; lamina 0.6-1.7 x 0.4-1.3cm, rounded-ovate, margin slightly recurved downwards, entire, ciliate (cilia 0.1cm), obtuse-acute, base shallowly cordate or rounded, glabrous above, bristly beneath, nerves impressed above and prominent below. Pedicels 0.1-0.2cm. Bracts small, oblong, brown. Flowers axillary, solitary; sepals upto 0.3cm, triangular; petals 0.5-0. x 0.3-0.5cm, globular urn-shaped, pinkish white or creamy, lobes short upto 0.2cm; stamens 10; anthers shortly 4-spurred; ovary 5-celled; style one, long, persistent. Capsule 0.5-0.8 x 0.4-0.6cm, covered by blue-black flashy calyx, blackish-blue when dry; seeds ellipsoid, numerous.

Flr.: Aug. - Sep. *Fr.*: Nov.- Mar.

Specimen Cited: PHE Source-Alubari, 2155-2280m, **AP Das & PC Rai** 0276, dated 17.6 1994; Rechila-Hattidara, 2280-2549m, **AP Das & PC Rai** 0636, dated 17.10. 1994.

Status: Common.

Local Distrib.: Hattidara, Alubari, PHE Source, Rechila Chowk. 2000-2600m.

General Distrib.: Himalayas (Garhwal-Bhutan), Meghalaya, S. Tibet, N. Myanmar.

Gaultheria semi-infera (Clarke) Airyshaw in Kew Bull. 1940: 317. 1941; FEH 1: 235. 1966; EFPN 3: 55. 1982; FB 2(1): 390. 1991.

Diplycosia semi-infera Clarke in FBI 3:459. 1882.

Shrub upto 150m high with bristly shoots. Stem stout. Leaves petiolate (petioles 0.4-0.5 cm long), lamina 3.8-6.7 x 1.8-2.9cm, oblong-ovate, margin crenate-serrate, mucronate, base rounded, dark green. Racemes upto 6cm long, many flowered, pubescent. Bracts short. Sepals 0.3-0.35 cm long, lanceolate with acute tip; corolla 0.4-0.5cm, ovoid to obconic, whitish with pink tinges on upper surface; stamens 5, spurred. Capsules 0.5-0.6cm, subglobose, violet to blackish blue or often white; persistent calyx fleshy.

Flr.: May - Jul. *Fr.*: Oct. - Feb.

Specimen Cited: Dhamdhamay 2550m, **AP Das & PC Rai** 1137, dated 29.4.1995.

Status: Frequent.

Local Distrib.: Lava, Dhamdhamay Dara, Thartharay, Todey-Tangta. 1900-2700m.

General Distrib.: E. Himalaya (Nepal-Bhutan), N. Myanmar, W. China.

Note: Fruit edible.

LYONIA Nuttall

Lyonia ovalifolia (Wallich) Drude in Engl., Pfl.- fam. 4(1):44. 1889; FEH 1: 236. 1966; EFPN 3:55. 1982; TBRI 50(4):119. 1987; FB 2(1): 395. 1991.

Andromeda ovalifolia Wallich in As. Res. 13:391, t. 11. 1820.

Pieris ovalifolia (Wallich) D. Don in Edinb. New Philos. Journ. 17:159. 1834; FBI 3: 460. 1882.

Local Name: Angeri (Nep.).

Shrub to small tree to 10.5m, barks brown. Branches terete. Leaves alternate; petioles 0.5-1.2cm, sparsely haired; lamina 4-12 x 1.8-7.8cm, ovate, entire, acuminate, base cordate to rounded, glabrous and glazy with impressed nerves above, shaggy-haired and coarse with prominent nerves below. Racemes axillary, upto 16cm long, many flowered, simple, spreading. Pedicels upto 0.3cm long. Bracts linear, leaf like, green. Flowers pendulous, white; sepals 5, 5-toothed, teeth 0.15-0.25cm, triangular-lanceolate; petals 5, united into cylindrical tube, 0.4-1 x 0.2-0.4 cm, elongate, white, pubescent; stamens 10; filaments villous at the base; anthers basally 2-spurred; ovary 5-chambered, superior. Fruits 0.4-0.5cm in diam., globose, sepals persistent. Seeds numerous, many.

Flr.: May - Jul. *Fr.:* Aug. - Dec.

Specimen Cited: Alubari-Jorhpokhari, 2280-3040m, **AP Das & PC Rai** 0182, dated 15.6.1994; Jaributti-Rechila, 2195-2280m, **AP Das & PC Rai** 0414, dated 15.10.1994; Rechila-Hattidara, 2280-2549m, **AP Das & PC Rai** 0625, dated 17.10.1994.

Status: Common.

Local Distrib.: Chitray, Rechila Middle, Hattidar, Helipad, Helipad region. 200-2700m.

General Distrib.: Himalayas (Punjab-Bhutan), N. Assam, Tibet, Myanmar, east to China, Malaysia.

Note: Foliage highly poisonous to cattle, and also have insecticidal properties.

PIERIS D. Don

Pieris formosa (Wallich) D. Don in Edinb. New Philos. Journ. 17: 159. 1834; FBI 3:461. 1882; FEH 1: 236. 1966; EFPN 3: 56. 1982; TBRI 50(4): 123. 1987; FB 2(1): 395. 1991. *Andromeda formosa* Wallich in As. Res. 13.: 395. 1820.

Local Name: Balu (Nep.).

Evergreen shrubs or trees with terete and downy young twigs. Leaves in pseudowhorls; petioles 0.3-1.2cm; lamina 5-10 x 1.6-2.7cm, oblanceolate, serrate, acute-acuminate, base cuneate, glabrous, dark green. Racemes 5-11cm clustered into panicles, terminal. Bracts linear, caducous. Flowers 0.3-0.45 x 0.1-0.2cm, pendent, numerous, white; sepal lobes 0.3-0.45 x 0.1-0.2 cm, broadly triangular, sparsely glandular hairy; petals ovoid, white; stamens hairy at the base; filaments apically 2-spurred and divaricate; ovary almost globose; style short and nearly impressed at ovary-apex. Capsule 0.4-0.5 x 0.35-0.5cm, ovoid-globose, sepals persistent; seeds 0.1-0.2cm.

Flr.: Mar. - Jun. *Fr.:* Oct. - Dec.

Specimen Cited: Rechila Chowk-Dhamdhamay Dara, 2520-2280m, **AP Das & PC Rai** 656, dated 18.10.1994.

Status: Frequent.

Local Distrib.: Dhamdhamay Dara, Middle Rechila Chowk, Helipad region, Chitray. 2000-2750m.

General Distrib.: E. Himalaya (Nepal-Bhutan), N. Assam, Meghalaya, Myanmar.

Note: Shoots highly poisonous to cattle and man.

RHODODENDRON L.

Key to the species:

1. Leaves matted tomentose beneath.....2
1. Leaves scaly beneath.....3
2. Tomentum white silvery.....*R. arboreum*
2. Tomentum brown or reddish-brown.....*R. edgeworthii*
3. Stamens 10.....4
3. Stamens 12 or more.....5
4. Corolla asymmetric, pale yellow.....*R. triflorum*
4. Corolla symmetric, red or rose-pink or creamy white.....6
5. Leaves glabrous below; corolla white.....*R. griffithianum*
5. Leaves hairy or scaly below.....7
6. Petioles 1-1.8cm long; young parts stiffly bristly.....*R. barbatum*
6. Petioles 0.4-0.6cm long; young parts glandular scaly.....*R. glaucophyllum*
7. Lamina rugose above; ovary not glandular hairy at the top.....*R. falconeri*
7. Lamina not rugose above; ovary glandular hairy at the top.....*R. grande*

Rhododendron arboreum Smith, Exot. Bot. 1: 9, t. 6. 1805; FBI 3:465 1882; FEH 1: 237. 1966, 2:95. 1971; NRBGE 37 (2): 328. 1979; EFPN 3:56. 1982; TBRI 50 (4):125. 1987; Sik. Him. Rhod. 75, f. 29 & 30 b. t. 30. 1990; FB 2(1):372. 1991.

Local Name: Lali Guras/Rato Guras (Nep.).

Large shrub to robust trees upto 15m, bark reddish brown. Leaves clustered at branch tips; petioles 0.8-1.4cm, nearly round; lamina 6-14 x 1.8-3.5cm, elliptic-oblongate, entire acute-shortly acuminate, base cuneate, glossy green with deeply impressed veins above, lower surface silvery tomentose. Racemes many flowered, compact. Pedicels 0.4-0.8cm, hairy, glandular, yellowish. Flowers colours ranging from pinkish white to red; sepals very short, 0.1-0.2 cm, shortly 5-lobed, glandular; petals campanulate, tube 5-nerved vertically on outer surface, lobes 5, 3-4.5cm, dark brown spotted within along half length of tube and with nectar pouches; stamens 10; filament glabrous; ovary woolly hairy, hairs white; style glabrous. Capsule 1.4-2.5 x 0.6-0.8cm, cylindric and curved, light brown.

Flr.: Jan. - May *Fr.:* Jun. - Oct.

Specimen Cited: Jorhpokhari, 3040m, AP Das & PC Rai 1240, dated 03.5.1995.

Status: Common.

Local Distrib.: Thosum Hill, Jorpokhari, Hattidara, Dhamdhamay Dara, left hill top of Chouda Feri. 2100-3050m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya, S. Tibet.

Note:

1. Important ornamental and firewood plant. Flowers are consumed medicinally for dysentery. Flowers also chewed and swallowed in case fish bones stick at the throat while eating.

2. People prepare a wine called *Gurans ko rakshi* by traditionally fermenting its flowers, which they believe to be antidote to high altitude sickness.

Rhododendron barbatum G. Don, Gen. Hist. 3:844. 1834; Rhod. Sik. Him. t. 3. 1949; FBI 3: 468. 1882; FEH 1:237. 1966; 2: 96. 1971; EFPN 3: 57. 1982; Sik. Him. Rhod. 81, f, 32, 33a, t. 34. 1990; FB 2(1):376. 1991.

R. lancifolium Hk. f. in Rhod. Sik. Him. n. 3, t. 4. 1849.

Local Name: Lal Chimal (Nep.).

Tree to 6m. Barks peeling, greyish red. Young shoots stiffly bristly. Leaves clustered at branch ends; petioles 1-1.8cm, with spreading glandular 0.9cm long bristles; lamina 9-13.5 x 3-5.8 cm, elliptic-oblongate, margin almost entire, shortly acuminate-mucronate, base cuneate to narrowly rounded, coriaceous, green and glazy above, beneath light green and densely tomentose with brownish yellow wooly hairs, mid vein thick and projected beneath, whitish green, hairy, lateral veins 15-18 pairs. Racemes compact, usually 10-20 flowered. Pedicels 0.8 -1.4cm, green, puberulous with spreading hairs. Flowers dark blood red; sepals 0.5-1cm, cup-shaped, deeply toothed with rounded lobes; petals 2.8-3.3cm, tubular-campanulate, 5-lobed, dark red; stamens 10, glabrous; anthers black to purple; ovary stiffly hairy; style red in the apical portion and the rest whitish, glabrous. Capsule 1.6-2 cm, slightly curved, bristly.

Flr.: Apr. - May *Fr.:* Oct. - Dec.

Specimen Cited: Thosum Beat-Jorpokhari, 2590-3040m, **AP Das & PC Rai** 1236, dated 03.5.1995.

Status: Less Common.

Local Distrib.: Ruka Hill, Thosum Peak, Jorpokhari. 2600-3050m

General Distrib.: Himalayas (Kumaon-Bhutan).

Rhododendron dalhousiae Hk. f., Rhod. Sik. Him. t. 1 & 2. 1849; FBI 3: 469. 1882; FEH 1: 23. 1966; NRBGE 36 (1):107. 1978; EFPN 3:57. 1982; TBRI 50(4):125. 1987; Sik. Him. Rhod. 40, t. 8. 1990; FB 2(1):379. 1991.

Local Name: Kurlingo, Laharay Chimal (Nep.).

Shrub to 2.5m, growing on rock or even epiphytic. Barks thin papery. Young shoots bristly-scaly. Leaves compactly alternate; petioles 0.4-1.2cm, bristly; lamina 10-12 x 2-5.3cm, obovate-oblong to oblanceolate, entire, apex very variable, obtuse-acute, rounded

or mucronate, base cuneate and slightly ciliate, dark red sessile glandular scales scattered beneath. Pedicels upto 1.3cm, pubescent. Flowers 2-4 in terminal clusters, fragrant; sepals 0.8-1.2 x 0.4-0.8cm, deeply 5-lobed, lobes oblong obtuse, scatterly pubescent externally, nerves impressed within; petals large, 7-10cm long, wide campanulate, lobes 5, tips rounded, creamy white to light yellow; stamens 10; filament downy and pubescent in lower half part; anthers brown; ovary 5-chambered. Capsule 5-6cm, straight, 5-ribbed. (**Plate III: 24**).

Flr.: Mar. - May *Frt.:* Jun. - Oct.

Specimen Cited: Chouda Feri-Rechila Middle, 2285-2490m, **AP Das & PC Rai** 1246, dated 05.5.1995.

Status: Frequent.

Local Distrib.: Mulkharka Pokhari, Neora Valley-Sikkim Border, Rechila Middle. 2200-2500m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Arunachal Pradesh.

Note: Ornamental; often planted in the courtyard of the house. Flower scent cause headache.

Rhododendron edgeworthii Hk. f. in Rh. Sik. Him. 22. t. 21. 1851; Bot. Mag. t. 4936. 1856; FBI 3: 469. 1882; Sp. Rh. 321, fig. 1930; FEH 96. 1971; NRBGE 36 (1):10. 1978; Rh. Hb. 5 & 142. 1980; Him. Pl. Journ. 3 (8):116. 1985; FB (2):1. 378. 1991.

Local Name: Edgeworth ko Chimal, Lahare Chimal (Nep.).

Small shrubby epiphyte, 1-4m. Branchlets straggling densely pale brown tomentose. Barks on older branches grey and glaucous. Petioles 0.5-1.5 cm long; lamina 4-9 x 1.8-4.1cm, ovate or ovate-elliptic, margin recurved below, acute to shortly acuminate, base rounded, dark shiny green, strongly rugose and glabrous above, lower surface covered by soft and thick reddish-brown tomentum. Pedicels 1-2cm, stout, densely tomentose. Flowers terminal, usually 2 or solitary or upto 3 in numbers, highly fragrant, upto 8 cm long; calyx 1.3-1.6 cm, cup-shaped, deeply 5-lobed, pink to green, pubescent and scaly, lobes obovate and spreading; corolla 5-7.2 cm long, tubular at base and opening into a wide funnel at the mouth, white, often tinged pink or pink, lobes 5 to middle and rounded, scaly outside, margins crisped; stamens 10, slightly curved; filaments white, pilose in lower part; anthers purple-brown; pistil upto 6.5 cm long, pale pink, hairy and swollen towards base; ovary ovoid, tomentose; style pilose at lower part; stigma 5-6 lobed. Capsules 2-2.5 x 1.2-1.3 cm, cylindrical, erect and tomentose.

Flr.: Apr. - May *Frt.:* May - Sep.

Specimen Cited: Rechila, 2300m, **AP Das & PC Rai** 0501, dated 15.10.1994; Rechila Middle, 2490 m, **AP Das & PC Rai** 1259, dated 05.5.1995.

Status: Less Frequent.

Local Distrib.: Rechila Middle, Ruka Hill, Thosum Hill, Rechila Chowk. 2200-2850m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), S. Tibet, N.E. Myanmar, S. China.

Note: Much prized ornament. Pendulous from cliffs and trees or on rocks. Most cliff habitats overhang rivers.

Rhododendron falconeri Hk. f., Rhod. Sik. Him. t. 10. 1849; FBI 3:465. 1882; FEH 1:239. 1966; 2:96. 1971; NRBGE 37(2): 330. 1979; EFPN 3:58. 1982; TBRI 50(4):125. 1987; Sik. Him. Rhod. 95, f. 40, t. 41 & 42. 1990; FB 2(1):370. 1991.

Local Name: Kurlingo (Nep.).

Tree to 15cm, densely branched. Branchlets brown hairy. Bark thick, light red. Leaves large; petioles 2-4cm, thinly white hairy; lamina 15-29.5 x 8.5-14.5cm, elliptic-obovate, entire, obtuse or rounded with small mucro, base round to sub-cordate, coriaceous, upper surface rugose and dark green, beneath wooly-tomentose with densely matted red-brown fimbriate hairs, veins impressed above, prominent below and tomentose, lateral nerves 13-18 pairs. Corymbs 8-13cm in diam., many flowered, subglobose. Pedicels 3-4cm, glandular. Bracts large, densely hairy. Flowers creamy white to pale yellow; sepal small cup, 0.12-0.21 cm; petals 4-5.1cm long, campanulate, fleshy, toothed into 8-10 lobes, creamy white to pale yellow, purple blotched at base within; stamens 12-16; ovary many celled, glandular and thickly tomentose; style stout, extending stamens; stigma almost capitate. Capsule straight.

Flr.: Apr. - May . *Fr.:* Oct. - Dec.

Specimen Cited: Rechila Chowk-Jorhpokhari, 2490-3040m, AP Das & PC Rai 1195, dated 03.5.1995.

Status: Frequent.

Local Distrib.: Hattidara, Jorpokhari, Rechila Chowk, Thosum Peak. 2300-2850m.

General Distrib.: E. Himalaya (E. Nepal-Arunachal Pradesh).

Rhododendron glaucophyllum Rehder, Sp. Rh. 804. 1930; NRBGE 36(1):113. 1978; Rh. Hb. 24 & 151. 1980; Alph. Check. Rh. Sp. 1981;EFPN 3:58.1982; Fl. Him. 232. 1984; Him. Pl. Journ. 3(8):118. 1985; FB 2(1): 384. 1991.

Rhododendron glaucum Hk. f., Rhod. Sik. Him. t. 17. 1849; FBI 3:471. 1882.

Local Name: Takma Chimal (Nep.)

Small dwarf shrub upto 1.5m high, basally branched. Young shoots glandular-scaly, glaucous. Bark peels cinnamon coloured. Leaves fragrant; petioles 0.4-0.6 cm, glandular-scaly; lamina 4-6 x 1.4-2.3cm, lanceolate to elliptic-lanceolate, margin recurved, acute, base rounded, dull green above, white and glaucous with brown and yellow scales underside. Racemes subumbellate and in terminal truss of few to 5. Pedicels 1-2 cm long, light green, scaly. Floral bracts 1.1-1.2 x 0.9-1cm, ovate and light greenish. Flowers 2-3cm across, rosy-pink or rarely white with pinkish marks; calyx 0.65-0.75 x 0.35-0.45cm, foliaceous, deeply 5-lobed, persistent and scaly externally; corolla 2-3cm, tubular-campanulate or campanulate, with 5 orbicular spreading lobes (1.1-1.2cm long, marked

with distinct light green nerve); stamens 10, exerted; filaments 0.8-1cm. hairy; anthers dark brown; pistil 1.5cm, prematurely pale green turning into reddish pink with time, glabrous; ovary 0.45cm long, 5-chambered, scaly towards the apex; stigma 5-lobed. Capsule 0.8cm, elliptic-globular, scaly and covered with a little shorter persistent calyx.

Flr.: Apr. - May *Fr.*: May - Aug.

Specimen Cited: Near Jorhpokhari, 3000m, **AP Das & PC Rai** 1215, dated 03.5.1995.

Status: Less Common.

Local Distrib.: Tinsimana, Jorhpokhari, Thosum Peak, Hatti Dara. 1650-3100m.

General Distrib.: Endemic to E. Himalaya (Sikkim, Darjeeling, Bhutan).

Note: Foliage strongly aromatic. Also cultivated for ornamental value.

Rhododendron grande Wight in Calc. Journ. Nat. Hist. 8:176. 1847; Sik. Him. t. 9. 1949; Bot. Mat. t. 5054. 1858; FBI 3:464. 1882; Sp. Rh. 310. 1930; FEH 1:239. 1966; 2:96. 1971; NRBGE 37(2): 331. 1979; Rh. Hb. 40 & 152. 1980; Alph. Check Rh. Sp. 1981; EFPN 3:58. 1982; Fl. Him. 227. 1984; Him. Pl. Journ. 3(8):118. 1985; TBRI 50 (4):125. 1987; FB 2 (1): 370. 1991.

Local Name: Patle Kurlingo (Nep.)

A tree 8-15m tall, trunks solitary or sometimes 2-3; barks pale; shoots glabrous at young stage. Leaves petiolate; petioles 1.8 - 3.6cm cylindrical; lamina 11.5-35 x 5-15.3cm, elliptic-oblongate, entire, subacute to acute or rounded and often apiculate, base cuneate, leathery, shiny deep green above, silvery-white beneath with indumentum, primary veins 18 to 24 pairs, impressed above, elevated beneath. Racemes 20-30 flowered, 15-18cm across, rachis elongated upto 8cm. Pedicels 2.-3cm long, glandular. Flowers pale pink in bud becoming white to creamy-white later; calyx 0.1-0.2cm, obscurely 8-lobed; corolla 5-7.5 x 5-6cm, campanulate, white or creamy-white, with reddish-purple nectar pouches, limb 8 lobed, lobes spreading and deeply divided into 10 lobules; stamens 16, unequal, 4-5cm long; filaments white and basally hairy; anthers purplish brown; pistil 4.5-5.5cm, glabrous; ovary glandular and hairy, 10-16 celled; stigma disc-like, purplish-brown. Capsules 3.5-4.5 x 1.3-1.5cm, woody, curved.

Flr.: Mar. - Apr. *Fr.*: May - Jul.

Specimen Cited: Thosum Hill-Jorhpokhari, 2780-3040m, **AP Das & PC Rai** 0866, dated 22.10.1994.

Status: Frequent.

Local Distrib.: Jorhpokhari, Thosum Beat, Dhamdhamay Dara, Sikkim-Neora Valley Border. 2500-3050m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan), Meghalaya, S. Tibet.

Rhododendron griffithianum Wight in Ic. Plant. 4:t 1203. 1850; Hk. f., Rh. of Sik. Him. t. 11. 1851 (as *R. aucklandii*); FBI 3:468. 1882; Sp. Rh. 268. 1930; FEH 1: 239. 1966; 2:97. 1971; NRBGE 37(2):330. 1979; Rh. Hb. 37 & 152. 1980; Alth. Check. Rh. Sp. 1981; Fl. Him. 229. 1984; Him. Pl. Journ. 3(8):118. 1985; FB 2(1):368. 1991.

Local Name: Seto Chimal (Nep.).

Shrub or small tree 2-6m high, glabrous. Peeling barks reddish-brown. Leaves drooping; petioles 1.8-3.5cm, light green; lamina 8.5-17.5 x 2.7-5.5 cm, oblong-elliptic, acute or mucronate, base rounded, leathery, glabrous, midrib elevated beneath and yellowish-green. Racemes 3-5 flowered. Pedicels 1.5-4cm, glabrous or sparsely glandular. Flowers bell-shaped, white, very fragrant; calyx 1.2-1.4cm across, saucer-shaped, shallowly lobed, glabrous; corolla 4-7.5cm long, broadly funnel-shaped, 5-lobed, white or tinged pink; stamens 12-16; filament 3-4.5cm long, whitish, glabrous; anthers pale brown; pistil upto 5 cm long, greenish; ovary and style glandular. Capsule 2.8-3.2 x 1.3-1.65 cm, with persistent calyx.

Flr.: Apr. - May *Fr.:* May - Jun.

Specimen Cited: Rechila Middle, 2490m, AP Das & PC Rai 0236, dated 16.6.1994; Hattidara, 2549m, AP Das & PC Rai 0637, dated 17.10.1994; Rechila-Jorhpokhari, 2490-3040m, AP Das & PC Rai 0990, dated 23.4.1995.

Status: Frequent.

Local Distrib.: Rechila Chowk, Hattidara, Tinsimana, Jorhpokhari, Thosum Peak. 2100-3050m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan), Meghalaya, S. Tibet.

Rhododendron triflorum Hk.f., Rh. Sik. Him. t. 19. 1851; FBI 3:474. 1882; Sp. Rh. 791. fig. 1930; FEH 1:240.1966; 2:99.1971; NRBGE 36(1):109. 1978; Rh. Hb. 13 & 218. 1980; Alph. Check. Rh. Sp. 1981; EFPN 3:59. 1982; Fl. Him. 231. 1984; Him. Pl. Journ. 4 (9-10): 1986; FB 2(1):380. 1991.

Local Name: Pahenle Chimal (Nep.).

Shrub upto 3m high, shoots glaucous and black glandular. Petioles 0.5-0.7 cm long, scaly; lamina 4-6.5 x 1.5-2.3cm, lanceolate to oblong-lanceolate, entire, acute, base rounded, glabrous and shiny green above, whitish or pale green and densely minute scaly and glandular beneath, mid-nerve elevated and prominent on under surface, lateral nerves upto 14 pairs, distinctly marked above and faintly impressed beneath. Racemes terminal, 2-3 flowered, contemporaneous with the new year's leaves. Pedicels 0.7-1cm long, scaly. Flowers fragrant, pale yellow to greenish yellow, with green spots; calyx minute, obscurely 5-lobed, lobes very short, fringed; stout hairy. Corolla zygomorphic, 4-5 cm across, funnel-shaped, pale yellow, with 5 spreading ovate-obtuse lobes, tube 0.7-0.8cm, spreading and densely scaly outside; stamens 8-10, exerted; filaments hairy towards base; pistil exceeding stamens and curved upwardly; ovary oblong-cylindrical, scaly; stigma truncate. Capsule 1.2cm long, narrowly cylindrical, erect and scaly.

Flr.: Apr. - Jun. *Fr.:* Jun. - Aug.

Specimen Cited: Near Jorhpokhari, 3000m, AP Das & PC Rai 0868, dated 22.10.1994.

Status: Frequent; fairly scattered in open slopes.

Local Distrib.: Thosum Beat, Jorhpokhari, Chitray, Helipad area. 2300-3050m.

General Distrib.: E. Nepal to Bhutan, Assam, Myanmar, S.E. Tibet.

MONOTROPACEAE Nuttall

MONOTROPA L.

Monotropa uniflora L., Sp. Pl. ed. 1(1):387. 1753; FBI 3: 476. 1882; FEH 1:232. 1966; 2: 93. 1971; EFPN 3:60. 1982; TBRI 50(4):120. 1987; FB 2(1): 356.1991.

Small, soft, glabrous, white saprophyte, upto 12 cm tall. Stem erect, fleshy, scaly, 1.2-1.5 cm long, ovate-lanceolate, rounded, papery, pinkish-white. Flowers terminal, solitary, nodding; sepals 0.45-0.51 cm, ovate-oblongate, glabrous, white; petals 3, free, almost obovate, entire, hairy within, reddish-white or white, pubescent inside; stamens 10, free; anthers with terminal slit on each cell, whitish; filament pubescent below; ovary ovoid, 5-chambered; style flattened and stout. Capsule 0.6-0.8 x 0.4-0.8 cm, globose.

Flr.: Jun. - Jul. *Fr.:* Oct.

Specimen Cited: Jaributti-Alubari, 2195-2280 m, AP Das & PC Rai 0114, dated 14.6.1995.

Status: Rare.

Local Distrib.: Found only in Jaributti-Alubari Area. 2195-2280 m.

General Distrib.: Himalayas (Punjab-Bhutan), Meghalaya, W. and C. China, Korea, Japan, N. and C. America.

PRIMULACEAE Vent.

Key to the Genera:

1. Corolla lobes imbricate; capsules usually subglobose, loculicidal.....*Lysimachia*
1. Corolla lobes contorted; capsules generally oblong.....*Primula*

LYSIMACHIA L.

Key to the species:

1. Erect plants.....2
1. Prostrate plants.....3
2. Leaves petiolate; sepals 0.4-0.5cm, ovate-acuminate.....*L. laxa*
2. Leaves sessile or subsessile; sepals 0.6-0.7cm, lanceolate.....*L. alternifolia*
3. Flowers congested in terminal clusters.....*L. congestiflora*
3. Flowers axillary, solitary.....*L. debilis*

Lysimachia alternifolia Wallich in Roxb., Fl. Ind. ed. Carey, 2:26. 1824; FBI 3:504. 1882; FEH 1:345. 1966; EFPN 3:64. 1982; TBRI 50(4):119. 1987.

Erect herb, 15-40cm high, much branched from base. Branches upto 24cm long, spreading ridged, leafy, pubescent. Leaves subsessile; lamina 1.8-3 x 0.9-1.9cm, ovate-elliptic, acute, margin entire. Peduncles 2.5-5cm long, axillary, 1-flowered. Sepals 0.65-0.75cm, lanceolate, glandular; corolla shorter than sepals, rotate, yellowish, lobes oblong and gland-dotted; filaments upto 0.22 cm long, basally united. Capsule 0.6-0.65 cm, glabrous, dehiscent by valves.

Flr.: May - Jul. *Fr.:* Jul. - Dec.

Specimen Cited: Near Sakam, 1400m, **AP Das & PC Rai** 1834, dated 11.9.1997.

Status: Common.

Local Distrib.: Hattidara, Sakam, Reshete, Lava, Pankhasari, Alubari..1200-2400m.

General Distrib.: Himalayas (Garhwal-Bhutan), Meghalaya, Myanmar.

Lysimachia congestiflora Hemsley in Jour. Lin. Soc. 26:50. 1889; FEH 1:245. 1966; 2:101. 1971; EFPN 3:64. 1982; TBRI 50 (4):119. 1987.

L. japonica Thunb. *sensu* FBI 3:505. 1882, p.p.

L. japonica var. *cephalantha* Franchet in Jour. de. Bot. 9:461. 1895.

Small perennial prostrate herb, 15-30cm. Stem terete, puberulous, rooting from lower nodes. Leaves opposite; lamina 2.5-5.5 x 1.5-2.5cm, ovate, entire-gland dotted, acute, base cordate. Peduncles 0.55-0.6cm, solitary or 2-nate, congested in terminal clusters. Sepals 1-1.2cm, lanceolate, villous; corolla subrotate, yellowish, lobes to 1 cm long, oblong, acute and gland dotted; filaments 0.45-0.5cm; basally united; ovary villous; styles glabrous. Capsules 0.45-0.5cm.

Flr.: May - Jul. *Fr.:* Jul. - Sep.

Specimen Cited: Rechila Park, 2280m, **AP Das & PC Rai** 1200, dated 03.5.1995.

Status: Less Common.

Local Distrib.: Chouda Feri, Sakam, Dhamdhamay Dara, Rechila. 1300-2450m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Myanmar, Thailand, S. Tibet, China, Taiwan.

Lysimachia debilis Wallich in Roxb., Fl. Ind. ed. Carey 2: 25. 1824; FEH 1:245. 1966; 2:101. 1971; EFPN 3:64. 1982; TBRI 50(4):119. 1987.

L. japonica auct. non Thunb., Hk. f., FBI 3:505. 1882, p.p.

Like *L. congestiflora* but branches ferruginous-villous; peduncles axillary, elongating in fruit, 1-flowered, not congested; corolla campanulate, lobes smaller, reflexed in fruit.

Flr.: May - Jul. *Fr.:* Jul. - Dec.

Specimen Cited: Below Jaributti, 2060m, **AP Das & PC Rai** 0440, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Todey-Tangta, Jaributti, Rechilla Midde, Mulkharka. 1600-2500m.

General Distrib.: Himalayas (Kashmir-Sikkim), Meghalaya, N. Assam, Myanmar, Thailand.

Lysimachia laxa Baudo, Ann. Soc. Nat. (Bot.) II, 20: 347. 1843; FM 6(2):180. 1962.

L. ramosa Wallich *ex* Duby in DC., Prodr. 8: 65. 1844; FBI 3:503. 1882; EFPN 3:65. 1982; TBRI 50 (4):119. 1987.

Small annual herb. Stem erect, 18-45 cm tall, branched. Leaves simple, alternate; petiole 0.3-1.2 cm, glabrous; lamina 3-11.5 x 1.2-2.5 cm, lanceolate, entire, acute to acuminate, base attenuate, sparsely hairy and faintly gland-dotted above, glabrous beneath. Pedicels axillary, slender, 2-5.5 cm, glabrous. Flowers solitary, 0.7-1 cm long; sepals 5, 0.4-0.5 cm long, ovate-acuminate, basally united; corolla rotate, longer than sepals, yellow, segments elliptic-oblong; stamens 4, 0.3-0.35 cm long, narrow above, broad below, inserted on petal lobes; anthers 2-celled; filament very short, basifixed; ovary swollen, sub-globose; style 1, filiform, long upto 0.6 cm. Capsule globose, splitting irregularly.

Flr.: May - Aug. *Fr.:* Sep. - Dec.

Specimen Cited: PHE Source, 2155 m, **AP Das & PC Rai** 0290, dated 17.6.1994; Near Lava, 2118 m, **AP Das & PC Rai** 0314, dated 18.6.1994.

Status: Rare.

Local Distrib.: PHE Source, Ruka Hill, Lava, Jaributti. 1900-2600m.

General Distrib.: Himalayas (Nepal-Sikkim), Sri Lanka, Meghalaya, Myanmar, S.W. China, Thailand.

PRIMULA L.

Key to the species:

1. Marshy and strong-deep rooted herbs; flowers dark brownish red.....*P. kingii*
1. Herbs not marshy and not deep rooted; flowers blue or pinkish purple.....2
2. Lamina 5-14cm long, ovate-spathulate, margins toothed or serrate.....3
2. Lamina 1.5-4.5 cm long, oblong-spathulate to elliptic, margin toothed with hairy spines.....*P. gracilipes*
3. Corolla funnel-shaped, tube 0.7-0.8cm long.....*P. melacoides*
3. Corolla salver-shaped, 0.85-1cm long.....*P. denticulata*

Primula denticulata Smith, Exot. Bot. 2:109. t. 114. 1805; FBI 3:485. 1882; SFSH f. 38. 1963; FEH 1:247. 1966; EFPN 3:71. 1982; TBRI 50(4):124. 1987.

P. acqualis Craib in NRBGE 10:205. 1918.

Mealy herb upto 28cm, with stout rootstock. Leaves developing later in compact rosette at flowering, surrounded by leaf scales at base; lamina 7.5-14 x 2.5-4.5cm, ovate-spathulate, narrowed to base, minutely dentate, obtuse, elongated upto 30cm in fruit. Scape 12-36cm, stout. Heads globular. Bracts unequal. Pedicels 0.45-0.5cm. Calyx 0.85-1cm; corolla 0.85-1cm, salver-shaped, bluish, tube 1.5-1.8cm long, lobes obcordate. Capsule 0.8-1cm, oblong, with granulate seeds.

Flr.: Apr. - Jun. *Fr.*: Jun. - Sep.

Specimen Cited: Near Tinsimana, 2900m, AP Das & PC Rai 0797, dated 20.10.1994

Status: Less Common.

Local Distrib.: Chitray, Jorpokhari, Tinsimana. 2400-3000m.

General Distrib.: Afganistan, Himalayas (Kashmir-Bhutan), Meghalaya, S.Tibet, N. Myanmar.

Primula gracilipes Craib in NRBGE 6:252. 1917; FEH 1: 247. 1966; J. Econ. Tax. Bot. 3: 234. 1982; EFPN 3: 72. 1982; *Flr. Pl. Ind. Nep. Bht.* 271. 1990.

P. petiolaris var. *nana* Hk. f., FBI 3: 493. 1882. p.p.

P. scullyi Craib in NRBGE 6:255. 1917.

Upto 6.5 cm tall, robust. Leaf stalks short to 3 cm long; leaf lamina 1.5-4.5 x 1-2.3 cm, oblong-spathulate to elliptic, margin toothed, rounded, base gradually tapered or obscurely rounded, nearly glabrous, mid-nerve raised beneath. Flower stalks 1.5 to 6 cm long. Bracts sometimes basally pouched. Flowers pinkish purple, with an appendage of orange-coloured eye; calyx shorter(1/3) than corolla-tube, lobes 5, triangular, acute and farinose; petals spreading, 2.5-3.5 cm, obovate, irregularly toothed. Fruit not seen.

Flr.: Apr.- May

Specimen Cited: Rechila-Jorpokhari, 2490-3040 m, AP Das & PC Rai 1188, dated 03.5.1995.

Status: Less Frequent.

Local Distrib.: Middle Rechila Chowk, Jorpokhari, Dhamdhamay Dara, Chitray. 2300-3100m.

General Distrib.: Temperate Himalayas (Simla-Bhutan).

Note: Ornamental.

Primula kingii Watt., *Journ. Lin. Soc.* 9:20. 1882; FBI 3:491. 1882.

Small marshy herb with a rigid root-stock, 8-13cm, glabrous. Leaves arr radical; lamina 6.5-9 x 1-1.7cm, ellitic-lanceolate, thick, entire or obscurely crenulate, acute, base broad and sheathing, membranous, midrib thick, pale when dry. Scapes 5-10cm long, 2-4 flowered. Bracts subulate. Pedicels upto 1cm long, puberulous. Flowers 1-1.6 x 0.5-1.4cm, bell-shaped; calyx 5-partite, narrowly campanulate, puberulous; corolla funnel-

shaped, dark brownish red, obscurely 5-lobed, -outer surface puberulous, lobes retuse; ovary globose with a 5-lobed crown. Fruits not seen. (Plate III: 27, Plate XXIV).

Flr. Sep. - Oct.

Specimen Cited: Jorpokhari, 3040m, AP das & PC Rai 0797 dated 20.10.1994.

Status: Extermely rare.

Local Distrib.: Found only at Jorpokhari. 3040m.

General Distrib.: Endemic (Sikkim & Darjeeling). This is the first report of occurrence for the species in West Bengal.

Primula melacoides. Franchet in Bull. Soc. Bot. France 33:64. 1886; J. Lin. Soc. Bot. 26:39. 1889; J. Econ. Tax. Bot. 2:10. 1981; TBRI 50(4): 124. 1987.

Local Name: Pandar Phul (Nep.).

Small annual herb, upto 30cm high. Leaves all radical; petioles 5-8.5cm long; lamina 3.5-8 x 3-5.5 cm, ovate-spathulate, double serrate, obtuse, base cordate, margin nerves hispid, whitish mealy beneath. Scapes many, upto 21 cm, glandular, mealy hairy. Scapes many, upto 21cm, glandular mealy hairy. Bracts 0.55-0.65cm, linear. Pedicels 2-2.5cm. Flowers in 2-3 whorls; calyx 0.35-0.45cm, subcampanulate, 5-lobed, whitish farinose, lobes lanceolate; corolla funnel-shaped, pinkish purple, tube 0.7-0.8cm, lobes spreading; stamens included; style 0.45-0.55cm, with bifid stigma. Capsule upto 0.55cm, subglobose.

Flr.: Nov. - Feb. *Fr.:* Feb. - Mar.

Specimen Cited: Near Chitray, 2520m, AP Das & PC Rai 1229, dated 04.5.1995.

Status: Frequent.

Local Distrib.: Lava, Alubari, Jaributti, Chouda Feri. 1900-2550m.

General Distrib.: Native of China & Myanmar; naturalised in Darjeeling and Sikkim.

MYRSINACEAE R. Br.

Key to the Genera:

1. Fruits few (1-2) seeded.....2
1. Fruits many seeded.....*Maesa*
2. Corolla lobes contorted in buds.....*Ardisia*
2. Corolla lobes imbricate in buds.....3
3. Stamens epipetalous.....*Embelia*
3. Stamens not epipetalous.....*Myrsine*

ARDISIA Sw.

Ardisia crispa (Thunb.) DC. in Trans. Lin. Soc. 17: 124. 1834 exclimber Descr.; Fl. Asm. 3: 182. 1939; Fl. Jow. 1: 291. 1981; Nam Chang. Fl. Pl. 42. 1987.

Bladhia crispa (Thunb.) Pl. Jap. 97. 1784.

Ardisia crenulata Roxb., Fl. Ind. 2: 276. 1824; FBI 3: 524. 1882.

A. undulata Climber in FBI 3: 524. 1882.

Shrub to 1-3 m tall with rerrucose branches. Bark brownish. Petiole 0.23-05 cm long; leaf lamina 6.2-12 x 1.6-3.9 cm, elliptic, oblong, acute, base narrowed, cuneate, glabrous, dark-green above, pale and gland dotted beneath, lateral nerves 7-9 on each side. Umbels simple or compound, often corymbose, few flowered. Pedicels 0.75 cm long, slender. Flowers 0.7-0.8 cm diam., white or yellowish; calyx segments 0.22 cm, ovate; corolla lobes unequal, contorted in buds, ovate, acuminate, white with purple marking dots; filaments short; anthers punctate, acute; ovary ovoid. Berries 0.75-0.82 cm diam., sugblose, purplish; seeds 1-2.

Flr.: Feb. - May *Fr.:* Jun. - Dec.

Specimen Cited: Near Chouda Feri, 2280 m, AP Das & PC Rai 0967, dated 22.4.1995.

Status: Less Frequent.

Local Distrib.: Thartharay, Rechila Durpinay, Chouda Feri, Sakam Forest. 1500-2250m.

General Distrib.: E. Himalaya and Khasia Hills.

EMBELIA Burm.

Embelia floribunda Wallich in Roxb., Fl. Ind. 2: 291. 1824; FBI 3: 514. 1882; Man. Ind. Timb. 440. 1902; Omd. Trees 417. 1906; Fl. Asm. 3: 171. 1939; Fl. Jow. 1:286. 1981; Fl. Meg. 2: 557. 1987.

Large climbers. Branches lenticellate. Stems reddish-brown. Petioles 0.45-1.65 cm long, glandular. Leaf lamina 4.5-9.5 x 1.55-3 cm, oblong-elliptic, oblong-lanceolate or ovate-lanceolate, acuminate, base rounded, sometimes obtuse or cuneate, margins recurved, glaucous beneath, lateral veins very fine, obscure beneath. Panicles 14-18.5 cm long, puberulous. Pedicels 1.5 cm long. Flowers 0.4 -0.5 cm diam., greenish-white; corolla lobes ovate or oblong, pubescent, slightly overlapping. Fruits 0.5-0.55 cm across, globose, greenish or pinkish-black.

Flr. & Fr.: Oct. - Apr.

Specimen Cited: Near Lava, 2050 m, AP Das & PC Rai 0319 dated 18.6.1994.

Status: Less Frequent.

Local Distrib.: Lava, Machuki, Sakam Forest. 1300-2000m.

General Distrib.: E. Himalaya and Java.

MAESA Forsk.

Key to the species:

1. Margins distantly obscure-denticulate.....2
1. Margins conspicuously toothed.....*M. macrophylla*
2. Leaves 4.5-12cm, highly variable in shape.....*M. montana*
2. Leaves 12-22cm, narrowly lanceolate, rugose.....*M. rugosa*

Maesa macrophylla (Wallich) A. DC. in Trans. Lin. Soc. 17:134. 1834; FBI 3:510. 1882; FEH 1:243. 1966; EFPN 3:76. 1982.

Bacobotrys macrophylla Wallich in Roxb., Fl. Ind. 2: 234. 1824.

Maesa tomentosa D. Don, Prodr. Fl. Nep. 148. 1825.

Local Name: Bhogotay (Nep.).

Evergreen shrub to 2-4.5m high. Stem round, twigs velvety-haired at young stage. Leaves petiolate (petioles 1-2cm), lamina 7-12 x 3-4.5cm, elliptic or rounded, margin conspicuously toothed, acute, base narrowly rounded, sometimes obscurely cordate, softly hairy, nerves more prominent beneath. Bracts small. Flowers 5-merous, clustered in lax paniced racemes, panicles as long as leaves; sepals 5, nearly free except at base; petals 5, creamy yellow, fused by their bases; stamens equal to petals in number; ovary unilocular; style short. Berry globose, pinkish-white.

Flr.: Apr. - Jun. *Fr.:* Jul. - Jan.

Specimen Cited: Samsing-Phari, 640-760m, AP Das & PC Rai 1578, dated 07.6.1996.

Status: Frequent.

Local Distrib.: Machuki, Phari, Samsing, Asala Khola. 600-1300m.

General Distrib.: Himalayas (Kumaon-Bhutan).

Maesa montana A. DC. in DC., Prodr. 8: 79. 1844; Philip. J. Sci., 73: 28. 1940; FEH 1: 243. 1966; Fl. Meg. 2: 561. 1987; Nam. Chang. Flr. Pl. 352. 1987.

M. indica auct. non (Roxb.) A. DC.: Cl. in FBI 3: 509. 1882 p.p.

M. elongata Mez in Pfreich. Ht. 9: 31. 1902; RBBI 18(1): 32. 1959.

Shrub to 4.5 m high. Branches slender. Bark warty, dark brown. Leaves 4.5-12 x 2.4-5 cm, highly variable from ovate or obovate-elliptic, oblanceolate, elliptic-lanceolate, obscurely dentate at distant, acute to caudate-acuminate, base cuneate, rounded, sometimes obtuse, glabrous. Racemes 3.5-5 cm long, branched. Flowers 0.2-0.3 cm diam., white. Fruits 0.45-0.55 cm across, subglobose, creamy white, many seeded.

Flr. & Fr.: Feb. - Nov.

Specimen Cited: Pankhasari Hill, 2220 m, AP Das & PC Rai 1313, dated 05.5.1995.

Status: Frequent.

Local Distrib.: Sakam Forest, Thartharay, Machuki, Zero Point. 1200-2250m.

General Distrib.: Tropical Himalayas (Nepal-Bhutan), Assam, east to West China.

Maesa rugosa Clarke in FBI 3: 508. 1882; SFSH 151. 1963; FEH 1: 246. 1966; Nam. Chang. Flr. Pl. 352. 1987.

Maesa rugosa var. *griffithii* Clarke in FBI 3: 509. 1882.

Local Name: Thulo Bilounay (Nep.)

Stout shrub to small tree. Stem silver-grey. Petiole 1.3-2cm, glabrous; lamina 12-22 x 2.5-5.1cm, narrowly lanceolate, distantly obscure-denticulate, caudate, base cuneate, rugose, both sides glabrous, slightly coarse beneath, nerves prominent and raised beneath, slightly impressed above, lateral nerves 12-15 on either halves, veinules not obscure. Racemes many flowered, upto 3.8cm long, paniced, glabrous. Flowers small, tetramerous; calyx 4-lobed, persistent; petal small, campanulate, lobes round, whitish-yellow; stamens 5, inserted on the petal tube; style short. Berry 0.2-0.4cm in diam., globose, almost completely enclosed within persistent sepals.

Flr.: Jan. - Apr. *Fr.:* Jun. - Oct.

Specimen Cited: Mulkharka, 2120m, **AP Das & PC Rai** 1139, dated 24.4.1995.

Status: Less Common.

Local Distrib.: Lava, Mulkharka, Neora Valley-Sikkim Border, Sakam Forest. 1600-2150m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Manipur, S. Tibet, W. China.

MYRSINE L.

Myrsine semiserrata Wallich in Roxb., Fl. Ind. 2:293. 1824; FBI 3: 511. 1882; Trs. N. Beng. 85. 1929; FEH 1:243. 1966; EFPN 3:76. 1982; FPK 61. 1981; TBRI 50(4):122. 1987.

M. semiserrata var. *subspinosa* (D. Don) Clarke, FBI 3:512. 1882.

Local Name: Phalame (Nep.).

Bushy rigid shrub, sparingly branched, glabrous. Leaves shortly petiolate, 3.9-12 x 1.3-3.3cm; lamina lanceolate, dentato-serrate, acute or short-acuminate, cuneate, coriaceous, glabrous, light red when young, lateral nerves 10-15 pairs, thick beneath, impressed above. Pedicels 0.2cm. Flowers numerous in axillary fascicles, 4-merous, whitish-green; sepals persistent; style branched. Berries blue to reddish-purple.

Flr.: Dec. - Mar. *Fr.:* Jan. - Jun.

Specimen Cited: Alubari-Jaributti, 2280-2195m, **AP Das & PC Rai** 0478, dated 15.10.1994; Rechila Middle, 2490m, **AP Das & PC Rai** 0988, dated 23.4.1995.

Status: Very Common.

Local Distrib.: Jaributti, Neora Khola, Rechila Middle, Alubari. 2000-2400m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), N. Assam, Tibet, N. Myanmar, W. C. China.

STYRACACEAE Spreng.

STYRAX L.

Key to the species:

1. Flowers in lax axillary and terminal clusters; lamina 6.5-12.5cm, elliptic
.....*S. hookeri*
1. Flowers in axillary pedunculate fascicles to short racemes; lamina 3-7.5cm, elliptic-ovate, serrulate.....*S. serrulatus*

Styrax hookeri C.B. Clarke in FBI 3:589. 1882; Pfl.-reich IV-241, Ht. 30: 74. 1907; FEH 1:251. 1966; EFPN 3: 78. 1982; TBRI 50(4):128. 1987.

Local Name: Khari (Nep.).

Medium sized trees upto 10m tall. Stem branched; branchlets stellately hairy when young. Petiole upto 0.8cm long; lamina 6.5-12.5 x 2.3-4.8cm, elliptic, margin toothed, acuminate, base unequal and obliquely rounded, dark green with nerves bristly above, pale green and stellately hairy beneath. Pedicels 0.5 cm long, shining pubescent. Flowers 1.5-2 cm long, in lax axillary and terminal clusters; sepals 0.7-1cm long, campanulate, shallowly 5-lobed, wooly-red; petal-lobes 5, 1-1.5cm long, elliptic-oblong, basally connate, white, pubescent, tube short; stamens many, clustered, marginally pubescent. Fruit ellipsoid, pubescent. (**Plate II: 18**).

Flr.: Apr. - Jun. *Fr.:* Aug. - Oct.

Specimen Cited : Dhamdhamay Dara, 2490m, AP Das & PC Rai 0140, dated 28.4.1994.

Status: Frequent.

Local Distrib.: Left Hill cleft of Lava, Dhamdhamay Dara, Sakam. 1800-2500 m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Manipur.

Styrax serrulatus Roxb., Fl. Ind. ed. 2(2):415. 1832; FBI 3:588. 1882, p.p., FEH 1:251. 1966; EFPN 3:78. 1982; TBRI 50(4):128. 1987.

Local Name: Khari (Nep.).

Evergreen tree, 5-12m high. Young shoot stellately pubescent. Petioles 0.5-0.7cm long; lamina 3-7.5 x 1.5-3cm, elliptic-ovate, serrulate, acuminate, base acute, glabrous above, setulose to stellate pubescent beneath. Inflorescence axillary pedunculate fascicles to small racemes, upto 12 cm. Calyx 0.4cm across, 5-toothed, white, tomentose; corolla 1-1.2cm, yellowish white, 5-lobed, lobes 0.55 cm long, obtuse; stamens 10 with inflexed hairy filaments. Fruit 1.2-1.5x 0.8-1cm, ellipsoid, fulvous tomentose, fruiting calyx acrescent.

Flr.: Apr. - May *Fr.*: Jun. - Aug.

Specimen Cited: Pankhasari, 2120m, AP Das & PC Rai 0434, dated 15.10.1994.

Status: Rare.

Local Distrib.: Observed only in Pankhasari region of the valley; population very less. 2120m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), N. Assam, Myanmar, Thailand, Malaysia.

SYMPLOCCACEAE Desf.

SYMPLOCOS L.

Key to the species:

1. Flowers in axillary fascicles.....*S. glomerata*
1. Flowers in racemes, racemes branched or unbranched.....2
2. Panicles 2-3.4cm, densely flowered; petals 0.45-0.55cm.....3
2. Racemes/spikes 4-9cm long; petals 0.25-0.35cm.....4
3. Calyx 0.15-0.2cm long; stamens many*S. lucida*
3. Calyx much larger, lobes upto 0.3cm long; stamens less than 30.....*S. theaeifolia*
4. Petioles 0.6-1.6cm long; leaves densely hairy; calyx hairy.....5
4. Petioles twice longer in length; leaves glabrous; calyx glabrous.....*S. dryophila*
5. Stem pubescent; flowers sessile; calyx rusty villous *S. cochinchinensis*
5. Stem glabrous; flowers shortly pedicellate (pedicels 0.1-0.15cm); calyx pubescent externally.....*R. ramosissima*

Symplocos cochinchinensis (Lour.) S. Moore in Jour. Bot. 52:148. 1914; EFPN 3:78. 1982; TBRI 50(4):128. 1987; Fasc. Fl. Ind. 20: 144. 1990. sub sp. *cochinchinensis*.

Dicalix cochinchinensis Lour., Fl. Cochinch. 1:663. 1790.

S. ferruginea Roxb. var. *polystachya* Clarke in FBI 3:575. 1882.

Local Name: Kharanay (Nep.).

Small trees, 8-14m high. Stem pubescent. Petiole upto 1.6cm long; lamina 7.5-15.5 x 3.5-6cm, elliptic-lanceolate, serrulate, acuminate, base cuneate, coriaceous, densely hairy. Spikes 4-9cm long, densely flowered, rusty-pubescent. Flowers sessile, white; calyx lobes 0.15-0.22cm, ovate, rusty villous; petals 0.25-0.35cm, ovate, creamy white; stamens many. Fruits 0.7-0.8cm, ovoid, beaked.

Flr.: Jan. - Apr. *Fr.*: May - Aug.

Specimen Cited: Near Lava, 2060m, AP Das & PC Rai 0329, dated 18.6.1994.

Status: Less Frequent.

Local Distrib.: Machuki, Lava, Reshete. 1200-2100m.

General Distrib.: Himalaya, India, Sri Lanka, Myanmar, China, Malaysia, Indonesia, Japan, Pacific Islands.

Symplocos dryophila C.B. Clarke in Hk.f., FBI 3, 578. 1882; Pfl. Reich IV-242, Ht. 6: 42. 1901; Fl. Asm. 3: 213. 1939; FEH 1: 250. 1966.

Local Name: Kharanay (Nep.)

A tree with gray branchlets, thinly hairy when young. Petioles 1.4-2.2 cm long. Lamina 7.4-12 x 2.8-4.2cm, oblanceolate or oblong-elliptic, entire, acuminate, base acute, coriaceous, glabrous, mid-rib prominent beneath, lateral nerves 8-12 pairs. Racemes 13-15 cm long, axillary, lax, fulvous hirsute. Bracts orbicular, villous; bracteoles similar to bracts in shape. Pedicels upto 0.38cm long. Calyx 0.55 cm long, tube ca 0.25cm., lobes ovate, hairy at the top; petals 0.5-0.62cm, ovate-lanceolate, white; stamens many. Fruit 0.5 cm across, globose, reddish-brown, with narrow calyx rim. (Plate II: 17).

Flr.: May - Jul. *Fr.:* Jul. - Sep.

Specimen Cited: Pankhasari Forest, 2240m, **AP Das & PC Rai** 1371, dated 06.5.1995.

Status : Less Frequent.

Local Distrib.: Alubari, Pankhasari, Chouda Feri, Rechila Middle. 1900-2550m.

General Distrib.: E. Himalaya (Nep.- Sikkim).

Symplocos glomerata King ex C.B. Clarke in FBI 3:577. 1882; Trs. N. Beng. 86. 1929; FEH 1:250. 1966; FPK 62. 1981; EFPN 3:78. 1982; TBRI 50(4):128. 1987; Fasc. Fl. Ind. 20:152. 1990.

Local Name: Kholme (Nep.).

Small trees, almost glabrous. Petiole upto 0.6-1cm; lamina 7-12 x 2.5-3.2cm, lanceolate, serrate, acute to acuminate, cuneate, glabrous both sides, coriaceous, lateral nerves 8-9 on either sides. Bracts and bracteoles small, ovate, wooly. Pedicels short, hairy. Flowers in axillary fascicles; calyx small, glabrous within; petals 0.3cm long, yellowish; stamens 25. Fruits not collected.

Flr.: Apr. - May

Specimen Cited : Neora Khola Bank, 2280m, **AP Das & PC Rai** 0269, dated 16.6.1994; Jaributti, 2195m, **AP Das & PC Rai** 0415, dated 15.10.1994; Dhamdhamay Dara, 2520m, **AP Das & PC Rai** 0675, dated 18.10.1994; Helipad, 2500m, **AP Das & PC Rai** 1100, dated 27.4.1995.

Status : Common.

Local Distrib.: Jaributti, Dhamdhamay Dara, Helipad, Neora Khola Bank, Chitray. 1750-1600m.

General Distrib.: E. Himalaya and Khasia Hills.

Symplocos lucida (Thunb.) Sieb. et Zucc., Fl. Jap. 1:55, t. 24. 1835; Fl. Jow. 1:297. 1981; Fl. Meg. 2:577. 1987.

Laurus lucida Thunb., Fl. Jap. 174. 1784.

S. theaefolia D. Don, Prodr. 145. 1825; FBI 3: 575. 1882.

Local Name: Kharanay (Nep.).

Medium glabrous tree. Stem greenish. Petioles 0.7-1cm; lamina 6-12.5 x 2-3.8cm, oblong-lanceolate, obscurely serrate, acuminate, base wedge-shaped, light green beneath, glabrous, glossy, coriaceous, nerves prominent on both sides. Panicles axillary, densely flowered. Bracts 0.4-0.5cm. Calyx 0.15-0.2cm, lobes rounded, ciliate, persistent; petals larger than calyx, ovate, whitish; stamens many, disc long, whitish hairy. Fruits 0.5-0.8 x 0.35-0.6cm, ellipsoid, black when fully ripe; fruiting sepals incurved.

Flr.: Mar. - Apr. *Frt.:* May - Aug.

Specimen Cited: Rechila-Mulkharka, 2490-2120m, AP Das & PC Rai 1140, dated 29.4.1995; Chouda Feri-Rechila Middle, 2285-2490m, AP Das & PC Rai 1314, dated 05.5.1995.

Status: Common.

Local Distrib.: Chouda Feri, Mulkharka, Rechila Chowk, Chonkobhir, Hattidara. 1900-2650m.

General Distrib.: E. Himalaya.

Note: Oil produced from its seeds can cure spider-bites.

Symplocos ramosissima Wallich ex G. Don, Gen. Hist. 4:3. 1837; Prodr. 8:257.1844; FBI 3: 577. 1882; Trs. N. Beng. 87. 1929; FEH 1: 250. 1966; FPK 62. 1981; EFPN 3: 79. 1982; TBRI 50(4):128. 1987; Fasc. Fl. Ind. 20:167. 1990.

Lodhra ramosissima (G. Don.) Miers in Journ. Soc. 17. 299. 1880.

Local Name: Kharanay (Nep.).

Small trees. Stem glabrous. Petioles 0.6-1.1 cm., glabrous; lamina 6.5-10.5 x 2- 3cm, oblong-lanceolate, finely serrate, acuminate, cuncate, papery, surfaces glossy and glabrous, nerves more distinct beneath. Pedicels 0.1-0.15cm, yellowish, pubescent. Racemes axillary, small, usually 4-8 flowered; calyx small, yellowish pubescent externally, lobes ovate; petals 0.25-0.3 cm, white; stamens 20; anthers slightly exerted. Fruits 0.5-0.8cm long, ellipsoid; styles 0.3-0.4cm long.

Flr.: Mar. - Jun. *Frt.:* Jul. - Nov.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0101, dated 15.6.1994.

Status: Abundant.

Local Distrib.: Jaributti, Alubari, PHE Source, Chouda Feri, Pankhasari. 1800-2450m.

General Distrib.: Temperate Himalayas and Khasia Hills.

Symplocos theaeifolia D. Don, Prodr. Fl. Nep. 145. 1825; FBI 3:575. 1882; FEH 1:251. 1966; EFPN 3:79. 1982; TBRI 50(4):123. 1987; Facs. Fl. Ind. 20:170. 1990.
S. phyllocalyx C.B. Clarke in FBI 3:575. 1882; FEH 1:250. 1966.

Local Name: Khorsanay (Nep.).

Medium sized trees, 10-16m high with branchlets usually glabrous or patently villous. Petioles 0.9-1.3cm long; lamina 7-12 x 3-4.5cm, oblong-lanceolate, obscurely serrulate, acuminate, base cuneate, coriaceous, nerves many. Panicles 2-3.4cm, axillary, dense, sometimes triPl. As. Rar.tite below. Bracts 0.5cm long. Bractleoles to 0.15cm, pubescent. Flowers sub-sessile, scented; calyx lobes upto 0.3 cm long, lanceolate, ciliate; petals 0.45-0.55cm, lanceolate or ovate, whitish; stamens 20-25cm, with hairy disc; styles to 0.3cm, densely pubescent. Fruits ellipsoid, blackish on ripening.

Flr.: Dec. - Apr. *Fr.:* May - Aug.

Specimen Cited: Mulkharka, 2460m, AP Das & PC Rai 1172, dated 03.5.1995.

Status: Common.

Local Distrib.: Lava, Reshete, Chuda Feri, Mulkharka, Alubari. 1900-2500m.

General Distrib.: Himalayas, Myanmar, Thailand, S. China, Malaysia.

OLEACEAE Hoffm. et Link.

Key to the Genera:

1. Climbing shrubs.....*Jasminum*
1. Shrubs to small trees.....2
2. Leaves imperipinnate; pedicels 0.4-0.65cm.....*Fraxinus*
2. Leaves simple; pedicels upto 0.25cm.....*Ligustrum*

Fraxinus floribunda Wallich in Roxb., Fl. Ind. ed. Carey 1:150. 1820; FBI 3:605. 1882; FEH 1:251. 1966; 2: 105. 1971; EFPN 3: 79. 1982; TBRI 50(4): 114. 1987.

Local Name: Lankuri (Nep.).

Large deciduous tree, to 20m tall. Leaves opposite, imPl. As. Rar.ipinnate, rachis 13-19cm, petiolules upto 1.2cm; lateral leaflets 7-13; lamina 9-17.5 x 4-6.5cm, oblong elliptic, shallowly serrate, caudata-acuminate, base cuneate, glabrous above, pubescent beneath, membranous, nerves pillose beneath. Panicles terminal, compound, subfascicle on branches, emerging before new leaves. Pedicels 0.4-0.65cm. Flowers bisexual; calyx to 0.15cm, with triangular teeth; petals 4, 0.4-0.5cm, linear-oblong, concave; stamens 2; stigma long. Samara 2-2.5cm, oblanceolate, with fruiting enlarged calyx and emarginate wings upto 1.75cm.

Flr.: Apr. - May *Fr.:* Jul. - Dec.

Specimen Cited: Jaributti, 2160m, AP Das & PC Rai 0981, dated 23.4.1995.

Status: Less Common.

Local Distrib.: Jaributti, Pankhasari, Chouda Feri. 1500-2200m.

General Distrib.: Himalayas (Punjab-Bhutan), Meghalaya, W. China.

Note: An important medicinal plant in tribal medicine.

JASMINUM L.

Jasminum dispernum Wallich in Roxb., Fl. Ind. ed. Carey, 1:99. 1820; FBI 3: 602. 1882; FEH 1:251. 1966; EFPN 3:80. 1982; TBRI 50(4): 117. 1987.

Local Name: Harhey Lahara, Charpatay Lahara (Nep.).

Climbing shrub, often liana, glabrous. Stem woody, terete, glabrous, light greenish. Leaves opposite 3-foliolate, rachis 1.5-3.5cm long; petioles very short to 0.15cm; lateral leaflets smaller, 2-4.7 x 0.9-2.5cm, terminal leaflet generally large, 4-8.5 x 1.7-3.7cm, ovate-lanceolate, entire, acute-acuminate, base obliquely rounded to obscurely lobed inwards, both surfaces, glabrous, slightly coriaceous, glossy, 3-nerved, from base, reticulate. Cymes terminal and axillary, 5-15 flowered, 2.5-3.5cm long. Pedicels 0.5-0.9cm long, minutely coarse hairy. Flowers ebracteate, 1.5-1.9cm; sepal tube upto 0.3cm long, greenish, with 5 triangular teeth; corolla infundibuliform, white-pinkish, tube 1.1cm long, vertically lined, lobes 6, 0.5-0.6cm long, elliptic with a sharp mucro, spreading with indistinct vertical lines; stamens included; anthers 2-celled, 0.4cm long, oblong-cylindric, dehiscing longitudinally; filament very short; style 1, long upto 1.5cm; stigma broad and swollen, slightly coiled at base.

Flr.: Feb. - May *Fr.:* Sep. - Mar.

Specimen Cited: Mulkharka-Rechila Middle, 2120-2490m, AP Das & PC Rai 1148, dated 29.4.1995.

Status: Less Common.

Local Distrib.: Mulkharka, Sakam Forest, Rechila Middle. 1500-2500m.

General Distrib.: Himalayas (Kashmir-Arunachal-Pradesh), N. Assam, Thailand, W. China.

LIGUSTRUM L.

Ligustrum lucidum Aiton f., Hort. Kew ed. 2(1):19.1810; FEH 1:252. 1966; TBRI 50(4):118. 1987.

Ligustrum nepalense Hk. in Bot. Mag. t. 2921. 1829; FBI 3:617. 1882.

Olea clavata G. Don; Gen. Hist. 4:49. 1938.

Shrub to small tree. Branches lenticellate. Stem rusty pilose when young. Leaves opposite; petiole 0.3-0.6cm, glabrous; lamina 2.5-8 x 1.3-2.5cm, ovate-lanceolate, entire, acute, base unequal-cuneate, both surfaces glabrous, coriaceous, glossy above, nerves

slightly impressed above, prominent beneath, lateral nerves 7-9 pairs, irregular. Panicles 1.5-3cm when young, terminal, branched, densely rusty villous. Bract lanceolate. Pedicel very short to 0.25cm, villous. Bracteoles 0.2cm, linear, pubescent. Floral buds 0.3 x 0.2 cm, scattered or clustered calyx very short, 0.1cm, indistinctly 4-toothed; corolla slightly longer than sepals, upto 0.15cm, white-ligh red, glabrous; stamens 2, included.

Flr.: May - Jul. *Fr.*: Oct. - Jan.

Specimen Cited: Joributti-Alubari, 2280-2195m, AP Das & PC Rai 075, dated 10.6.1994.

Status: Rare.

Local Distrib.: Jaributti, Alubari, Machuki. 1300-2300m.

General Distrib.: Native of China, naturalised in Darjeeeling.

APOCYNACEAE Juss.

Key to the Genera:

1. Climbing shrubs; follicles 14-16cm long.....*Microchites*
1. Erect plant; follicles 2-4.5cm long.....*Tabernamontana*

MICROCHITES Rolfe

Microchites elliptica Hk. f., FBI 3:671. 1882; Trees N. Beng. 91. 1929.

Shrubby climber with pendent branches. Latex milky. Petioles 0.8-1.1 cm long. Leaves 6-12 x 2.5-4.5 cm, elliptic-lanceolate, shortly acuminate, base oblique, nerves many and slender, glabrous, reddish. Cymes both axillary and terminal, thyrsoid, hairy. Calyx lobes 0.25-0.3 cm long, ovate-oblong, glandular within; corolla salver-shaped and yellowish, 5-lobed, tube 0.55-0.6 cm; stamens included. Follicles 14-16 cm, divaricate, sub-cylindric; seeds 1.4-1.6 cm, oblong, flat.

Flr.: Jul. - Oct. *Fr.*: Sep. - Dec.

Specimen Cited: Above Samsing, 870m, AP Das & PC Rai 1726, dated 17.5.1997.

Status: Rare.

Local Distrib.: Samsing, Machuki, Phari. 800-1500m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya.

TABERNAMONTANA L.

Tabernamontana divaricata (L.) R. Br. in R & S. Syst. 4: 427. 1819; FEH 1: 259. 1966, Fl. Jow. 2: 311. 1983, Fl. Meg. 2: 607. 1987.

Nerium divaricatum L., Sp.Pl. 209. 1753.

N. coronarium Jacq. Coll. 1: 138. 1785.

Tabernaemontana coronaria (Jacq.) Willd., Enum. Hort. Bertol 275. 1809; FBI 3: 646. 1882; Man. Ind. Timb. 485. 1902; Ind. Trees 460. 1906; Fl. Asm. 3: 255. 1939.

Shrub with white-gray and minutely fissured bark. Stem dichotomously branched. Leaves 4-13 x 1.2-4 cm, ovate-lanceolate, oblong-lanceolate or elliptic-lanceolate, acuminate, base obliquely cuneate, greenish, glossy above. Cymes upto 9.2 cm long. Flowers 4.5cm diam., fragrant. Follicles 2-4.5cm long, divaricate, yellowish, seeds arillate.

Flr. & Frt.: Apr. - Nov.

Specimen Cited: Samsing, 850 m, AP Das & PC Rai 1737, dated 17.5.1997.

Status: Sparse.

Local Distrib.: Phari, Samsing. 700-950m.

General Distrib.: Native of Tropical Asia, widely naturalised.

ASCLEPIADACEAE R. Br.

Key to the species:

1. Epiphytic pendent plants.....*Hoya*
1. Terrestrial climbing plants.....2
2. Coronal scales connate.....*Periploca*
2. Coronal scales clavate, not connate.....3
3. Filaments free.....4
3. Filaments connate.....5
4. Corolla lobes twisted.....*Cryptolepis*
4. Corolla lobes valvate.....*Hemidesmus*
5. Corolla tube elongated, throat dilated*Ceropegia*
5. Corolla tube short, throat not dilated.....6
6. Branches slender, greenish; corona fleshy.....*Treutlera*
6. Branches terete, silvery white; corona absolute.....*Gongronema*

CEROPEGIA L.

Key to the species:

1. Petioles 0.65-0.85cm long; cymes upto 4-flowered; pedicels 0.65-1.2cm
.....*C. longifolia*
1. Petioles 3-5cm long; cymes 3-12 flowered; pedicels 1.5-2.5cm.....*C. pubescens*

Ceropegia longifolia Wallich, Pl. As. Rar. 1: 56 t. 73. 1830; FBI 4: 69. 1883; EFPN 3: 85.1982; Fasc. Fl. Ind.16: 20.1984; TBRI 50 (4):109. 1987. var. *longifolia*: TBRI 50 (4):109. 1987.

Slender wiry climber, glabrous. Petioles 0.65-0.85 cm long; lamina 10-19 x 2.5-4cm, linear-lanceolate, acuminate, entire. Cymes extra-axillary. Peduncles upto 5 cm long, 1-4 flowered, hairy. Pedicels 0.65-1.2 cm long. Sepals 3.5-4cm, purple with curved tube and bulbous base, lobes ovate, bristly ciliate and blackish, corona 10-lobed, ciliate, horns linear, follicles upto 14.5 cm long; seeds to 0.9cm, oblong.

Flr.: Aug. - Sep. *Frt.:* Oct. - Feb.

Specimen Cited: Rechila Durpinay, 2300m, **AP Das & PC Rai** 1356, dated 06.5.1995.

Status : Sparse (vulnerable).

Local Distrib.: Sakam, Above Pareng, Rechila Durpinay. 1300-2100m.

General Distrib.: Himalayas (Simla-Sikkim), N. Assam, Myanmar.

Ceropegia pubescens Wallich, Pl. As. Rar. 2: 81, t. 187. 1831; FBI 4:73. 1883. FEH 1:260.1966; EFPN 3:85.1982; Fasc. Fl. Ind. 16:28. 1984.

Slender climbers, glabrous or sparsely pubescent. Petioles 3-5cm long; lamina 7-15 x 5.5-7cm, ovate, acuminate, base rounded, glabrous or sometime sparsely pubescent. Cymes 3-12 flowered. Peduncles upto 6 cm long; pedicels 1.5-2.5 cm. Sepals upto 0.5 cm long, linear; corolla 3-4 cm long, subcylindric, with dilated throat, spotted greenish, lobes elliptic. Coronal processes minute or obsolete, ciliated. Follicles 9-11 cm long; seeds 0.45 cm, oblong.

Flr.: Aug. - Sep. *Fr.:* Oct. - Jan.

Specimen Cited: Below Zero Point at Chouda Feri, 2000 m, **AP Das & PC Rai** 1393, dated 07.5.1995.

Status: Sparse.

Local Distrib.: Jaributti, Sakam, Machuki, Zero Point. 1200-2000m.

General Distrib.: Himalayas (Simla-Sikkim), N. Assam, Myanmar.

CRYPTOLEPIS R. Br.

Cryptolepis sinensis (Lour.) Merrill in Philip. Journ Sci. 15:254. 1919; FEH 1:260. 1966; TBRI 50 (4):110. 1987.

Pergularia sinensis Lour., Fl. Cochinch. 169. 1790.

Cryptolepis elegans Wallich ex G. Don, Gen. Hist. 4:82. 1837; FBI 4:6. 1883.

Local Name : Dudhay Lahara (Nep.).

Glabrous, slender dextrorse climbers exuding sticky latex. Petioles upto 1.2 cm long; lamina 4-8 x 1.5-3 cm, elliptic-lanceolate, acute, base rounded, glossy above, glaucous beneath. Cymes upto 12 cm long, both axillary and terminal. Pedicels 0.3-0.42 cm long. Sepals 0.7-0.8cm, ovate, obtuse; corolla 3-3.5 cm across, yellowish with short tube, lobes 1.6-1.8 cm long, lanceolate, twisted, slightly recurved; coronal scales clavate. Follicles 14-21cm, divergent; seeds 0.65-0.75cm, oblong.

Flr.: Jun. - Jul. *Fr.:* Oct. - Feb.

Specimen Cited: Samsing-Phari, 700-950m, **AP Das & PC Rai** 1740, dated 17.5.1997.

Status: Common.

Local Distrib.: Machuki, Gorubathan, Samsing , Phari. 500-1400m.

General Distrib.: Sub-tropical. East Himalaya, India, East S. China, Malaysia.

GONGRONEMA *Decaisne*

Gongronema thomsonii (Hk. f.) Matthew in KB 34:68. 1979; Nam. Chang. Flr. Pl. 264. 1987.

Gymnema thomsonii Hk. f., FBI 4:32. 1883; Trs. N. Beng. 91. 1929.

Shrubby twinner, glabrous. Branches slender. Leaves 6-12 x 3-8 cm, linear-lanceolate, entire, coriaceous, glabrous both sides, glossy white beneath. Cymes long peduncled, branching into 3 arms. Flower shortly pedicellate. Sepals ovate, corolla linear, lobed with reflexed margins; anthers membranous; corona absolute; stigma turribinate.

Flr.: Jul. - Sep. *Fr.:* Nov. - Feb.

Specimen Cited: Near Sakam, 1300m, **AP Das & PC Rai** 1443, dated 08.10.1995.

Status: Frequent.

Local Distrib.: Machuki, Tangta, Sakam. 700-1400m.

General Distrib.: Endemic to Darjeeling and Sikkim Himalayas.

HEMIDESMUS *R. Br.*

Hemidesmus indicus R. Br. in Mem. Wern. Soc. 1:56. 1809; FBI 4:5. 1883; Beng. Pl. 2: 686. 1903; Bot. Mem. Uni. Bomb. 4:96. 1962; Fl. Calic. 171. 1982.

Periploca indica L., Sp. Pl. 211. 1753.

Shrubby twinner. Stem rigid, upper half brownish red, other half greenish-white, glabrous to sparsely hairy. Petiole 0.5-1.3cm, sparsely pubescent, light red in young shoot; lamina 4.5-14 x 1.2- 4.3cm, linear-lanceolate, entire, acute, few ones even retuse, base rounded or oblique, glabrous both sides, leathery, dark greenish above, greenish white beneath, mid rib thick and light reddish brown, lateral nerves 6-9 pairs. Cymes sub-sessile, opposite. Bracts ovate, tip acute. Pedicels short and covered by bracts. Flowers small, light green; sepals acuminate, glandular inside; petals rotate, light green, very small (upto 0.25cm), glabrous; stamens 5; filaments free, terete; seeds oblong.

Flr.: Jul. - Oct. *Fr.:* Sep. - Dec.

Specimen Cited: Jaributti-Alubari, 2155-2280m, **AP Das & PC Rai** 0303, dated 17.6.1994; Chouda Feri, 2285m, **AP Das & PC Rai** 0341, dated 14.10.1994.

Status : Rare.

Local Distrib.: Machuki, Chouda Feri, Rechila Durpinay, Jaributti. 1300-2550m.

General Distrib.: India, Sri Lanka, Eastern Himalaya (Nepal-Sikkim), Myanmar.

HOYA R. Br.

Key to the species:

1. Plant ramous epiphyte; stem creeping and rooting; corolla dull white-brown, tomentose within.....*H. serpens*
1. Epiphytic plant but not ramous; stem not rooting; corolla white and centrally pinkish, glabrous.....2
2. Leaves sessile; stem flaccid; corolla white.....*H. linearis*
2. Leaves shortly petiolate (0.15-0.25cm); stem not flaccid; corolla white and centrally pinkish.....*H. lanceolata*

Hoya lanceolata Wallich ex D. Don, Prodr. Fl. Nep. 130. 1825; FBI 4:54. 1883; FEH 1: 261. 1966; EFPN 3:87. 1982; TBRI 50(4) :116. 1987.

Small epiphytic shrub, 60-90 cm long pendent branches. Branchlets pubescent. Petioles 0.15-0.25cm long. Lamina 2-5 x 0.9-2cm, ovate-lanceolate, acuminate, base acute, glabrous, succulent. Cymes terminal and axillary, umbellate, 6-10 flowered. Sepals 0.5-0.6 cm, oblong-lanceolate, pubescent; corolla 1-1.2cm diam., whitish, centrally pinkish, tube upto 1.5 cm long, lobes 0.65-0.7cm; spreading, coronal processes terete, spreading. Follicles 10-15 cm, slender; seeds 0.25-0.3 cm.

Flr.: May - Jun. *Fr.:* Aug. - Dec.

Specimen Cited: Samsing-Phari, 700-950m, **AP Das & PC Rai** 1742, dated 17.5.1997.

Status: Common.

Local Distrib.: Samsing, Todey-Tangta, Sakam, Choudha Feri. 900-2280m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar.

Hoya linearis Wallich ex D. Don, Prodr. Fl. Nep. 130. 1825; Bot. Mag. t. 6682. 1883; FBI 4: 53. 1883; Trs. N. Beng. 92. 1929; FEH 1: 261. 1966; EFPN 3: 87. 1982; TBRI 50 (4): 116. 1987.

Hoya linearis var. *nepalensis* Hk. f. in FBI 4:53. 1883.

Pendent epiphytic undershrub. Stem 22-30cm, flaccid, densely hirsute. Leaves sessile; lamina 3-5.5 x 0.2-0.3cm, linear, narrowly terete, entire, acute, densely hirsute both surfaces, coarse, isobilateral, nerves not distinct. Umbels many flowered, terminal and sessile. Flowers ebracteate, white, fragrant; sepals small, hirsute; petals broadly ovate, coronal processes spreading stellately.

Flr.: Sep. - Oct. *Fr.:* Dec. - Apr.

Specimen Cited: Mulkharka, 2240m, **AP Das & PC Rai** 1415, dated 30.4.1995.

Status: Common.

Local Distrib.: Lava, Mulkharka, Sakam Forest, Middle Rechila Chowk, Reshete. 1700-2400m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Assam, Meghalaya, W. China.

Hoya serpens Hk. f., FBI 4:55. 1883; FEH 1: 261.1966; EFPN 87.1982 ; TBRI 50(4):116. 1987.

Small epiphyte, ramous. Stem slender, creeping, rooting on the bark. Petioles 0.2-0.25cm long. Lamina 1.5-2 cm across, broadly elliptic to sub-orbicular, acute, base rounded, succulent, hairy both sides. Umbels axillary. Peduncles 3.5-4.2 cm, stout. Pedicels 1.5-2.5cm long. Sepals upto 0.41cm, ovate; corolla 1.3-1.8cm across, dull white-brown, tomentose within, lobes to 0.75 cm, ovate and obtuse; corona lobes ellipsoid. Follicles 3.5-4.5cm; seeds 0.3-0.4cm.

Flr.: Mar. - May *Fr.:* Sep. - Nov.

Specimen Cited: Near Todey-Tangta, 1700m, **AP Das & PC Rai** 0827, dated 21.10.1994.

Status : Common.

Local Distrib.: Samsing, Machuki, Todey-Tangta , Gurbathan . 700-1800m

General Distrib.: E. Himalaya (Dargeeling-Bhutan).

PERIPLOCA

Periploca calophylla (Wight) Flaconer in Proc. Lin. Soc. 1:115. 1841; FBI 4:12. 1883; Trs. N. Beng. 91. 1929; FEH 1:262. 1966; 2:109. 1971; EFPN 3:88. 1982; TBRI 50(4):122. 1987.

Streptocaulon calophyllum Wight, Contr. B. Ind. 65. 1834 .

Large shrubby, glabrous evergreen twinner with milky latex. Branches slender. Petioles 0.35-0.75 cm long. Lamina 6-12 x 1-2.5cm, linear-lanceolate, acuminate, slightly repand, both surfaces shining, nerves horizontal. Cymes in opposite axils, lax, sessile, 1.5-2.5cm diam. Sepals 0.25-0.3 cm long, broadly ovate; corolla 0.65 -0.75 cm across , rotate, pink, lobes 0.45-0.5cm, ovate-oblong, acute, brown; corona brownish; stamens free. Fruits not seen.

Flr.: Mar. - Apr.

Specimen Cited: Near Sakam ,1500 m, **AP Das & PC Rai** 1447, dated 16.8.1997.

Status: Sparse.

Local Distrib.: Sakam, Mulkharka.1500-2050m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Tibet , W. and C. China.

TREUTLERA Hk. f.

Treutlera insignis Hk.f. in Hooker, Icon. Pl. t. 1425. 1883; FBI 4:45. 1883; Trs. N. Beng. 91. 1929; FEH 1:262. 1966; FPK 66. 1981; EFPN 3:88. 1982; TBRI 50(4): 129. 1987.

A glabrous branched twinning shrub with milky latex. Branches terete, glabrous, silvery white. Leaves distantly placed; petiole 1.5-4cm; lamina 9-13.2 x 3-5.5 cm, elliptic,

entire, acuminate, base rounded to shallowly lobed inward medianly, glabrous both surfaces except in the nerves above, dark green and leathery above, paler to silvery white beneath, dorsiventral, midrib broad and prominent below, lateral nerves spreading, 5-6 pairs, distinct below, slightly impressed above. Umbels axillary. Peduncles 3.5-5cm. Bracts small, lanceolate. Pedicels shorter than peduncles, 2-2.8cm. Flowers 2.5cm across, dark purple; sepals ciliate, small; corolla larger, nearly rotate, 5-lobed, lobes ovate. Fruit not collected.

Flr.: Sep. - Nov.

Specimen Cited: Chouda Feri, 2285m, **AP Das & PC Rai** 0351, dated 14.10.1994; PHE Source-Middle Rechila Zone, 2155-2490m, **AP Das & PC Rai** 1056, dated 26.4.1995.

Status: Common.

Local Distrib.: Middle Rechila, Thosum Beat, Ruka Hills, Thartharay. 2100-2850m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya.

BUDDLEJACEAE Wilhelamina

BUDDLEJA Griif.

Key to the species:

1. Small shrubs, 1-2.5m tall; lamina 15-29cm, crenulate-dentate.....*B. macrostachya*
1. Larger shrubs, 2.5-5m tall; lamina 5.5-16cm, entire or minutely toothed to sinuate-dentate.....2
2. Lamina 5.5-14.5cm, entire or minutely toothed.....*B. asiatica*
2. Lamina 9-16cm, sinuate-dentate*B. paniculata*

Buddleja asiatica Lour., Fl. Cochinch. 72. 1790; FBI 4:82. 1883; Trs. N. Beng. 93. 1929; KB 1930:195. 1930; FEH 1:253.1966; FPK 66. 1981; EFPN 3:89. 1982; TBRI 50(4):107. 1987.

Local Name: Bhimsen Paati (Nep.).

Shrub to 3-5 m tall, with grey-tomentose branchlets. Petioles 0.6-0.75 cm long. Leaves 5.5-14.5 x 2-3cm, lanceolate, acuminate, entire, sometime minutely toothed, white pubescent beneath. Spikes dense upto 15.5cm long, paniced, axillary and terminal, white tomentose. Flowers small; calyx 0.45-0.5cm, campanulate, tube narrow, lobes 4, rounded, 0.55-0.6 cm, glabrous, whitish. Capsule 0.55-0.65 cm, ellipsoid.

Flr.: Jan. - Mar. *Fr.:* Feb. - Jul.

Specimen Cited: Samsing-Phari, 700-950m, **AP Das & PC Rai** 1753, dated 18.5.1997.

Status: Common.

Local Distrib.: Gorubathan, Sakim, Samsing, Phari, Machuki. 800-2050m .

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Assam, India, Myanmar, C. and S. China, Taiwan.

Note: A sacred plant linked to the cultural and traditional ceremonies. Leaves and flowers are invariably used in offering pujas and invoking the nature diety.

Buddleja macrostachya Benth., Scroph. Ind. 42. 1935; FBI 4:81. 1883; EFPN 3:89. 1982.

B. griffithii (C.B. Clarke) Marquand in Kew Bull. 1930: 194. 1930; FEH 2:106. 1971.

Local Name: Bhimsen Paati (Nep.)

Shrubs to 1-3m. Branches quadrangular. Leaves opposite; stipules much developed and eared uniting the opposite leaves; petioles 0-0.5cm; lamina 15-29 x 2-4.2cm, crenulate-dentate, acuminate, base attenuate, rusty wooly beneath, mid rib very thick, veins prominent below. Spikes both terminal and axillary, 3-20cm, elongate subpanicked, dense flowered. Flowers rusty-white, villous; sepals upto 0.32cm, campanulate, 4-lobed, teeth lanceolate, acute; petals 1.2 x 0.5cm, 4-merous, silvery white tinged with pinkish tube; stamens 4; anthers ovate to oblong, subsessile; ovary 2-chambered with clavate and linear style; ovules numerous. Capsules oblong and acute, villous; seeds elongate.

Flr.: Sep. - Dec. *Fr.:* Dec. - Apr.

Specimen Cited: Rechila-Hattidara, 2280-2549m, **AP Das & PC Rai** 0611, dated 17.10.1994.

Status: Less Frequent.

Local Distrib.: Hattidara, Rechila Chowk, Reshete, Todey-Tangta. 1900-2550m.

General Distrib.: E. Himalaya, N. Assam, Myanmar, Vietnam, W. China.

Buddleja paniculata Wallich in Roxb., Fl. Ind. ed. Carey 1:412. 1820; FBI 4:81.1883 p.p.; FEH 2:106. 1971; EFPN 3:89.1982; TBRI 50(4):107. 1987.

Tall shrubs, 2.5-5 m high, with peeling bark. Branchlets rusty pubescent. Petioles 0.2-0.4 cm long. Lamina 9-16 x 3.5-5cm, hastate-lanceolate, acuminate, narrowed at the base, sinuate-dentate, wooly beneath; terminal leaves oblong-lanceolate, subentire. Flower heads in interrupted panicles. Calyx 0.4-0.5 cm, wooly; corolla 0.7-0.8 cm long; pinkish or white, tube narrow, lobes spreading and rounded. Capsule 0.55-0.6cm, ellipsoid.

Flr.: Mar. - Apr. *Fr.:* May - Aug.

Specimen Cited: Below Zero Point, 1820 m, **AP Das & PC Rai** 0966, dated 22.4.1995.

Status: Common.

Local Distrib.: Reshete, Todey, Zero Point. 1400-2300m.

General Distrib.: Himalaya (Nepal-Bhutan), Manipur, Myanmar, China.

GENTIANACEAE Juss.

Key to the Genera:

1. Plants climbing.....2
1. Plants erect or procumbent.....3
2. Fruits berry-like.....*Tripterospermum*
2. Fruits capsular.....*Gentiana*
3. Corolla spurred.....*Halenia*
3. Corolla not spurred.....4
4. Petals with distinct nectaries.....*Swertia*
4. Petals without nectaries.....*Gentiana*

GENTIANA L.

Key to the species:

1. Plants climbing.....*G. speciosa*
1. Plants erect or procumbent.....2
2. Erect, unbranched or scarcely branched herbs.....*G. capitata*
2. Erect/semierect/procumbent, much branched herbs.....3
3. Branches soften, not procumbent; corolla reddish-violet.....*G. micans*
3. Branches procumbent; corolla white or blue.....4
4. Flowers terminal, solitary, greenish-white; capsule much elongated.....*G. bryoides*
4. Flowers in few flowered terminal cymes, blue or white; capsule ovoid.....*G. pedicellata*

Gentiana bryoides Burkill in JASB n.s. 2: 316. 1906; FEH 1:254. 1966; 2 107. 1971; EFPN 3: 91. 1982; TBRI 50(4): 115. 1987.

Small, erect, annual herb to 5.5 cm. Branches semidecumbent. Stem branched, glabrous. Leaves opposite, sessile, 0.2-0.6 x 0.15-0.3cm, ovate-lanceolate, entire and cauline, acute, base obtuse, triplinerved, nerves prominent below and impressed above, glabrous. Flowers terminal, solitary; sepals leafy, lobed; petals longer upto 0.6cm, tubular, greenish white, distinctly veined. Capsules exerted and elongated. (Plate II: 19).

Flr.: Apr. - Jun. *Frt.*: Jul. - Aug.

Specimen Cited: Rechila Chowk, 2280m, AP Das & PC Rai 0230, dated 16.6.1994.

Status: Frequent.

Local Distrib.: Tinsimana, Thosum Peak, Jorpokhari, Rechila Chowk. 2250-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), S.E. Tibet.

Gentiana capitata Hamilton ex D. Don, Prodr. Fl. Nep. 126. 1825; FBI 4: 113. 1883; FEH 1: 254. 1966; EFPN 3: 92. 1982; TBRI 50(4): 115. 1987.

G. cephalodes Edgew. in Lond. Journ. Bot. 4: 637, t. 20, ut. *G. bacon*. 1845.

Small unbranched erect herb to 8-13.5cm tall. Stem greenish-white. Leaves opposite and densely clustered near the tip, 0.7-2.1 x 0.4-1.5cm, broadly ovate, entire, mucronate-emarginate, base narrowly rounded, glabrous, whitish-green beneath, greenish above.

Flowers many (upto 7), upto 0.6 cm long, capitate, aggregated into terminal leafy heads, purplish white; sepals lobed, lobes triangular and acute; petals with emarginate folds, bluish-white.

Flr.: Dec. - Apr. *Frt.:* May - Jul.

Specimen Cited: Alubari Belt, 2280m, **AP Das & PC Rai** 0210, dated 16.6.1994; Jaributti-Rechila, 2195-2280m, **AP Das & PC Rai** 0514, dated 15.10.1994;

Status: Common.

Local Distrib.: Alubari, Reshete, Jorpokhari, Rechila Durpinay. 2100-3050m

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar.

Gentiana micans C.B. Clarke, FBI 4:112.1883; EFPN 3:93. 1982; TBRI 50 (4):115. 1987.

G. argentea C.B. Clarke in J. Lin. B. 14:436. 1875.

Small annual erect herb to 4-6.5cm. Branches many, tufted. Stem radically branched, violet red. Radical leaves in rosettes (upper leaves opposite); lamina 0.5-2.4 x 0.4-1.5cm, broad ovate, entire, rarely indistinctly undulate, acute, base narrow and connate at base, glabrous, nerves prominent below, impressed above, dark red-brown beneath, deep green and glazy above. Flowers actinomorphic, bisexual, greenish white; sepals imbricate, leafy green, persistent; petals short lobed; stamens alternating with petal lobes; anthers 2-celled; ovary superior; style simple. Fruits not collected.

Flr.: Mar. - Apr.

Specimen Cited: Rechila Helipad, 2500m, **AP Das & PC Rai** 1090, dated 17.4.1995; Dhamdhamay Dara, 2518m, **AP Das & PC Rai** 1132, dated 28.4.1995; Mulkharka, 2240m, **AP Das & PC Rai** 1172, dated 01.5.1995.

Status: Frequent.

Local Distrib.: Dhamdhamay Dara, Helipad region, Mulkharka. 2000-2550m.

General Distrib.: Afganistan, temperate and subalpine Himalayas.

Gentiana pedicellata (D. Don) Wallich ex Grisebach, Gen. Sp. Gent. 273. 1838; FEH 1: 255. 1966; RBSI 19(2): 68. 1966; EFPN 31:93. 1982; TBRI 50(4): 115. 1987.

Ericala pedicellata D. Don in Philos. Mag. 76. 1836; Trans Linn. Soc. 17: 514. 1837.

G. quadrifaria auct. non Blume: Clarke in FBI 4: 111. 1883.

H. squarrosa auct. non Ledeb.: Clarke in FBI 4:111. 1883

Small annual herbs with much branched decumbent branches. Roots white. Upper stem region whitish green, bulk lower portions reddish. Leaves opposite, sessile, radical leaves much larger and broader than cauline leaves, rosulate, ovate-lanceolate, margin entire and minutely hairy, mucronate, singly nerved (cauline) or triply nerved (radical), yellowish green beneath with thick mid rib. Cymes terminal, few flowered. Flowers sessile, pale

blue; sepals lobed, lobes awl-shaped and half as long as tube; petal tube 0.5-0.7cm, lobes triangular, pointed, blue or white. Capsules ovoid.

Flr.: Jan. - Apr. *Frt.:* Apr. - Jun.

Specimen Cited: Rechila Durpinay, 2300m, **AP Das & PC Rai** 1373, dated 06.5.1995.

Status: Abundant.

Local Distrib.: Thartharay, Rechila Durpinay, Jaributti. 2000-2400m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Myanmar.

Gentiana speciosa (Wallich) Marquand in KB 1931:70. 1931; FEH 1:255, t. 4b. 1966; EFPN 3:93. 1982; TBRI 50 (4):115. 1987.

Crawfordia speciosa Wallich, Tent. Fl. Nep. 64, t. 48. 1826; FBI 4:6. 1883.

1-2.5m long twinner, slender. Leaves opposite, 4.8-7.6 x 2.2-3.2cm, elliptic, acuminate, base rounded, margin obscurely denticulate, 3-nerved, glabrous both sides. Pedicels upto 4.3cm long. Bracts to 0.5cm, lanceolate. Flowers solitary, pendent, axillary; calyx 1.2-1.5cm, campanulate, lobes triangular, reflexed; corolla 3-4.2cm long, tubular or bell shaped, purple, lobes triangular; stamens connected to corolla at middle Pl. As. Rar.t; style upto 0.78cm long. Capsule 3.2-4.2cm, cylindric, with upto 2cm long stalk.

Flr. & Frt.: Sep. - Dec.

Specimen Cited: Rechila, 2300m, **AP Das & PC Rai** 0133, dated 15.6.1994.

Status: Common.

Local Distrib.: Reshete, Jaributti, Chonkobhir, Rechila, Chitray, Ruka Hill. 2200-2700m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Myanmar.

HALENIA Borkh.

Halenia elliptica D. Don in Trans. Linn. Soc. 17: 529. 1837; FBI 4:130. 1883; FEH 1:256. 1966; RBSI 19(2):68.1966; EFPN 3:95. 1982; TBRI 50(4): 115. 1987.

Erect annual herbs. Stem narrowly 4-angled, glabrous. Leaves opposite, sessile to shortly stalked, lamina 0.5-2.5 x 2.5-1cm, narrow-elliptic, entire, acute-subglobose, base slightly rounded. Flowers in branched terminal and axillary cymose panicle pale blue; sepals 4-lobed, lobes lanceolate-ovate; petals upto 0.8cm across, deeply 4-lobed, 4 short blue spurs 0.7cm projecting backward and outward from the petal base. Fruit not recorded.

Flr.: Sep. - Oct.

Specimen Cited: Jorhpokhari, 3040m, **AP Das & PC Rai** 0700, dated 19.10.1994.

Status: Less Frequent.

Local Distrib.: Chitray, Jorhpokhari, Rechila Peak. 2600-3100m.

General Distrib.: W. Asia, Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar, S. Tibet, N.W. China.

SWERTIA L.

Key to the species:

1. Nectaries on petals naked.....*S. bimaculata*
1. Nectaries on petals covered, forming a pocket like structure.....2
2. Basal leaves 5 or 7 nerved at base.....3
2. Basal leaves 3 nerved at base.....6
3. Radical leaves long (upto 3cm), petioled, 7nerved.....*S. speciosa*
3. Radical leaves sessile or subsessile, 5-nerved.....4
4. Flowers 5-merous.....*S. lurida*
4. Flowers 4-merous.....5
5. Flowers almost sessile.....*S. chirayita*
5. Flowers with 0.3-1cm long pedicels.....*S. hookeri*
6. Stem 4-winged or sharply 4-angled.....*S. nervosa*
6. Stem terete.....*S. dilatata*

Swertia bimaculata (Sieb. et Zucc.) Hk. f. et. Thoms. ex C. B. Clarke in Journ. Linn. Soc. 14:449. 1875; FBI 4:123. 1883; FEH 1:256. 1966; EFPN 3:96. 1982; TBRI 50(4): 128. 1987.

Ophelia bimaculata Sieb. & Zucc. in Abh. Akad. Wiss. Munchen. 4 (3):159. 1946.

Local Name: Bhalay Chireto (Nep.).

Erect, annual herb upto 1m tall. Stem much branched upward, hollow. Leaves opposite, cauline leaves petiolate (petiole upto 1cm), lamina 1.8-7.5 x 0.3-3.3cm, broad elliptic-lanceolate, entire, acute, base rounded pointed, glabrous both sides, distinctly 3-nerved. Inflorescence both axillary and terminal clusters. Flowers tetra-pentamerous; sepals 5, small and shorter than petals, nearly elliptic; petals larger and longer upto 1.2cm, white, many nerved, apical portion spotted; stamens 4-5; filament long upto 0.6cm, anthers dorsifixed. Seeds numerous, reddish black.

Flr.: Aug. - Oct. *Fr.:* Oct. - Mar.

Specimen Cited: Chouda Feri, 2285m, AP Das & PC Rai 0363, dated 14.10.1994; Jaributti-Rechila, 2195-2280m, AP Das & PC Rai 0412, dated 15.10.1994.

Status: Abundant.

Local Distrib.: Thartharay, Chouda Feri, Chitray, Thosum Hill. 1950-2800m.

General Distrib.: E. Himalaya, Myanmar, China and Japan.

Swertia chirayita (Roxb. ex Fleming) Karsten, Deuts. Fl. 1025. 1880-83; FBI 4: 124. 1883, ut *chirata*; FEH 1: 257. 1966; EFPN 3: 96. 1982; TBRI 50(4): 128. 1987.

Gentiana chirayita Roxb. ex Fleming in As. Res. 11. 167. 1812.

Swertia tongluensis Burkill in JASB n.s. 2: 319. 1906; 3: 33. 1907.

Local Name: Chireto (Nep.); Chirata (Beng.).

A perennial herb upto 60cm high. Stem subterete. Leaves opposite, sessile or very shortly stalked (subsessile), lamina 4-9 x 1.4-3.5cm, elliptic, entire, acute, base narrowed, basally 5-nerved, dark green. Panicles terminal as well as axillary, leafy, many flowered. Flowers sessile to very shortly pedicelled (pedicel 0.1cm), 4-merous, lurid bluish yellow; calyx lobed, segments lanceolate; corolla lobes 0.6cm long, ovate, acuminate, variously tinged, 2-glands on each lobe; filaments free; anthers and stigma oblong. Capsule 0.65cm long, ovate with acute tip. (**Plate II: 21**).

Flr.: Sep. - Nov. *Fr.:* Nov. - Feb.

Specimen Cited: Chitray Bunglow below Jorhpokhari, 2800m, **AP Das & PC Rai** 0639, dated 17.10.1994; Rechila Peak, 3100m, **AP Das & PC Rai** 0818, dated 21.10.1994.

Status: Less Common.

Local Distrib.: Rechila Peak, Chitray, Jorpokhari, Pankhasari, Lava. 2000-3100m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya.

Note: Highly medicinal plant. The extract obtained by boiling the plant parts is orally administered as high esteemed tonic, febrifuge, enthelmintic, laxative and for liver troubles.

Swertia dilatata C.B. Clarke in FBI 4: 122. 1883; RBSI 19(2): 69. 1966; FEH 1: 257. 1966; EFPN 3: 97. 1982; TBRI 50(4): 1987.

Erect, small, annual herb to 50cm. Stem round, hollow, glabrous. Leaves opposite, sessile or shortly petiolate, lamina 1.2-4.7 x 0.2-0.9cm, lanceolate, acute-acuminate, base rounded or pointed, glabrous, triplinerved. Flowers in panicles, pentamerous: sepals broad, upto 1cm, elliptic-lanceolate, pointed acuminate, persistent; petals shorter than sepals, acute, base provided with a purplish band, pale membranous, greenish yellow, distinctly 5-nerved, mid nerve thick and prominent; glands (nectaries) horse-shoe shaped; scales hanging. Capsules 0.85-1.25cm; seeds round, numerous, green yellow.

Flr.: Sep. - Nov. *Fr.:* Oct. - Jan.

Specimen Cited: Rechila-Jorhpokhari, 2280-3060m, **AP Das & PC Rai** 0385, dated 19.10.1994.

Status: Common.

Local Distrib.: Rechila Park, Dhamdhamay Dara, Thosum, Chitray, Jorpokhari. 2200-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, Myanmar, S.E. Tibet.

Swertia hookeri C.B. Clarke in FBI 4:127. 1883; Bull. Br. Mus. (Nat. Hist.) B. 4:242. t. 23. f. 2 a-d 1970; EFPN 3:97. 1982.

Small erect robust herb, 20-33cm high. Root-stock stout, perennial. Stem hollow, stout. Cauline leaves 5.5-11 x 2-3.5cm, spatulate-elliptic, basally connate, entire, narrowed at both ends, 5-nerved; radical leaves sessile, smaller than cauline, lamina ovate, terminal ones flushed with purple colour. Cymes axillary, densely flowered. Pedicels 0.3-1cm. Flowers nodding, bell-shaped, 4-merous, maroon, darkly veined; calyx upto 0.8cm, lobes ovate, acute, green; corolla-lobes 1.7 x 0.8cm, obtuse, nerved with bluish lines; filaments linear; anthers oblong; style upto 0.25cm long with very short stigma. Capsule 1.5 x 0.8cm, glossy, brownish.

Flr. & Frt.: Sep. - Dec.

Specimen Cited: Alubari, 2490m, **AP Das & PC Rai** 032, dated 13.6.1994.

Status : Common.

Local Distrib.: Middle Alubari, Reshete, Chitray, Pankhasari, Jaributti. 2100-2500m.

General Distrib.: E. Himalaya (Nepal-Bhutan), S.E. Tibet.

Swertia lurida (D. Don ex G. Don) C.B. Clarke in FBI 4:124. 1883; Grana Palyn. 7:111. 1967; EFPN 3: 97.1982.

Ophelia lurida D. Don ex G. Don, Gen. Syst 4:179.1837.

Stem upto 45cm high, internodes 2-5.5cm long. Leaves opposite, cauline. Leaves subsessile, lamina 1.4-4.3 x 0.7-1.9cm, elliptic, entire, acute, base rounded, 5-nerved, nerves raised beneath. Flowers tetramerous; corolla lobes 0.25cm, lurid green-yellow and with glabrous 2 glands near lobe base; filaments linear, free; anthers oblong; style cylindrical. Capsule 0.4cm.

Flr. & Frt.: Aug. - Nov.

Specimen Cited: Thosum Beat-Jorpokhari, 2780-3000m, **AP Das & PC Rai** 0841, dated 22.10.1994.

Status : Frequent.

Local Distrib.: Thosum Beat, Ruka Hill, Tinsimana, Jorpokhari, Middle Rechila. 2300-2900m.

General Distrib.: N.W. Himalayas, Nainital, Sikkim, Darjeeling.

Swertia nervosa (D. Don) C.B. Clarke in FBI 4: 125. 1883; FEH 1: 259. 1966; EFPN 3: 97. 1982; TBRI 50(4): 128. 1987.

Agathotes nervosa G. Don, Gen. Syst. 4: 177. 1837.

Small, annual erect herb upto 1m, branched. Stem 4-winged/angled. Leaves opposite, cauline; sub petiolate upto 0.25cm; lamina 1-3.8 x 0.2-0.6cm, elliptic-lanceolate, margin entire, acuminate, base narrowed, sparsely hairy and coarse below, 3-nerved. Inflorescence many flowered, branched, axillary and terminal clusters. Flowers greenish yellow with purple spots; sepals nearly twice longer the petals, oblong-linear; petals 4-

lobed, 0.5-0.7cm, ovate to long pointed, depression shallow, greenish yellow. Gland (nectaris) near petal base, one and orbicular with a scale covering the depression.

Flr.: Sep. - Nov.

Specimen Cited: Rechila-Jorhpokhari, 2280-3060m, AP Das & PC Rai 0709, dated 19.10.1994.

Status: Less Frequent.

Local Distrib.: Rechila Chowk, Sikkim-Neora Valley Border, Hattidara. 2100-2500m.

General Distrib.: Himalayas (Simla-Bhutan), Meghalaya, Naga Hills, W. China.

Swertia speciosa D. Don in London Edinb. Philos. Mag. J. Sci 8:77.1836; FBI 4:128.1883; NRBGE 26:275. 1965; Grana Palyn. 7:112. 1967; EFPN 3:97. 1982.
S. perfoliate Royle ex G. Don, Gen. Syst. 4:176. 1837.

Erect herbs to 50cm high. Stem hollow, thick. Radical leaves opposite, long petioled (petiole upto 3cm long); lamina 6-12 x 1.9-5cm, entire, acute, base narrowed downwards, dark green, upto 7-nerved; cauline leaves elliptic, acute or acuminate, sometimes clasping the stem. Cymes paniculate. Pedicels long. Flowers pentamerous, 1.5-1.8cm diam.; calyx-lobes to 1.5cm long, elliptic, acute, serrate, overlapping basally; corolla-lobes 5, spreading, 1.7-2cm, elliptic, lurid grey, each with 0.3cm long fimbriae at the base; filaments linear, flattened; anthers ovate. Capsule 1.6-1.8 x 1.2cm.

Flr.: Aug. - Oct. *Fr.*: Oct. - Dec.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai. 032, dated 13.6.1994; Resheta Area, 2240m, AP Das & PC Rai 1326, dated 06.5.1995.

Status: Common.

Local Distrib.: Reshete, Alubari, Dhamdhamay Dara, Ruka Hill. 2100-2600m.

General Distrib.: Endemic to Eastern Himalaya.

TRIPTEROSPERMUM Blume

Tripterospermum volubile (D. Don) Hara in Journ. Jap. Bot. 40:21. Jan. 1965; FEH 1: 258. t. 4c 1966; EFPN 3:98. 1982; TBRI 50(4):129. 1987.

Gentiana volubilis D. Don, Prodr. Fl. Nep. 126. 1825.

Crawfurdia fasciculata Wallich, Tent. Fl. Nep. 63. t. 47. 1826; FBI 4: 107. 1883.

C. japonica var. *luteoviridis* (Clarke) Clarke in FBI 4: 108. 1883.

D. affinis Wallich ex Clarke in FBI 4: 107. 1883.

Small twinners. Leaves opposite; lamina 1.7-4.5 x 0.6-1.5cm, ovate-lanceolate, denticulate, acute, base narrow rounded, glabrous both surfaces, 3-nerved. Flower axillary, short pedicellate, light pinkish; sepals toothed, teeth linear; petals campanulate, pinkish white. Berry ellipsoid, succulent, reddish.

Flr.: Aug. - Sep. *Fr.*: Oct. - Dec.

Specimen Cited: Rechila-Jorhpokhari, 2280-3040m, **AP Das & PC Rai** 0134, dated 15.6.1994; Alubari Belt, 2280m, **AP Das & PC Rai** 0207, dated 16.6.1995; Jaributti-Alubari, 2195-2280m, **AP Das & PC Rai** 0118, dated 14.6.1994.

Status: Common.

Local Distrib.: Alubari, Chitray, Hattidara, Mulkharka, Thosum Hill. 2000-2850m.

General Distrib.: E. Himalaya (Nepal-Bhutan), S.E. Tibet, N. Myanmar.

BORAGINACEAE Juss.

Key to the Genera:

1. Leaves petiolate; lamina 4-6 nerved; nutlets pyramidal.....*Hackelia*
1. Leaves sessile; lamina 3 nerved; nutlets ovate.....*Cyanoglossum*

CYANOGLOSSUM L.

Key to the species:

1. Lamina base attenuate; corolla purple.....*C. glochidiatum*
1. Lamina base newly rounded; corolla blue.....*C. zeylanicum*

Cyanoglossum glochidiatum Wallich *ex* Benth. in Royle, III. Bot. Him. 306. 1836; FBI 4: 156 1993; FEH 1:266. 1966; EFPN 3: 100. 1982.

C. wallichii G. Don, Gen. Hist. 4: 354. 1832; FBI 4:157. 1883.

C. denticulatum DC., Prodr. 10: 105. 1846; FBI 4: 157. 1883.

Erect herbs, 30-40cm tall. Branches ascending. Stem hispid with hairs rising from tubercles. Leaves alternate, sessile, lamina 2.5-7 x 1-2.2cm, lanceolate, acute, base attenuate, 3-nerved, hairy on both surfaces, hairs whitish, dense and almost erect. Flowers in elongated racemes, purple; sepal lobed, ovate to obtuse. Nutlets ovate, margined and glochidiate.

Flr.: Jul. - Nov. *Fr.*: Aug. - Dec.

Specimen Cited: Jaributti-Alubari, 2200-2300m, **AP Das & PC Rai** 0448, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Jaributti, Alubari Chowk, Helipad region, Reshete, Machuki. 1500-2300m.

General Distrib.: Afganistan, C. Asia, Himalayas (Kashmir-Sikkim), Tibet, W. China.

Cyanoglossum zeylanicum (Vahl.) Thunb. *ex* Lehm. in Neue Schr. Nat. Ges. Halle 3(2): 20. 1817; FEH 1: 266. 1966; EFPN 3: 100. 1982.

C. furcatum Wallich *ex* Roxb., Fl. Ind. ed. Carey, 2: 6. 1824; FBI 4:155. 1883.

Herb, erect, 30-50 cm tall, hairy. Leaves alternate, sessile, lamina 1.2-6.5 x 0.4-2.5cm, lanceolate, acute, base nearly rounded, scabrous on the upper surface, hairs whitish and less dense, 3-nerved, prominent beneath, mid vein thick Racemes furcate. Flowers pedicellate (lower pedicel upto 0.35cm), bluish; calyx-lobes ovate, broadly oblong in fruits. Nutlets 4, ovate, depressed, margin with the confluence of marginal glochidia bases.

Flr.: Jul. - Sep. *Fr.:* Aug. - Dec.

Specimen Cited: Thosum Beat, 2590-2780m, AP Das & PC Rai 0911, dated 23.10.1994.

Status: Frequent.

Local Distrib.: Todey-Tangta, Thosum Beat, Chitray, Alubari, Sakam Forest. 1700-2800m.

General Distrib.: Afganistan, Himalayas (Kashmir-Bhutan), India, Sri Lanka, East to China, Japan, Malaysia.

HACKELIA Opiz.

Hackelia uncinata (Royle ex Benth.) C.E.C. Fischer, KB 1939:336. 1939. var. *brachytuba* (Diels) Hara, FEH 1:267. 1966; EFPN 3:101. 1982.

Paracaryum brachytubum Diels in NRBGE 5:168. 1912.

Hackelia brachytuba (Diels) Johnson in JAA 18:25. 1937.

Herbs upto 55cm high, hairy. Leaves both cauline and radical; petioles upto 9cm long; cauline leaves 4.5-7.8 x 3-4.8cm, broadly elliptic, acuminate, base obtuse; radical leaves larger than cauline, ovate, cordate, 4-6 nerved from base. Racemes 6-14cm, furcate. Pedicels upto 1.3cm long. Flowers blue; sepals 0.3-0.4cm, oblong-ovate, acute, glabrous, much elongated in fruit; corolla funnel-shaped, mouth to 1.2cm across, lobes upto 0.6cm, rounded, overlapping; style 0.25-0.3cm. Nutlets to 1.2cm, pyramidal; glochidia upto 0.6cm. (Plate V: 43).

Flr.: Jun. - Aug. *Fr.:* Aug. - Nov.

Specimen Cited: Below Jorpokhari, 3000m, AP Das & PC Rai 050, dated 14.6.1994.

Status: Less Common.

Local Distrib.: Alubari, Chitray, Below Jorpokhari. 2280-3000m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, S. Tibet, W. China.

CONVOLVULACEAE Juss.

Key to the Genera:

1. Capsules one-seeded; fruiting sepals enlarged upto 2cm.....*Porana*
1. Capsules generally 4-seeded; fruiting sepals not enlarged.....*Ipomoea*

IPOMOEA L.

Key to the species:

1. Cymes few flowered; flowers scarlet.....*I. quamoclit*
1. Cymes 4-7 flowered; flowers bluish.....*I. indica*

Ipomaea indica (Burm.) Merrill, Interp. Rumph. Herb. Amb. 445. 1917; FEH 1: 264. 1966; Contrib. Bot. 36: 12. 1977; Nam. Chang. Flr. Pl. 298. 1987.

Convolvulus indicus Burm., Ind. Univ. Herb. Amb. 7: 6- 1755.

Ipomoea congesta R. Br., Prodr. 485. 1810.

I. learii Paxt. Mag. Bot. 6: t. 267. 1839; FPM 919. 1923.

Perennial twinner, hirsute. Leaves ovate to cordate, margin slightly lobed, sometime entire, acute, thinly hairy above, almost glabrous beneath. Cymes pedunculate, 4-7 flowered. Bract 1, foliaceous. Flowers bluish; corolla 6.25-7.5 cm long, glabrous externally. Fruits not seen.

Flr.: Jul. - Sep.

Specimen Cited: Samsing, 730 m, **AP Das & PC Rai** 1739, dated 07.5.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Machuki, Suntalay. 500-1250m.

General Distrib.: Circumtropical regions.

Ipomaea quamoclit L., Sp.Pl. ed. 1. 159. 1753; Bot.Mag. t. 244. 1794; FBI 4: 199. 1883; Fl. Asm. 3: 350. 1939; Blumea 3: 555 1940; FEH 1: 265. 1966; Fl. Meg. 2: 646. 1987.

Slender climbers. Leaves pinnatipartite with filiform segments. Cymes few flowered, axillary, long peduncled Flowers scarlet red. Calyx segments 5, elliptic, corolla salver shaped, slightly irregular, tube slender, funnel- like, scarlet red or sometimes white, stamens 5, exerted; filaments unequal, ovary 4-celled, glabrous; ovules 4; stamens 2, globose. Capsule 4-celled; seeds 4, glabrous, blackish.

Fls. & Frt.: May - Aug.

Specimen cited: Phari, 850 m, **AP Das & PC Rai** 1749, dated 18.5.1997.

Status: Frequent.

Local Distrib.: Sakam, Samsing, Phari, Machuki. Upto 1300m.

General Distrib.: Native of New World Tropicas, naturalised in circumtropical regions.

Note: Generally grown in gardens.

PORANA *Burm. f.*

Key to the species:

1. Corolla mauve or bluish.....*P. grandiflora*
1. Corolla white.....2
2. Bracts 0.5-0.7cm, subulate; capsules globose.....*P. paniculata*
2. Bracts 2-2.5cm, ovate-cordate; capsules ellipsoid.....*P. racemosa*

Porana grandiflora Wallich in Roxb., Fl. Ind. ed. Carey 2:41. 1824; FBI 4:221. 1883; Trs. N. Beng. 95. 1929; FEH 1: 265. 1966; EFPN 3: 108. 1982; TBRI 50(4): 123. 1987.

Slender twinner, thinly pubescent. Petioles 5-7cm long; lamina 9-15.5 x 8-12cm, broadly ovate, entire, acuminate, deeply cordate. Racemes 6-8.2cm long, pubescent. Peduncles 7-10.2cm, few to many flowered. Bracts 0.4-0.55cm, linear. Pedicels upto 1 cm long. Sepals 0.5-0.65cm, linear-lanceolate, acuminate, hairy; corolla infundibular, mauve, scented, tube 3cm, linear, with limb 3.5-4cm long. Capsules upto 1.6cm, subglobose, with persistent enlarged sepals.

Flr.: Aug. - Oct. *Frt.:* Oct. - Jan.

Specimen Cited: Mulkharka, 2120m, AP Das & PC Rai 1171, dated 01.5.1995.

Status: Common.

Local Distrib.: Lava, Middle Rechila Chouda Feri, Helipad, Ruka. 1820-2400m.

General Distrib.: Himalayas (Nepal-Bhutan).

Porana paniculata Roxb., Pl. Corom. 3:31, t. 235. 1891; FBI 4:222. 1883; FEH 1: 265 1966; EFPN 3:108. 1982.

An extensive climber, densely tomentose, profusely branched. Petioles upto 5 cm long; lamina 7-12.5 x 5-8cm, ovate-cordate, acute, entire, pubescent both sides. Panicles many flowered, terminal. Bracts 0.55-0.7 cm, subulate. Sepals 0.25-0.35 cm, linear-oblong, pubescent; corolla 0.65-0.8 x 0.55-0.6cm, campanulate, white, lobes very short; stamens included; stigma bilobed. Capsules 0.55-0.6cm, globose, frutiing sepals 3, enlarged upto 2 cm..

Flr.: Oct. - Dec. *Frt.:* Jan. - Mar.

Specimen Cited: Phari, 900m, AP Das & PC Rai 1767, dated 25.8.1997.

Status: Abundant at low altitude places.

Local Distrib.: Gorubathan, Samsing-Phari, Suntalay. 600-1300m.

General Distrib.: Himalayas, N. India, Myanmar.

Porana racemosa Roxb., Fl. Ind. ed. Carey 2:41. 1824; FBI 4:222. 1883; FEH 1:266. 1966; EFPN 3:108. 1982; TBRI 50(4): 123. 1987.

Deciduous slender climber, profusely branched forming thick patches. Stem pubescent, pinkish. Petioles 1.5-3cm long; lamina 6-11 x 4-7.8cm, ovate, entire, acute, deeply cordate, pubescent above. Recemes lax, compound and dichotomous. Bracts 2.2-2.5 x 0.8-1.2cm, forked, ovate-cordate, persistent. Sepals upto 0.3cm long, linear-oblong; corolla 1.2-1.5 x 1-1.2cm, whitish, lobed halfway, lobes 0.65-0.75cm, rounded, spreading. Capsules 0.5-0.6cm, ellipsoid, apiculate.

Flr.: Sep. - Oct. *Fr.:* Nov. - Jan.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1460, dated 12.11.1995.

Status: Less Common.

Local Distrib.: Phari, Suntalay, Samsing, Machuki, 600-1500m.

General Distrib.: Himalayas, Assam, N. Myanmar, China, Malaysia.

SOLANACEAE Juss.

Key to the Genera:

1. Berries completely covered with enlarged calyx.....*Physalis*
1. Berries not enclosed with calyx.....2
2. Inflorescence a terminal dense fascicle; corolla tubular.....*Cestrum*
2. Inflorescence axillary cymes; corolla rotate.....3
3. Umbels pedunculate; seeds compressed and discoid.....*Solanum*
3. Umbels sessile; seeds sub-triangular.....*Lycianthus*

CESTRUM L.

Cestrum aurantiacum Lindley, Bot. Reg. 71. 1844; EFH 1:282. 1966; EFPN 3:108. 1982; TBRI 50(4):108. 1987; Fl. Meg. 2:649. 1987.

Local Name: Malami Phul (Nep.).

Large shrubs, 2-4m high, young shoots sparsely hairy. Branches spreading, lenticellate. Petioles upto 3.2cm long. Leaves alternate; lamina 5-12.2 x 3-5cm, ovate-elliptic, entire acute, glabrous on both sides. Cymes terminal and axillary, laxly branched, 1-5 flowers on each branch, terminal flowers fascicled. Bracts 1-1.5cm, ovate lanceolate, foliaceous. Flowers tubular, orange yellow; calyx tube upto 1cm, green, 5-lobed, lobes to 0.35-0.4cm, linear, with ciliate mouth; corolla 2-2.5cm long, bell shaped, orange yellow, with spreading ovate lobes; stamens 5, epipetalous at the middle of corolla tube; filaments 0.6-0.7cm long; ovary 2-locular; style upto 2cm; stigma notched. Berry upto 1.2cm diam., globose, obscurely 2-lobed, white.

Flr.: Jul. - Mar. *Fr.:* Oct. - Jun.

Specimen Cited: Below Chouda Feri, 1900m, AP Das & PC Rai 0965, dated 22.4.1995.

Status: Frequent along the margin of Neora Valley National Park near human habitations. Nicely naturalised.

Local Distrib.: Sakam, Lava, Kolhbong, Machuki. 1600-2100m.

General Distrib.: Central America, now cultivated and naturalised everywhere.

LYCIANTHES Adans.

Lycianthes biflora (Lour) Bitter in Abh. Naturw. Ver. Bremen. 24:461. 1920. sub-sp *macrodon* (Wallich ex Nees) Deb in Bot. Jour. Lin. Soc. 76:293. 1978; EFPN 3:109. 1982; TBRI 50 (4):119. 1987.

Solanum macrodon Wallich ex Nees in Tr. Lin. Soc. 17:43. 1834; FBI 4:232. 1883.

Lycianthes macrodon (Wallich ex Nees) Bitter in Abh. Naturw. Ver. Bremen 24:468. 1920.

Shrub upto 1.5m high. Branches many, setulose, nodes jointed. Lamina 7-14.5x4-6.5cm, elliptic-lanceolate, entire or rarely distantly toothed, acuminate, base narrowed to petiole, setulose both sides. Cymes few flowered (usually 2-6 flowers), sessile. Pedicels upto 2.5cm; sepals upto 0.5cm long, linear lanceolate, hispidulous; petals 0.9-1.2cm, oblong, purplish white or light pink. Berry 0.65-0.75cm diam., globose, red, with nearly triangular seeds to 0.25cm.

Flr.: Jul. - Sep. *Frt.:* Aug. - Dec.

Specimen Cited: Near Chouda Feri, 2120m, **AP Das & PC Rai** 1318, dated 06.5.1995.

Status: Rare.

Local Distrib: Lava, Chouda Feri. 1900-2150m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Meghalaya.

PHYSALIS L.

Physalis peruviana L., Sp. Pl. ed. 2:1670. 1763; FBI 4:238. 1883; FEH 1:283. 1966; EFPN 3:110. 1982; TBRI 50(4):122. 1987; Fl. Meg. 2:650. 1987.

Local Name: Patpatay (Nep.).

Small annual pubescent stout herb, upto 70cm high. Petioles 2-2.5cm long; lamina 3-6 x 2-3cm, ovate, angular-sinuate, acute, base cuneate, dark green, hairy on both surfaces. Flowers axillary, solitary. Pedicels upto 1.4cm long; calyx 0.4-0.5cm, campanulate, lobes lanceolate; corolla 1-1.4cm across, greenish-yellow, with 5 purple spots inside. Berries 1.3-1.6cm across, globose, accrescent, with fruiting villous calyx upto 4.5cm long.

Flr.: Apr. - Jul. *Frt.:* Jun. - Oct.

Specimen Cited: Phari, 900m, **AP Das & PC Rai** 1896, dated 26.10.1997.

Status: Rare and found only in the lower belt.

Local Distrib.: Samsing, Phari, Gorubathan, Choudha Feri. Upto 2050m.

General Distrib.: Tropical S. America, naturalised elsewhere.

SOLANUM Juss.

Key to the species:

1. Small unarmed herbs or undershrubs.....*S. nigrum*
1. Stout armed undershrubs or shrubs.....2
2. Corolla externally pubescent; berries 1.25-1.5cm, reddish on ripening.....*S. torvum*
2. Corolla glabrous; berries 2-3.5cm, green and white-mosaic, yellow on ripening
.....*S. myriacanthum*

Solanum myriacanthum Dunal, Hist. Solan. 218, t. 19. 1813; EFPN 3:111. 1982; TBRI 50(4):127. 1987 (*ut. myrianthum*).

S. khasianum C.B. Clarke, FBI 4:234. 1833.

Local Name: Kalchunray Kanra, Bhare Kanra (Nep.).

Small perennial stout shrub, upto 1m tall, branched, prickly. Stem densely yellow hirsute, covered with 1.5-2cm long straight prickles. Petioles upto 5.5cm long, prickly; lamina 10-17 x 7-11.5cm ovate, deeply lobed, lobes acute, prickly on both sides, hirsute. Racemes lateral, few flowered. Pedicels 1.6-1.9cm long. Sepals upto 0.75cm, lanceolate, hirsute; corolla 1.5-2cm across, whitish, lobes lanceolate, spreading, glabrous. Berries 2-3.5cm across, globose, green and white mosaic, yellow at ripening; seeds to 0.3cm, brownish.

Flr.: Jun. - Sep. *Fr.:* Oct. - Mar.

Specimen Cited: Near Sakam, 1500m, AP Das & PC Rai 1445, dated 08.10.1995.

Status: Common.

Local Distrib.: Phari, Samsing, Sakam, Choudha Feri, Gorubathan. Upto 2150m

General Distrib.: S. America, naturalised in E. Himalaya and in Meghalaya.

Note : Fruits and seeds poisonous; an important medicinal plant.

Solanum nigrum L., Sp. Pl. ed. 1, 186. 1753; FBI 4: 229. 1883; Fl. Asm. 3: 366. 1939; FEH 1: 284. 1966; Fl. Meg. 2: 648. 1987.

Unarmed annual herb or undershrub, suffrutescent. Leaves 2-7.5 x 1.25-5cm, ovate-lanceolate or ovate-oblong, margin entire, sinuate, toothed or lobed, acute to acuminate, base narrowed to petioles, glabrous both surfaces. Flowers in sub-umbellate cymes, whitish; calyx with 5 teeth, pubescent, segments rounded; corolla rotate, 5-lobed, glabrous externally; ovary glabrous; style hairy at base. Berries 0.5-0.75 cm across, globose, shining purplish, sometimes yellow or red on ripening; seeds discoid.

Flr. & Fr.: Throughout the year.

Specimen Cited: Samsing-Phari, 700-950m, AP Das & PC Rai 1741, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Todey-Tangta, Chouda Feri, Alubari, Phari. 700-2300m.

General Distrib.: Cosmopolitan.

Solanum torvum Swardz, Prodr. 47. 1788; FBI 4: 234. 1883; Fl. Asm. 3: 369. 1939; FEH 1: 284. 1966; Fl. Meg. 2: 648. 1987.

Shrubs or undershrubs, 1.5-2.8 m high, unevenly armed and stellate, pubescent. Petioles 1.25-2.5 cm long; leaf lamina 5-15 x 3.75-5 cm, ovate, margin lobed or serrate, short acuminate, base rounded or unequal membranous, sparsely pubescent and stellate on the upper surface. Cymes usually extra-axillary, dense, often branched. Pedicels 1 cm long, slender, pubescent, thickened and enlarged upto 1.8 cm in fruits. Flowers 1.75-2.5 cm diam., white; calyx 0.5cm across, abruptly apiculate, persistent; corolla externally pubescent, lobes lanceolate, linear-oblong, spreading. Berry 1.25-1.5 cm diam., globose, reddish and glabrous.

Flr. & Frt.: Aug. - Oct.

Specimen Cited: Asola Khola at Samsing, 750 m, AP Das & PC Rai 1459, dated 12.11.1995.

Status: Less Frequent.

Local Distrib.: Gorubathan, Machuki, Samsing. 500-1200m.

General Distrib.: West Indies, extensively naturalised everywhere.

SCROPHULARIACEAE Juss.

Key to the Genera:

1. Flowers almost regular.....2
1. Flowers distinctly irregular.....3
2. Leaves whorled; fruits acute-tipped.....*Scoparia*
2. Leaves opposite; fruits obovate.....*Veronica*
3. Corolla personate.....4
3. Corolla otherwise.....5
4. Corolla distinctly spurred and not saccate.....*Linaria*
4. Corolla not spurred but the anterior limb saccate.....5
5. Heterophyllous plants.....6
5. All leaves nearly similar.....7
6. Fruits berry; terrestrial plants.....*Hemiphragma*
6. Fruits capsule; plants of marshy habitat.....*Limnophila*
7. Lamina deeply pinnatisect; corolla coiled.....*Pedicularis*
7. Lamina never pinnatisect; corolla not coiled.....8
8. Corolla not distinctly 2-lipped.....9
8. Corolla distinctly 2-lipped.....10
9. Basal leaves in rosette; corolla over 5cm long.....*Digitalis*
9. All leaves cauline; corolla less than 2.5cm long.....*Centrathera*
10. Flowers axillary.....11
10. Flowers in definite inflorescence.....12

11. Corolla yellow.....*Mimulus*
 11. Corolla bluish-violet.....*Torenia*
 12. Basal leaves in rosette, flowers on erect scape.....13
 12. All leaves cauline.....14
 13. Inflorescence much branched; corolla greenish.....*Schrophularia*
 13. Inflorescence simple; corolla white, brown spotted.....*Mazus*
 14. Calyx lobes broad, with a distinct mid-vein.....*Lindenbergia*
 14. Calyx lobes slender and subulate, mid-vein not distinct.....*Lindernia*

CALCEOLARIA L.

Calceolaria gracilis Kunth in Humb. Bonpl. & Kunth, Nov. Gen. Sp. 2:339. 1818; EFPN 3:113. 1982; TBRI 50(4):108. 1987.

C. mexicana Benth in DC., Prodr. 10:205. 1846; FBI 4: 246. 1883; FEH 1:285. 1966.

Small pubescent annual herb, upto 30cm high. Stem spongy. Leaves opposite; lamina 2.5-6 x 1.8-2.5cm, coarsely toothed or pinnately lobed, upper lobe ovate-lanceolate, acute, incisodentate, pubescent above, glabrous beneath. Pedicels upto 2cm long. Flowers solitary, axillary; calyx 0.5-0.6cm, lobes lanceolate, pubescent; corolla 1-1.5cm long, obovate-orbicular, deep yellowish, tube slender, with concave lower lip; stamens 2, included. Capsules 0.4-0.5cm, subglobose.

Flr.: Jun. - Oct. *Fr.*: Sep. - Dec.

Specimen Cited: Chitray, 2600m, **AP Das & PC Rai** 1187, dated 03.5.1995.

Status: Less Common.

Local Distrib.: Alubari, PHE Source, Chitray. 1900-2600m.

General Distrib.: Native of Mexico, naturalised in E. India & Malaysia.

CENTRANTHERA R. Br.

Centranthera nepalensis D. Don, Prodr. Fl. Nep 88. 1825; FEH 1:285. 1966; EFPN 3:113. 1982; TBRI 50(4): 109. 1987.

C. hispida auct. non R. Br. : Hk. f. in FBI 4:301. 1884, p.p.

Erect annual hispid herb, 30-50cm. Leaves opposite; petioles upto 0.35cm long; lamina 1.5-2.6 x 0.5-0.8cm, narrowly oblong, dentate, acute. Spikes bracteate, terminal. Flowers sessile; calyx 0.7-0.8cm, ovoid, lobes acute; corolla 1.6-1.9cm long, tubular, slightly incurved, yellowish, with oblique limb, lobes 5; stamens 4, included, woolly. Capsules 0.6-0.8cm, globose.

Flr.: Oct. - Jan. *Fr.*: Dec. - Mar.

Specimen Cited: Near Sakam, 1250m, **AP Das & PC Rai** 1466, dated 14.11.1995.

Status: Sparse.

Local Distrib.: Phari, Sakam, Todey, Machuki. Upto 1400m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Tibet, Assam, Myanmar, W. China.

DIGITALIS L.

Digitalis purpurea L., Sp. Pl. 621. 1753; TBRI 50 (4):112. 1987.

Rosette herb; scape leafy, upto 1.2m. Root-stock perennial, swollen. Stem leafy, usually unbranched, rounded or slightly angled. Leaves simple, alternate; petioles longer upto 11cm (in radical leaves), flattened-winged on both sides; lamina 6-15 x 2.2-4.8cm, basal leaves broad lanceolate, others ovate or elliptic-oblong, crenate, acute, base tapering into wings, downy pubescent both surfaces, dull green, veins densely white pubescent beneath. Recemes terminal, simple, 15-30cm long, erect, many flowered. Bracts ovate. Pedicels shorter, 0.35-0.9cm, densely pubescent. Flowers slightly large, pendent, pinkish red; calyx-lobes 0.5-0.8cm, ovate-lanceolate, dark pubescent outside; corolla 3-4.5cm, tubular, hairy within, palate with elegant eye-like spots. Capsule ovoid; seeds small, oblong, pale brown. (Plate V: 46).

Flr.: May - Jun. *Fr.:* Jul. - Aug.

Specimen Cited: Alubari Belt, 2300m, AP Das & PC Rai 0537, dated 15.10.1994.

Status: Commonly naturalised in Alubari area.

Local Distrib.: Alubari Khasmahal, Helipad region. 2200-2300m.

General Distrib.: Native of Europe; cultivated in many places; naturalised in Darjeeling.

Note: Highly medicinal. Powdered leaves and seeds in infusion or tincture is extensively used as a diuretic and in fever, dropsy, inflammation, haemorrhage, heart troubles etc.

HEMIPHRYGMA Wallich

Hemiphrygma heterophylla Wallich in Trans. Linn. Soc. 13: 612 (*ut heterophyllum*) 1822; FBI 4:289. 1884; Acad. Nat. Sci. Philad. Monogr. 5:62.1943; FEH 1: 286.1966; EFPN 3: 114. 1982; TBRI 50 (4): 116. 1987.

Local Name: Mala Phul (Nep.).

Prostrate perennial running herb covering the ground. Branches spreading, rooting at nodes. Leaves dimorphic: normal cauline leaves opposite, sessile -shortly stalked, 0.6-1.1 x 0.5-1cm, orbicular, crenate, acute or obtuse, cordate, pubescent, nerves indistinct; axillary leaves 0.6-0.9cm, acicular, fascicled, ciliate. Flowers small, solitary, axillary, sessile, 0.8cm across; calyx narrowly lobed; corolla with 5-broad subequal spreading lobes, pinkish. Fruit globose, shining red.

Flr.: Mar. - Jul. *Fr.:* Jul. - Oct.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0140, dated 15.6.1994; Jaributti, 2195m, AP Das & PC Rai 0374, dated 15.10.1994; Near Jorhpokhari, 2950m, AP Das & PC Rai 1203, dated 03.5.1995; Chitray Bunglow, 2740m, AP Das & PC Rai 1226, dated. 04.5.1995.

Status: Abundant.

Local Distrib.: Alubari, Jorpokhari, Jaributti, Chitray Bunglow, Neora River Bank, Hattidar, Chouda Feri, Rechila Peak, Sakam. 1500-3100m.

General Distrib.: Himalayas (Garhwal-Bhutan), Meghalya, Myanmar, W. and C. China, Taiwan, Philippines.

Note: A medicinal plant. Fruits edible.

LINDENBERGIA Lehm.

Key to the species:

1. Plants perennial, suffrutescent; lamina upto 11.5 x 6cm; corolla 2.5-3.5cm long.....*L. grandiflora*
1. Plants annual, herbaceous; lamina upto 3.5x2cm; corolla 1-1.2cm long.....*L. indica*

Lindenbergia grandiflora (Hamilt. ex D. Don) Benth., Scroph. Ind. 22. 1835; FBI 4:261. 1884; FEH 1:287. 1966; EFPN 3:115. 1982; TBRI 50(4): 118. 1987.

Stemodia grandiflora Hamilt. ex D. Don, Prodr. Fl. Nep. 89. 1825.

Erect suffrutescent herb, 20-60cm. Rootstock perennial, woody. Stem and branches flexuose, soft hairy. Leaves opposite; petioles to 1cm; lamina 5-12 x 3.5-6cm, ovate, acute, coarsely serrate, glandular pubescent on both surfaces, nerves 6-8 pairs. Spikes 12-25 cm long, terminal, rarely paniced. Bracts upto 1.2 cm, ovate. Pedicels 0.3-0.35 cm long. Calyx tube 0.7-0.8cm, campanulate, with rounded lobes; corolla 3-3.5 cm long, tubular, inflated on the upper part, lower lip 3-lobed; stamens included; anthers lobes separate; style exerted; ovary 2-celled, villous. Capsule 0.6-0.7 cm, ovoid. (**Plate XXVI**).

Flr.: Jun. - Nov. *Frt.:* Sep. - Feb.

Specimen Cited: Phari, 900 m, AP Das & PC Rai 1885, dated 26.10.1997.

Status: Abundant.

Local Distrib.: Samsing, Phari, Sakam, Jaributti. 700-2200m.

General Distrib.: Himalayas (Alubari-Bhutan), Assam, Tibet, Myanmar, W. China.

Lindenbergia indica (L.) Vatke in Oestr. Bot. Zeits. 25:10. 1875; FEH 1:287. 1966; EFPN 3:115. 1982; TBRI 50(4):118. 1987.

Dodartia indica L., Sp. Pl. ed. 1:633. 1753.

L. polyantha Royle ex Benth., Scroph. Ind. 22. 1835; FBI 4:262. 1884.

L. urticifolia Lehm. in Link & Otto, Ic. Pl. Rar. 95, t. 48. 1831; FBI 4:262. 1884.

Erect annual, glandular villous herb, 10-30cm, branched. Stem slender, much villous. Petioles 0.85-1.8cm long; lamina 1.5-3.5 x 1-2cm, ovate, cranate-serrate, obtuse, pubescent on both sides. Bracts leafy, ovate. Flowers axillary, solitary or 2-nate; calyx 0.45-0.5 cm, with recurved lobes; corolla 0.9-1.2cm, yellowish with reddish-throat, thinly hairy, lower lip 3-lobed, base 2-plaited, upper lip bilobed. Capsule to 0.3cm, ovoid.

Flr.: Jul. - Oct. *Frt.:* Sep. - Dec.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 1571, dated 07.6.1996.

Status: Common.

Local Distrib.: Lava, Alubari, Mulkharka, Rechila Middle. Upto 2450 m.

General Distrib.: Afganistan, Himalayas, India, Myanmar, east to west China.

LINDERNIA All.

Key to the species:

1. Fruits equal or shorter than calyx.....*L. crustacea*
1. Fruits longer than calyx.....2
2. Erect herb; corolla white.....*L. ciliata*
2. Decumbent or prostrate herb; corolla blue-white.....*L. parviflora*

Lindernia ciliata (Colsm.) Pannell in Brittonia 2:182. 1936; FEPN 3:116. 1982; TBRI 50(4):118. 1987.

Gratiola ciliata Colsm., Prodr. Descr. Gratiola 1:14. 1793.

Bonnaya brachiata Link & Otto, Ic. Pl. Sel. Berol 1:25, t. 11. 1820; FBI 4:284. 1884; Beng. Pl. 2: 1903.

Vandellia ciliata (Colsm.) Yamazaki in Journ. Jap. Bot. 30:176. 1955; FEH 1:293. 1966.

Small annual rigid, erect or diffusely branched herb, upto 18cm. Leaves sessile, all opposite; lamina 1.6-3.3 x 0.65-1cm, oblong, sharply serrate with mucronate teeth, acute, base rounded, glabrous. Racemes upto 8.5cm, terminal. Flowers bracteate, opposite decussate; sepals 5, 0.2-0.25cm, narrow-lanceolate; corolla 0.65-0.75cm, cylindric, whitish, upper lip recurved-concave; stamens 2. Capsules to 1 cm, linear oblong.

Flr. & Frt.: Jun. - Nov.

Specimen Cited: Near Asala Khola at Samsing, 650m, **AP Das & PC Rai** 1887, dated 26.10.1997.

Status : Frequent only in low altitude areas.

Local Distrib.: Sakam, Machuki, Phari, Zero Point. Upto 1500m.

General Distrib.: Himalayas (Kumaon-Sikkim), India, Myanmar east to W. & S. China, Taiwan, Malaysia, Australia.

Lindernia crustacea (L.) F. Muell., Syst. Census Austr. Pl. 97. 1882; EFPN 3:116. 1982.

Copraria crustacea L., Mant. Pl. 1:87. 1767.

Vandellia crustacea (L.) Benth., Scroph. Ind. 35. 1835; FBI 4:279. 1884; FEH 1:293. 1966.

Upto 25cm high creeping-decumbent herb, diffusely branched. Stem quadrangular, rooting at nodes. Leaves opposite; petioles upto 0.6 cm long; lamina 1.5-2.8 x 0.65-1.8cm, ovate to lanceolate, serrate, obtuse, base rounded-cuneate, sparsely pubescent. Racemes terminal or axillary. Peduncles to 3.5 cm long. Calyx 0.45-0.5cm, sub-

campanulate; corolla 0.6-0.7cm, bilabiate, violet-blue; stamens 4, with appendiculate filaments. Capsules to 0.55 cm long, obovate.

Flr.: Jul. - Oct. *Fr.*: Sep. - Nov.

Specimen Cited: Suntalay, 500m, **AP Das & PC Rai** 1173, dated 01.5.1995.

Status: Frequent, only in low altitude areas.

Local Distrib.: Samsing, Phari, Suntalay, Gorubathan. Upto 1050m.

General Distrib.: Tropical Africa, Himalayas, India, Sri Lanka, east to China, Korea and Japan, Malaysia, Australia, America.

Lindernia parviflora (Roxb.) Haines, Bot. Bihar Orissa 4: 635. 1922; FEH 1:287. 1966; EFPN 3:117. 1982; TBRI 50(4):118. 1987.

Gratiola parviflora Roxb., Pl. Corom. 3:3, t. 204. 1819.

Bonnaya parviflora (Roxb.) Benth., Scroph. Ind. 34. 1835.

Ilysanthes parviflora (Roxb.) Benth. in DC., Prodr. 10:419. 1846; FBI 4:283. 1884.

Slender decumbent herb, 10-15cm, annual. Stem quadrangular, glabrous. Leaves opposite, sessile; lamina 0.55-2 x 0.65-1.2cm, ovate-elliptic, obtuse or acute, base attenuate, nerves 3-5. Racemes both axillary and terminal. Pedicels upto 1.6cm. Sepals 0.35-0.4cm, lanceolate; corolla tube 0.7-0.8cm, cylindric, bluish white, upper lip erect, lower lip large, 3-lobed; stamens 2. Capsules upto 0.55cm, cylindric-ellipsoid.

Flr. & Fr.: May - Dec.

Specimen Cited: Phari, 950m, **AP Das & PC Rai** 1889, dated 26.10.1997.

Status: Frequent only in low altitude areas.

Local Distrib.: Samsing, Phari, Machuki, Gorubathan, Sakam. Upto 1000m.

General Distrib.: Tropical Africa, Himalayas, India, Myanmar, China.

MAZUS Lour.

Key to the species:

- 1. Plants with prominent runners.....*M. surculosus*
- 1. Plants without runners.....2
- 2. Lamina obovate-spathulate.....*M. pumilus*
- 2. Lamina oblong-elliptic to ovate.....*M. dentatus*

Mazus dentatus Wallich ex Benth., Scroph. Ind. 27. 1835; FBI 4:260. 1884; FEH 1:288. 1966; 2:119. 1971; EFPN 3:117. 1982.

Small herb with perennial rootstock. Flowering stem 10-20cm, leafy at base. Petioles 1.5-5.5cm long; lamina 3-9.5 x 2-6cm, broadly ovate or oblong-elliptic, sinuate or waxy, deep purple beneath. Racemes 4-6cm long, few flowered. Pedicels 0.7-0.8cm long. Bracts setaceous. Calyx 0.65-0.8cm, tubular, lobes 0.2-0.25cm, acute; corolla upto 2cm

long, funnel-shaped, drooping, purple to white, lower lip 3-lobed, spreading. Capsule globose, with sub-erect persistent calyx.

Flr.: Apr. - Jun. *Frt.*: Jun. - Sep.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 0378, dated 15.10.1994.

Status: Less Common.

Local Distrib.: PHE Source, Alubari, Rechila Middle, Reshete. 2100-2600m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), Meghalaya.

Mazus pumilus (Burm. f.) Van Steenis in Nova Guin. n. 5. 9: 31. 1958; EFPN 3:117. 1982; TBRI 50(4): 119. 1987.

Lobelia pumila Burm. f., Fl. Ind. 186, t. 60, f. 3. 1768.

Mazus japonicus O. Kuntze, Rev. Gen. Pl. 462. 1891; FEH 1:288. 1966.

Lindernia japonica Thunb., Fl. Jap. 253. 1784.

Mazus rugosus Lour., Fl. Cochinch. 385. 1790; FBI 4:259. 1884.

Erect annual herb with flowering stem 10-30cm high, thinly hairy. Petioles 1-2.2cm long; lamina of radical leaves 2-5 x 1-2cm, obovate-spathulate, obtuse, base narrowed to petiole. Racemes upto 14cm long, terminal. Pedicels 0.7-1.2cm long. Flowers alternate; calyx 0.45-0.55cm, campanulate, with ovate-lanceolate lobes; corolla 1-1.2cm, pale blue, bilipped; upper lip 2-lobed, erect, lower 3-lobed, larger. Capsules globose, with 1.2-1.7cm long fruiting calyx.

Flr.: May - Sep. *Frt.*: Aug. - Nov.

Specimen Cited: Samsing 700m, **AP Das & PC Rai** 1618, dated 18.4.1997.

Status: Common in lower regions of the valley.

Local Distrib.: Phari, Samsing, Machuki, Sakam. 700-1900m.

General Distrib.: Himalayas (Kashmir-Bhutan), India, east to China, Korea, Japan, Malaysia.

Mazus surculosus D. Don, Prodr. Fl. Nep. 87. 1825, *ut surculosa*; FBI 4: 260. 1884; FEH 1: 288. 1966; EFPN 3: 118. 1982; TBRI 50(4): 119. 1987.

Small perennial runners. Leaves in lax rosette, radical leaves larger, opposite, lamina 1-3 x 0.6-1.3cm, obovate-spathulate or subpinnatifid, crenate, base narrowed to petioles, surfaces pubescent. Pedicels bracteate. Flowering stem 6-8.5cm. Calyx lobes triangular, suberect in fruits; corolla bluish white or pinkish violet, 2-lipped, upper lip dark and shortly two-lobed, lower lip larger with 3-rounded lobes.

Flr.: May - Oct.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 023, dated 23.6.1994; Mulkharka Pokhari, 2240m, **AP Das & PC Rai** 0538, dated 15.10.1994.

Status: Very Common.

Local Distrib.: Mulkharka Pokhari, Alubari, Machuki, Ruka Hill. 1500-2750m.

General Distrib.: Himalayas (Kashmir-Bhutan), Assam, Tibet, W. China.

MIMULUS L.

Mimulus nepalensis Benth., Scroph. Ind. 29. 1835; FEH 1: 289. 1966; 2: 119. 1971; EFPN 3: 118. 1982; TBRI 59(4): 120. 1987.

M. assamicus Griff. in Linnaea 12: 199. 1836.

M. tenellus Bunge *sensu* Handel-Mazzetti, Symb. Sin. 7: 832. 1936, p.p. var. *nepalensis*.

Small prostrate herb, 6-15cm. Leaves opposite; petioles 0.2-0.45cm; lamina 0.8-2.5 x. 0.5-1.6cm, ovate, coarsely serrate, acute, base slightly rounded, glabrous or sparsely hairy, nerves not prominent above. Pedicels 1.8-2.5cm, slender, axillary, addressed hairy. Flowers solitary; calyx 0.9-1.2cm, truncate, tubular, 5-angled, with 5 short unequal lobes, greenish, sparsely pubescent; corolla longer than calyx, yellow, upper lip erect, 2-lobed, palate 2-lobed, slightly swollen; anther cells divergent. Capsules included with inflated sepals

Flr.: May - Sep. *Fr.:* Jul. - Oct.

Specimen Cited: PHE Source-Alubari, 2155-2280m, AP Das & PC Rai 0294, dated 17.6.1994; Tangta, 2805m, AP Das & PC Rai 0814, dated 21.10.1994; Jaributti, 2195m, AP Das & PC Rai 1014, dated 23.4.1995.

Status : Common.

Local Distrib.: Todey-Tangta, Alubari, PHE Source, Jaributti, Sakam. 1300-2400m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Assam, W. and C. China.

PEDICULARIS L.

Key to the species:

1. Leaves spiral; calyx campanulate; upper lip of corolla hooded.....*P. pantlingii*
1. Leaves whorled; calyx oblong; upper lip of corolla decurved.....*P. mollis*

Pedicularis mollis Wallich *ex* Benth., Scroph. Ind. 53. 1835; FEH 1: 290. 1966; EFPN 3: 124. 1982; TBRI 50(4):122. 1987.

Erect annual herbs upto 45cm. Stem fistular, stout, brownish. Branches simple or whorled, slender. Leaves whorled, 1.5-3.5cm; lamina ovate or oblong, pinnatifid with linear segment, pubescent. Spikes terminal, 10-27cm. Bracts pinnatifid. Flowers 1.4cm long; calyx 0.4cm, lobes short, oblong; corolla bilipped, upper lip longer and decurved, pinkish purple. Fruits not seen. (Plate V: 47, Plate XXV).

Flr.: Jul. - Sep.

Specimen Cited: Dhamdhamay Dara, 2280-2520m, AP Das & PC Rai 0664, dated 18.10.1994.

Status: Less Common.

Local Distrib.: Rechila Peak, Dhamdhamay Dara, Chitray, Thosum Hill. 2300-3100m.

General Distrib.: Temperate Himalayas.

Pedicularis pantlingii Prain in JASB 58. 2: 273. 1889; FEH 1: 290. 1966; EFPN 3: 124. 1982.

P. furfuracea Wallich var. *integrifolia* Hk. f., FBI 4: 316. 1884.

Small herbs 15-32cm high. Petioles upto 5cm long; leaf lamina 3-6.4 x 1.5-4.2cm, broadly ovate, sub-cordate, pinnately shallow lobed, lobes being dentate and rotundate, dark green above, almost glabrous or thinly hairy. Flowers purplish pink; calyx 4-lobed, campanulate; corolla lip trilobed with ciliate margin, upper lip hooded and prolonged into a curved beak; filaments thinly hairy; style exerted. Capsule upto 2cm long, lanceolate.

Flr.: Jul. - Sep. *Fr.:* Aug. - Oct.

Specimen Cited: Alubari Middle-Rechila Peak, 2480-3100m, AP Das & PC Rai 0171, dated 15.6.1994.

Status: Frequent.

Local Distrib.: Rechila Peak, Middle Alubari Chowk, Tinsimana, Ruka. 2400-3100m.

General Distrib.: E. Himalaya (Nepal-Bhutan), S. Tibet, Myanmar.

SCOPARIA L.

Scoparia dulcis L., Sp. Pl. ed. 1, 116. 1753; FBI 4: 289. 1884; Fl. Asm.3:380. 1939; Acad. Nat. Sci. Phillad. Monogr. 5: 22. 1943; FEH 1:290. 1966; EFPN 3:126. 1982.

Branched annual herb, upto 90 cm high. Stem erect, semi-woody. Leaves sessile, opposite, sometimes ternately whorled; lamina 1.25-2.5 x 0.27-0.75 cm, elliptic or rhomboid, margin serrate, punctate. Flowers axillary, white; calyx 3 nerved, segments imbricate in bud; corolla 0.32 cm diam., white; filament base wooly. Capsule 0.35 cm diam., globose, septical; seeds obovoid, angular.

Flr. & Fr.: Jun. - Dec.

Specimen Cited: Near Samsing, 730 m, AP Das & PC Rai 1426, dated 08.10.1995.

Status: Frequent.

Local Distrib.: Samsing, Phari, Suntalay, Asala Khola. 500-1100m.

General Distrib.: America, commonly naturalised in tropical Asia.

Note: Young leaves are consumed orally in diabetes.

***SCROPHULARIA* L.**

Key to the species:

1. Stem unbranched, cylindric; lamina elliptic-ovate.....*S. urticaefolia*
1. Stem branched, 4-winged; lamina ovate-lanceolate.....*S. elatior*

Scrophularia elatior Benth., Scroph. Ind. 18. 1835; FBI 4:255. 1884; FEH 1:290. 1966; EFPN 3:126. 1982; TBRI 50(4):126. 1987.

Erect annual glabrous herb, 70-140cm tall, branched. Stem stout, 4-winged. Petioles upto 8.2cm long; lamina 10-24x4.5-8.5cm, ovate-lanceolate, margin coarsely dentate, acuminate; subcordate nerves distinct beneath. Cymes much branched, branches spreading. Peduncles 3-5cm long. Bracts linear. Calyx lobes elliptic, subacute; corolla to 0.5cm, green; stamens upto 0.8cm, exerted; styles equal to stamens, much exerted. Capsules 0.7-0.8cm diam., ovoid.

Flr.: Jul. - Aug. *Frt.:* Sep. - Oct.

Specimen Cited: Chouda Feri, 2240m, AP Das & PC Rai 0370, dated 14.10.1994.

Status: Less Common.

Local Distrib.: Todey-Tangta, Chouda Feri, Mulkharka, Lava. 1900-2700m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, Meghalaya.

Scrophularia urticaefolia Wallich ex Benth., Scroph. Ind. 18. 1935; Prodr. 10:306. 1846; FBI 4:254. 1884; Eng. Bot. Jahrb. 44:459. 1910; Lloydia 16:168. 1953; FEH 1: 291. 1966; EFPN 3:127. 1982; TBRI 50(4): 126. 1987.

English Name: Figwort

Small annual erect herbs to 57cm with thinly pubescent slender and almost quadrangular stem. Leaves opposite, sessile to shortly petioled (upto 0.6cm); lamina 2.5-5.7 x 1.5-3.1cm, ovate, coarsely dentate, acute, cordate, much smaller in inflorescence, glabrous, pale beneath. Flowers many in lax, leafy terminal branched cymes, calyx lobes rounded; corolla 0.5-0.6cm, bilipped, upper 2 lobes longer than the lower anterior ones; stamens 4, included; staminode 1, obovate and scaly. Capsule beaked.

Flr.: Jul. - Sep. *Frt.:* Aug. - Oct.

Specimen Cited: Chitray, 2740m, AP Das & PC Rai 0539, dated 18.10.1994.

Status: Less Common.

Local Distrib.: Thartharay, Chonkobhir, Chitray, reshete. 1900-2400m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

TORENIA L.

Torenia asiatica L., Sp. Pl. 619. 1735; FBI 4:277. 1884, p.p.; EFPN 3:127. 1982; TBRI 50(4):125. 1987.

T. cordata (Griff.) Dutta in BBSB 19:25. 1963; FEH 1:291. 1966.

Treisteria cordata Griff., Notul. 4:190. 1854.

Pubescent annual herb, 20-30cm, diffused with slender and creeping branches. Stem 4-angled. Petioles 0.55-0.65cm; lamina 1.8-4.6cm, ovate, serrate, acuminate, base cordate, pubescent on both surfaces. Flowers axillary, solitary to often subumbellate. Peduncles upto 4.2cm long. Calyx 2-2.5cm, tubular, bilipped, more elongate in fruiting, keeled, with decurrent base; corolla 3-3.6cm, cylindric-tubular, violet, 2-lipped, upper lip erect, purplish, lower spreading, whitish. Capsules 0.6-0.7cm, oblong, with strongly ribbed persistent calyx.

Flr.: May - Nov. *Fr.:* Aug. - Jan.

Specimen Cited: Jaributti, 2180m, AP Das & PC Rai 0377, dated 15.10.1994.

Status: Common in lowermost fringes of the Park.

Local Distrib.: Samsing, Alubari, Jaributti, Reshete. 700-2300m.

General Distrib.: Himalayas, India, Sri Lanka, Myanmar east to China, Malaysia.

VERONICA L.

Key to the species:

1. Erect herbs with ascending branches; flowers racemose..... *V. javanica*
1. Plants slightly creeping below, ascending above from perennial base..... 2
2. Leaves shortly petiolate, mostly opposite..... *V. cana*
2. Leaves sessile, alternate in flowering branches..... *V. serpyllifolia*

Veronica cana Wallich ex Benth, Scroph. Ind. 45. 1835; FBI 4: 295. 1884; FEH 1: 294. 1966; EFPN 3: 129. 1982.

Small grey-hairy erect herbs to 7cm high. Stem usually unbranched. Petioles upto 0.35cm long; leaf lamina 0.9-1.6 x 0.6-1.2cm, ovate, margin toothed, with rounded teeth, acute, base rounded, pale green beneath, nerves not much prominent. Spikes usually terminal, 3cm long. Flowers upto 0.9cm across, pale blue; sepals linear-oblong; corolla 4-lobed, lobes unequal and spreading, upper being larger; stamens 2. Capsules 0.65-0.75cm diam., notched and laterally 2-winged, wings being triangular.

Flr.: Jun. - Aug. *Fr.:* Jul. - Dec.

Specimen Cited: Below Jorhpokhari, 2850m, AP Das & PC Rai 0785, dated 20 10.1994.

Status: Frequent.

Local Distrib.: Chitray Bunglow, Lava, Jorhpokhari, Reshete. 2100-2800m.

General Distrib.: Himalayas (Kashmir-Bhutan), S. Tibet, W. China.

Veronica javanica Blume, Bijdr. 742. 1826; Bull. Bot. Soc. Bong. 593. 1960; FEH 1: 294. 1966; EFPN 3:129. 1982; TBRI 50(4):129. 1987.
V. maddenii Edgew. ex Hk. f., FBI 4: 296. 1885.

Small annual erect herbs, 4-7.5cm. Branching diffusely from base, densely white pubescent. Leaves opposite; petioles upto 0.3cm, hairy; lamina 0.6-1.3 x 0.5- 0.6cm, ovate, crenate-serrate, obtuse, rounded, thinly pubescent above and dense beneath. Racemes both terminal and axillary, few flowered, shortly peduncled. Bracts narrow. Pedicels shorter than bracts. Flowers minute; calyx linear-oblong, obtuse; corolla actinomorphic, whitish below and bluish above the middle; anthers brownish. Capsules obcordate, pubescent.

Flr.: Mar. - Aug. *Fr.:* May - Oct.

Specimen Cited: Rechila-Dhamdhamay Dara, 2280-2520m, AP Das & PC Rai 0673, dated 18.10.1994.

Status: Common.

Local Distrib.: Chonkobhir, Thartharay, Rechila Middle, Dhamdhamay Dara. 2300-2600m.

General Distrib.: Tropical Africa, E. Himalaya (Nepal-Bhutan), Assam, east to S. China and S. Japan, Malaysia, S. Africa.

Veronica serpyllifolia L., Sp. Pl. ed. 1:12. 1753; FEH 1:295. 1966; TBRI 50(4):129. 1987.

10-15cm high herb, with a small perennial rootstock. Branches slender, suberect, ascending, glandular pubescent below. Leaves sessile, alternate above; lamina 1.3-1.9 x 0.5-0.7cm, oblong, entire, obtuse, coriaceous. Racemes terminal, upto 9cm long. Pedicels 0.35-0.45cm. Sepals 0.35-0.4cm, obovate-oblong; corolla 0.55-0.7cm diam., regular, lilac, bluish. Capsules upto 0.3cm, obcordate.

Flr.: May - Aug. *Fr.:* Jul. - Nov.

Specimen Cited: Jaributti, 2160m, AP Das & PC Rai 0382, dated 15.10.1994.

Status: Common.

Local Distrib.: Rechila Park, Jaributti, Pankhasari, Sakam. 1900-2300m.

General Distrib.: Temperate subalpine Himalayas, Nilgiris, Europe, Africa, S. America.

OROBANCHACEAE Vent.

Key to the Genera:

1. Stem covered with scales; corolla tubular; capsules 4-valved.....*Boschniakia*
1. Stem naked (leafless); corolla cup-shaped; capsules 2-valved.....*Aeginetia*

***AEGINETIA* L.**

Aeginetia indica L., Sp. Pl. ed. 1:632. 1753; FBI 4:320. 1884; FEH 1:296. 1966; 2:121. 1971; EFPN 3:130. 1982; TBRI 50(4):104. 1987.

Root parasite, naked (leafless). Scape 1-3, upto 32cm long, slender, brownish purple. Bracts 2 at base. Flower terminal, solitary, nodding; calyx 2-3.5cm long, spathaceous, purple, acute, enclosing corolla partially; corolla 3-4.6cm long, cup-shaped, bilipped, limb upto 2 cm across, lobes 5, rounded; stamens 4, didynamous; lower anthers with spur; ovary unilocular. Capsules 2-valved, embedded in persistent calyx; seeds pitted.

Flr.: Jul - Sep. *Frt.*: Sep. - Dec.

Specimen Cited: Near Sakam, 1250m, **AP Das & PC Rai** 1467, dated 14.11.1995.

Status: Less Frequent.

Local Distrib.: Samsing, Tangta, Gorubathan. 600-1600m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), India, Sri Lanka, Myanmar, China, Japan, Phillipines, Malaysia.

***BOSCHNIAKIA* C.A. Mey.**

Boschniakia himalaica Hk. f. *et* Thoms. in FBI 4: 327. 1884; Forbes *et* Hemsley in Journ. Linn. Soc. 26: 221. 1890; Hand.-Mzt., Symb. Sin. 7(4): 875. 1936; FEH 1: 296. 1966; 2:121. 1971; EFPN 3:130. 1982.

Xylanche himalaica (Hk.f. *et* Thoms.) G. Beck, Monogr. Orob. 58. 1890; in Pfl.- Reich IV-261, Ht. 96:330 *et* 331, fig. 24, H-L. 1930; H. Smith in Act. Hort. Gothob. 8: 139, fig. 5, a-k. 1933; SFSH. 27, f. 50-51. 1963.

Boschniakia kawakamii Hayata, Icon. Pl. Formos. 4:19. 1914, *syn. nov.*

Small robust and brownish, leafless root parasite, upto 40cm tall. Stem erect, stout. Scale leaves 1-1.9 x 0.5-0.9cm, oblong to lanceolate, overlapping, fleshy at young stage and colourless or brownish later. Spike 10-18cm long, dense. Bracts nearly half or equal to corolla in length, brownish. Flowers 1.8-2cm long, yellowish-brown; calyx cup-shaped; corolla bilipped, tube straight, upper lip erect, hooded and almost entire, lower lip shorter with small lateral lobes; stamens 4, exceeding the corolla; ovary mostly unilocular, superior; stigma often bilobed. Capsule brown.

Specimen Cited: Thosum Beat, 2590m, **AP Das & PC Rai** 0946, dated 25.10.1994; Jorhpokhari, 3040m, **AP Das & PC Rai** 1214, dtd.03.5.1995.

Status: Frequent.

Local Distrib.: Jaributti, Alubari, Chouda Feri, Thosum, Jorpokhari. 2000-3050m.

General Distrib.: Himalayas (Garhwal-Arunachal Pradesh), China, Taiwan.

LENTIBULARIACEAE L.C. Rich.

UTRICULARIA L.

Utricularia striatula Smith in Ress, Cyclop. 37, n. 17. 1818; FEH 1:300. 1966; FPK 74. 1981; EFPN 3:133. 1982; TBRI 50(4):129. 1987.

U. orbiculata Wallich ex DC., Prodr. 8:18. 1844; FBI 4:334.1884.

Annual small herb, growing on the moist walls or tree-barks amongst the mosses. Branches very small, creeping. Petioles of cauline leaves 0.5-0.6cm; lamina, 0.35-0.4cm across, orbicular. Basal leaves much dissected and with bladder. Scape 6-12cm, erect, very slender. Racemes 1-5 flowered. Pedicels 0.4-0.55 cm; calyx lobes 0.15-0.2 cm; corolla 0.25-0.45cm, ligulate with lower lip, lower lip 5-lobed, lobes sub-equal, obtuse, white-pink. Spur to 0.5cm, linear; stamens included. Capsules 0.2-0.25cm, globose, with ovoid and glochidiate seeds.

Flr.: Jul. - Oct. *Fr.:* Oct. - Dec.

Specimen Cited: Near PHE Source, 1855m, AP Das & PC Rai 1049, dated 26.4.1995.

Status: Less Frequent.

Local Distrib.: Found only in places such as Kuwa Paani, PHE Source. 1680-2150m.

General Distrib.: Africa, Pakistan, India, Myanmar, Malaysia, China, New Guinea, etc.

GESNERIACEAE Dumort.

Key to the Genera:

1. Stamens 2.....2
1. Stamens 4 to 5.....5
2. Seeds with hairy coma.....*Lysionotus*
2. Seeds without coma.....3
3. Capsules slightly exceeding calyx (i.e., more than 0.4cm).....*Rhynchoglossum*
3. Capsules much longer than calyx.....4
4. Stigma bifid; capsules 8cm or more.....*Chirita*
4. Stigma entire; capsules 2-5cm long.....*Didymocarpus*
5. Epiphytic plants.....*Aeschynanthus*
5. Terrestrial plants.....*Loxostigma*

AESCHYNANTHUS Jack.

Key to the Genera:

1. Lamina 3.5-8.5cm, ovate-elliptic, base rounded; capsules upto 9cm long
.....*A. bracteatus*
2. Lamina 6.5-10.5cm, lanceolate, base cuneate; capsules 11-15.5cm.....*A. parviflorus*

Aeschynanthus bracteatus Wallich ex DC., Prodr. 9: 261. 1845; FBI 4: 342. 1884; FEH 2:121. 1971; TBRI 50(4): 104. 1987.

A. peelii Hk. f. & Thoms. in Hk. f., Ill. Him. Pl. t. 17. 1855.

Epiphytic undershrub. Branches slender, narrow and terete. Leaves opposite, petiolate (petiole 0.3-1cm); lamina 3.5-8.5cm, ovate-elliptic, entire, acuminate, base rounded, thick, mid-nerve prominent. Bracts large, scarlet, enclosing each flower at base; sepals dissected, scarlet; petals long upto 3.2cm, curved, lower lip-lobes reflexed; stamens 4 to 5, exerted. Capsule long to 9cm.

Flr.: Jul. - Sep. *Fr.* Sep. - Mar.

Specimen Cited: Rechila Chowk-Hattidara, 2280-2549m, AP Das & PC Rai 0623, dated 17.10.1994.

Status: Frequent.

Local Distrib.: Jaributti, Mulkharka, Hattidara, Rechila. 2000-2550m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya, S. Tibet, N. Myanmar, W. China.

Aeschynanthus parviflorus (D. Don) Sprengel, Syst. Veg. 4(2):238. 1827; FEH 1:297. 1966; FPK 75. 1981; EFPN 3:133. 1982; TBRI 50(4): 105. 1987.

Trichosporum parviflorum D. Don in Edinb. Philos. Journ. 7: 85. 1822.

A. ramosissima Wallich, Pl. As. Rar. 1:55, t. 71. 1829; FBI 4: 339. 1884.

Small undershrubs, epiphytic or on rocks; branches upto 85 cm long. Stem glabrous. Petioles 0.7-1cm long. Lamina 6.5-10.5 x 3.5-4.5cm, lanceolate, entire, acuminate, base cuneate, both surfaces glabrous, veins distinct. Pedicels 0.65-1.2cm. Flowers clustered at branch tips; calyx 0.7-0.8cm, lobed halfway downward, scarlets, lobes narrowly-lanceolate; corolla 0.25-0.3cm long, scarlet red, throat contracted; stamens exerted, glandular hairy. Capsules 11-15.5cm, linear.

Flr.: Jul. - Sep. *Fr.:* Sep. - Jan.

Specimen Cited: Rechila Chowk, 2200m, AP Das & PC Rai 0608, dated 16.10.1994.

Status: Less Frequent.

Local Distrib.: Pankhasari, Rechila Chowk, Reshete. 1700-2300m.

General Distrib.: Himalayas (Kumaon-Sikkim), S.E. Tibet.

CHIRITA Ham.

Chirita macrophylla Wallich, Pl. As. Rar. 1:56, t. 72. 1829; FBI 4:358. 1884; FEH 1:297. 1966; 2:121. 1971, EFPN 3:133. 1982; TBRI 50(4): 109. 1987.

Calosacme macrophylla Wallich, Cat. 24, n. 805. 1829. *nom. nud.*

Perennial herb. Stem brownish, minutely white hairy. Leaves petiolate, 5-10 x 2-6cm, ovate-elliptic, acute, base cordate, densely pubescent above, nearly glabrous beneath.

Peduncles upto 8cm long, many flowered. Pedicels 3-4cm long. Bracts ovate, serrulate. Flowers drooping; sepals toothed, teeth lanceolate; petals upto 4.9cm long, tubular, yellowish; ovary glabrous. Capsule 8cm or more.

Flr.: Jul. - Sep. *Frt.:* Sep. - Jan.

Specimen Cited: Jaributti-Rechila, 2195-2280m, AP Das & PC Rai 0424, dated 15. 10. 1994.

Status: Frequent.

Local Distrib.: Lva, Rechila Chowk, Jaributti, Chitray. 1900-2600m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Myanmar, Thailand, W. China.

DIDYMOCARPUS Wallich

Key to the species:

1. Stem with only 4-leaves at the tip; naked below.....*D. podocarpus*
1. Stem leaves distributed all along, not naked.....2
2. Calyx deeply lobed, white.....*D. albicalyx*
2. Calyx shallowly lobed, purple.....3
3. Leaf base auricled.....*D. aromaticus*
3. Leaf base unequally narrowed but not auricled.....*D. hookeri*

Didymocarpus albicalyx Clarke in DC. , Monog. Phaner. 5: 78. 1883; FEH 1: 298. 1966; 2:122. 1971; EFPN 3:134. 1982; TBRI 50(4): 112. 1987; Nam. Chang. Flr. Pl. 187. 1987.

D. villosa DC. *sensu* Clarke Comm. & Cyrt. Beng. 89, t. 59. 1874.

D. leucocalyx Clarke in FBI 4: 348. 1884.

Small, unbranched, erect herb with 3 large shortly stalked. Leaves opposite; petiole 0.4-1.5cm, densely villous; lamina 9 -11.2 x 3.4-5.7cm, obovate, crenate, acute, base cuneate, teeth obtuse and alternating in size, villous upper surface, reddish brown beneath, nerves impressed above, prominent below. Peduncle upto 7.5cm, glabrous. Pedicels 0.4-1.5cm. Bracts 0.25 x 0.15cm, connate, leafy. Flowers both axillary and terminal, reddish brown; sepals upto 0.35cm, campanulate, 5-lobed, lobes 0.15cm, rounded; petals upto 0.6cm, long, tubular. Capsule 2cm, cylindrical, dry.

Flr.: Jul. - Sep. *Frt.:* Sep. - Apr.

Specimen Cited: Alubari Belt, 2280m, AP Das & PC Rai 014, dated 13.6.1994.

Status: Common.

Local Distrib.: Alubari, Pankhasari, PHE Source, Thartharay, Reshete. 1900-2300m.

General Distrib.: Endemic to E. Himalaya (Nepal-Bhutan).

Didymocarpus aromaticus Wallich *ex* D. Don, Prodr. Fl. Nep. 123. 1825, *ut aromatica*; FEH 3: 104. 1975; EFPN 3: 134. 1982; TBRI 50 (4): 112. 1989.

E. subalternatus Wallich ex R. Br. in Bennett, Pl. Jav. Ror. 118. 1840; FBI 4: 347. 1884.

Local Name: Kumkumpaati (Nep.).

Small, dampy, erect, apically 4-leaved herb. Stem unbranched, upto 12cm, round, softly hairy. Leaves petiolate, petioles unequal, upto 0.5cm, densely pale hairy; lamina 3-5 x 1-2.8cm, ovate or elliptic, crenately serrate (serration unequal), acute, base narrowly cuneate, light red below, dense golden wooly and coarse above, venation thick and distinct beneath, impressed above. Inflorescence shorter than leaves, terminal, in two distinct lower and upper rings/layers, shorter ones upto 2.3cm, longer ones upto 4cm. Peduncles 2-3.7cm, glabrous. Flowers purple-green; sepals upto 0.3cm, campanulate, deeply 5-lobed; petals 1.4cm long, purplish green. Capsules upto 2cm long.

Flr.: Jun. - Aug. *Fr.:* Aug. - Dec.

Specimen Cited: Rechila Chowk, 2280m, **AP Das & PC Rai** 0327, dated 18.6.1994.

Status: Common.

Local Distrib.: Rechila Middle, Alubari, Chouda Feri, sakam Forest. 1700-2400m.

General Distrib.: Himalayas (Kumaon-Sikkim).

Note: Used as incense in religious ceremonies.

Didymocarpus hookeri C. B. Clarke, Comm. et Cyrt. Beng. t. 54. 1874.

Herb to 33cm high. Stem villous. Leaves exstipulate, petiolate (petioles 1.3-4cm long), opposite, lamina 6.5-14.5 x 3.5-7cm, sub-orbicular, sometimes ovate, acute, base unequally narrowed, pubescent above, lateral nerves upto 11 on either halves, puberulous beneath along nerves. Flowers in pedunculate inflorescence; sepals 5 partite; corolla 5-lobed, pubescent. Capsules upto 4.2cm long, linear, loculicidal.

Flr.: Aug. - Sep. *Fr.:* Oct.

Specimen Cited: Thosum Beat, 2590-2780m, **AP Das & PC Rai** 0904, dated 23.10.1994.

Status: Common.

Local Distrib.: Middle Rechila, Hattidara, Chitray, Thosum Beat. 2300-2800m.

General Distrib.: Darjeeling, Khasia Hills.

Note: Endemic to Khasia Hills. New record of occurrence in Darjeeling.

Didymocarpus podocarpus Clarke in DC., Monogr. Phaner. 5: 76. 1883, ut *podocarpa*; FBI 4:347. 1884; FEH 1: 298. 1966; 2:122. 1971; EFPN 3:134. 1982; TBRI 50(4): 112. 1987.

Pubescent herb, 10-20cm high, greyish. Stem apically 4-leaved. Leaves opposite; petioles 0.5-1.8 cm; lamina 7-14 x 4.5-9.5cm, ovate-elliptic, crenate, obtuse acute, sparsely hairy

above, glabrous beneath except nerves. Peduncles 4-6cm long. Bracts 0.5-0.6cm. Pedicels 0.9-1.4cm; calyx 0.5-0.6cm, campanulate, purple, divided into 0.2cm long obtuse lobes; corolla upto 2.6cm long, purplish and minutely hairy. Capsule 3.4-5cm, with 1 cm long stalk.

Flr.: Jul. - Oct. *Fr.:* Oct. - Mar.

Specimen Cited: Ruka Hill, 2480m, AP Das & PC Rai 0944, dated 24.10.1994.

Status : Common.

Local Distrib.: Lava, Ruka Hill, Hattidara, Thosum Beat, Sikkim-Neora Valley Border, Chouda Feri. 1900-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

LOXOSTIGMA Clarke

Key to the species:

1. A villous herb, 20-40cm tall; corolla purple.....*L. kurzii*
1. A undershrub, upto 1m tall; corolla pale yellow.....*L. griffithii*

Loxostigma griffithii (Wight) Clarke in DC., Monogr. Phaner. 5:60. 1883; FBI 4:344. 1884; FEH 1:299, t. 5a . 1966; EFPN 3:135. 1982; TBRI 50(4): 119. 1987.

Didymocarpus griffithii Wight, Ill. Ind. Bot. 2: 182, t. 153. 1850.

Dichrotrichum griffithii Clarke, Com. & Cyrt. Beng. 79, t. 51.1874.

Small undershrub, upto 1m high. Stem weak, herbaceous, softly pubescent. Leaves in unequal pairs; petioles upto 6cm long. Lamina 6.5-12.5 x 3.5-6.5cm, elliptic, subfalcate, finely serrate, acuminate, base unequal, pubescent. Cymes many flowered. Peduncles upto 10.5cm long. Pedicels 1.5-3cm. Bracts 0.55-0.6cm. Sepals 0.55-0.65cm, oblong, acute, denticulate; corolla 0.45-0.5cm long, tubular, inflated above the base, pale yellow, 5-lobed; stamens 4, included; anthers connivent in pairs; ovary shortly stalked. Capsules 9-14.5, linear; seeds pedunculous.

Flr.: Sep. - Nov. *Fr.:* Dec. - Mar.

Specimen Cited: Rechila Park, 2280m, AP Das & PC Rai 0579, dated 16.10.1994.

Status: Less Common.

Local Distrib.: Lava, Jaributti, Alubari. 1780-2400m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Meghaalaya, Manipur, N. Myanmar, W. China.

Loxostigma kurzii (Clarke) Burt. in NRBGE 34: 104. 1975; Nam. Chang. Flr. Pl. 344. 1987.

Didymocarpus kurzii Clarke Comm. & Cyrt. Beng. 96, t. 66. 1874.

Chirita kurzii (Clarke) Clarke in J. Lin. Soc. Bot. 15:145. 1876 & in FBI 4: 358. 1884.

Small villous herb with prostrate and sub-erect branches, 20-40 cm tall. Leaves paired; petioles 1.2-4.5cm long; lamina 9-16 x 3.9-8cm, elliptic-lanceolate, serrate, acuminate, base cuneate, pubescent both sides. Peduncles 6-12 cm long, few flowered. Bracts 0.7-0.8cm, elliptic. Pedicels 0.8-1.2cm densely villous. Calyx 1.3-1.5cm, divided into free and lanceolate lobes; corolla 3.7-4.1cm, funnel-like, purplish, lower lip lined with yellow marks and throat with purple spots; stamens 4, sometimes 2; style slender, pubescent. Capsule 6-8cm long, linear, stalkless.

Flr.: Jul. - Sep. *Fr.*: Sep. - Nov.

Specimen Cited: Thosum Hill, 2780 m, **AP Das & PC Rai** 0870, dated 23. 10.1994.

Status : Common.

Local Distrib.: Ruka Hill, Hattidara, Thosum Hill, Rechila Chowk, Tinsimana. 2200-2900m.

General Distrib.: E. Himalaya (Nepal-Bhutan), N. Myanmar, W. China.

LYSIONOTUS D. Don

Lysionotus atropurpureus Hara in Journ. Jap. Bot. 48:359, f. 4. 1973; FEH 3: 105, t. 6a. 1975; EFPN 3: 135. 1982.

L. ternifolia DC. *sensu* Clarke, Comm. & Cyrt. Beng. 81. 1974, p.p.

L. serrata auct. non D. Don: Clarke in FBI 4:344. 1884, p.p.; FEH 1: 299. 1966, p.p.; TBRI 50(4): 119. 1987.

Epiphytic, perennial small undershrubs. Stem branched, upto 50cm, glabrous. Leaves opposite, often clustered in three; petioles 0.5-1.3cm long; lamina 5-16.5 x 1-3.4cm, narrow lanceolate-elliptic, closely crenate-serrate, acuminate, base narrow, glabrous both sides, nerves oblique, prominent below. Peduncles upto 8cm, axillary, many flowered. Pedicels to 1.2cm long. Bracts ovate. Flowers in laxly drooping clusters, purplish white; sepals 0.6cm, narrow-lanceolate, fused at base; petals 2-2.5cm, tubular, inflated at middle portion, 2-lipped, lower lip 2-folded within, bluish purple; perfect stamens 2, often with 2-3 rudimentary ones; connective provided with an oblong appendage. Capsule 6-9 cm, linear, narrow; seeds with hairy coma.

Flr.: Jul. - Sep. *Fr.*: Oct. - May.

Specimen Cited: Rechila Chowk-Hattidara, 2280-2549m, **AP Das & PC Rai** 0650, dated 17.10.1994; Ruka Hill-Thosum Beat, 2480-2590m, **AP Das & PC Rai** 0933, dated 24.10.1994.

Status: Frequent.

Local Distrib.: Hattidara, Ruka Hill, Rechila Chowk, Alubari, Thosum Beat. 2100-2800m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

RHYNCHOGLOSSUM Blume

Rhynchoglossum obliquum Blume, Bijdr. 471. 1826; FBI 4:367. 1884; FEH 1:299. 1966; EFPN 3:135. 1982; TBRI 50(4):125. 1987.

Wulfenia obliqua Wallich, Tent. Fl. Nep. 5, t. 35. 1826.

R. obliquum var. *β. parviflora* Clarke in DC., Monogr. Phaner. 5:162. 1883; FBI 4:367. 1884.

Scabrid, succulent, erect annual herb, 20-40cm. Stem translucent, nodes swollen. Leaves alternate; petioles 1-1.8cm long; lamina 3-5.2 cm long, elliptic, entire, acuminate, base unequally cordate. Racemes many, upto 16cm, many flowered. Bracteoles 0.25-0.4cm, filiform. Pedicels 0.25-0.3cm long. Calyx 0.35-0.4cm, campanulate, lobes lanceolate, acuminate; corolla bluish, tube 0.85-1cm, cylindric, bilipped, falcate, lower lip 3-lobed; stamens 2, perfect. Capsules 0.4-0.5cm, ellipsoid, included.

Flr.: Aug. - Oct. *Frt.:* Oct. - Dec.

Specimen Cited: Suntalay, 750m, AP Das & PC Rai 1786, dated 10.9.1997.

Status: Rare; in open places.

Local Distrib.: Noticed only in Suntalay. 500-800m.

General Distrib.: Himalayas (Garhwal-Arunachal Pradesh), India, Sri Lanka, Myanmar, W. & S. China, Malaysia.

ACANTHACEAE Juss.

Key to the Genera:

- 1. Plants climbing.....*Thunbergia*
- 1. Plants erect.....2
- 2. Bracts broader and larger than calyx.....3
- 2. Bracts slender and equalling calyx.....4
- 3. Leaf margin entire or undulate, base cuneate.....*Justica*
- 3. Leaf margin crenate, base obscurely rounded.....*Hypoestis*
- 4. Inflorescence not secund; anther cells not spurred at base.....5
- 4. Inflorescence slightly displaced to one side; anther cells spurred at base
.....*Asystaria*
- 5. Bracts caducous.....*Diffflugossa*
- 5. Bracts persistent.....6
- 6. Flowers usually in heads, rarely simple or fascicled spikes.....7
- 6. Flowers in spreading paniculate spikes.....*Pteracanthus*
- 7. Bracteoles present.....*Goldfussia*
- 7. Bracteoles absent.....*Strobilanthus*

ASYSTARIA Blume

Asystasia macrocarpa Nees in Wallich, Pl. As. Rar. 3:89. 1832; FBI 4:495. 1885; FEH 1:300. 1966; EFPN 3:139. 1982; TBRI 50(4):106. 1987.

Highly branched undershrub, upto 1.5m high, erect. Stem pubescent, with swollen nodes. Petioles 0.7-0.85cm long. Leaves 9-14 x 4-6.5cm, lanceolate, acuminate, cuneate at base, margin undulate, dark green. Racemes upto 10.5 cm long, terminal. Pedicels upto 0.5cm

long. Bracts to 0.3 cm long. Flowers opposite; sepals 0.5-0.65cm, lanceolate, pubescent; corolla upto 3.5cm, tubular, pink-white; stamens 4. Capsules 2.5-3.5cm, cylindrical, 2-seeded.

Flr.: Feb. - May *Fr.:* May - Jul.

Specimen Cited: Jaributti, 2160m, **AP Das & PC Rai** 0442, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Chonkobhir, Reshete, Sakam, Phari. 900-2200m.

General Distrib.: Sub-tropical Himalayas (Nepal-Bhutan).

DIFLUGOSSA Bremek.

Diflugossa divaricata (Nees) Bremek. in Verh. Ned. Akad. Wetens. Sect. 2, 41(1): 246. 1944; BBSI 5: 82. 1963; EFPN 3:140. 1982; TBRI 50(4): 12. 1987.

Strobilanthes divaricatus (Nees) T. Anders in Journ. Linn. Soc. 9: 478. 1867; FBI 4: 468. 1884; FEH 1: 305. 1966; FPK 78. 1981.

Goldfussia divaricata Nees in Wallich, Pl. As. Rar. 3: 89. 1832

Small shrubs, 55-110cm, glabrous. Petioles 0.5-0.8cm; lamina 7-13 x 3-4.8cm, lanceolate, serrulate, acuminate, minutely setulose, nerves pinnate, 7-pairs. Spikes axillary, lax, divaricate; upper flowers alternate; bracts 0.4-0.5cm, ovate, caducous; bracteoles slightly smaller than bracts, obovate-oblong, caducous. Calyx upto 2.5cm, unequal, lobes narrow-lanceolate, long-caudate; corolla 3.5-4.5cm, tubular and slightly curved, purplish; filament hairy. Capsules upto 1.3cm, glabrate; seeds usually 4.

Flr.: Aug. - Oct. *Fr.:* Oct. - Feb.

Specimen Cited: Jaributti, 2195m, **AP Das & PC Rai** 0425, dated 15.10.1994; Near Tangta, 2805m, **AP Das & PC Rai** 0834, dated 21.10.1994.

Status: Frequent.

Local Distrib.: Tangta, Jaributti, Chouda Feri, Goth, Alubari, Sakam. 1700-2300m.

General Distrib.: E. Himalya (Nepal-Bhutan), Meghalaya, W. China.

GOLDFUSSIA Nees.

Goldfussia echinata (Nees) Haridasan et R.R. Rao, Comb. Nov.; Fl. Meg. 2:663. 1987.

Basionym: *Strobilanthes echinata* Nees in Wallich, Pl. As. Rar. 3:85. 1832.

Strobilanthes pectinatus T. Anders. in Journ. Lin. Soc. 9: 474. 1867; FBI 4: 447. 1884; Man. Ind. Timb. 519. 1902; Ind. Trees 500. 1906; Fl. Asm. 3:420. 1939.

A large undershrub or often spreading gregarious scabrous shrubs. Leaves petiolate (petioles 1.2-2.1cm long), lamina 4-11 x 1-3cm, lanceolate, elliptic-lanceolate, coarsely dentate, long acuminate, base cuneate, coriaceous, thinly haired above, undersurface villous, lateral nerves 6-8 pairs, sub-parallel, villous. Spikes capitate, peduncled, hairy. Bracts upto 2.2cm long, ovate and pectinate; bracteoles small. Flowers 3.2-5cm long,

purplish-white; sepals segmented, scarious; corolla infundibular, nearly glabrous. Capsules upto 1.6cm long.

Flr. & Frt.: May - Feb.

Specimen Cited: Chonko Bhir (Rechila Durpinay), 2300m, AP Das & PC Rai 1364 dated 06.5.1995.

Status: Common.

Local Distrib.: Chouda Feri, Chonkobhir, Reshete, Alubari, Jaributti. 2100-2350m.

General Distrib.: Endemic to E. Himalaya (Sikkim, Darjeeling and Bhutan, Meghalaya).

HYPOESTIS Soland ex R. Br.

Hypoestis triflora Roemer et Schultes, Syst. Veg. 1: 141. 1817; Prodr. 11: 506. 1847; FBI 4:557. 1884; FEH 2:123. 1971; EFPN 3:141. 1982; TBRI 50(4):117. 1987.

Justica triflora Forssk., Fl. Aegypt.- Arab. 4.1775.

H. wallichii Nees in Wallich, Pl. As. Rar. 3:114. 1831.

Dicliptera roxburghiana auct. non Nees: Yamazaki in FEH 1: 301. 1966.

Small ramous semi-erect herb, to 30cm high. Stem ribbed, pubescent. Petioles 2-3cm long. Leaves 5-8 x 3-4.5cm, ovate, acute, obscurely rounded at base, margin crenate, pubescent on both surfaces. Cymes capitellate, 1-5 flowered. Bracts 2, to 0.5cm, opposite, foliaceous. Bracteoles 2, to 1 cm long. Sepals 0.7-0.8cm, lanceolate, greenish white; corolla tube 1.4-1.6cm long, pinkish to white, bilipped, lower lip trilobed and recurved, red-spotted within; stamens 2. Capsules 1-1.5cm, ellipsoid; seeds 4.

Flr.: Sep. - Nov. *Frt.:* Nov. - Mar.

Specimen Cited: Below Jorpokhari towards Todey-Tangta, 2800m, AP Das & PC Rai 0818, dated 21.10.1994.

Status: Common.

Local Distrib.: Sakam, Machuki, Alubari, Pankhasari. 1300-2400m.

General Distrib.: W. Asia, Himalayas (Nepal-Bhutan), W. China.

JUSTICA L.

Justica adhatoda L., Sp. Pl. 1: 15. 1753; FBI 4: 540. 1885; JAA 52: 640. 1971; Nam. Chang. Flr. Pl. 305. 1987; Fl. Meg. 2: 661. 1987.

Adhatoda zeylanica Medicus in Hist. Comm. Acad. Theod. Palat 6 Phys. 393. 1790.

A. vasica Nees in Pl. As. Rar., 3: 103 1832; FBI 4: 540. 1885, Man. Ind. Timb. 533. 1902; Ind. Trees 498. 1906; Fl. Asm. 3:455. 1939.

Gregarious shrubs or undershrubs, 1-2m tall. Bark gray or grayish-brown. Young parts usually pubescent. Petiole 1.25-3.7 cm long; lamina 8-18 cm, entire or undulate, acuminate or acute, base cuneate, attenuate, subcoriaceous, pubescent, leteral nerves 8-12 pairs. Spikes 5-10 cm long, peduncled, bracteate. Bracteoles narrower. Bracts ovate to obovate, mostly mucronate. Flowers 2.5-4 cm long, whitish or greenish-white; calyx

sharply 5-toothed, 1-1.3cm long, lobes lanceolate; corolla 2.5-3.25 cm long, tube shortly swollen at the middle and hairy externally; stamens 2; filaments basally hairy; anther lobes minutely pointed towards the base; ovary hairy. Capsule 1.8-2 cm long, clavate; seeds ca. 0.5 cm., suborbicular.

Flr. & Frt.: Jan. - Jun.

Specimen Cited: Above Samsing, 750 m, **AP Das & PC Rai** 1743, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Gorubathan, Phaparkheti. Upto 1600m.

General Distrib.: Subtropical Himalayas, India, Malaysia.

PTERACANTHUS (Nees) Bremek.

Pteracanthus alatus (Wallich ex Nees) Bremek in Verh. Nederl. Akad. Wet. 41. 199. 1944; EFPN 3:143. 1982; Fl. Of Muss. 549. 1978; TBRI 50(4): 124. 1987; Flr. Him. 313. 1992.

Strobilanthes wallichii Nees in Wallich, Pl. As. Rar. 3: 87. 1832, FBI 4: 471. 1884; FEH 1: 305. 1966.

Ruellia alata Wallich, Pl. As. Rar. 1: 26, t. 31. 1830.

Goldfussia thomsonii Hk. in Bot. Mag. t. 5119. 1859.

Strobilanthes alatus Nees in DC. Prodr. 11. 194. 1847 non Blume 1825-26.

Small erect perennial herbs, 30-55cm tall. Stems quadrangular, weak, hairy. Leaves opposite, uppermost pair usually sessile, lower petiolate (petioles 0.4-1.5cm), lamina 1.3-7 x 0.9-2.8cm, ovate to elliptic, crenate-serrate, acute-acuminate, base rounded or shallow cordate, pubescent above, glabrous beneath except on the basal nerves. Spikes lax, paniced, glandular hairy. Bracts leafy, lanceolate or oblong, caducous. Flowers blue; calyx 0.7cm long, lengthening to 1.5cm in fruits, 5-partite deeply, lobes ligulate, glandular-hairy; corolla 2.5-3.6cm, curved, broadly dilated from cylindrical base, pale blue or nearly white. Capsules upto 1.7cm long, cylindric.

Flr.: Aug. - Oct. *Frt.:* Oct. - Nov.

Specimen Cited: Jaributti, 2195m, **AP Das & PC Rai** 0417, dated 15.10.1994; Near Tangta, 2805m, **AP Das & PC Rai** 808, dated 21.10.1994; Thosum Beat, 2590m, **AP Das & PC Rai** 905, dated 23.10.1994.

Status: Common.

Local Distrib.: Thosum Beat, Tangta, Jaributti, Middle Rechila, Hattidar. 1900-2850m.

General Distrib.: Himalayas (Kashmir-Bhutan).

STROBILANTHES Blume

Strobilanthes pentstemonoides (Nees) T. Anders. in Jour. Lin. Soc. 9. 477. 1867; FBI 4: 463. 1884; FEH 1: 305. 1966.

Goldfussia pentstemonoides Nees in Wallich, Pl. As. Rar. 3:88. 1832; Icon. t. 1510. 1850.

Herbaceous to robust undershrubs, to 1.5m high. Stem much branched. Petioles upto 1cm; lamina 6-15.5 x 2.5 - 6.5cm, elliptic-lanceolate, serrate, acuminate, base narrowed to the leaf-stalk or rarely rounded, glabrous, lateral nerves 7-10 on each side. Bracts orbicular. Flowers usually in hairy peduncled heads, less often paniced; calyx 0.5-0.6cm, segments linear, hairy; corolla 3.7cm long, purple. Capsule upto 2.3cm long, glandular-pubescent, with accrescent calyx.

Flr.: Oct. - Jan. *Frt.:* Feb. - Mar.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 0298, dated 16.6.1994.

Status: Common.

Local Distrib.: Machuki, Sakam, Rechila Park, Jaributti. 1200-2100m.

General Distrib.: E. Himalaya (Nepal-Bhutan) and Indo-China.

THUNBERGLIA Retz.(*nom. cons.*)

Key to the species:

1. Flowers fascicled on pendent raceme.....*T. coccinea*
1. Flowers axillary, solitary or paired.....2
2. Corolla whitish.....*T. fragrans*
2. Corolla yellowish to creamy white.....*T. lutea*

Thunbergia coccinea Wallich, Tent. Fl. Nep. 49: 58.t. 37. 1824; FBI 4: 393. 1884; Man. Ind. Timb. 518. 1902; Ind. Trees. 497. 1906; Fl. Asm. 3: 411. 1939; Fl. Jow. 2: 349. 1983; Fl. Meg. 2: 670. 1987.

Climber with profuse and pendent branches. Leaves petiolate, petioles, upto 5 cm long; lamina 5-17 x 2-7cm, ovate-ellitic or ovate-lanceolate, margin entire or remotely toothed, acuminate, base truncate or shallow cordate, glabrous, membranous, 3-5 nerved. Flowers fascicled at the pendent racemes, 3-4 cm long, orange red; corolla lobes reflexed. Capsule upto 5 cm long.

Flr.: Sep. - Nov. *Frt.:* Dec. - Feb.

Specimen Cited: Near Mulkharka, 1920 m, **AP Das & PC Rai** 1168, dated 01.5.1995.

Status: Rare.

Local Distrib.: Mulkharka, Reshete, Pankhasari. 1800-2150m.

General Distrib.: Subtropical to temperate Himalayas, China, Indo-China.

Note: Flowers very attractive. The species is worth introducing into the nursery or botanic gardens.

Thunbergia fragrans Roxb., Pl. Corom. 1:47, t. 67. 1795; FBI 4:390. 1884; Trs. N. Beng. 97. 1929; FEH 1:305. 1966; EFPN 3:145. 1982; TBRI 50(4):129. 1987.

Local Name: Kaneshi Lahara (Nep.).

Twinning shrubby climber. Stem retosely pubescent. Petioles 1-4cm. Leaves 4-5 x 1.5-2.5cm, ovate-lanceolate or triangular cordata, acute to acuminate, base cordate, margin entire, upper surface pubescent. Racemes axillary. Pedicels upto 6 cm long. Bracts to 2.4cm, 3 nerved, hairy. Flowers scented; calyx to 2.5cm, with 10-15 teeth, glabrous; corolla upto 3 cm long, lobes 5, whitish; stamens 4; anthers 0.25-0.3 cm, acute; ovary to 0.4cm, glabrous; stigma capitate. Fruits upto 2.5cm, glabrous, beaked, 4 seeded.

Flr.: Jul. - Oct *Fr.:* Oct. - Feb.

Specimen Cited: Samsing, 700m, **AP Das & PC Rai** 1924, dated 30.10.1997.

Status: Frequent.

Local Distrib.: Gorubathan, Samsing, Sakam, Machuki. 500-1600m.

General Distrib.: Himalayas, Tropical and Sub-tropical Asia, Australia and W. China.

Thunbergia lutea T. Anderson in Journ. Lin. Soc. Bot. 9:448. 1867; FBI 4:392. 1884; FEH 1:305. 1966; FPK 79. 1981; EFPN 3:144. 1982; TBRI 50(4): 129 1987.

Destorse perennial twinner, shrubby. Stem slender, glabrous. Petioles 1.5-2.6cm. Leaves 5-8.5 x 3.2-4.2cm, ovate-lanceolate, acuminate, base cuneate, margin dentate, ciliate, hairy above. Bracteoles broadly ovate. Flowers solitary and axillary; calyx 0.4-0.5cm, crenulate; corolla 2-2.5cm, creamy white, with oblique limbs; stamens 4; staminode rudimentary; filaments glandular at apex; style hairy on the upper Sparsely Capsules 2.5-3cm, globose, beaked above.

Flr.: Aug. - Sep. *Fr.:* Sep. - Dec.

Specimen Cited: Near Sakam, 1250m, **AP Das & PC Rai** 1468, dated 14.11.1995.

Status: Less Frequent.

Local Distrib.: Kuwa Paani, Machuki, Sakam, Phari, Chouda Feri .900-2100m.

General Distrib.: Endemic to E. Himalaya (Sikkim, Darjeeling, Nepal).

VERBENACEAE **Jaume St. Hil.**

Key to the Genera:

1. Flowers in unbranched spikes or heads.....*Lantana*
1. Flowers in umbellate/thyrsoid or paniculate cymes.....2
2. Drupes covered with persistent calyx.....3
2. Drupes not covered with calyx.....4
3. Calyx salver-shaped.....*Holmskioldia*
3. Calyx campanulate, toothed.....*Clerodendrum*
4. Leaves simple, not foetid.....5

4. Leaves digitately 3-5 foliolate, foetid.....*Vitex*
 5. Petioles 2.5-5.5cm long; cymes axillary.....*Callicarpa*
 5. Petioles 0.8-1cm long; cymers in terminal thyrse.....*Caryopteris*

CALLICARPA L.

Key to the species:

1. Lamina ovate-lanceolate, entire; corolla puberulous.....*C. arborea*
 1. Lamina obovate or obovate-elliptic, dentate-serrate above the middle; corolla glabrous.....*C. vestita*

Callicarpa arborea Roxb. ex Clarke in FBI 4:567. 1885; Trs. N. Beng. 102. 1929; FEH 1: 268. 1966; EFPN 3: 145. 1982; TBRI 150(4): 108. 1987.

Local Name: Guenlo (Nep.).

Small evergreen trees, 5-10m tall, branches stellate hairy. Leaves opposite; petioles 2.5-5 cm long; lamina 15-32 x 6.5-13cm, ovate-lanceolate, acute, narrowed at base, margin entire, glabrous above, stellate tomentose beneath. Cymes upto 25 cm long, axillary. Calyx 0.15-0.2 cm, campanulate, 4-lobed, stellate pubescent; corolla 0.3-0.35 cm, tubular or campanulate, mauve-purple, 4-lobed, puberulous; stamens 4. Drupe 0.25-0.3 cm across, globose, purplish.

Flr.: Apr. - Jan. *Fr.:* Aug. - Nov.

Specimen Cited: Samsing-Phari, 700-900m, **AP Das & PC Rai** 1461, dated 12.11.1995.

Status: Less Common.

Local Distrib.: Gorubathan, Samsing, Phari, Machuki. 500-1500m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, Myanmar, S. China, Malaysia.

Note: A good fodder plant.

Callicarpa vestita Wallich ex Clarke in Hk. f., FBI 4: 567, 1885; Man. Ind. Timb. 525. 1902, Ind. Trees 512. 1906; Fl. Asm. 3: 463. 1939; Fl. Jow. 2: 367. 1983; Fl. Meg. 2: 674. 1987.

Shrubs or middle-sized trees upto 13 m tall, usually branching from base. Bark warty, dark brown or dark gray. Young parts brown tomentose. Petioles 2.5 - 5.4 cm long, brown tomentose; lamina 12-23 x 6-14.5 cm, obovate, obovate-elliptic, margin sub-entire, usually dentate serrate at upper half, acute - acuminate, base narrowed or rounded, glabrous above, tomentose beneath, lateral nerves 8-12 on either side, sub-Pl. As. Rar.alleled. Cymes axillary, 10-15cm across, brownish pubescent. Peduncles ca. 5 cm long, pubescent. Flowers 0.28 - 0.4 cm long, pinkish; calyx glabrous; corolla pinkish, usually glabrous. Drupes 0.2 - 0.25 cm diam., globose, purplish.

Flr. & Fr.: Apr. - Oct.

Specimen Cited: Phari, 920 m, **AP Das & PC Rai** 1744, dated 17.5.1997.

Status: Less Frequent.

Local Distrib.: Samsing, Machuki, Phari. 500-1300m.

General Distrib.: Endemic to E. Himalaya (Nepal-Bhutan).

CARYOPTERIS Bunge

Caryopteris odorata (D. Don) B.L. Robinson in Proc. Amer. Acad. 51:531. 1916; FEH 2: 112. 1971; EFPN 3:145. 1982; TBRI 50(4):108. 1987.

Clerodendron odoratum D. Don, Prodr. Fl. Nep. 102. 1825.

Caryopteris wallichiana Schauer in DC., Prodr. 11:625. 1847; FBI 4:597. 1885.

Small spreading shrubs, 1.5-4m, with quadrangular and ashy-pubescent branchlets. Bark peeling off, papery. Petioles 0.8-1cm long. Leaves 5-12.5 x 3-5 cm, elliptic, acuminate, base cuneate, margin subentire to crenate, ashy pubescent. Cymes 9-12.5 cm, in terminal thyrses. Bracts upto 0.5 cm long, caducous. Calyx 0.25-0.35 cm, segmented into 5, lilac, lobes linear-lanceolate, 1-3 ribbed, densely pubescent; corolla tube upto 1cm, pale-mauve, bilipped, lobes ovate, glandular pubescent; stamens 4, exerted. Capsules 0.45-0.55 cm, globose, hairy.

Flr.: Dec. - Mar. *Fr.:* Apr. - Jun.

Specimen Cited: Suntalay, 655m, **AP Das & PC Rai** 1506, dated 04.6.1996.

Status: Frequent.

Local Distrib.: Phari, Samsing, Gorubathan, Suntalay. 500-1050m.

General Distrib.: Pakistan, Himalayas (Kumaon-Bhutan), India.

CLERODENDRUM L.

Key to the species:

- 1. Corolla white, pink-tinged.....2
- 1. Corolla scarlet.....*C. japonicum*
- 2. Leaf base rounded or sub-truncate; bracts elliptic.....*C. viscosum*
- 2. Leaf base obscurely subcordate or truncate; bracts lanceolate.....*C. philippinum*

Clerodendrum japonicum (Thunb.) Sweet, Hort. Brit. 322. 1827; FEH 1: 269. 1966; EFPN 3. 146. 1982.

Volkameria japonica Thunb. in Nov. Act. Reg. Soc. Sci. Upsal. 3: 208. 1780.

C. squamatum Vahl, Symb. 2: 74. 1791; FBI 4:593. 1885.

Local Name: Asaray (Nep.).

Small soft shrubs, 1-2 m high. Branches thinly hairy. Petioles 7-18 cm long. Leaves 16-40 x 10-28 cm, broadly ovate-cordate or sub-orbicular, acuminate, margin dentate, scaberulous above, odorous. Panicles upto 35 cm long, thyrsoid, scarlet red. Bracts 0.4-0.5 cm, linear. Calyx 0.65-0.75 cm long, 5-lobed; corolla scarlet, tube 2-2.5 cm, lobes

spreading, upto 1.2 cm; stamens 4-4.5 cm long. Drupes to 1 cm diam., bluish black, with enlarged persistent calyx to 4 cm.

Flr.: Jun. - Jul. *Frt.*: Aug. - Sep.

Specimen Cited: Suntalay, 655m, AP Das & PC Rai 1462, dated 12.11.1995.

Status: Frequent.

Local Distrib.: Samsing, Phari, Gorubathan, Suntalay 400-1000m.

General Distrib.: Himalayas (Nepal-Sikkim), India, Tropical Asia.

Clerodendrum philippinum Schaner in DC., Prodr. 11: 667 1847; Taxon 17: 54. 1968; Nam. Chang. Flr. Pl. 134. 1987.

Volkameria japonica Jacq., Hort. Schoenbr. 3: 48. 1987. 1998 non Thunb. 1780.

V. fragrans Vent., Jard. Malamina 2: t. 70 1804.

Clerodendrum fragrans Hort. ex vent., Jard. Malamina 2: t. 70. 1804.

C. japonicum (Thunb.) Sweet var. *pleniflorum* (Schaver) Maheshwari in Taxon 15: 43. 1966.

Shrubs or under shrubs, 1-2 m tall, usually unbranched or sparsely branched. Branchlets quadrangular, tomentose. Leaves 7.5-15 x 7.5-16 cm, ovate, ovate-orbicular, margin irregularly dentate, acute or acuminate, base obscurely subcordate or truncate, thinly hairy above. Corymbs dense, 5.3-10 cm across, capitate. Bracts lanceolate, purplish or red. Flowers sessile or very shortly stalked, 1.5-2 cm diam., white, turning purplish-pink later, fragrant; corolla 2-3 segmented; stamens inconspicuous. Fruits ovoid, purplish.

Flr. & Frt.: Feb. - Nov.

Specimen Cited: Near Samsing, 710 m, AP Das & PC Rai 1548, dated 06.6.1996.

Status: Common.

Local Distrib.: Phari, Suntalay, Samsing, Gorubathan. Upto 1150m.

General Distrib.: Malaysia, Indo-China and S. China; naturalised in India.

Clerodendrum viscosum Vent., Jard. Malamina 1: 25, 1803; BBSI 3: 14, 1961; Nam. Chang. Flr. Pl. 134. 1987; Fl. Meg. 2: 678. 1987.

C. infortunatum auct. non L.: Cl. in FBI 4: 594. 1885.

Shrubs or undershrubs to 3 m high. Young shoots warty, lenticular and tomentose. Petioles 1.25 - 12 cm long, pubescent; leaf lamina 7.5-19 x 6.5-14 cm, ovate-lanceolate, margin subentire to serrate, dentate, acute or acuminate, base sub-truncate or rounded, lateral nerves 6-9 on either side. Panicles pyramidal, corymbose, terminal upto 18.5 cm across. Bracts elliptic, acuminate reddish. Flowers 2.5-3 cm long, white, tinged pink; calyx 5-segmented, upto 1 cm long, red, pubescent and accrescent in fruit; corolla tube 1.75-2.25 cm long, slender, pubescent, lobes obovate or elliptic; stamens exerted; style extended. Drupes 0.75-1 cm diam., bluish-black, glossy and hidden within persistent calyx.

Flr.: Feb. - May *Fr.*: May - Jul.

Specimen Cited: Near Phari, 900 m, **AP Das & PC Rai** 1746, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Samsing, Phari, Machuki, Phaparkheti. Upto 1600m.

General Distrib.: Himalayas (Nepal-Sikkim), India, Sri Lanka, Myanmar, Malaysia.

HOLMSKIOLDIA Retz.

Holmskioldia sanguinea Retz., Obs. Bot. 6:31. 1791; FBI 4: 596. 1885; Trs. N. Beng. 100. 1929; FEH 1: 269. 1966; FPK 80. 1981; EFPN 3: 147. 1982; TBRI 50(4):116. 1987.

Local Name: Haray Lahara, Aputo (Nep.).

Large semiscandent to straggling shrubs 4-8m, with drooping branchlets. Stem angled, brownish, hairy. Petioles 1.6-3.2 cm long. Leaves 6-12 x 4-8 cm, ovate, acuminate, base subcordate or cuneate, margin obscurely toothed, pubescent. Cymes 4-7 cm, axillary and terminal, hairy. Bracts 0.4-0.5 cm, lanceolate. Calyx upto 2.2. cm long, salver-shaped, orange-scarlet or greenish white, margin undulate, membranous, reddish or white; corolla upto 2.5 cm long, cylindric with curved tube, orange red, bilipped with rounded lobes; stamens 4, didynamous. Drupes 0.7-0.8 cm, obovoid; fruiting calyx accrescent.

Flr.: Oct. - Jan. *Fr.*: Feb. - Apr.

Specimen Cited: Above Gorubathan, 620m, **AP Das & PC Rai** 1920, dated 30.10.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Machuki, Gorubathan. 400-1400m.

General Distrib.: Himalayas (Kumaon-Bhutan), India.

Note: Children suck nectar from flowers.

LANTANA L.

Lantana camera L., Sp. Pl. 627. 1753; FBI 4: 562. 1885; Fl. Asm. 3: 460. 1939; FEH 1: 270. 1466; Fl. Meg. 2: 681. 1987, Nam. Chang. Flr. Pl. 315. 1987.

L. acuteata L., Sp. Pl. 627. 1753; FBI 4: 562. 1885.

Straggling prickly shrubs, aromatic. Bark grayish-brown. Petiole 0.5-1cm long. Leaves opposite, lamina 2-8 x 2-6 cm, ovate, crenate, acute or acuminate, base cuneate or rounded scabrous, rugose. Spikes 3-4.5 cm diam., capitate. Bract lanceolate, 3-5 ribbed. Flowers 0.75-1.1 cm long, mostly orange, often varying to white or pinkish. Fruits 0.35-0.55 cm diam., greenish blue when ripe, shining.

Flr. & Fr.: Jun. - Dec.

Specimen Cited: Suntalay, 655 m, **A P Das & P C Rai** 1516, dated 04.6.1996.

Status: Common.

Local Distrib.: Phari, Gorubathan, Machuki, Samsing, Suntalay. 400-1650m.

General Distrib.: Native of Tropical America; naturalised in the Himalayas, India, Bangladesh, Myanmar, China, Malaysia, Australia.

Note: Introduced from tropical America and runs wild through India, common both in hills and plains. Very invasive and overrun forest areas driving other species away.

VITEX L.

Vitex negundo L., Sp. Pl. 638. 1753; FBI 4: 583. 1885; Man. Ind. Timb. 539. 1902; Ind. Trees 503. 1906; Fl. Asm. 3: 480. 1939; FEH 1: 270. 1966; Fl. Meg. 2: 692. 1987.

Small trees or large shrubs, 2-9 m high, deciduous. Bark thin, smooth, gray or ashy white. Branches usually suberect, quadrangular and foetid. Petioles 2.3-5 cm long; leaves digitately 3-5 foliolate; petiolules 0.2 cm long; leaflets 3.5-11.5 x 1-2.3 cm, lanceolate or ovate-lanceolate, sometimes oblong-lanceolate, entire, crenulate or rarely coarsely toothed, acute or acuminate, base cuneate, glaucous and gray beneath. Panicles 12-18 cm long. Flowers 0.6-0.8 cm, bluish or purplish or purplish-white; calyx ca 0.25cm long, 5-toothed, campanulate, teeth triangular; corolla 0.6-0.8 cm long, bilipped, upper bilobed, lower longer and trilobed; stamens ovoid, exerted; filaments villous at base. Drupe ca. 0.5cm diam., obscurely ribbed and glandular.

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Near Asala Khola at Samsing, 760 m, AP Das & PC Rai 1748, dated 17.5.1997.

Status: Common.

Local Distrib.: Gorubathan, Phaparkheti, Samsing, Suntalay, Asala Khola. 400-1400m.

General Distrib.: Afganistan, India, Himalayas, Sri Lanka, China, Myanmar, Malaysia.

LABIATAE Juss.
(LAMIACEAE alt. nom.)

Key to the Genera:

1. Fruiting calyx tubular.....3
1. Fruiting calyx bilipped and not tubular.....2
2. Flowers in axillary verticillaster; corolla-tube exceeding calyx.....*Clinopodium*
2. Flowers in unbranched spike or head; corolla-tube not exceeding calyx.....*Prunella*
3. Plants prostrate or decumbent.....4
3. Plants erect, stout.....5
4. Calyx lobes without spines.....*Ajuga*
4. Calyx lobes with hooked spines below.....*Notochaete*
5. Shrubs to small trees.....*Leucocephalum*
5. Herbs or undershrubs.....6

6. Plants much hispid; lamina ovate.....7
 6. Plants puberulous; lamina elliptic to ovate-lanceolate.....8
 7. Inflorescence secund; plants much branched; cymes terminal, dense.....*Craneotome*
 7. Inflorescence not secund; plants usually unbranched; panicles both axillary and terminal.....*Rabdosia*
 8. Corolla white or pink; inflorescence compact.....*Elsholtzia*
 8. Corolla lavender-blue; inflorescence generally lax.....*Plectranthes*

AJUGA L.

Key to the species:

1. Flowers in spicate inflorescence; corolla light purple, turning to white
*A. macrosperma*
 1. Flowers in lax whorls; corolla lilac, violet.....*A. lobata*

Ajuga lobata D. Don, Prodr. Fl. Nep. 108. 1825; FBI 4 702. 1885; Lab. Ind. 224. 1940; FEH 1: 271. 1966; 2: 113. 1971; 3:92. 1975; EFPN 3:149. 1982.

Prostrate aromatic perennial herbs. Stem flexuous, rooting at nodes, slightly procumbent, deep brown and softly hairy. Petioles 4-6cm, white pubescent; lamina 6-9 x 3-4.3cm, broadly oblong, margins hairy and sinuate-lobed, base slightly cordate, white hairy above, deep brown and hairy along nerves beneath; juvenile leaves densely hairy. Bracts oblong, dentate. Flowers whorls lax, axillary, lilac, violet; calyx 5-lobed, teeth lanceolate, thinly hairy; corolla tube 1.9cm, slender, straight, deeply 2-lipped, upper lip short, violet, limbs reticulate with dark violet lines; stamens 4, exerted, ascending; anther cells diverging; ovary with sub-equal lobes; fruiting calyx tubular.

Flr.: Apr. - Jun. *Fr.:* Jun. - Sep.

Specimen Cited: Jorhpokhari-Thosum Beat, 3040-2780m, AP Das & PC Rai 0846, dated 22.10.1994.

Status: Less Common.

Local Distrib.: Thosum Beat, Alubari, Jorhpokhari, Jaributti. 2100-3050m.

General Distrib.: Himalayas, India, Tibet, Myanmar, S. W. China.

Ajuga macrosperma Wallich ex Benth. in Wallich, Pl. As. Rar. 1:58. 1830. var. *breviflora* Hk. f. , FBI 4: 704. 1885; Lab. Ind. 220. 1940; FEH 1:271. 1966; 2:113. 1971; EFPN 3: 149. 1982.

Perennial small prostrate herbs. Branches short, slender, decumbent, villous. Leaves 6-12.8 x 2-4.5 cm including petioles; lamina ovate-oblong, sinuate-crenate and hairy, base subcordate, thickly white hairy above, sparsely hairy along nerves to almost glabrous beneath; young lamina light violet beneath, older ones dark green. Spike terminal, whorls interrupted. Bracts ovate. Calyx obconic, 0.2-0.25cm, teeth short and obtuse; corolla inflated at base, 0.3-0.45cm, 2-lipped, upper lip nearly erect, light purple to turning white on maturation, glabrous; stamens 4, exerted; ovaries shortly 4-lobed. Nutlets deeply pitted; fruiting calyx tubular.

Flr.: May - Jul. *Fr.*: Jun.- Sep.

Specimen Cited: Jaributti-Rechila Chowk, 2195-2280m, AP Das & PC Rai 0477, dated 15.10.1994.

Status: Frequent in open and semi-open places.

Local Distrib.: Todey-Tangta, Thosum Beat, Jaributti, Machuki. 2150-3050m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh).

CLINOPODIUM L.

Clinopodium umbrosum (M.-Bieb) C. Koch in Linnaea 21: 673. 1848; FEH 1: 272. 1966; 2: 114. 1971; 3: 92. 1975; EFPN 3: 150. 1982.

Melissa umbrossa M.- Bieb., Fl. Taur. Cauc. 2: 63. 1808.

Calmintha umbrosa (M.-Bieb.) Fisch. & Mey., Ind. Sem. Hort. Petrop. 6:6. 1840; FBI 4: 650. 1885; Lab. Ind. 98. 1940.

Procumbent annual aromatic herb, slender, 16-38 cm, with slightly woody base. Stem 4-ribbed, hairy, branching from base, nearly unbranched above. Petioles upto 0.6 cm; lamina 0.9-2.8cm, ovate, dentate, subacute, rounded, both-sides pubescent. Verticillaster dense, globose, densely pubescent. Flowers upto 0.65cm long; calyx 13 nerved, bilipped, upper teeth triangular; corolla light purple to pinkish-white, tube straight, bilipped, upper lip erect, throat villous; stamens included; anther-cells Pl. As. Rar.allel to diverging; style lobed, lobes equal. Nutlets minute, subglobose and smooth.

Flr.: Jun. - Sep. *Fr.*: Aug. - Oct.

Specimen Cited: Jaributti-Lower Rechila Chowk, 2195-2280m, AP Das & PC Rai 0445 dated 15.10.1994.

Status: Abundant in open places upto 2700m.

Local Distrib.: Machuki, Jaributti, Lower Rechila Chowk, Alubari, Pankhasari, Rechila Middle. 1300-2700m.

General Distrib.: Iran, Afganistan, Pakistan, Himalayas (Kashmir-Bhutan), India, Myanmar, Tibet, China.

CRANEOTOME Reichb.

Craneotome furcata (Link.) Kuntze, Rev. Gen. Pl. 2:516. 1891; EFPN 3:152. 1982; TBRI 50(4):110. 1987.

Ajuga furcata Link., Enum. Pl. H. Berol. 2: 99. 1822.

A. versicolor Reichb., Icon. Exot. 1:39. 1824; FBI 4:672. 1885; Lab. Ind. 151. 1940; FEH 1:273. 166; 3:92. 1975.

Much branched, erect, hispid herb, 20-55 cm, with small perennial root-stock. Petioles 1.5-2cm long; lamina 4-7.5 x 2.5-4.6cm, broadly ovate-cordate, crenate, acuminate, densely hispid. Cymes in dense terminal panicles. Bracts subulate. Calyx 0.25-0.3cm, ovoid, lobes triangular-ovate, hairy within, enlarged in fruit; corolla 1.4-1.65 cm, mauve-

purple, deeply bilabiate, upper lip entire, lower one spreading, 3-lobed, with midlobe larger and notched; stamens 4. Nutlets minute, subglobose, shiny.

Flr.: Jul. - Oct. *Fr.*: Sep. - Dec.

Specimen Cited: Near Sakam, 1250m, AP Das & PC Rai 1469, dated 14.11.1995.

Status: Abundant in open places.

Local Distrib.: Samsing, Lava, Machuki. 800-2500m.

General Distrib.: W. Pakistan, Himalayas (Kashmir-Bhutan), Myanmar, S. W. China.

ELSHOLTZIA Willdenow

Key to the species:

- 1. Bracts linear subulate; perennial plants.....2
- 1. Bracts semi-circular; annuals.....*E. strobilifera*
- 2. Calyx ribbed; nutlets narrow.....*E. fruticosa*
- 2. Calyx unceolate; nutlets ellipsoid.....*E. blanda*

Elsholtzia blanda (Benth.) Benth., Lab. Gen. Sp. 162. 1833; FBI 4:643. 1885; Lab. Ind. 89. 1940; FEH 1: 273. 1966; EFPN 3:152. 1982; TRBI 50(4):113. 1987.

Aphanochilus baldus Benth. in Wallich, Pl. As. Rar. 1:29. 1830.

Suffrutescent, slender, strongly aromatic undershrubs, 55-110cm, pubescent, scarcely branched. Petioles 0.16-1cm long. Lamina 3-6.1 x 1.8-3cm, elliptic-lanceolate, serrate, acuminate, base narrowed, puberulous above, gland-dotted beneath. Spikes terminal and an short lateral branches, 6-13cm long, paniced, secund. Bracts subulate. Flowers sessile; calyx 0.25-0.28cm, urceolate, glandular-pubescent, lobes lanceolate; corolla 0.35-0.4cm, pubescent, white, tube to 0.15cm, limb 0.5cm across, oblique. Nutlets minute (*c* 0.08cm), ellipsoid.

Flr.: Sep. - Nov. *Fr.*: Nov. - Feb.

Specimen Cited: Samsing, 800m, AP Das & PC Rai 1460, dated 12.11.1995.

Status: Frequent.

Local Distrib.: Machuki, Alubari, Samsing, Sakam. 800-2200m.

General Distrib.: Himalaya (Nepal-Bhutan), Assam, Myanmar, China, Malaysia.

Elsholtzia fruticosa (D. don) Rehder in Pl. Wilson. 3: 381. 1916; FEH 1:274. 1966; 3: 93. 1975; EFPN 3: 153. 1982.

Perilla fruticosa D. Don, Prodr. Fl. Nep. 115. 1825.

E. polystachya Benth., Lab. Gen. Sp. 161. 1833; FBI 4: 643. 1885; Lab. Ind. 89. 1940.

Suffrutescent undershrubs, highly aromatic. Branches obscurely 4-ridged, grey, puberulous. Leaves subsessile-shortly petioled; lamina 4-8 x 1.1-2.5cm, elliptic-lanceolate, serrate, acute to shortly acuminate, base cuneate-acute, glandular and finely

haired both sides. Spikes long, upto 14.5cm, fascicled, terminal, slender. Bracts small, linear subulate and puberulous. Flowers tiny, shortly pedicelled, calyx upto 0.28cm, ribbed and 5-6 toothed, teeth short and sharply triangular, pubescent; corolla tubular, notched, twice the length of sepals, densely hairy, white, strongly fragrant; stamens 4, exerted, filament long, upto 0.2cm, base thickened and hairy; style exerted, bifid. Nutlets narrow with persistent calyx, shiny. (**Plate V: 45**).

Flr.: Sep. - Nov. *Frt.*: Nov. - Jan.

Specimen Cited: Jaributti - Lower Rechila Chowk, 2195-2280m, **AP Das & PC Rai** 0489, dated 15.10.1994.

Status: Common.

Local Distrib.: Jaributti, PHE Source, Rechila Chowk, Hattidara. 2100-2550m.

General Distrib.: Punjab, Himalayas (Kashmir-Bhutan), India, Tibet, Myanmar, China.

Elsholtzia strobilifera (Benth.) Benth., Lab. Gen. Sp. 163. 1833; FBI 4: 645. 1885; Lab. Ind. 92. 1940; FEH 1: 274. 1966; 3: 93. 1975; EFPN 3: 153. 1982.

Cyclostegia strobilifera Benth. in Wallich, Pl. Asia. Rar. 1:30. 1830, excl. *syn.*

Annual herbs upto 30cm. Branches opposite, white-hairy. Petioles 0.3-0.6cm, hairy; lamina 0.9-3.8 x 0.4-1.8cm, ovate, serrate, obtuse-acute, base cuneate to rounded, white hairy concentrating along nerves on both surfaces. Spikes short 1-3.8cm, cylindric, compact, pubescent, peduncled Bracts large, nearly semi-circular, longer than sepals, membranous, ciliate and nerved. Flowers minute; calyx narrowly tubular, 5-toothed, teeth lanceolate, hyaline; corolla-tube slender, longer than calyx, upto 0.29cm, pinkish, glabrous, lobes narrowly, spreading; stamens and styles long, exerted, brown. Nutlets oblong, light brown but not shiny. (**Plate XXVII**).

Flr.: Aug. - Nov. *Frt.*: Oct. - Jan.

Specimen Cited: Chouda Feri, 2280m, **AP Das & PC Rai** 0334, dated 14.10.1994; Jaributti, 2195m, **AP Das & PC Rai** 0386, dated 15.10.1994; Lower Rechila-Rechila Peak, 2280-3100m, **AP Das & PC Rai** 0728 dated 19.10.1994.

Status: Abundant in open places.

Local Distrib.: Rechila Peak, Alubari, Jaributti, Chouda Feri. 2000-3100m.

General Distrib.: Himalayas (Kashmir-Bhutan), Tibet, Myanmar, China.

Note: The population is extremely variable.

LEUCOCEPTRUM *Smith.*

Leucocephtrum canum Smith, Exot. Bot. 2: 113. t.116. 1805; FBI 4:699. 1885; Man. Ind. Timb. 548. 1902; Ind. Trees 516. 1906; Fl. Asm. 3: 529. 1939; FEH 1:278. 1966; 2:115. 1971; Fl. Meg. 2:699. 1987; Nam. Chang. Flr. Pl. 324. 1987.

Clerodendron leucocephtrum D. Don, Prodr. Fl. Nep. 103. 1825.

Comanthosphace nepalensis Kitam. et Murata in Act. Phytotax. Geobot. 15: 109. 1954; BBSI 15: 211. 1976.

Local Name: Ghurpis (Nep.).

Small trees upto 10m tall. Bark dark greyish. Branches horizontal, densely hairy or clothed with pale brown tomentum. Petioles upto 3cm long. Leaf lamina 11.5- 28 x 2.6-9.3cm, elliptic or elliptic-lanceolate, often oblong-elliptic, crenate-serrate, acute to acuminate, base cuneate, coriaceous, glabrous above at maturity, matted with grey tomentum beneath, lateral nerves many (10-30 pairs), sub-Pl. As. Rar.allel. Spikes 7.5-14.5cm long, cylindrical, terminal. Bracts oblong, tomentose beneath. Pedicels short. Flowers upto 2cm long, dull white or yellowish white; corolla exceeding calyx; stamens 2.5cm long, exerted; anthers reniform. Nutlets obovoid, brown.

Flr.: Jan. - Feb. *Fr.:* Feb. - Apr.

Specimen Cited: Alubari, 2280-2424m, **AP Das & PC Rai** 0575, dated 16.10.1994.

Status: Common.

Local Distrib.: Alubari, Rechila Durpinay, Rechila Middle. 1600-2450m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, Myanmar, S. W. China.

Note: Corolla juicy and sweet.

***NOTOCHAETE* Benth.**

Notochaete hamosa Benth. in Wallich, Pl. As. Rar. 1:63. 1830; FBI 4:694. 1885; Lab. Ind. 202. 1940; FEH 1: 279. 1966; 2: 116. 1971; 3: 94. 1975; EFPN 3: 159. 1982.

Erect, small suffrutescent perennial herbs, 45-75cm tall, thinly pubescent, upper stem part nearly quadrangular and stout. Petioles long, 1.7-5.3cm, pubescent; lamina 4-14 x 1.5-8.3cm, broadly ovate, toothed, acuminate, sub-cordate, white hairy above, nerves pubescent below. Verticillaster axillary, upto 3.5cm in diam., many flowered, spiny. Bracts many, slender. Calyx tube 3-5cm, 5-toothed, teeth spinous and hooked, villous; corolla white, as long as calyx spines, upper lip concave and erect, lower 3-lobed; stamens 4, anther-cells divaricate; style lobed, minute and nearly equal. Nutlets oblong, narrow, smooth.

Flr.: Jul. - Sep. *Fr.:* Sep. - Nov.

Specimen Cited: Alubari region, 2280-2424m, **AP Das & PC Rai** 0567, dated 16.10.1994.

Status: Common.

Local Distrib.: Alubari, Lava, Chitray Bunglow, Helipad region. 1900-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), India, Myanmar.

PLECTRANTHUS L'Herit.

Plectranthus japonicus (Burm. f.) Koidz. in Bot. Mag. Tokyo 43: 386. 1929; BBSI 5: 107. 1964; Nam. Chang. Fl. Pl. 437. 1987.

Scutellaria japonica Burm. f., Fl. Ind. 130. 1768.

P. menthoides Benth. in Pl. As. Rar. 2: 17. 1830; FBI 4: 620. 1885.

P. coetsa Buch.-Ham. ex D. Don, Prodr. 117. 1825; FBI 4: 619. 1885; RBSI 14(1): 44. 1940.

Isodon coetsa (Buch.-Ham.) Kudo, Lab. Sino-Jap. 131. 1929; FEH 1: 275. 1966.

Tall herbs to undershrubs, highly aromatic. Stem quadrangular. Leaves opposite; petioles upto 1.8cm; lamina 1-3.5 x 1-1.7cm, ovate or ovate-lanceolate, margin crenate or dentate, acute or acuminate, membranous, thinly pubescent, nerves prominent and bright white beneath. Flowers in panicle cymes, lavender-blue; calyx 5-toothed hispid; corolla bilipped, recurved, tube exerted; stamens 4, didynamous; ovaries 4 loculed; styles slender, bifid. Fruits ovoid or orbicular, granulate; fruiting calyx enlarged bilabiate with acute teeth, scaberulous.

Flr.: Aug. - Oct.

Fr.: Sep. - Dec.

Specimen Cited: Suntalay Samsing, 655m, AP Das & PC Rai 1505, dated 04.6.1996.

Status: Frequent.

Local Distrib.: Samsing, Machuki, Sakam Forest, Phaparkheti. 500-1900m.

General Distrib.: India, N. Myanmar, W. China.

PRUNELLA L.

Prunella vulgaris L., Sp. Pl. ed. 1: 600. 1753; FBI 4: 670. 1885; Lab. Ind. 14. 148. 1940; FEH 1: 281. 1966; 2: 117. 1971; 3: 95. 1975; EFPN 3: 162. 1982.

Perennial, small suffrutescent hispidly hairy herb, 8-22cm. Stem erect, upper portion dense brown hairy, lower portion compressed to nearly 4 angular and thinly hairy. Rootstock creeping. Lower leaves with 0.4-1.5 cm long petiole; upper leaves sessile; lamina 1.1-3 x 0.3-1.4cm, very variable, ovate or oblong, entire to dentate ciliate, rounded-acute, base highly variable from straight, round to even notched/lobed, densely hispid above, nerves prominent below. Spike compact, 1-2.8cm, cylindric. Bracts ovate-cordate, ciliate. Flowers deep purple; calyx reticulate, toothed, teeth variable; corolla small, 0.5-0.7cm, purple, bilipped, lower lip spreading and upper one erect; stamens 4, exerted; filament 2-fid; anther cells diverging; ovary 4-lobed; style lobes subulate. Nutlets oblong, smooth.

Flr.: Jun. - Sep.

Fr.: Aug. - Oct.

Specimen Cited: Jaributti-Alubari, 2195-2280m, AP Das & PC Rai 0124 dated 01.6.1994; Alubari Belt, 2280m, AP Das & PC Rai 0227, dated 16.6.1994.

Status: Abundant.

Local Distrib.: Jaributti, Alubari, Chitray, Dhamdhamay Dara. 1600-2600m.

General Distrib.: All over Europe and Temperate Asia.

RABDOSIA Hassk.

Key to the species:

1. Lamina 2-3cm long, rugose above.....*R. rugosa*
1. Lamina 4-10.2cm long, surface not rugose.....2
2. Corolla white and pink striped; leaf base cuneate.....*R. lophanthoides*
2. Corolla bluish white; leaf base narrowed to winged petiolke.....*R. coetsa*

Rabdosia coetsa (Hamilt. et D. Don) Hara in Journ. Jap. Bot. 47:194. 1972; FEH 3:95. 1975; EFPN 3:162. 1982.

Isodon coetsa (Hamilt. et D. Don) Kudo, Lab. Sino. Jap. 131. 1929; FEH 1:275. 1966.

Plectranthus coetsa Hamilt. et D. Don, Prodr. Fl. Nep. 117. 1825; FBI 4:619. 1885; Lab. Ind. 44. 1940.

P. menthoides Benth. in Wallich, Pl. As. Rar. 2:17. 1830; FBI 4:620. 1885.

Aromatic herb, 60-130cm high, highly branched. Branches pubescent. Petioles upto 3.2cm long, pubescent. Leaves 4.5-10.2 x 2.7-5.2cm, ovate, acute, base narrowed to winged petiole, margin crenate, puberulous both sides. Cymes paniced, lax. Bracts ovate. Calyx bilipped, sub-campanulate, lobes 5, tube upto 0.3cm long, hairy, lobes acute, fruiting calyx scaberulous; corolla 0.7-0.9cm, bluish white, tube decurved, pubescent, lips 2, lower one erect, entire, upper one 4-fid; stamens 4, upto 0.62cm long; style exceeding the corolla; ovary disc raised. Nutlets 0.18-0.25cm, globose-oblong. (**Plate V: 44**).

Flr. & Frt.: Sep. - Dec.

Specimen Cited: Reshete Forest, 2240m, **AP Das & PC Rai** 0383, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Chouda Feri, Mulkharka, Sakam Forest, Reshete. 1500-2300m.

General Distrib.: Himalayas (Kashmir-Bhutan), India, Sri Lanka, Myanmar, W. China.

Rabdosia lophanthoides (Buch.-Ham. ex D. Don) Hara in Journ. Jap. Bot. 47:197. 1972; FEH 3:95. 1975; EFPN 3: 162. 1982; TBRI 50(4): 124. 1987.

Hyssopus laphanthoides Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 110. 1825; FBI 4: 618, 625. 1885.

Plectranthus striatus Benth. in Pl. As. Rar. 2:17. 1831; FBI 4:618. 1885.

Isodon striatus (Benth.) Kudo in Mem. Fac. Sci. Agr. Taitioku Univ. 2:134. 1929; FEH 1:277. 1966.

Densely pubescent, erect herbs, 20-40cm tall, usually unbranched or rarely branched. Petioles of lower leaves upto 2.2 cm long, upper leaves sessile, clasping; lamina 4-8 x 3-5 cm, broadly ovate, crenate, acuminate, base cuneate, thinly villous. Panicles axillary and terminal, with slender branches. Calyx 0.2-0.25cm, 5-toothed, 2-lipped, lobes obtuse, hispid; corolla 0.5-0.6cm, white and pink striped, tube subcylindric; stamens 4, long exerted. Nutlets 0.14-0.15cm, oblong.

Flr.: Sep. - Nov. *Frt.:* Oct. - Jan.

Specimen Cited: Mulkharka, 2240m, AP Das & PC Rai 1172, dated 01.5.1995.

Status: Less Common.

Local Distrib.: Lava, Dhamdhamay Dara, Mulkharka, Ruka. 1600-2550m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Myanmar, China.

Rabdosia rugosa (Wallich ex Benth.) Hara in Journ. Jap. Bot. 47:199. 1972; EFPN 3:161. 1982; TBRI 50(4):124. 1987.

Plectranthus rugosus Wallich ex Benth., Pl. As. Rar. 2:17. 1831; FBI 4:620. 1885; Lab. Ind. 47. 1940.

Isodon plectranthoides Schrad. in Benth., Lab. Gen. Sp. 43. 1832; Acta. Phyt. Geobot. 24.82. 1969.

Simple slender herbs to 1m high, hoary pubescent. Stem woody below. Petioles 0.35-0.55cm long; lamina 2.5-3 x 1.3-1.9cm, ovate, crenate, obtuse to subacute, base subcordate, rugose above, white tomentose beneath. Cymes terminal and axillary paniced. Fruiting calyx 0.35-0.4cm, shortly bilipped, teeth subequal, acute and pubescent; corolla 0.4-0.55cm, white with purplish spots. Nutlets ca 0.1cm, oblong.

Flr.: Aug. - Oct. *Fr.:* Oct. - Dec.

Specimen Cited: Near Tangta, 2120m, AP Das & PC Rai 0825, dated 21.10.1994.

Status: Abundant in open places.

Local Distrib.: Todey, Tangta, Ruka. 1900-2450m.

General Distrib.: Afganistan, Pakistan, Himalayas (Kashmir-Bhutan), S.W. China.

PLANTAGINACEAE Juss.

PLANTAGO L.

Plantago erosa Wallich in Roxb., Fl. Ind. 1: 423. 1820; FEH 1: 306. 1966; EFPN 3:166. 1982; TBRI 50(4): 123. 1987.

P. major auct. non. L.: Hk. f. in FBI 4: 705. 1885 p.p.

Small rosette scapigerous herbs. Root-stock stout, perennial. Leaves all radical, exstipulate; petiole 1.5- 4 cm long, usually glabrous or sparsely pubescent; lamina 3-6.3 x 1.4-2.9 cm, oblong or oblong-ovate, entire to repand or irregular-dentate, acute or obtuse, base cuneate or rounded glabrous above, pubescent to glabrous beneath, 3-5 nerved, nerves pubescent beneath. Spikes upto 2-3.5cm, axillary. Peduncles long upto 17cm, slender, sparsely hairy. Bract 0.2cm long. Flowers small, 0.3-0.4cm, sessile, densely crowded on spike, white; sepals 4, basally connate, 0.2 x 0.15-0.2cm, glabrous, medianly black thick-lined, persistent; petals longer than sepals, salver-shaped, scarious, glabrous; filament short, capillary and persistent. Capsule few seeded; seeds small, 0.1cm long, narrow cylindric, angular.

Flr.: Apr. - Jul. *Fr.:* Jun. - Oct.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 037, dated 13.6.1994.

Status: Abundant.

Local Distrib.: Mulkharka, Rechila Middle, Ruka Hill, Thosum Beat, Neora-Sikkim Border, Machuki. 1400-2900m.

General Distrib.: India, Sri Lanka, Himalayas (Kumaon-Bhutan), Assam, Meghalaya, Myanmar, S.E. Tibet, W. China.

AMARANTHACEAE Juss.

Key to the Genera:

1. Erect herbs or sub-erect undershrubs; leaves petiolate.....2
1. Prostrate or decumbent herbs; leaves sessile.....*Alternanthera*
2. Lamina elliptic-lanceolate; perianth segments 0.3- 0.4cm long.....3
2. Lamina broadly ovate; perianth segments about 0.1cm long.....*Amaranthus*
3. Bracts concave; sub-erect undershrubs.....*Cyathula*
3. Bracts ovate; erect herbs.....*Achyranthus*

ACHYRANTHUS L.

Achyranthus bidentata Blume, Bijdr. 545. 1825; FBI 4:730. 1885; FEH 1:76 and 635, f. 57. 1966; 2:25. 1971; EFPN 3:168. 1982; FB 1(2):227. 1984; TBRI 50(4):104. 1987.

Local Name: Ankhlay Jhar (Nep.).

Erect herbs, 30-80 cm tall. Root-stock woody and perennial. Branches slender, striate, pubescent. Nodes swollen. Leaves petiolate (petioles upto 2cm); lamina 4.5-13 x 3-4.8 cm, elliptic-lanceolate, repand entire, pubescent. Spikes upto 11.5 cm long; rachis slender. Bracts upto 0.4 cm long, ovate; bracteoles longer than bracts, spinous and auricled basally. Flowers nodding; perianth segments 5, unequal, upto 0.4 cm long, ovate-oblong, greenish. Staminodes quadrangular, dentate and green. Capsule 0.2-0.25 cm long, oblong, enclosed by perianth.

Flr.: Aug. - Nov. *Frt.:* Nov. - Feb.

Specimen Cited: Above Samsing, 870m, AP Das & PC Rai 1722, dated 17.5.1997.

Status: Very Common.

Local Distrib.: Lava, Pharparkheti, Chonkobhir, Chodha Feri, Alubari Khasmahal. 1200-2280m.

General Distrib.: Tropical Africa, Himalayas (Kashmir-Sikkim), India, Sri Lanka, China, Malaysia and New Guinea.

ALTERNANTHERA Forsk.

Alternanthera sessilis (L.) R.Br. ex DC. in Cat. Hort. Monsp. 77. 1813; FBI 4: 731.1885; KB 1956: 172. 1958; FB 1(2): 228. 1984; Nam. Chang. Flr. Pl. 25. 1987.

Gomphrena sessilis L., Sp. Pl. 225. 1753.

Alternanthera nodiflora R. Br., Prod. 417. 1810; FBI 4: 732. 1885.

Prostrate or decumbent herbs, often perennial, stem hairy in 2 lines. Nodes rooting. Leaves opposite, sessile; lamina 1-5 x 0.25-2 cm, oblanceolate or elliptic, acute, base attenuate, glabrous. Flower heads sessile, 0.35-0.8 cm across, globose. Perianth segments 5, all alike 0.2-0.3 cm long, membranous; stamens 5 out of which only 3 hairy one-celled anthers, filaments united into a short basal cup, pseudostaminodes minute; ovary with short style and capitate stigma. Capsule ca 0.2 cm diameter, rounded and compressed, apically emarginate, seeds ca 0.1 cm, covered by ca. 0.05 cm broad wing.

Flr. & Frt.: Mar. - Sep.

Specimen Cited: Phari, 750 m, **AP Das & PC Rai** 1762, dated 25.8.1997.

Status: Common.

Local Distrib.: Suntalay, Asala Kholā, Phari, Samsing, Machuki. Upto 1400m.

General Distrib.: Tropical old World.

AMARANTHUS L.

Amaranthus viridis L., Sp. Pl. 2: 1405. 176; FBI 4: 720. 1885; Amar. J. Bot. 23: 609. 1936; AMBG 48: 14. 1961, FB 1(2): 224. 1984; Nam. Chang. Flr. Pl. 28. 1987.

A. gracilis Desf., Table Ec. Bot. 43. 1804; FM 4: 76. 1919.

Erect annual herbs, 15-48 high. Stem unarmed. Leaves alternate; lamina 2.5-6.8 x 1.1-5.5 cm, broadly ovate, subacute or obtuse, base attenuate, glabrous, greenish. Spikes 2.3-7 x 0.35-0.65 cm, slender. Flowers mainly female, male only a few and usually on the upper part; perianth segments 3, about 0.1 cm long; stamens 3; stigma equal to stamens, minute. Capsules equal or slightly exceeding perianth, warty; seeds glossy and scurfy warty.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Suntalay, 655m, **AP Das & PC Rai** 1463, dated 12.11.1995.

Status: Frequent.

Local Distrib.: Suntalay, Phari, Samsing. Upto 950m.

General Distrib.: Pantropic.

CYATHULA Blume

Cyathula capitata Mouquin in DC., Prodr. 13 (2):329. 1849; FBI 4:722. 1885; FEH 1:77. 1966; EFPN 3:169. 1982; TBRI 50 (4):111. 1987; FB 1(2):225. 1984.

Perennial suberect undershrub, 1-1.5 m tall. Branches soft. Nodes swollen, brownish. Petiole to 2.6 cm long. Leaves opposite; lamina 6-11.5 x 2.5-5 cm, elliptic-lanceolate, caudate-acuminate, base acute, entire, membranous. Flowers 3-4 cm across, clustered in globose heads. Bracts concave. Perianth segments 0.3-0.4 cm long, linear-lanceolate, 1-nerved and with terminal hooked awns; stamens 5, united; staminodes fimbriate and

alternating with stamens; style simple; stigma capitellate; ovule solitary. Capsule covered by persistent perianth and styles; seeds 0.1 cm.

Flr.: Jun. - Aug. *Fr.*: Sep. - Dec.

Specimen Cited: Alubari Khasmahal, 2200 m, **AP Das & PC Rai** 0209, dated 16.6.1994.

Status: Frequent.

Local Distrib.: Reshete, Machuki, Chouda Feri. 800-2280 m.

General Distrib.: Himalayas (Kashmir-Bhutan), Indo-China.

PHYTOLACCACEAE R. Br.

PHYTOLACCA L.

Phytolacca acinosa Roxb., Fl. Ind. ed. 2, 2:458. 1832; FBI 5:21. 1890 p.p.; FEH 1: 78. 1966; EFPN 3: 171. 1982; TBRI 50(4): 122. 1987; FB 1(2): 191. 1984.

Local Name: Jaringo (Nep.).

Tall perennial, succulent herb. Stem erect, fleshy, cymosely branched. Leaves simple, alternate; petiole 0.5-1 cm; lamina large, 5.5-17 x 1.7-5.7cm, elliptic-lanceolate, entire, acute or acuminate, base attenuate; membranous, glabrous, pinnately veined, lateral nerves 9-13 pairs. Racemes terminal or leaf-opposite, erect, many-flowered. Bracts short, membranous, linear. Bracteoles linear. Pedicel 0.3-0.5cm long, coarse, short hairy. Flowers actinomorphic, basexual, greenish-white, upto 0.6cm across; tepals 5, free but shortly connate at base, 0.5 x 0.3 cm, elliptic, obtuse, spreading; stamens 8-10; carpels 10, free, dark purple, upto 0.45cm in fruits. Fruit globose to slightly depressed, 0.85-1cm in diam., bluish-black when ripe.

Flr.: May - Jul. *Fr.*: Jun. - Aug.

Specimen Cited: Jaributti, 2195m, **AP Das & PC Rai** 0274, dated 17.6.1994.

Status: Rare.

Local Distrib.: PHE Source, Jaributti, Sakam. 1300-2300m.

General Distrib.: Himalayas (Kashmir-Bhutan), Assam, W. China.

Note: Leaves cooked as vegetable and also used as narcotic.

POLYGONACEAE Juss.

Key to the Genera:

1. Plants twinning, herbaceous.....*Fallopia*
1. Erect or scrambling herbs or undershrubs.....2

2. Scrambling herbs; basal leaves fall off before flowering; stems and petioles prickly or bristly.....*Persicaria*
2. Erect or scrambling herbs; basal leaves intact; stems or petioles never prickly.....3
3. Basal leaves deltoid.....*Fagopyrum*
3. Basal leaves of various shapes but not deltoid.....4
4. Root-stock creeping, basal leaves in rosette.....*Bistorta*
4. Root-stock not creeping, basal leaves not in fruit.....5
5. Flowers in panicles; perianth fleshy in fruit.....*Aconogonum*
5. Flowers in axillary clusters, often forming simple to paniced racemes; perianth not fleshy in.....6
6. Ochreae membranous, deciduous; perianth segments 6; stamens 6.....*Rumex*
6. Ochreae cylindrical; perianth segments 3-5; stamens 8.....*Koenigia*

ACONOGONUM (Meisn.) Reichenbach

Key to the species:

1. Straggling bushy shrubs; branches zigzag; stipules upto 6cm.....2
1. Creeping or suberect herbs; branches dichotomous; stipules upto 1.8cm long
.....*A. campanulatum*
2. Plants pubescent; petioles upto 1cm; lamina not dotted above.....3
2. Plants glabrous; petioles more than 1cm; lamina dotted above
.....*A. molle* var. *frondosum*
3. Stipules upto 6cm long.....*A. molle* var. *molle*
3. Stipules upto 1cm long.....*A. molle* var. *rude*

Aconogonum campanulatum (Hk.f.) Hara in FEH 1:67. 1966; EFPN 3:172. 1982; FB 1(1): 154. 1983; TBRI 50(4): 104. 1987.

Polygonum campanulatum Hk.f., FBI 51. 1886.

Reynoutria campanulata (Hk. f.) Moldenke in Bull. Torrey Bot. Cl. 68: 675. 1941.

Aconogonum campanulatum var. *fulvidum* (Hk.f.) Hara in FEH 1 : 67. 1966.

Creeping or suberect perennial herbs, 70-110cm tall. Stems dichotomously branched, tomentose, hairs wooly, golden yellow and coiling, bottom portion of stem creeping and stoloniferous. Leaves simple, alternate; stipules long upto 1.8cm, tubular, enclosing almost all internodal length in young shoots, nerved, bristly hairy, margin ciliate, deciduous, white; petiole upto 1.5cm, densely white hairy; lamina 5-13 x 1.8-4.8cm, elliptic-ovate or even lanceolate, margin entire, finely ciliate, acuminate, base narrowly acute to rounded, even obscurely oblique, coriaceous, densely appressed pilose and dark green above, paler and tomentose with adpressed matted grey hairs beneath, dorsiventral, reticulate, nerves densely pubescent beneath. Cymes axillary and terminal, divaricate. Panicles spreading, often compact in just flowering stage, pubescent. Bracts small, nearly ovate, acute, membranous. Pedicels short, often jointed under the perianth. Flowers bisexual, 0.35cm long, pendent; perianth minute, 0.3-0.35cm, campanulate, white, glabrous; stamens 8; filaments long to 0.3cm; styles free. Achenes 3-winged, exceeding perianth length. (Plate V: 50).

Flr.: Jul. - Oct. *Fr.:* Sep. - Dec.

Specimen Cited: Alubari-Rechila Peak, 2280-3100m, AP Das & PC Rai 0135, dated 15.6.1994; Near Zero Point, 2190m, AP Das & PC Rai 0177, dated 18.6.1994;

Status: Very Common.

Local Distrib.: Dero Point, Alubari, Rechila Peak, Thosum Hill, Chitray. 2200-3100m.

General Distrib.: Himalayas (Kumaon-Sikkim), Naga Hills, S. Tibet and W. China.

Aconogonum molle (D. Don) Hara in FEH 1:68. 1966; 2:21. 1971; EFPN 3: 172. 1982; FB 1(1): 156. 1983; TBRI 50(4): 104. 1987. var. *molle*.

Polygonum molle D. Don, Prodr. Fl. Nep. 72. 1825; FBI 5: 50. 1886; SFSH f. 164. 1963.

Ampelgonum molle (D. Don) Roberty et Vautier in Boissiera 10: 31. 1964.

Local Name: Thotney (Nep.).

Bushy straggling shrubs. Branches zigzag and pubescent, terete, vertically grooved. Stipules upto 6cm, oblique tubular and caducous, membranous, densely pubescent; petiole shorter, 0.2-1 cm, densely adpressed hairy; lamina 4-12 x 1.5-4.5 cm, elliptic-lanceolate, entire-ciliate, acute to acuminate, narrowly rounded to cuneate, hairy and dark green above, pale and adpressed silky woolly-villous beneath, densely haired along mid-nerve, lateral nerves 12-17 pairs. Panicles both axillary and terminal, 2-8.5 cm long, hirsute with white and flexuous hairs. Bracts 0.25-0.3 cm, rounded, sparsely hairy. Pedicels upto 0.2 cm. Flowers 0.4 x 0.3 cm across; tepals 5, spreading, united at base, 0.2 cm long, elliptic-oblong; stamens 8; ovary 0.17 cm long, cylindric, slightly swollen in the middle, brownish red; style trifid, short; stigma 0.1 cm long, brownish red. Nutlets trigonous and covered within fleshy perianth.

Flr. & Frt.: Jun. - Sep.

Specimen Cited: Tangta-Jorpokhari, 2805m-3040m, AP Das & PC Rai 0817, dated 21.10.1994.

Status: Abundant.

Local Distrib.: Almost in all places of Neora Valley. 1200-3050m.

General Distrib.: Himalayas, Meghalaya, Malaysia, Indo-Chin and China.

Note: Young stems are taken raw and also consumed as curry.

var. *frondosum* (Meisn.) Hara in FEH 1:68. 1966; EFPN 3: 172. 1982; FB 1(1):156. 1983; TBRI 50(4): 109. 1987.

Polygonum paniculatum Bl., Bijdr. 533 (Dec. 1825-Mar. 1826); FBI 5:49. 1886.

P. frondosum Meisn. in DC., Prodr. 14: 137. 1856; FBI 5: 50. 1886.

Just like var. *molle* but a glabrous plant. Stem vertically ribbed and light red. Leaves slightly larger (upto 8-18 x 1.6-7 cm); petiole upto 2 cm; mid-rib red to some length and surface dotted above.

Flr.: Jul. - Oct. *Frt.:* Aug. - Nov.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 016, dated 13.6.1994; Thosum Beat 2590m-2780m, AP Das & PC Rai 0902, dated 23.10.1994.

Status: Common.

Local Distrib.: Ruka Hill, Thosum Beat, Sakam, Chonkobhir, Chitray, Machuki. 1000-2600m.

General Distrib.: Himalayas and Java.

Note: Stem used as pickle and curry.

var. **rude** (Meisn.) Hara in FEH 1:68. 1966; 2:22. 1971; EFPN 3:172. 1982; FB 1(1): 156. 1983; TBRI 50(4): 104. 2987.

Polygonum rude Meisn. in DC., Prodr. 14: 137. 1856; FBI 5: 49. 1886.

Local Name: Thotne (Nep.).

Small hairy herbs. Branches subscaudent, covered with brownish white ascending retrorsely appressed hairs. Stipules 0.5-1 cm, tubular, thick, densely silky hairy; petiole upto 1 cm long with dense adpressed hairs; lamina 4.5-12 x 1.2-3.2 cm, elliptic-lanceolate, entire, ciliated, acuminate, base cuneate-acute, softly appressed pubescent beneath or along nerves only, pale beneath, lateral nerves 12-22 pairs, veins thick and prominent mid-rib dense silky hairy beneath. Panicles large, upto 10 cm long, both axillary and terminal, much branched, dense flowered, laxly hirsute. Bracts short, 0.15 cm, tubular almost enclosing pedicel, shortly 4-lobed. Pedicels upto 0.2 cm long, glabrous, whitish-brown. Flowers 0.25 cm across; tepals 5, united just below the middle; stamens 8; styles free. Nuts trigonous, red, enclosed by enlarged fleshy perianth.

Flr. & Frt.: Jul. - Nov.

Specimen Cited: Thosum Beat, 2590-2780m, AP Das & PC Rai 0910, dated 23.10.1994.

Status: Common.

Local Distrib.: Thosum Beat, Pankhasari, Lava, Thartharay, Reshete. 2100-2800m.

General Distrib.: Himalayas (Garhwal-Bhutan).

Note: Young stems are eaten raw and also cooked as curry.

***BISTORTA* (L.) Adanson**

Key to the species:

1. Erect herbs; rhizomatous; leaves amplexicauled, lower ones petiolate; ochreae 2-4.8cm, entire.....*B. amplexicaulis*
1. Trailing subshrubs, stoloniferous; leaves not amplexicauled, sessile; ochreae 1.1cm, lacerate.....*B. vacciniifolia*

Bistorta amplexicaulis (D. Don) Greene, Leaf. 1:21. 1904; FEH 2:69. 1966; EFPN 3:173. 1982; FB 1(1):167. 1983; TBRI 50 (4):107. 1987.

Polygonum amplexicaule D. Don, Prodr. Fl. Nep. 70. 1825; FBI 5:32. 1886.

P. oxyphyllum Wallich ex Meisn. in Wallich, Pl. As. Rar. 3:54. 1832.

Rhizomatous erect herb. Stem 25-65cm, usually unbranched. Lower leaves petiolate (upto 14cm long), upper ones sessile, amplexicaul; ocreae 2-4.8cm, entire, membranous, brownish; leaf lamina 5.5-9.8 (-21) x 3.1-5.8 (12) cm, ovate, acuminate, base cordate, glabrous. Peduncles 4-7.8cm, slender. Racemes 3-6.5cm, bearing many flowers. Pedicels 0.7-0.85cm long. Perianth 0.6cm, 5-partite, purplish or pink; stamens inserted. Achenes 0.55cm, brownish.

Flr. & Frt.: Jun. - Sep.

Specimen Cited: Near Tinsimana, 3020m, AP Das & PC Rai 1818, dated 20.9.1996.

Status: Sparse.

Local Distrib.: Tinsimana, Thosum Peak. 2800-3050m.

General Distrib.: Afganistan, Himalayas (Kashmir-Bhutan), W. and C. China.

Bistorta vacciniifolia (Wallich) Greene, Leafl. 1:21. 1904; FEH 1:69. 1966; EFPN 3:173. 1982; FB 1(1):167. 1983.

Polygonum vacciniifolium Wallich ex Meisner in Wallich, Pl. As. Rar. 3:54. 1832; FBI 5:33. 1886.

Trailing subshrub with prostrate stoloniferous stems. Flowering shoots upto 17cm, suberect, woody. Ocreae 1.1cm, lacerate, nerved. Leaves sessile; lamina 1-2.1 x 0.7-1cm, ovate-elliptic, acute, base cuneate, glabrous. Racemes upto 9cm long, terminal, sometimes branched. Flowers few; perianth 0.6cm, pinkish; stamens exerted; styles 2, elongate, shortly exerted. Achenes 0.2cm across, brownish.

Flr. & Frt.: Aug. - Oct.

Specimen Cited: Rechila Peak, 3100m, AP Das & PC Rai 0744, dated 19.10.1994.

Status: Rare.

Local Distrib.: Thosum Peak, Rechila Peak. 2800-3100m.

General Distrib.: Himalayas (Kashmir-Bhutan), Manipur and W. Tibet.

FAGOPYRUM Gaertn.

Fagopyrum dibotrys (D. Don) Hara in FEH 1:69. 1966; 2:22. 1971; EFPN 3:174. 1982; FB 1(1):171. 1983; TBRI 50(4):114. 1987.

Polygonum dibotrys D. Don, Prodr. Fl. Nep. 73. 1825.

Fagopyrum cymosum (Trev.) Meisn. in Wallich, Pl. As. Rar. 3:63. 1832; FBI 5:55. 1886.

Local Name: Ban Bharay, Tite Phapar (Nep.).

Erect branched and puberulous herb with perennial root-stock. Stem reddish, thinly hairy. Stipules 0.4cm, tubular, brown, pubescent; petiole 1.1-2.5 cm, slender; lamina 1.5-4.5 x 1.5-3 cm, deltoid or triangular, angles acute, margins ciliated, acuminate, base hastate,

densely pubescent and dark green above, pale and thinly pubescent below, nerves diverging, densely pubescent. Inflorescence branched, spikate, lax, secund. Peduncles recurved. Perianth 5-partite, segments 0.3 cm long; stamens 8, not extruded; styles 3. Achenes twice longer than perianth(0.6 cm), trigonous, ovoid, surfaces flat.

Flr.: Jun. - Sep. *Frt.*: Aug. - Dec.

Specimen Cited: Rechila Chowk, 2280 m, **AP Das & PC Rai** 0326, dated 18.6.1994.

Status: Common.

Local Distrib.: Lava, Rechila Chowk, Phaparkheti, Kuwapaani. 1500-2300m.

General Distrib.: Himalayas, Meghalaya, Tibet, east to China.

Note: Young shoots eaten as vegetable.

FALLOPIA Adanson

Fallopia convolvulus (L.) Holub in Folia Geobot. Phyt. Praha 6:176. 1971; EFPN 3:174. 1982; FB 1(1):169. 1983; TBRI 50(4):114. 1987.

Polygonum convolvulus L., Sp. Pl. 364. 1753; FBI 5:53. 1886.

Bilderdykia convolvulus (L.) Dumort., Fl. Belg. 18. 1827.

Twinning annual herbs, diffusely branched, puberulous. Branches wiry, deep pink on maturity. Ocreae to 0.4cm, entire, membranous; petioles upto 2.6cm long; lamina 2.5-4 x 1.5-2.5cm, ovate, entire, acuminate, base codate; Flowers in axillary fascicles, few, often forming racemes; perianth segments 5 in 2 series, upto 0.3cm, pinkish, inner 2 thinner, outer 3 keeled or narrowly winged, elongating upto 0.55cm in the fruiting stage. Fruiting pedicels to 0.2cm long. Achenes trigonous, black.

Flr. & Frt.: May - Sep.

Specimen Cited: Near Mulkharka, 1920m, **AP Das & PC Rai** 1161, dated 29.4.1995.

Status: Less Common.

Local Distrib.: Sakam, Rechila Midde, Chonkobhir, Alubari. 1200-2400m.

General Distrib.: Europe, Africa and Asia.

KOENIGIA L.

Koenigia nepalensis D. Don, Prodr. Fl. Nep. 74.1825; FEH 1:70. 1966; EFPN 3:174. 1982; FB 1(1):157. 1983.

Polygonum filicaule Wallichex Meisn. in Wallich, Pl. As. Rar. 3:59. 1832; FBI 5:25. 1886.

Small annual herb, 15-32cm. Stem creeping. Ocreae 0.2-0.4cm, membranous, cup-shaped, pilose; petioles only on lower leaves and upto 0.65cm long (upper leaves sessile). Leaf lamina 0.55-2.3 x 0.32-1cm, ovate, acute, base rounded, sparsely hairy both sides. Flowers in small flat-topped corymbs; perianth to 0.15cm, segments 5, basally connate,

white or pinkish; stamens 0.05cm; styles 3, very short and obliquely capitate. Achenes to 0.15cm, trigonous.

Flr. & Frt.: Jun. - Aug.

Specimen Cited: Rechila Peak, 3100m, AP Das & PC Rai 0791, dated 20.10.1994.

Status: Abundant.

Local Distrib.: Rechila Peak, Tinsimana, Thosum Beat, Ruka Hill. 2700-3100m.

General Distrib.: Himalayas (Kashmir-Darjeeling), Tibet, W. China, Formosa.

PERSICARIA L.

Key to the species:

1. Plants erect or procumbent/prostrate herbs.....2
1. Plants erect or rambling shrubs.....6
2. Stem flaccid, grooved, glabrescent; lamina runcinate.....*P. runcinata*
2. Stem not flaccid, hairy; lamina not runcinate.....3
3. Heads 1.2cm across, sub-terminal.....*P. microcephala*
3. Heads smaller, axillary and terminal.....4
4. Ochreae glabrous; leaves sessile except lower ones; stamens 6.....5
4. Ochreae hairy; leaves petiolate; stamens 3.....*P. nepalensis*
5. Ochreae 0.6-1.45cm long; leaves punctate glandular.....*P. hydropiper*
5. Ochreae upto 12.6cm long; leaves glabrous with glandular and setulose margin
.....*P. flaccidum*
6. Rambling shrubs; stipules over 2cm; leaf margin minutely dissected
.....*P. chinensis* var. *ovalifolia*
6. Much stout erect shrub; stipules only upto 2cm long; leaf margin entire, ciliate
.....*P. chinensis* var. *brachiata*

Persicaria capitata (Hamilt.) H. Gross in Engl., Bot. Jahrb. 49:277. 1913; FEH 1:70. 1966; FB 1(1):165. 1983.

Polygonum capitatum Hamilton ex D. Don, Prodr. Fl. Nep. 73. 1875; FBI 5:44. 1886; FEH 1:70. 1966.

Decumbent annual with leafy stems. Internodes 1-4cm, pubescent. Ochreae 0.6-0.8cm long, truncate and pubescent; petioles upto 0.31cm long, auricled at base. Leaf lamina 1.6-3.8 x 1.2-2.2 cm, ovate-elliptic, acute, base cuneate or rounded, margins ciliate, sparsely pubescent. Peduncles 1.5-4cm long, glandular at apex. Flower heads solitary, globose. Achenes trigonous.

Flr. & Frt.: Apr. - Sept.

Specimen Cited: Near Pankhasari, 1920m, AP Das & PC Rai 1303, dated 05.5.1995.

Status: Common.

Local Distrib.: Pankhasari, Helipad region, Chouda Feri, Sakam, Tiffin Dara. 1500-2300m.

General Distrib.: Himalayas (Punjab-Bhutan), Assam, N. Myanmar, Tibet, Indo-China, W. China.

Persicaria chinensis (L.) H. Gross in Engl. Bot. Jahrb. 49:269. 277 & 315. 1913; FB 1(1):163. 1983; TBRI 50(4):122. 1987.

Polygonum chinense L., Sp. Pl. ed. 1, 1:363. 1753; FBI 5:44. 1886.

var. *ovalifolia* (Meisn.) Hara in FEH 1:71. 1966; 2:22. 1971; EFPN 3:175. 1982.

Polygonum chinense var. *ovalifolia* Meisn. *sensu* FBI 5:45. 1886.

Polygonum auriculatum Meisn., Monog. Polu. 59, t. 6. 1826.

Local Name: Ratnewlo (Nep.).

Erect or rambling shrubs. Branches many, glabrous or minutely pubescent. Stem grooved. Stipule forming obliquely truncate tube and enclosing almost the entire internode, membranous, white, caducous; petiole upto 1cm, winged in few ones, 2-unequally auricled at base; upper leaves amplexicauled, lamina 6-12 x 2-4.3 cm, shape much variable, oblong-lanceolate to oblong-ovate, margins very minutely dissected, light red and thinly hairy, acute or acuminate, base variable from rounded, truncate to subcordate, glabrous and dark green above, densely brown hairy along mid-vein beneath, lateral veins 6-12 or more. Inflorescence peduncled corymbose heads, 0.3-0.4 cm across. Peduncles divaricate. Panicles glandular hairy. Bracts scarious, glabrous. Involucral leaves 0. Perianth pinkish-white, 5-cleft, lobes subequal; stamens 8; filaments glandular; styles 3, united below. Nuts trigonous, enclosed by accrescent perianth, red-turning black on maturity.

Flr.: Jun. - Oct. *Fr.:* Aug. - Dec.

Specimen Cited: Chouda Feri, 2285 m, **AP Das & PC Rai** 033, dated 14.6.1994.

Status: Very Common.

Local Distrib.: Todey-Tangta, Chouda Feri, Alubari, Sakam, Jaributti. 1600-2200m.

General Distrib.: Himalayas, India east to China, Japan, Malaysia.

Note: Good fodder for cattle.

var. *brachiata* (Lam.) Hara in FEH 1:71. 1966; 2:22. 1971; EFPN 3:175. 1982.

Polygonum brachiatum Lam. III. 2:t:315, f. 4. 1797.

P. patens D. Don, Prodr. Fl. Nep. 73:1. 1825.

Same as var. *Ovalifolia* but stout, erect shrubs. Stem weak, stiffly hairy. Stipules upto 2 cm, lanceolate, membranous. Leaves 2.5-7.3 x 1.2-3.7 cm, ovate-lanceolate, margin entire or ciliate, acuminate, base variable, acute to acuminate, setose along mid-rib beneath. Heads 1.5-1.9 cm across, corymbose. Peduncles 1.5 cm long. Stamens 8; styles 3, united. Achenes 0.5 cm, trigonous.

Flr.: Jun. - Oct. *Fr.:* Aug. - Dec.

Specimen Cited: Thosum Beat-Jorpokhari, 2780-3040m, **AP Das & PC Rai** 0849, dated 22.10.1994.

Status: Abundant.

Local Distrib.: Alubari, Jaributti, Thosum Beat, Tinsimana. 2100-3000m.

General Distrib.: India, Myanmar, Thailand, east to China and S. Japan, Malaysia.

Note: Fodder for cattle.

Persicaria flaccidum (Meisn.) Steward in Contrib. Gray Herb. 88. 59. 1930; BBSI 5: 108. 1964; Fl. Howrah 134. 1979; FB 1(1): 162. 1983; Nam. Chang. Fl. Pl. 445. 1987.

Polygonum flaccidum Meisn. in DC., Prodr. 14: 107. 1856; FBI 5: 39. 1886.

Perennial weak herbs, 13-40 cm. Leaves shortly petiolate; ocreas upto 12.6 cm long, glabrous with ciliate mouth; lamina 1.8-6.8 x 0.4-1.4 cm, lanceolate, acuminate, base attenuate, glabrous, glandular with setulose margins, reddish;. Racemes 3-6 cm, slender. Bracts ciliate. Perianth upto 4 cm long, minutely glandular; stamens 6; styles 2. Achenes 0.29 cm, biconvex and brownish.

Flr. & Frt.: Apr. - Sep.

Specimen Cited: Suntalay, 655m, **AP Das & PC Rai** 1464, dated 12.11.1995.

Status: Less Frequent.

Local Distrib.: Samsing, Phari, Machuki. 700-1600m.

General Distrib.: Himalayas, India, east to China and Japan, south to Malaysia and Australia.

Persicaria hydropiper (L.) Spach, Hist. Veg. 10:536. 1841; FEH 2:23. 1971; EFPN 3:176. 1982; FB 1(1):162. 1983; TBRI 50 (4):122. 1987.

Polygonum hydropiper L., Sp. Pl. 361. 1753; FBI 5:39. 1886; RBSI 4:128. 1910.

Perennial, ascending weak herb, 18-60cm, with branching stems. Stipules ochreate, 0.6-1.45cm, glabrous, ocreae mouth ciliate. Leaves sessile but lower ones petiolate (petioles upto 0.7cm long); lamina 2.2-7.5 x 0.6-1.4cm, lanceolate, aciminate, base attenuate, glabrous, punctate-glandular, margins setulose. Racemes 4-7.2cm long, slender. Bracts ciliate. Perianth 0.4cm long, 4-5 partite, minutely glandular; stamens 6; styles 2, capitate. Achene 0.3cm, biconvex, dark brown.

Flr. & Frt.: May - Aug.

Specimen Cited: Below Jorhpokhari, 2700m, **AP Das & PC Rai** 0852, dated 22.10.1994.

Status: Sparse.

Local Distrib.: Ruka Hill, Hattidara, Reshete. 2200-2700m.

General Distrib.: Europe, N. Africa, Himalayas, India, Meghalaya, Japan, N. America.

Persicaria microcephala (D. Don) H. Gross in Engl., Bot. Jahrb. 49: 277. 1913; FEH 1: 72. 1966; 2: 23. 1971; EFPN 3: 170. 1982; FB 1(1):165. 1983; TBRI 50(4):122. 1987.

Polygonum microcephalum D. Don, Prodr. Fl. Nep. 72. 1825; FBI 5:42. 1886. var. *microcephala*.

Small herbs to 30cm. Root-stock woody. Branches few, dichotomous, vertically grooved, glabrous to sparsely short hairy. Stipules 1.1-2.3cm long, membranous, ciliate at apex, nerved and sparsely hairy outside. Petiole 0.3-1.1cm. Upper leaves sessile and amplexicauled, base swollen and thick; lamina 2-8 x 1-2.9cm, ovate-lanceolate, entire to slightly repund, acuminate, base abruptly narrowed, densely white glandular-dotted both sides. Heads 1.2 cm across, sub-terminal. Peduncle 1.7-4cm long, slender, bifurcated, glandular-hairy; involucre leaf absent. Pedicels only upto 0.12 cm. Perianth white or pinkish-white, 5-cleft, upto 0.3 cm long, segments unequal, ovate-acute, membranous, glabrous; stamens 8; anthers black; filament equal to perianth or slightly extruded; styles 3, united below, reddish; stigma capitate. Nuts trigonous.

Flr. & Frt.: Apr. - Nov.

Specimen Cited: Thosum Beat, 2590-2780m, AP Das & PC Rai 0916 dated 23.10.1994; Ruka Hill, 2480m, AP Das & PC Rai 0924 dated 24.10.1994.

Status: Common.

Local Distrib.: Ruka Hill, Thosum Beat, Dhamdhamay Dara, Pankhasari. 2100-2800m.

General Distrib.: Himalayas (Garhwal-Bhutan), Meghalaya, Manipur, Naga Hills, S. and W. China.

Persicaria nepalensis (Meisn.) H. Gross in Engl., Bot. Jahrb. 49:277. 1913;FEH 1:72. 1966; EFPN 3:177. 1982; FB 1(1):164. 1983; TBRI 50(4):122. 1987.

Polygonum punctatum Hamilt. ex D. Don, Prod. Fl. Nep. 72. 1825.

P. nepalense Meisn., Monog. Polyg. 84, t. 7. fig. 2: 1826.

P. alatum Hamilt. ex Sprengel, Syst. Veg. Cur. Post. 154. 1827; FBI 5: 41. 1886.

Erect or procumbent small annual, sparsely hairy. Stipules upto 0.7 cm long, tubular, obliquely truncate, persistent. Petioles upto 0.5cm, broadly winged, often auricled, basally haired at nodal region, hairs 0.15-0.2cm; lamina 1.1-2.3 x 0.4-1.4cm, ovate or deltoid-ovate, slightly repund, little curved downwards, acute, base narrowed to winged petiole, dark green above, paler, glabrous to sparsely glandular hairy beneath, nerves impressed above, prominent below, mid-rib thick. Heads axillary and terminal, 0.8cm across, with involucre green, sessile, ovate-cordate. Leaves peduncles small or nil, glandular hairy at the tip. Bracts ovate, glabrous and membranous. Perianth 5-lobed, 0.25-0.3cm, accrescent, light pink; stamens 3; stigma capitate. Achenes 0.3cm, biconvex.

Flr. & Frt.: May - Nov.

Specimen Cited: Alubari-Rechila Peak, 2280-3100m, AP Das & PC Rai 0184, dated 15.6.1994.

Status: Abundant.

Local Name: Alubari, Rechila Middle, Chitray, Hattidara, Thosum Hill. 1500-3100m.

General Distrib.: Tropical Africa, Afganistan, Himalayas, India, Sri Lanka, Malaysia, China, Korea, Japan.

Persicaria runcinata (D. Don) H. Gross in Engl., Bot. Jahrb. 49:277. 1913; FEH 1:74. 1966; EFPN 3:178. 1982; FB 1(1):164. 1983; TBRI 50(4):122. 1987.

Polygonum runcinatum D. Don, Prodr. Fl. Nep. 73. 1825; FBI 5:43. 1886.

Local Name: Ratnawlo (Nep.).

Small prostrate or ascending annual herbs upto 33cm. Stem flaccid, grooved, basal portion creeping, glabrescent. Stipules 1cm long, cylindric, truncate, white-membranous. Petiole 1.5cm long, often articulate at base, thinly white hairy. Lamina 2.5-5.5 x 1.3-3cm, runcinate, terminal lobe rhombic-ovate, lateral lobes linear oblong, usually 1-3 pairs, base truncate to amplexicled, coarse and dotted above, pubescent beneath, veins densely pubescent beneath. Head 1.2cm across, globose. Peduncle 3cm long, slender, glandular-hispid; involucre leaf absent. Bracts 0.25cm long, membranous, enclosing pedicel, medianly nerved, hairy outside. Pedicels 0.15cm, short. Perianth light pink or white, 5-cleft, 0.35-0.4cm; stamens 8, slightly exceeding perianth; anthers black; filament 0.35 cm long, white; styles 3, united basally. Achenes 0.3cm, rounded, subtended by dry perianth.

Flr. & Frt.: Apr. - Dec.

Specimen Cited: Jaributti-Alubari, 2195-2280m, **AP Das & PC Rai** 091, dated 14.6.1994; Helipad Area, 2500m, **AP Das & PC Rai** 1104 dated 27.4.1995; Rechila Durpinay, 2300m, **AP Das & PC Rai** 1416 dated 08.9.1995.

Local Distrib.: Almost in all places of the Valley in an altitude range of 1100-2800m.

General Distrib.: Himalayas, Meghalaya, Myanmar, Thailand, W. and C. China, Formosa, Malaysia.

Note: Good fodder for cattle.

RUMEX L.

Rumex nepalensis Sprengel, Syst. Veg. 2:159. 1825; FBI 5:60. 1886; FEH 1:75. 1966; EFPN 3:179. 1982; FB 1(1):173. 1983; TBRI 50(4):126. 1987.

Local Name: Halhalay (Nep.).

Robust perennial rosette herbs to 45-90cm tall. Root-stock woody. Branches spreading. Stem vertically ridged. Stipules 2.5cm long, ochreate, white, membranous and persistent, sparsely hairy to glabrous; petiole 1.5-6.5cm, thinly hairy; lamina of cauline leaves 4-14.5 x 1.6-7cm, and of radicals 12-18 x 6-9cm, oblong-ovate, repund, subacute, cordate, mucilagenous, thinly pubescent to glabrous beneath, dark green above, brown when dry. Racemes both axillary and terminal 12 cm or longer. Pedicels upto 0.5cm. Flowers minute, polygamous, whorls much crowded upwards, reddish to yellowish-green; perianth segments 6, outer 3 smaller, 0.2-0.25cm, oblanceolate, entire; inner 3 larger, 0.3

x 0.2cm, ovate, toothed in lower half portion, persistent and enlarged, 0.45-0.6 x 0.38 cm in fruits (i.e. acrescent), distinctly veined and fringed with hooked bristles of 0.2 cm length; stamens 6; ovary 3-gonous; style 3; stigma fimbriate. Achenes 0.3-0.4 x 0.15-0.2cm; light red.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Rechila, 2280m, **AP Das & PC Rai** 002, dated 13.6.1994; Jorhpokhari-Tinsimana, 3040-2900m, **AP Das & PC Rai** 0749, dated 20.10.1994; PHE Source, 2155m, **AP Das & PC Rai** 1058, dated 26.4.1995.

Status: Abundant in open places.

Local Distrib.: Alubari, Jaributti, Tinsimana, Reshete, Rechila Middle.1900-2900m.

General Distrib.: S. W. Europe, W. Asia, Afganistan, Himalayas, Nilgiri, Meghalaya, Manipur, Myanmar, Tonkin, W. and C. China, C. Japan and Java.

Note: Leaves used as vegetable; also reported to be medicinally used in eczema.

PODOSTEMACEAE Rich ex C.A. Agardh.

***HYDROBRYUM* Endl.**

Hydrobryum griffithii (Griff.) Tulasne in Ann. Sci. Nat. Ser. 3 (11):104. 1849; FBI 5:64. 1890; FEH 1:110. t. 5c. 1996; 2:45. 1971; 3:45. 1975; Photo-alb. Pl. E. Him. f. 54. 1968; EFPN 3:180. 1982; FB 1(3):738. 1987; TBRI 50(4):116. 1987.

Podostemon griffithii Wallich ex Griff. in As. Res. 19:105, t.17. 1836; Icon Pl. Asia. t. 541, f. II; t. 544. 1854.

Annual moss-like herbs with basal greenish thallus, emerging as patches on submerged rocks, 12-26cm across. Stem scattered on thallus mass. Filamentous leaves upto 1cm, prostrate; stem leaves 4-7x1-1.7cm long, boat-shaped. Flowering stems 0.25-0.3cm; spathe cylindric, toothed at mouth after flower emergence. Flowers solitary, bisexual; sepals 2, linear, basally connate; stamens adnate to sepals; petals 0; ovary to 0.2cm, ellipsoid, 2-chambered; styles 2 with bilobed and purple stigma. Capsules to 0.25cm, narrowly ellipsoid, ribbed, pale brown.

Flr.: Sep. - Oct. *Frt.:* Oct. - Dec.

Specimen Cited: Near Machuki, 1300m, **AP Das & PC Rai** 1828, dated 10.9.1997.

Status: Rare.

Local Distrib.: Gorubathan, Sakam, Machuki. 110-1500m.

General Distrib.: Himalayas (Garhwal-Bhutan), Assam, Maghalaya, Manipur, Thailand, Tonkin.

ARISTOLOCHIACEAE Juss.

ARISTOLOCHIA L.

Key to the species:

1. Plants glabrous.....*A. tagala*
1. Plants hairy.....2
2. Petiole 0.5-1.3cm; lamina broadly ovate to orbicular cordate, nerves 6-9 from base.....*A. griffithii*
2. Petiole upto 5cm; lamina ovate-lanceolate, nerves 5 from base.....*A. saccata*

Aristolochia griffithii Ducharte in DC., Prodr. 15(1): 437. 1864; FBI 5: 77. 1886; SFSH f. 173. 1963; FEH 1: 66. 1966; 2: 21. 1971; EFPN 3: 180. 1982; FB 1(2): 353. 1984.
Isotrema griffithii (Duchartre) Fischer in Kew Bull. 1940: 98. 1940.

Shrubby climbers, woody below, young shoots brown-wooly. Leaves simple, alternate; petiole 0.5-1.3 cm long, wooly hairy; lamina 2.5-8 x 1.6-5cm, broadly ovate to orbicular-cordate, entire, acute, base articulate-cordate, pubescent above, shining wooly haired beneath (i.e., densely tomentose), nerves 6-9 from base, more distinct above. Bracteoles small, leafy. Pedicels 1.9-3.6cm long. Flowers axillary, solitary, pendulous; perianth curved, ribbed, tube folded, 4-5.5cm, densely pubescent, green with purple veins, inflated below into a sac of 3-3.9 cm, above narrowed, limb enlarged into a broad rhombic-orbicular yellow spotted mouth upto 9cm across, warted and brownish-purple within. Column trilobed with 12 light brown anthers; ovary 3-4.4cm, narrow cylindrical. Fruit long to 9-13 x 1.6-2.2 cm, oblong, ribbed into 6; seeds many, 0.4-0.55 x 0.25-0.3cm, ovate. (Plate V: 48).

Flr.: Apr. - Jun. *Frt.*: Jun. - Aug.

Specimen Cited: Jaributti-Middle Rechila, 2160-2490m, AP Das & PC Rai 0991, dated 23.4.1995.

Status: Rare.

Local Distrib.: Dhamdhamay Dara, Ruka, Middle Rechila. 2100-2500m.

General Distrib.: Endemic to E. Himalaya (Nepal-Arunachal Pradesh).

Aristolochia saccata Wallich, Pl. As. Rar. 2:2. t. 103. 1830; FBI 5: 76. 1886; Ind. Trs. 522, 716. 1906; Fl. Asm. 4: 30. 1940; Fl. Meg. 2: 706. 1987.

A stout climber. Branchlets villous with deflexed hairs. Leaves simple; petiole upto 5cm, pubescent; lamina 12-16.5 x 6.5-9.3cm, ovate-lanceolate, entire, acute or acuminate, base cordate, wooly pubescent beneath, bright and thinly hairy above, basally 5-nerved. Flowers 4-5cm long; perianth tube yellowish white with purple veins, hairy, sac curved below neck, neck slightly constricted, mouth broader, circular, yellowish within. Fruit not seen.

Flr.: Aug. - Mar.

Specimen Cited: Hattidara, 2549m, AP Das & PC Rai 0621, dated 17.10.1994.

Status: Rare.

Local Distrib.: Hattidara, Dhamdhamay Dara, Chitray Bunglow. 2300-2650m.

General Distrib.: Central and Eastern Himalayas.

Aristolochia tagala Chamisso in Linnaea 7: 207, t. 5 f. 3. 1832:FEH 3:29.1975; EFPN 3:180. 1982; FB 1(2):354. 1984.

A. roxburghiana Klotzsch in Monatsb. Berl. Akad. 596. 1859, FBI 5:75. 1886; FEH 1: 66. 1966.

Twiner, usually glabrous. Petiole 2-5cm long, often coiled; lamina 8-20 x 3.5-8.5cm, shape much variable, ovate-oblong, upper one lanceolate, acuminate, base cordate, cordate-sagitate in upper leaves, margin entire, 5-nerved, thinly pubescent beneath. Cymes racemose, lax, pubescent. Flowers dark-brown. Peduncles and pedicels slender. Bracts oblong. Perianth 5-7cm long with swollen base, tube inflated, glabrous and with purple marks, mouth curved, white-yellow, lip 2.5-4.5cm long, villous; stamens 6; filaments united; anthers 6, extrorse. Capsule size variable, usually 2.5-6cm long, pyriform or oblong, 6-angled; seeds 0.7-1.2 cm diam., triangular and winged.

Flr.: Apr. - Jun. *Fr.:* Jul. - Oct.

Speciman Cited: Above Sakam, 1150m, **AP Das & PC Rai** 1470, dated 14.11.1995.

Status : Rare.

Local Distrib.: Confined only in Samsing-Phari Area . 700-1150 m.

*General Distrib.:*E. Himalaya (Nepal -Bhutan), India, Malaysia.

SAURURACEAE A. Rich.

HOUTTUYNIA Thunb.

Houttuynia cordata Thunb., Vet. Acad. Stockholm Handl. 4: 149., t. 5. 1783, *ut Houtuynia*; Fl. Jap. 234, t. 26. 1784; FBI 5: 78. 1886; FEH 1: 42. 1966.

Stoloniferous aromatic herb, 15-42 cm high. Stipules 1.8-2.6 cm. Leaves alternate; petioles upto 4.5 cm long; lamina 3-8.5 x 2.5-7.5 cm, broadly ovate, margin usually entire, acute or short-acuminate, base cordata. Spikes numerous flowered, terminal and leaf-opposed, subtended by showy bracts. Flowers actinomorphic, bisexual; perianth O; stamens 3-6; filaments adnate to ovary base; ovary unilocular; ovules many; styles 3, usually recurved. Capsule fleshy, apically dehiscent.

Flr. & Fr.: Jun. - Oct.

Specimen Cited: Near Jaributti, 2155m, **AP Das & PC Rai** 0299, dated 17.6.1994.

Status: Common.

Local Distrib.: Todey-Tangta, Jaributti, Machuki, Lava. 700-2200m.

General Distrib.: Himalayas (Punjab-Arunachal Pradesh), Assam, S. Tibet, Thailand, east to China, Japan.

Note: Leaves cooked and consumed as vegetable

PIPERACEAE C. A. Agardh.

Key to the Genera:

- 1. Climbing or free-standing shrubs; leaves always alternate; stigma 3-5.....*Piper*
- 1. Erect/diffuse herbs; leaves opposite or whorled; stigma 1.....*Peperomia*

PEPEROMIA Ruiz. et Pav.

Key to the species:

- 1. Leaves opposite, distinctly petiolate, 2-4 nate, lamina 1.25-2.5cm long, base attenuate.....*P. heyneana*
- 1. Leaves opposite or in whorls of 4, almost sessile, lamina 0.8-1.5cm long, base rounded.....*P. tetraphylla*

Peperomia heyneana Miquel, Syst. Pip. 123. 1843; FBI 5: 99. 1886; FEH 1:42. 1966; 2:14. 1971; EFPN 3:181. 1982; FB 1(2):344. 1984; TBRI 50 (4):122. 1987.

Tufted, succulent, glabrous herb, often prostrate, 8-20cm tall, branched. Leaves opposite, 2-4 nate; petioles 0.35-0.5cm, glabrous; lamina 1.25-2.5 x 0.5-1.2 cm, obovate, obtuse, base alternate, 3-veined from base, with distinct midrib. Spikes terminal and axillary, fascicled, 1.5-3.5cm long, glabrous.

Flr.: May - Aug. *Frt.:* Sep. - Jan.

Specimen Cited: Rechila Chowk, 2300m, AP Das & PC Rai 0607, dated 16.10.1994.

Status: Common.

Local Distrib.: Lava, Phari, Rechila Chowk, Reshata, Samsing-Phari. 900-2400m.

General Distrib.: Himalayas (Kashmir-Bhutan), India.

Peperomia tetraphylla (Forst. f.) Hk et Arnt., Bot. Beech. Voy. 97. 1832; FEH 1:42. 1966; 2:14. 1971; EFPN 3:181. 1982; FB 1(2):344. 1975; TBRI 50(4):122. 1987.

Piper tetraphyllum Forst. f., Prodr. 5.1786.

P. reflexa (L. f.) Dietrich, Sp. Pl. 1:180. 1831, non Kunth, FBI 5:99. 1886.

Profusely branched, bushy, succulent herb, 8-22cm, often growing as epiphyte. Stem rooting at lower nodes, ribbed. Leaves opposite or in whorls of 4; petioles 0.1-0.2cm; lamina 0.8-1.3 x 0.55-1cm, obovate-orbicular, obtuse, base rounded, fleshy, 3-veined from base, pubescent. Spikes solitary, erect, terminal, densely pubescent. Flowers bisexual; stamens 2, reniform. Drupes sessile, to 0.1cm, ellipsoid, acute.

Flr.: Mar. - Jul. *Fr.*: Sep. - Dec.

Specimen Cited: Rechila Middle, 2460m, **AP Das & PC Rai** 1229, dated 04.5.1995.

Status : Abundant.

Local Distrib.: Lava, Todey-Tangta, Alubari, Chouda Feri, Pankhasari, Reshate. 1300-2500m.

General Distrib.: America, Africa, Himalayas (Kashmir-Bhutan), India, Sri Lanka, China, Malaysia.

PIPER L.

Key to the species:

1. Nodes swollen; stigmas 3.....2
1. Nodes not swollen; stigmas 3 or 4.....3
2. Lamina 6-10cm long, ovate-lanceolate.....*P. khasianum*
2. Lamina 6-12.5cm long, ovate-cordate or elliptic-ovate.....*P. mullesua*
3. Petioles 0.5-0.9cm (upper leaves sessile);stigmas 3; drupes to 0.15cm across
.....*P. pedicellatum*
3. Petioles 0.7-1.5cm; stigmas 4; drupes 0.55-0.6cm.....*P. suipiqua*

Piper khasianum C. DC., Prodr. 16:349. 1869; FBI 5:89. 1886; FB 1(2):350. 1982.

Local Name : Chabo (Nep.).

Large climbing shrubs. Stem glabrous. Branches swollen at nodes. Leaves entire. Petioles 0.42-0.8 cm long; lamina 6-10 x 2-3.9 cm, narrowly ovate to lanceolate, long acuminate, base cuncate or rounded,membranous, usually 5-nerved. Spikes 2-2.9 cm. Peduncles 0.5-0.78 cm. Flowers dioecious; perianth O; stamens 2; filaments short; anther 2-celled; ovary unilocular; stigma 3; ovule solitary. Drupe 0.35-0.4cm diam., globose.

Flr. & Fr.: Feb. - Jul.

Specimen Cited: Samsing, 730 m, **AP Das & PC Rai** 1759, dated 18.5.1997.

Status: Common.

Local Distrib.: Phari, Gorubathan, Samsing, Asala Kholo. 500-900m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya.

Piper mullesua D. Don, Prodr. 20. 1825; FEH 1: 43. 1966; FB 1(2): 347. 1984; Nam. Chang. Flr. Pl. 433. 1987; Fl. Meg. 2: 708. 1987.

P. brachystachyum Wallich ex Hk. f., FBI 5: 87. 1886; Man. Ind. Timb. 554. 1902; Ind. Trs. 533. 1906; Fl. Asm. 4:36. 1940.

Local Name: Peepla (Nep.).

Much branched ascending climbers. Branches ascending; nodes swollen and rooting. Older stems warted. Petioles 0.6-1.3 cm long. Leaves 6-12.5 x 2.5-6 cm, ovate-cordate or elliptic-ovate, long acuminate, base rounded or cuneate, glabrescent, basally 5-nerved, lateral nerves 1-2 pairs, prominent. Male spikes upto 7 cm long, erect. Peduncles 0.35-0.4 cm long. Bracts sub-sessile. Male flowers: stamens 2; anthers 2-celled, kidney-shaped. Female spikes cylindric or globose. Peduncles 0.3-0.7 cm; stigma 3. Fruiting spikes much elongated. Drupes 0.25 cm diam., densely clustered.

Flr. & Frt.: Mar. - Oct.

Specimen Cited: Neora Valley & Sikkim Border, 1700 m, **AP Das & PC Rai** 1145, dated 29.4.1995.

Status : Frequent.

Local Distrib.: Reshete, Thartharay, Neora Valley-Sikkim Border, Sakam Forest. 1600-2300m.

General Distrib.: Himalayas (Kumaon-Bhutan), India.

Piper pedicellatum C. DC. in Prodr. 16 (1): 343. 1869; FBI 5:81. 1886; FB 1(2):349. 1984; TBRI 50(4):123. 1987.

P. boehmeriifolium sensu Wallich (Cat. No. 6654 A 1832), *nom. nud.*) ex C. DC., Prodr. 16(1):348. 1869; FBI 5:85. 1886; FEH 1:43. 1966; EFPN 3:181. 1982.

Local Name: Bhalay Chabo (Nep.).

Shrubby climber, glabrous. Stem soft or often warted. Leaves alternate; petioles 0.5-0.9cm; lamina 5.5-11.5 x 5.2-8.2cm, broadly ovate, acuminate, base narrowed, nerves 5-8 with lateral nervules, glabrous, upper leaves subsessile, elliptic. Male spikes 10-21 cm long, flexuous, slender; peduncles upto 2cm long; bracts peltate; stamens 2; anthers subsessile. Female spikes 5-10cm long with peduncles to 2cm long; stigmas 3. Fruiting spikes 0.75-1.1cm, fleshy. Drupes ca 0.15cm across, densely coherent.

Flr.: Mar. - Jul. *Frt.:* Aug. - Jan.

Specimen Cited: Near Machuki, 1300m, **AP Das & PC Rai** 1821, dated 10.9.1997.

Status: Common.

Local Distrib.: Phari, Gorubathan, Machuki, Samsing. 600-1540m.

General Distrib.: Himalayas (Nepal-Bhutan), India, Myanmar.

Note: Leaves are sometimes chewed with bettle-nuts. The plant finds its sacred usage in Hindu rituals.

Piper suiipiqua Ham. ex D. Don, Prodr. Fl. Nep. 20. 1825; EFPN 3:181. 1982; FB 1(2):350. 1984.

P. nepalense Miquel, Syst. Pip. 318. 1843; FBI 5:49. 1886; FEH 1:43. 1966; EFPN 3:186. 1982.

Local Name: Dankhlay Chabo (Nep.).

Large climbing shrub, with glabrous stem. Leaves petiolate; petioles 0.7-1.45cm; lamina 6.5-12.5 x 3.5-7cm, ovate, acuminate, base obliquely cuneate, coriaceous, nerves 5-7 with 2 suprabasal nerves, glabrous. Male spikes upto 16cm long, on 1-2.2cm long peduncles; bracts peltate. Stamens 3, exerted beyond bracts; anthers erect; filaments short. Female spikes upto 8.2cm long, slender, on 1-1.5cm long peduncles; stigmas 4. Fruiting spikes 9-14cm, whitish pubescent. Drupes sessile, 0.53-0.6 x 0.35-0.4cm, ovoid.

Flr.: May - Aug. *Fr.:* Aug. - Jan.

Specimen Cited: Near Sakam Forest, 1550m, AP Das & PC Rai 1852, dated 12.9.1997.

Status: Frequent.

Local Distrib.: Gorubathan, Machuki, Sakam, Chouda Feri, Reshate. 1000-2300m.

General Distrib.: Himalayas (Garhwal-Bhutan).

LAURACEAE Juss.

Key to the Genera:

1. Leaves whorled, 4 or more in whorls.....*Actinodaphne*
1. Leaves opposite or alternate but never whorled.....2
2. Leaves pinnately nerved.....3
2. Leaves tripli or subtriplinerved.....5
3. Inflorescence umbels, solitary or paniced; bracts subpersistent.....4
3. Inflorescence not of umbels; bracts caducous.....6
4. Pedicels stout and bifurcating; fruiting perianth erect.....*Phoebe*
4. Pedicels slender, not bifurcating; fruiting perianth reflexed or spreading*Persea*
5. Fertile stamens upto 12.....*Litsea*
5. Fertile stamens less in no. (upto 6).....*Neolitsea*
6. Leaves glabrous, glossy above.....*Cinnamomum*
6. Leaves pubescent beneath.....*Neocinnamomum*

ACTINODAPHNE Nees

Key to the species:

1. Lamina narrowly elliptic-lanceolate; lateral veins 13-24 pairs; flowers pedicellate; fruiting pedicels 1.8-2.5cm long.....*A. longipes*
1. Lamina lanceolate; lateral veins only upto 11 pairs; flowers subsessile; fruiting pedicels much shorter (upto 0.75cm).....*A. sikkimensis*

Actinodaphne longipes Kostermans in Reinwardtia 9: 98. 1974; EFPN 3: 182. 1982; FB 1(2): 281. 1984.

A. reticulata Meisn. var. *glabra* Meisn. in DC., Prodr. 15:1. 212. 1864; FBI 5: 147. 1886; FEH 1: 99. 1966.

Local Name: Lali Kawlo (Nep.).

Small trees, young branches soft tomentose. Terminal bud-scales overlapping one another, brown, hairy. Leaves fleshy, whorled; petiole 0.5-1.2 cm, glabrous to sparsely pubescent; lamina 8-26 x 1.2-3.4cm, narrowly elliptic-lanceolate, entire, acuminate, cuneate, coriaceous, glabrous, dark green above, pale beneath, finely impressed reticulate on both sides, lateral nerves 13-24 pairs. Pedicels silky. Flowers unisexual, clustered, light yellow; perianth segments 6, sub-equal, tube short; perfect stamens 6, introrse; filaments glabrous; anthers 4-loculate. Fruit 1.3 x 1cm, broadly ellipsoid, seated on enlarged fleshy perianth cup; fruiting pedicels 1.8-2.5cm.

Flr.: Nov. - Feb. *Frt.:* Mar. - May

Specimen Cited: Neora River bank at Alubari, 2280m, **AP Das & PC Rai** 0237, dated 16.6.1994; Alubari Belt, 2280-2424,m **AP Das & PC Rai** 0563, dated 16.10.1994.

Status: Abundant.

Local Distrib.: Dhamdhamay Dara, Alubari, Neora Khola, Zero Point, Jaributti. 2000-2500m.

General Distrib.: E. Himalaya (Nepal-Sikkim), Meghalaya.

Actinodaphne sikkimensis Meisn. in DC., Prodr. 15(1):213. 1864; FBI 5:147. 1886; Trs. N. Beng. 108. 1929; FEH 2: 99. 1966; FPK 89. 1981; EFPN 3: 183. 1982; FB 1(2):281. 1984;TBRI 50 (4):104. 1987.

Local Name: Siksiki, Rudilo, Phurkay Sissi (Nep.).

Large shrub to medium tree, 6-10m high, branches arising from base. Leaves in whorls; petioles upto 1.2 cm long; lamina 9-15 x 2.2-4.2 cm, lanceolate, acuminate, base cuneate, membranous, glabrous, pale beneath, lateral veins upto 11 pairs. Flowers in sub-sessile clusters; perianth segments 6, segments 0.35-0.4cm, 2-4 bracteate. Fruits 1.2 -1.5 cm, ellipsoid, embedded on perianth cup to 0.25 cm diam.; fruiting pedicels 0.65-0.75 cm long.

Flr.: Oct. - Feb. *Frt.:* May - Aug.

Specimen Cited: Below Sakam, 1150 m, **AP Das & PC Rai** 1471, dated 14.11.1995.

Status: Less Common.

Local Distrib.: Lava, Sakam, Choudha Feri. 1550 -1800m.

General Distrib.: E. Himalayas (Nepal - Bhutan), Manipur.

CINNAMOMUM Blume

Cinnamomum impressinervium Meisn. in DC., Prodr. 15(1): 21. 1864; EFPN 3: 183. 1982; FB 1(2): 258. 1984.

Local Name: Khorsanay (Nep.).

Small trees. Branches green, slender; buds silky. Leaves subopposite-opposite; petiole 0.6-1cm, slender; lamina 5.5-13 x 1.2-3.9cm, curved downwards, elliptic-lanceolate, entire, long acuminate, base nearly acute, brown when dry, paler beneath, both surfaces glabrous, triply-nerved, nerves much impressed above. Panicles short, few flowered, pubescent. Flowers greenish-yellow; fruiting perianth cupular, segments 0.2 cm, deciduous. Fruits obovoid to globose. (**Plate XXVIII**).

Flr.: Jun. - Jul. *Fr.:* Oct. - Dec.

Specimen Cited: Rechila Durpinay, 2300m, **AP Das & PC Rai** 1347, dated 06.5.1995.

Status: Common.

Local Distrib.: Rechila Durpinay, Pankhasari, Hattidara, Ruka Hill. 2100-2600m.

General Distrib.: E. Himalaya (Nepal-Bhutan), India, Myanmar, S.W. China.

LITSEA Lamk. (*nom. cons.*)

Key to the species:

1. Plants aromatic; branchlets smooth; lamina lanceolate, acuminate, glabrous
.....*L. cubeba*
1. Plants not aromatic; branchlets tomentose or silky hairy; lamina obovate or elliptic-lanceolate, tomentose.....2
2. Umbels erect, solitary; peduncles densely villous.....*L. elongata*
2. Umbels clustered/fascicled or in cymes; peduncles thinly brownish hairy.....3
3. Lateral veins 6-8 pairs, conspicuous beneath; stamens 6.....*L. lancifolia*
3. Lateral veins 8-13 pairs, conspicuous above; stamens 12.....*L. sericea*

Litsea cubeba (Lour.) Persoon Pl. 2(1): 4. 1806; FEH 1: 101. 1966; 2: 38. 1971; EFPN 3: 185. 1982; FB 1(2): 274. 1984.

Laurus cubeba Lour., Fl. Cochinch. 1:252. 1790.

L. citrata Bl., Bijdr. 565. 1825; FBI 5: 155. 1886.

Tetranthera polyantha Wallich *ex* Nees in Wallich, Pl. As. Rar. 2:67. 1831; DC., Prodr. 15(1): 182. 1864.

T. cubeba (Lour.) Meisn. in DC., Prodr. 15(1): 199. 1864.

Local Name: Siltimbur (Nep.).

Shrubs to small trees, upto 5.5 m, aromatic, deciduous, with no well-formed winter buds. Branches slender, smooth. Stem glabrous, black when dry. Lower leaves nearly opposite, upper few alternate; petioles 0.4-0.9 cm, slender; lamina 5.1-11 x 1.6-2.7 cm, lanceolate, entire-half contortate, acuminate, cuneate, membranous, bright green above, glaucous beneath, glabrous both sides, nerves well impressed above, lateral veins variable from almost horizontal to obliquely ascending, 9-16 pairs. Umbels in clusters of 2-4, 4-10 flowered, short peduncled. Pedicels 0.15-0.2cm, white, pubescent. Flowers silky hairy; perianth toothed, tube short, base reduced. Fruit subglobose.

Flr.: Dec. - Feb. *Fr.*: Mar. - May.

Specimen Cited: Rechila Chowk-Dhamdhamay Dara, 2280-2520m AP Das & PC Rai 0658, dated 18.10.1994.

Status: Less Common.

Local Distrib.: Dhamdhamay Dara, Sikkim-Neora Border, Middle Rechila. 2200-2550m.

General Distrib.: E. Himalaya (Sikkim to Mishmi), Khasia, Myanmar, Tonkin, W. and C. China and Java.

Note: Fruits edible as well as medicinal.

Litsea elongata (Nees) Hk. f., FBI 5:165. 1886; FEH 2:101. 1966; 2:39. 1971; 3:42. 1975; EFPN 3:185. 1982; TBRI 50 (4):118. 1987. var. *latifolia* Cowan and Cowan, Trs. N. Beng. 110. 1929; FB 1(2): 275. 1984.

Local Name: Thulo Pahenlay (Nep.).

Trees upto 18m high. Branchlets tomentose, brownish, terminal buds ovoid with scaly scars. Petioles 1.2-1.6cm long; lamina 7.5-15 x 3.5-7.5 cm, obovate, acute or obtuse, base cuneate, tomentose, pinnately veined, lateral nerves upto 13 pairs, prominent beneath. Peduncles 1.2-2.5 cm long. Umbels solitary with silky pubescent scales. Pedicels 0.4-0.6cm long. Perianth segments oblong; filaments 0.55cm, villous. Fruits 1.2-1.6cm, ellipsoid, apiculate, borne on perianth cup ca 0.55-0.6cm across.

Flr.: Sep. - Nov. *Fr.*: Jun. - Apr.

Specimen Cited: Rechila Chowk, 2240m, AP Das & PC Rai 0652, dated 17.10.1994.

Status: Common.

Local Distrib.: Reshete, Chonkobhir, Middle Rechila, Lava. 1800-2600m.

General Distrib.: Himalaya (Garhwal-Bhutan), Maghalaya, Tibet, W. and S. China.

Note: Good fodder for cattle.

Litsea lanceifolia (Roxb. ex Nees) Wallich ex Hk. f., FBI 5: 159. 1886; Man. Ind. Timb. 571. 1902; Ind. Trees 537. 1906; Fl. Asm. 4: 84. 1940; Fl. Meg. 2: 731. 1987.
Tetranthera lancifolia Roxb. ex Nees in Wallich, Pl. As. Rar. 2: 65. 1831.

Shrubs to small trees. Young twigs tomentose. Bark thin, dark-brown. Petioles upto 0.7cm long. Leaves alternate, opposite or sub-opposite; lamina 8.5-18 x 2.7-5.2 cm, oblong acuminate, base acute or cuneate, glabrous beneath, mid-nerve hairy, lateral veins 6-8 pairs, conspicuous beneath. Pedicels upto 0.3 cm long. Flowers umbellately clustered, 0.2-0.25cm across; sepals unequal, villous; stamens 6, unequal. Fruits 1-1.5 cm long, ellipsoid-oblong or very often sub-globose.

Flr. & Fr.: Apr. - Nov.

Specimen Cited: Ruka Hill, 2480 m, AP Das & PC Rai 0925, dated 24.10.1994.

Status: Frequent.

Local Distrib.: Ruka Hill, Thosum beat, Hattidara, Chitray, Pankhasari. 2200-2750m.

General Distrib.: Indo-Malaya, Eastern Tropical and Subtropical Himalayas.

Litsea sericea (Nees) Hk. f, FBI 5:156. 1886; Ann. Miss. Bot. Gard. 25. 369. 1938; Fl. Asm. 4: 82. 1940; FEH 1: 102. 1966; 2: 39. 1971; 3: 42. 1975; EFPN 3: 186. 1982; FB 1(2): 273. 1984; Nam. Chang. Flr. Pl. 102. 1987.

Tetranthera sericea Nees in Wallich, Pl. As. Rar. 2: 67. 1831; Prodr. 15 (1): 181. 1864.

Litsea oreophila Hk. f., FBI 5: 156. 1886.

Local Name: Lekh Timbur (Nep.).

Medium sized trees with stout branches. Young shoots silky hairy. Leaf-buds punctate, golden brown. Petioles 0.7-2cm long. Leaves 6.5-10.5 x 1.5-3.5 cm, elliptic-lanceolate, acute to acuminate, base acute, densely silky tomentose when young; lateral nerves 8-13 pairs, impressed above, prominent and elevated beneath. Peduncles brownish, hairy. Bracts glabrous. Flowers in umbels; perianth segments rounded, basally hairy within; stamens 12; filaments hairy; ovary ovoid; style short. Fruit sub-globose with persistent small flat perianth tube; fruiting pedicel stout and longer.

Flr.: Mar. - Apr. *Fr.:* Sep. - Oct.

Specimen Cited: Reshete, 2240m, AP Das & PC Rai 1340, dated 06.5.1995.

Status: Less Common.

Local Distrib.: Reshete, Chitray Bunglow, Todey-Tangta, Jorpokhari. 2200-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Myanmar, W. and C. China.

NEOCINNAMOMUM Liou

Neocinnamomum caudatum (Wallich ex Nees) Merr. in Contrib. Arn. Arb. 8: 64. 1934; EFPN 3:186. 1982; FB 1(2): 260. 1984; Fl. Meg. 2: 733. 1987.

Cinnamomum caudatum Wallich ex Nees in Wallich, Pl. As. Rar. 2:76. 1831; FBI 5:134. 1886; Man. Ind. Timb. 560, 771. 1902; Ind. Trees 534. 1906; Fl. Asm. 4: 57. 1940.

Local Name: Khorsanay (Nep.).

Large shrubs with terminal vegetative buds. Branches slender, spreading. Stem chocolate-red, glabrous. Lower leaves alternate, sub-opposite upwards; petioles 0.8-1.3 cm, slender; lamina 9-14 x 3.2-5.3 cm, narrowly elliptic, entire, half contorted, obtusely caudate-acuminate, base acute, 3-nerved, nerves distinct and elevated beneath, veinlets transverse, faces glabrous. Cymes reduced, axillary and few flowered. Flowers bisexual, small; perianth 6-lobed, subequal, funnel-shaped, fleshy; stamens usually 9, of these 6 introrse and 3 extrorse; anthers 4-celled. Fruit globose.

Flr. & Frt.: Jul. - Jan.

Specimen Cited: Chouda Feri, 2285m, **AP Das & PC Rai** 0439, dated 14.10.1994.

Status: Common.

Local Distrib.: Machuki, sakam Forest, Chouda Feri, Zero Point. 1700-2300m.

General Distrib.: Himalaya (Nepal-Bhutan), Meghalaya, Myanmar, W. and C. China.

NEOLITSEA (*Benth.*) *Merr. in Philipp.*

Neolitsea cuipala (D. Don) Kostermans in BBSI 10: 287. 1968; Nam. Chang. Flr. Pl. 388. 1987; TBRI 50 (4): 120. 1987.

Tetranthera cuipala D. Don, Prodr. 65. 1825.

Litsea lanuginosa (Wallich ex Nees) Nees, Syst. Laurin. 634. 1836; FBI 5: 178. 1886.

L. cuipala (D. Don) Nees, Syst. Laurin. 638. 1836; JBNHS 63: 329. 1966.

Small deciduous trees. Stem greenish white, thinly white-hairy. Terminal buds conspicuous, 3-5cm, elongate, scales imbricating. Leaves alternate or sometimes crowded in terminal whorls; petiole 0.4-1.3 cm; lamina 4-12 x 0.6-3 cm, oblanceolate, entire, long acuminate, base attenuate, coriaceous, glabrous both sides, ash-white beneath, 3-nerved, basal lateral veins nearly straight upto lower half. Umbels sessile, 1.6-2.5cm across, globose and clustered, 4-flowered. Perianth segments 0.35 cm, yellow. Fruits with persistent small perianth cup, 1.1-1.3 x 0.6-0.7 cm, ellipsoid, fruiting pedicels 0.3-0.7 cm, thick.

Flr.: Feb. - Mar. *Frt.:* Mar. - Oct.

Specimen Cited: Rechila-Hattidara, 2280-2549m, **AP Das & PC Rai** 0642, dated 17.10.1994.

Status: Less Common.

Local Distrib.: Hattidara, Rechila Chowk, Pankhasari, Chitray. 2200-2600m.

General Distrib.: Himalayas and Khasia Hills.

PERSEA *Mill.*

Key to the species:

1. Lamina brownish both sides; mid nerve raised beneath; perianth, glabrous*P. clarkeana*
1. Lamina greenish; mid nerve not raised beneath; perianth segments villous or silky within.....2
2. Filaments hairy at base.....3
2. Filaments glabrous at base.....*P. gamblei*
3. Petioles 1.2-1.6cm long; lamina elliptic, silky hairy.....*P. duthiei*
3. Petioles over 1.6cm; lamina oblanceolate, glabrous.....*P. gammieana*

Persea clarkeana (King ex Hk. f.) Kost. in Reinwardtia 6: 191. 1962; EFPN 3: 186. 1982; FB 1(2): 265. 1984; Nam. Chang. Flr. Pl. 424. 1987; TBRI 50 (4):122. 1987.

Machilus clarkeana King ex Hk.f., FBI 5: 137. 1886.

M. gammieana Hk. f., FBI 5: 137. 1886; FEH 2: 39. 1971; 3: 42. 1975.

Local Name: Chiplay Kawlo, Seto kawlo (Nep.).

Small evergreen trees. Branches stout. Petioles shorter (upto 0.8cm long). Leaves alternate; lamina 9-15 x 1.6-2.7cm, narrowly elliptic-lanceolate, acuminate, base narrowed, glabrous, brownish on both sides, mid-nerve swollen and raised beneath. Panicles 5-7cm, few flowered, robust, nearly glaucous when dry. Peduncles and pedicels stout. Flowers large; perianth upto 1.2cm across, linear-oblong, glabrous; filament hairy at the base; anthers linear-oblong. Fruit globose.

Flr.: May - Jul. *Frt.:* Aug. - Dec.

Specimen Cited: Rechila Middle, 2490m, AP Das & PC Rai 1175, dated 03.5.1995.

Status: Common.

Local Distrib.: Rechila Middle, Chitray, Dhamdhamay Dara, Ruka Hill. 2400-2700m.

General Distrib.: Endemic to E. Himalaya (Darjeeling-Bhutan).

Persea duthiei (Hk. f.) Kostermans, Reinwardtia 6:191. 1962; EFPN 3:186.1982; FB 1(2):266. 1984; TBRI 50(4):122. 1987.

Machilus duthieir Hk. f., FBI 5:861. 1886; FEH 1:102. 1966; 2:39. 1971; 3: 42. 1975.

Evergreen trees to 12-20m tall. Branches stout, covered with bud scale scars. Bark pale. Petioles 1.2-1.6cm long; lamina 13-18 x 2.5-4 cm, elliptic, acuminate, base cuneate-attenuate, lateral nerves upto 10-20 pairs, silky hairy. Panicles 10-15 cm, sub-erect, few flowered and pubescent. Flowers 0.75-0.9 cm across; perianth segments 0.45-0.5cm, linear-oblong, greenish, silky within. Fruits 1-1.3 cm across, globose .

Flr.: Feb. - May *Frt.:* Aug. - Nov.

Specimen Cited: Rechila Durpinay, 2120m, AP Das & PC Rai 1363, dated 06.5.1995.

Status: Sparse.

Local Distrib.: Lower Rechila, Chouda Feri, Rechila, Durpinay. 2000-2300m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya.

Persea gamblei (King ex Hk. f.) Kost. in Reinwardtia 6: 192. 1962; Fl. Asm. 4: 67. 1940; Nam. Chang. Flr. Pl. 425. 1987.

Machilus gamblei King ex Hk.f., FBI 5: 138, 860. 1890.

Medium-sized trees Branches slender. Bark grayish brown or dark gray, warty. Young parts pubescent, glistening. Leaves alternate; lamina 7-13 x 2.1-3.8cm, shape variable from obovate-oblong, oblanceolate, entire, acute or acuminate, base cuneate, thinly coriaceous, glabrous, pale beneath, lateral nerves 7-10 pairs, slender and oblique. Panicles lax, shorter than leaves, few flowered. Pedicels 0.6cm, slender. Flowers silky,

yellowish-green; perianth-tube dissected towards base; lobes linear-oblong, villous within; filaments slender, glabrous at base; anthers oblong. Fruit 0.8-1.1 cm in diam., globose, black turning primrose on ripening.

Flr.: Jan. - Apr. *Frt.*: Jun. - Jul.

Specimen Cited: Alubari Belt, 2280 m, AP Das & PC Rai 0401, dated 15.10.1994.

Status: Common.

Local Distrib.: Thartharay, Thosum Hill, Ruka Forest, Alubari. 2200-2800m.

General Distrib.: Endemic. Sikkim, Darjeeling, Assam and Meghalaya.

Persea gammieana (King ex Hk.f.) Kostermans in Reinwardtia 6:191. 1962; EFPN 3:186. 1982; Nam. Chang. Flr. Pl. 425. 1987; TBRI 50(4):122. 1987.

Machilus gammieana King ex Hk. f., FBI 5:137. 1886.

Local Name: Seto Kawlo (Nep.).

Evergreen tall trees, 14-20m high with stout branches. Petioles upto 3cm long; lamina 10-21 x 2.4-5.2 cm, oblanceolate, acuminate, base attenuate, glabrous, lateral veins 10-20 pairs. Panicles peduncled, corymbose, few flowered, with spreading branches. Perianth segmented, greenish, segments 0.5-0.68 cm, obtuse, lobes silky within. Fruit upto 3cm in diam.

Flr.: Apr. - Jul. *Frt.*: Aug. - Nov.

Specimen Cited: Near Goth at Choudha Feri, 1920 m, AP Das & PC Rai 0318 dated 18.6.1994.

Status: Less Frequent.

Local Distrib.: Choudha Feri Goth, Reshete. 1900-2260m .

General Distrib.: Darjeeling and Sikkim Himalayas.

PHOEBE Nees.

Key to the species:

- 1. Leaves crowded at branchlet ends; lamina oblanceolate or ovate-lanceolate, obtuse or subacute; flowers 0.65-0.75cm diam.; perianth subtomentose.....*P. attenuata*
- 1. Leaves alternate; lamina elliptic or lanceolate, acuminate; flowers smaller (upto 0.55cm diam.); perianth glabrous.....*P. lanceolata*

Phoebe attenuate (Nees) Nees, Syst. Laurie. 104. 1836; FBI 5: 143. 1886; Man. Ind. Timb. 567. 1902; Ind. Trees 532, 716. 1906, Fl. Asm. 4: 73. 1940; Nam. Chang. Flr. Pl. 2: 741. 1987.

Ocotea attenuate Nees in Wallich, Pl. As. Rar. 2: 71. 1831.

Large trees, upto 22 m high, usually branching at horizontal directions. Young shoots rusty-tomentose. Bark thin, papery, dark gray to grayish-brown. Leaves crowded at branchlet ends; petioles 1.25 cm; leaf lamina 9.5-17.5 x 3.4-7.5 cm, oblanceolate, ovate-lanceolate, attenuate, subacute or obtuse, base narrowed, coriaceous, brownish tomentose beneath, lateral nerves more than 15. Peduncles 13-24 cm long. Flowers 0.65-0.75 cm diam., yellowish-white, subtomentose, perianth campanulate with coriaceous segments, subtomentose; stamens seriate; filaments linear; anthers punctate; staminodes sagitate; ovary globose, style filiform; stigma oblique. Fruit 0.8-1.35 cm, ellipsoid.

Flr.: Mar. - May *Fr.*: Aug. - Oct.

Specimen Cited: Near Phari, 900m, AP Das & PC Rai 1748, dated 18.5.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Machuki. 700-1300m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam.

Note: Good quality timber.

Phoebe lanceolata (Nees) Nees, Syst. Laurin. 109. 1836; FBI 5: 141 1886; Man. Ind. Timb. 568. 1902; Ind. Trees 532. 1906; Fl. Asm. 4: 71. 1940; FI 2: 408. 1983; FB 1(2): 261. 1984; Fl. Meg. 2: 743. 1987; Nam. Chang. Flr. Pl. 427. 1987.

Ocotea lanceolata Nees in Wallich, Pl. As. Rar. 2: 71. 1831.

Phoebe angustifolia Meissn. in DC., Prodr. 15 (1):34. 1864; FBI 5: 141 1886.

A middle sized tree upto 14 m tall. Branches spreading. Bark whitish, usually smooth. Bud scale scars distinct on shoots. Leaves alternate, petiolate (petiole 0.5-2.25 cm), usually clustered on the branch ends; lamina 5-18 x 2-6 cm, narrowly elliptic or lanceolate, acuminate, base attenuate, glabrous or thinly pubescent beneath, lateral nerves 6-10 pairs, ascending. Panicles 8-18 cm, aggregated at branch tips. Flowers 0.4-0.55 cm diam., greenish white or yellow, glabrous; perianth segments ca 0.25 cm, ovate, glabrous. Fruits 0.95-1.1 x 0.5-0.65 cm, ellipsoid, blackish-purple and basally enclosed by extended perianth segments.

Flr. & Fr.: Apr. - Dec.

Specimen Cited: Near Sakam, 1150m, AP Das & PC Rai 1472, dated 14.11.1995.

Status: Frequent.

Local Distrib.: Gorubathan, Samsing, Machuki, Sikkim-Neora Border. 700-1600m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, S. Deccan.

THYMELIACEAE Juss.

Key to the Genera:

1. Leaves glabrous; flowers 4-14 in erect clusters.....*Daphne*
1. Leaves pubescent beneath; flowers numerous in pendulous clusters.....*Edgeworthia*

DAPHNE L.

Key to the species and varieties:

- 1. Plant 1-3 m tall.....2
- 1. Plant less than 1 m tall.....3
- 2. Plant much branched; perianth lobes acute and reflexed at alter stage; fruits upto 1.5cm long.....*D. papyracea*
- 2. Plant less branched; perianth lobes deltoid, not reflexed; fruits to 2cm long.....*D. sureil*
- 3. Branches naked in spring; flower clusters borne on bare twigs; flowers pink to purple.....*D. bholua* var. *glacialis*
- 3. Branches not naked in spring; flowers clusters borne on leafy twigs; flowers white with pink or purple flushes outside.....*D. bholua* var. *bholua*

Daphne bholua Ham. ex D. Don, Prodr. Fl. Nep. 68. 1825; FEH 1: 215. 1966; 2: 85. 1971; EFPN 3: 1882; Flr. Him. 354. 1984; TBRI 50 (4):111. 1987; FB 2 (1): 212. 1991. var. *bholua*

D. cannabina sensu FBI 5: 193. 1886, p.p., non Loureiro.

Local Name: Kagatay, Lokta, Argeli (Nep.).

A spreading erect shrubs with stem usually 60-70 cm high. Leaves alternate, shortly stalked; lamina 5.2-12cm long, elliptic to oblanceolate, entire, acute, base tapering to a very short stalk, dull green, glabrous and leathery. Flowers fragrant, whitish, often with pink or purplish flushes outside, grouped in terminal sessile clusters; tube 0.7-1.2cm long, silky-haired; lobes 4, spreading, almost equalling tube length, ovate, acute. Fruit ellipsoid, black on ripening.

Flr. & Frt.: May - Aug.

Specimen Cited: Below Jorpokhari, 2950m, AP Das & PC Rai 1193, dated 04.5.1995.

Status: Less Common.

Local Distrib.: Tinsimana, Chitray, North Hilltop of Hattidara, Rechila Middle. 2300-2900m.

General Distrib.: Nepal-Arunachal Pradesh, Meghalaya, W. China.

var. *glacialis* (W.W. Smith *et* Cave) Burt in Kew Bull. 1936:438. 1936; EFPN 3:188. 1982; Flr. Pl. Ind. Nep. & Bhu. 368. 1990.

Local Name: Kagatay, Argeli (Nep.).

Similar to above but erect deciduous shrubs with bare branches in spring and sometime also in winter. Flowers highly fragrant, pink to purplish, borne on sessile clusters of bare twigs. (Plate V: 53).

Flr.: Apr. - May *Frt.:* Jun. - Aug.

Specimen Cited: Rechila Middle-Jorpokhari, 2490-3040m, AP Das & PC Rai 1182, dated 03.5.1995.

Status: Frequent.

Local Distrib.: Jorpokhari, Tinsimana, Rechila Middle. 2400-3050m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

Note: Handmade paper called *Paharay Kagaj* is being prepared from its bark in Sikkim, Darjeeling and Bhutan.

Daphne papyracea Wallich *ex* Steud. Nom. B 1: 483. 1840, emend W.W. Smith *et* Cave in RBSI 6: 54. 1913; Fl. Meg. 2: 750. 1987.

D. cannabina Wallich in Pl. As. Res. 13: 385. t. 1820(p.p.); FBI 5: 193. 1886; Man. Ind. Timb. 577. 1902; Ind. Trees 544. 1906; Fl. Asm. 4: 109. 1940.

Local Name: Argeli (Nep.).

Erect evergreen shrubs attaining about 3 m height; much branched. Barks tenacious, gray-brown. Branches leafy at the tips. Petioles upto 0.5 cm. Leaves 3.5-9 x 0.8-1.6cm, lanceolate to oblanceolate-oblong, entire, acuminate or acute, base cuneate, coriaceous, glabrous, dark green above, pale and glaucous beneath, lateral nerves 5-8 on each side, slender. Peduncles short, silky. Umbels 3.6-4cm diam. Bracts lanceolate, leafy, caducous, hairy. Flowers 1.5-2cm long, fragrant, pinkish or yellowish-white; perianth tube often bent, downy outside, lobes 4, acute and usually reflexed at later stage; stamens 2-seriate; filaments short; ovary stipy, 1-celled; style minute with capitate stigma. Fruits 1.2-1.5 cm long, ovoid-ellipsoid, orange coloured, blackish or scarlet on ripening.

Flr. & Frt.: Aug. - Dec.

Specimen Cited: Rechila Helipad, 2400m, AP Das & PC Rai 1040, dated 25.4.1995.

Status: Frequent.

Local Distrib.: Rechila Helipad, Left Hilltop of Dhamdhamay Dara, Thosum Beat. 2300-2800m.

General Distrib.: E. India (Nepal to Arunachal Pradesh), W. China.

Note: Paper is prepared from the inner fibrous bark.

Daphne sureil W. W. Smith *et* Cave in RBSI 6. 2: 51, fig. 2. 1913; FEH 2: 85. 1971; EFPN 3: 188. 1982; FB 2(1): 212. 1991.

D. shillong Banerjee in KB 1927, p.p. 75-76; Fl. Asm. 4: 109. 1940; Flr. Pl. Ind. Nep. Bht. 368. 1990.

Local Name: Argeli, Kagatay (Nep.).

Shrubs about 1.5m tall. Branchlets tufted-hairy. Petioles nil or very short (upto 0.5 cm). Leaf lamina 3.5-12 x 1.5-3cm, shapes very variable from obovate-lanceolate or lanceolate

to elliptic-lanceolate, entire, sometimes undulate, acuminate, base cuneate or acute, coriaceous, paler beneath, nerves 7-12 pairs, slender, much impressed above. Peduncles densely hairy. Bracts sericeous. Flowers in both terminal and lateral peduncled heads, fragrant; perianth tubular with silky hairs outside, lobes 4 and deltoid; stamens 8 in two rows; anthers slightly exerted; ovary unilocular; stigma capitate. Fruits 1.4-2cm long, ellipsoid or sub-globose, fleshy.

Flr.: Sep. - Jan. *Fr.:* Jan. - Apr.

Specimen Cited: Near Jaributti, 2195m, **AP Das & PC Rai** 0495, dated 15.10.1994.

Status: Rare.

Local Distrib.: Sakam, Pankhasari, Jaributti. 1500-2150m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya.

Note: Paper is prepared from the bark.

***EDGEWORTHIA* Meisn.**

Edgeworthia gardneri (Wallich) Meisn. in Denkschr. B. Ges. Regensb. 3:280, t. 6. 1841; FBI 5:195. 1886; SFSH 175. 1963; FEH 1:216 & 640, t. 15 b. 1966; FEH 2:85. 1971; Acta. Phyt. Geobot. 25:109. 1973; EFPN 3:188. 1982; TBRI 50 (4):112. 1987; FB 2 (1): 211. 1991.

Daphne gardneri Wallich in Pl. As. Res. 13:388, t. 9. 1820; Prodr. Fl. Nep. 69. 1825.

Local Name: Lokti, Kagatay (Nep.).

Large shrubs or small trees, 2-4m high, evergreen. Leaves scattered; petioles upto 1.3cm long; lamina 7-14.5 x 2.5-4.5cm, elliptic-oblongate, acute, cuneate at base, margin entire, glabrous above, silky pubescent beneath. Flower heads 3-4cm diam, globose, pendulous, axillary. Peduncles 2.5-5.2cm long. Involucral bracts upto 1.5cm, linear, pubescent. Flowers sweet scented; perianth light yellow, tube to 1.6cm long, silky pubescent, lobes 4, broadly ovate; stamens 8 in two whorls. Fruit 0.5-0.6 x 0.25-0.3cm, ovoid, covered with pale stiff hairs. (**Plate V: 52**).

Flr.: Dec. - Mar. *Fr.:* Apr. - Jun.

Specimen Cited: Helipad region, 2300m, **AP Das & PC Rai** 1096, dated 27.4.1995.

Status: Less Common.

Local Distrib.: Pankhasari, Mulkharka, Helipad. 2000-2300m.

General Distrib.: E. Himalaya (Nepal-Bhutan), Meghalaya, N. Myanmar, W. China

Note: Bark used for making paper.

ELAEAGNACEAE Juss.

ELAEAGNUS L.

Key to the species:

1. Fruits 1.6-2cm long, drupaceous.....*E. conferta*
1. Fruit 0.75-1.1cm long, angular-pyriform, dry.....*E. pyriformis*

Elaeagnus conferta Roxb., Fl. Ind. ed. Carey. 1:460. 1820; FB 2(1): 214. 1991.

E. arborea Roxb., Fl. Ind. ed. Carey 1; 461.1820; FEH 1: 216. 1966.

E. latifolia sensu FBI 5: 202. 1890, p.p. *non* L.

Local Name: Mallero (Nep.).

Straggling shrubs. Branches often thorny. Stem terete, much branched and silvery white. Leaves simple, alternate; petiole 0.7-1.1 cm, coarse; lamina 9-13 x 2.2-3.7 cm, elliptic-lanceolate, entire to slightly repund, shortly acuminate, base narrow and rounded, glabrous, light brown above, silvery white beneath with scattered scales, unicostate, nerves prominent beneath and impressed above. Pedicels 0.3-0.5 cm long. Flowers on axillary clusters of 2-5, 1-1.5 cm; tepals 0.8 cm long, tube constricted above the ovary, lobes 4, 0.2-0.3 cm, ovate and spreading, marginally black within; stamens 4, inserted within tepal throat; filament short, 0.12-0.15cm; anthers upto 0.1cm; style inserted, hairy. Fruit 1.6-2 x 0.8-1.2 cm, drupaceous, ellipsoid, pedicellate (fruiting pedicel 0.45-0.7 cm), with thin stiff pericarp, covered by persistent (0.6 x 0.3 cm), acrescent perianth base, shiny. (Plate V: 51).

Flr.: Nov. - Jan. *Fr.:* Feb. - Apr.

Specimen Cited: Jaributti-Rechila Chowk, 2195-2280 m, AP Das & PC Rai 0384, dated 15.10.1994.

Local Distrib.: Chouda Feri, Rechila Chowk, Chitray, sakam. 1800-2600m.

General Distrib.: India, Subtropical and temperate Himalayas, Sikkim, Meghalaya, Bhutan, Nepal, Myanmar, Malaysia, China.

Note: Fruits edible when ripe. Pickles are also made from fruits.

Elaeagnus pyriformis Hk. f., FBI 5:202. 1886; Fl. Meg. 2:752. 1987; FB 2 (1): 215. 1991.

Local Name: Gweli (Nep.).

Spiny straggling shrubs, young bracts densely brownish scaly. Leaves simple, alternate; petioles 0.4-0.75cm long; lamina 6-10.5 x 3-5cm, elliptic-oblong, entire or slightly undulating, acute to shortly acuminate, base cuneate or rounded, coriaceous, densely silver scaly beneath. Flowers in clusters, borne on axillary shoots. Pedicels upto 0.5 cm long. Perianth constricted, 4-lobed, lobes 0.25-0.3 cm, triangular-ovate, tube upto 1.3cm; stamens 4 with short filaments; style stellate hairy. Fruit 0.75-1.1cm, pyriform, angular, beaked at apex, brownish scaly, yellowish on ripening.

Flr.: Oct. - Jan. *Fr.:* Jun. - Apr.

Specimen Cited: Suntalay, 600m, AP Das & PC Rai 1493, dated 28.6.1996.

Status: Rare.

Local Distrib.: Phari, Suntalay, Gorubathan. 400-1050m.

General Distrib.: E. Himalaya (E. Darjeeling-Bhutan), Meghalaya, Mishmi Hills.

LORANTHACEAE Juss.

Key to the Genera:

1. Normal leaves absent; whole plant jointed phylloclade.....*Viscum*
1. Normal leaves present (not a phylloclade).....2
2. Young shoots and buds densely stellate tomentose to rusty pubescent.....*Scurrula*
2. Shoots glabrous.....*Helixanthera*

HELIXANTHERA Lour.

Helixanthera parasitica Lour, Fl. Cochinch. 1: 142. 1790; EFPN 3: 190. 1982; FB 1(1):146. 1983.

Loranthus pentapetalus Roxb., Fl. Ind. 2:211.1824; ed.2, 1:553.1832; Pl. As. Rar. 3: t. 225. 1832; Cat. 16, n. 503. 1829; FBI 5:206. 1886.

Local Name: Sano Aijenru (Nep.).

Shrubby, stem-parasites, upto 2 m tall. Petioles 1-2cm long; lamina 6-10 x 2-4.5cm, ovate, acute, base cuneate, glabrous. Racemes 7.5-10.8cm long, stouter, many flowered. Flowers shortly pedicellate; calyx present as a small rim; petals 5, upto 0.5cm long, bright red, inflated; ovary oblong, minutely brown-scaly; style jointed at middle, capitate, slender. Fruit 0.78 x 0.38cm, ellipsoidal.

Flr. & Frt.: Mar. - May.

Specimen Cited: Above Samsing, 1150m, AP Das & PC Rai 1473, dated 14.11.1995.

Status: Frequent in lower areas.

Local Distrib.: Phari, Gorubathan, Machuki, Asala Khola. 400-1350m.

General Distrib.: E. Himalaya (Nepal-Sikkim), India.

SCURRULA L.

Scurrula elata (Edgew.) Danser in Bull. Jard. Bot. Buitenz. Ser. 3(10): 350. 1929; FEH 1: 64. 1966; EFPN 3: 191. 1982; FB 1(1): 147. 1983; TBRI 50 (4):126. 1987.

Loranthus elatus Edgew. in Trans. Linn. Soc. 20:58. 1846; FBI 5: 212. 1886.

Local Name: Aijeru (Nep.).

Stem parasitic shrubs, 1-2.5 m. Young shoot and buds densely brown, stellate tomentose to rusty pubescent. Stem black. Leaves usually alternate but often opposite near apex; petiole 1-2 cm; lamina 3-11 x 1.2-5 cm, broadly ovate, entire, acute, base rounded to

cuneate, densely brownish stellate tomentose at young stage on both surfaces, glabrous both sides when mature, glazy and thickly coriaceous, lateral nerves 4-6 pairs, mid-vein axil obscurely short hairy. Racemes axillary. Peduncle 0.8-1.5cm, stouter. Bracts 0.15-0.25 cm, ovate, placed below ovary. Pedicel 0.15-0.3 cm, densely brown, pubescent in unexposed floral buds. Flowers bisexual, upto 3cm long, 6-10 in each cluster; sepals 0.25 cm, completely fused forming a truncate tube; petals 2.5-3 cm long, tubular, narrow, slightly curved, reddish in major basal part, apically light green; anthers 0.5 x 0.1 cm, reddish; filament 1-1.7 cm, slender, black; styles 1.8-2.8 cm; stigmas swollen and globose. Fruits obovoid, narrowing at base.

Flr.: Apr. - Jun. *Fr.:* Sep. - Dec.

Specimen Cited: Alubari-Jorpokhari, 2280-3040 m **AP Das & PC Rai** 0195, dated 15.6.1994; Alubari Belt, 2280-2424 m, **AP Das & PC Rai** 0562, dated 16.10.1994.

Status: Very Common.

Local Distrib.: Middle Rechila, Alubari, Jaributti, Chitray, hattidara. 2100-2850m.

General Distrib.: Himalayas (Simla-Bhutan), India, Tibet, W. China.

VISCUM L.

Viscum nepalense Spreng., Syst. Cur.-Post. 47. 1827; FB 1(1):150. 1983; Fl. Meg. 2: 762. 1987.

V. atriculatum auct non. N. Burm., 1768; FBI 5: 226. 1886; Man. Ind. Timb. 584. 1902; Ind. Trees 552. 1906; Fl. Asm. 4: 119. 1940; TBRI 50 (4): 130. 1987.

Local Name: Harchur (Nep.).

Cymosely branched, leafless stem-parasite shrub to 1m, usually pendent phylloclade. Stem jointed terete only towards base. Branches flattened, striate. Nodes constricted; internodes variable in length and breadth, 1.5-5 x 0.4-0.9 cm, flattened, decussately oriented, tapering towards base. Flowers unisexual, clustered at nodes, minute and greenish; anthers white. Fruits 0.45-0.6 cm across, globose, yellowish-green with succulent and sticky mesocarp.

Flr. & Fr.: Jul. - Sep.

Specimen Cited: Chouda Feri, 2285 m, **AP Das & PC Rai** 1383, dated 07.5.1995.

Status: Rare.

Local Distrib.: Chouda Feri, Zero point, Panb khasari. 1900-2200m.

General Distrib.: W. and E. Himalayas, Meghalaya, Assam, Manipur, Myanmar, Indochina, China and Formosa.

Note: Decoction of stem orally administered with milk or hot water for body pain and fever. Paste made of it is applied topically on fracture.(PC Rai *et al*).

SANTALACEAE R. Br.

Key to the Genera:

1. Shrubby stem parasites; lamina 3-9cm long, shape variable, commonly obovate to orbicular.....*Dufrenoya*
1. Deciduous small tree; lamina 9-17.8cm long, elliptic.....*Pyrularia*

DUFRENOYA Chatin

Dufrenoya platyphylla (Spreng.) Stauffer in Viert., Nat. Ges. Zurich. 114: 70. 1969; Tebbs in EFPN 3: 192. 1982; FB 1(1): 143. 1983; Nam. Chang. Flr. Pl. 201. 1987.

Viscum platyphyllum Spreng., Syst. Veg. 4 (Curr. Post.): 47. 1827.

Henslowia heterantha (Wallich ex DC.) Hk. f. ex A. DC. in DC., Prodr. 14: 632. 1857; FBI 5: 233. 1886; Brands, Ind. Trees 554. 1906; FEH 1: 63. 1966.

Dendrotrophe heterantha (Wallich ex DC.) Henry et Roy in BBSI 10: 276. 1969.

Local Name: Ainjeru (Nep.).

Small parasitic shrubs, 1-3 m. Branches pale-brown. Stem warty. Leaves very shortly petiolate, lamina 3-9 x 1.5-5 cm, shape variable, usually obovate to orbicular, entire, obtuse, base abruptly attenuate, coriaceous, glabrous, nerves 7-9 from base, distinct beneath. Male flowers sessile in pedunculate scaly clusters; perianth with 5-6 triangular lobes. Female flowers in clusters of 3-10, scaly only at base and apex; perianth tube 5-6 lobed; ovary obovoid, inferior. Fruiting pedicels upto 0.5 cm. Fruit a small drupe, obovoid and fleshy.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Mulkharka, 2240 m, AP Das & PC Rai 1168, dated 01.5.1995.

Status: Less Frequent.

Local Distrib: Sakam Forest, Thartharay, Mulkharka. 1600-2250m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, Myanmar.

PYRULARIA Michaux.

Pyrularia edulis (Wallich) DC., Prodr. 14: 628. 1857; FBI 5: 230. 1886; Ind. Trees 554. 1906; FEH 1: 63.1966; FB 1(1):141.1983; TBRI 50 (4):124. 1987.

Sphaerocarya edulis Wallich [Cat. No.4033.1929, *nom. nud.*] in Roxb., Fl. Ind. ed. Carey, 2: 371. 1824.

Local Name: Amphi (Nep.).

Small deciduous trees to 10.5m high. Petioles 0.6-1cm long; lamina 9.5-17.8 x 3.6-7.8cm, elliptic, acute to shortly acuminate, base cuneate, pinnately veined, veins beneath white pubescent. Male panicles leafy, upto 14.8 cm long; perianth 5-lobed, lobes 0.15 cm, triangular, limb 0.6cm diam.; ovary and style rudimentary. Female racemes 2.5-5.2cm, few flowered; perianth tube adnate to ovary; ovary inferior. Drupes 2.8-3cm diam., blackish, with tapering base and withered perianth lobes at apex .

Flr. & Frt.: Mar. - May.

Specimen Cited: Near Kuwapaani, 1850m, **AP Das & PC Rai** 1480, dated 18.3.1996.

Status: Rarely Found.

Local Distrib.: Sakam, Kuwapaani. 1300-2000m.

General Distrib.: E. Himalaya (Nepal-Bhutan), India, Myanmar, China.

Note: Fruits are edible. Important domestic dairy utensils locally called Ghoorra and Theka (used for preparing butter from curd) are made up of its timber.

BALANOPHORACEAE L. C. *et* A. Rich.

Key to the species:

1. Dioecious root-parasite; root-stock waxy; leaves 6-12, sheathing at base
.....*B. polyandra*
1. Monoecious or dioecious root-parasite; root-stock not waxy; leaves 2-4 on stem
.....*B. involucrata*

BALANOPHORA Forst.

Balanophora involucrata Hk. f. in Trans. Lin. Soc. 22:44, t. 4-6. 1856; FBI 5:237. 1886; FEH 1:66. 1966; EFPN 3:193. 1982; FB 1(1):152. 1983.

Dioecious or often monoecious root parasite, 10-16cm, varying from yellow to red colour. Root-stock tuberous forming peculiar wood knots on tree roots. Stems stout, erect, bearing scale-like leaves at mid part. Leaves 2-4 on stem, scaly; lamina 2-3 x 1.2-1.5cm, ovate, connate in a single whorl. Heads 2.5-3.5 x 1.4-3cm, ovoid or subglobose. Male flowers 3-merous; stamens united into a globose and depressed column; anthers transversely dehiscent.

Flr.: Jul. - Sep.

Specimen Cited: Below Alubari, 2100m, **AP Das & PC Rai** 0275, dated 17.6.1994.

Status: Very Rare.

Local Distrib.: Jaributti, PHE Source. 1900-2050m.

General Distrib.: Himalayas (Simla-Darjeeling), Tibet, W. China.

Balanophora polyandra Griffith in Trans. Lin. Soc. 20:94, t. 7.1846; Trans. Lin. Soc. 22:47. 1856; FBI 5:238. 1886; FEH 1:66. 1966; EFPN 3:193. 1982; FB 1(1):152. 1983.

Acroblastum polyandrum (Griff.) Setchell in Univ. Calif. Pub. Bot. 19:147. 1935.

Reddish or yellowish root-parasite, dioecious, 6-14cm high. Stems with overlapping rows of leaves Root-stock waxy. Leaves 6-12, free, arranged in 4 whorls, 1.2-2.5 x 1-1.1cm, oblong, sheathing at base. Male heads 4-7 x 1.2-3cm, ellipsoid. Flowers zygomorphic, 4-5 merous, with alternate narrow and broad perianth segments; staminal column broader,

flattened on top; anther cells many. Female heads 2.2-3.8 x 1.2-2.4cm, ellipsoid. (Plate VI: 56).

Flr. & Frt.: Sep. - Dec.

Specimen Cited: Near PHE Source of Neora River, 1940m, AP Das & PC Rai 0211, dated 16.6.1994.

Status: Very Rare.

Local Distrib.: Jaributti, Neora Khola Bank, PHE Souce. 1850-2100m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Assam, S.E. Tibet, Myanmar, W. China.

EUPHORBIACEAE Juss.

Key to the Genera:

1. Plant monoecious.....2
1. Plant dioecious.....3
2. Petals absent.....4
2. Petals present.....5
3. Stamens not more than 20.....6
3. Stamens more than 20.....7
4. Flowers in cup-like cyathia, perianthless.....*Euphorbia*
4. Flowers not in cyathia, sepals present.....8
5. Leaves palmately lobed, glabrous; stamens united.....*Jatropha*
5. Leaves unlobed, stellate pubescent beneath; stamens free.....*Croton*
6. Small shrubs; stamens 3-4; fruit a berry or drupe.....*Antidesma*
6. Trees; stamens ca 20; fruit a capsule.....*Mecaranga*
7. Trees upto 12m high; petioles extending upto 7.5cm; leaf margin entire*Mallotus*
7. Trees upto 23m high; petioles upto 20cm; lamina distantly serrate.....*Ostodes*
8. Ovary 3-celled; capsules fleshy or indehiscent, not woody.....9
8. Ovary 3-5 celled; capsules woody.....*Glochidion*
9. Stamens free; fruiting calyx absent.....*Phyllanthus*
9. Stamens united by filament; fruiting calyx present.....*Sauropus*

ANTIDESMA L.

Antidesma acuminatum Wallich ex Wt., Jc. T. 1991. 1853; FBI 5: 363. 1887; Man. Ind. Timb. 611. 1902; Ind. Trees 565. 1909; Fl Asm. 4: 168. 1940; Fl. Jow. 2: 423. 1983; Fl. Meg. 2: 770. 1987.

Shrub to small tree upto 8m high. Dark pale brown. Branchlets tomentose. Petioles 2.5-7.5 cm long; lamina 3-15.5 x 2-5.5 cm, variable from oblong, oblong-elliptic to oblong-ob lanceolate, margin entire, caudate acuminate, nerves 6-11 on each side of mid-nerve, nerves hairy beneath. Racemes pncl., 2.5-10.2 cm long. Flowers minute, greenish white; calyx-lobes broadly ovate; stamens 3-4; ovary glabrous. Fruits 0.4-0.55 cm long, elliptic, red turning ultimately purple or blackish, crowned by persistent style

Flr. & Frt.: Apr. - Nov.

Specimen Cited: Phari, 950 m, **AP Das & PC Rai** 1769, dated 25.8.1997.

Status: Less Frequent.

Local Distrib.: Machuki, Phari, Neora-Sikkim Border. 950-1600m.

General Distrib.: Himalayas (Nepal-Bhutan), India, Myanmar, N.E. Malaysia.

CROTON L.

Croton caudatus Geisel., *Croton Monogr.* 73. 1807; FBI 5:389. 1887; Man. Ind. Timb. 615. 1902; Ind. Trees 577. 1906; Fl. Asm. 4: 194. 1940; Fl. Meg. 2: 782. 1987.

Scandent shrubs with young parts stellate tomentose and sticky glandular. Bark brown, often exfoliating in papery pieces. Wood whitish. Stipules glandulose. Petioles 0.75-5 cm long, scaberulous; lamina 6-12 x 5-11.5 cm, ovate or ovate-orbicular, crenate-serrate or coarsely toothed, obtuse or acute, base cordate or almost truncate, subcoriaceous, scaberulous above, stellately pubescent beneath, basal nerves 5-7. Racemes upto 28 cm long, slender, stellately pubescent. Flowers 0.75-1.1 cm diam., yellowish or greenish-yellow; sepals ovate, oblong; petals woody; stamens free, many; ovary woolly; style bipartite. Capsule 1.55-2.5 cm long, oblong, obscurely trigonous, tomentose.

Flr. & Frt.: Mar. - Oct.

Specimen Cited: Near Samsing, 720 m, **AP Das & PC Rai** 1748, dated 18.5.1997.

Status: Frequent.

Local Distrib.: Phari, Samsing, Machuki, Gorubathan. Upto 1350m.

General Distrib.: E. Himalaya (Nepal-Bhutan), India, Sri Lanka, S. China, Malaysia.

EUPHORBIA L.

Euphorbia hirta L., Sp. Pl. 454. 1753; Fl. Asm. 4: 224. 1940; KB 26: 264. 1972; Nam. Chang. Fl. Pl. 224. 1987; A Cont. Fl. Namdapha Arun. Prad. 278. 1996.

E. pilulifera L., Sp. Pl. 454. 1753; FBI 5: 250. 1887. *non* L. 1753.

Chamaesca hirta (L.) Millsp in Publ. Field Mus. Bot. 2: 303. 1909; FEH 1:176. 1966.

Erect or decumbent, annual, much hispid herb. Stem simple or often dichotomously branched. Leaves opposite, shortly petioled; lamina oblong-lanceolate or elliptic oblong, margin dentate, sometimes serrulate, acute, base normally cordate. Flowers monoecious, in cyathia, cyathia clustered in sub-sessile or pedunculate and globose heads, greenish at earlier stage becoming pinkish at later stage.

Flr. & Frt.: Jan. - Nov.

Status: Common.

Specimen Cited: Sakam Forest, 1100-1500m, **AP Das & PC Rai** 1474, dated 14.11.1995.

Local Distrib.: Machuki, Thartharay, Sakam. 1200-1700m.

General Distrib.: A pantropic weed.

GLOCHIDION Forst.

Glochidion acuminatum Mueller-Arg. in Linnaea 32:68. 1863; FBI 5:323. 1887; EFPN 3:196. 1982; TBRI 50(4):115. 1987; FB 1(3):779. 1987.

Local Name: Lalikaath (Nep.).

Medium sized evergreen tree to 10m high, with pubescent drooping branchlets. Leaves alternate; lamina 6-11.5 x 2.5-3.5cm, lanceolate, entire, acuminate pinnately veined, greenish above, pale and hoary pubescent beneath. Flowers in axillary dense fascicles; sepals 6; unequal, obovate greenish; petals 0; male flowers with 3 anthers; styles connate, columnar, column 4-5 lobed, lobes erect, short. Fruits 0.7-0.8cm, globose, woody, lobed, with persistent style.

Flr.: Apr. - Jun. *Frt.:* Aug. - Jan.

Specimen Cited: Below Chouda Feri, 1950m, **AP Das & PC Rai** 0961, dated 22.4.1995.

Status: Frequent.

Local Distrib.: Sakam, Machuki, Chouda Feri. 1200-2000m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, S.W. China.

Note: Foliage is ideal fodder for cattle. Table plates and cups are made by pinning up the leaves and used in festive occasions and for puja offerings.

JATROPHA L.

Jatropha curcas L., Sp. Pl. ed. 1, 1006. 1753; Pax in Pfl.-reich IV-147, Heft. 42:77. 1910; FEH 1: 179. 1966.

Shrubs to small tree, young shoots tomentose. Trunk soft wooded. Bark papery, yellowish-brown. Petioles 8-20 cm long; leaf scars distinct; lamina 7-15 x 7-12.5 cm, ovate, sub-orbicular, cordate, palmately 3-5 lobed, acute to shortly acuminate, usually glabrous, nerves sparsely hairy beneath. Cymes long-pdnld. Flowers greenish yellow; male Flowers: calyx segmented into 5, elliptic or obovate; corolla campanulate; stamens 10, biseriate; female Flowers: calyx segments ovate and acute; corolla longer than calyx; stls. 3, basally connate; stigma bifid. Fruit 1.75-2.5 m long, ovoid-oblong.

Flr. & Frt.: Jan. - Dec.

Specimen Cited: Sakam Forest, 1100-1500 m, **AP Das & PC Rai** 1475, dated 14.11.1995.

Status : Less Frequent.

Local Distrib.: Samsing, Machuki, Phari. Upto 1400m.

General Distrib.: Pantropic. Possibly, a native of Tropical America.

MACARANGA Thon.

Macaranga postulata Hk.f., FBI 5:445. 1887; FEH 1:179. 1966; EFPN 3:197. 1987; TBRI 50(4):114. 1987; FB 1(3):805. 1987.

M. gmelinifolia Hk. f., FBI 5:445. 1887.

Local Name: Malata (Nep.).

Medium trees, 8-12m tall, with rusty pubescent branches. Leaves alternate; petioles 6-14cm; lamina 9-16 x 8-13cm, broadly ovate, obscurely sinuate-dentate, acute to shortly acuminate, base shallowly cordate or truncete, veins palmately 5-7 at base, glabrous above, densely gland-dotted beneath. Stipules 0.55-0.7cm, ovate. Male panicles 4-5.5 cm; flowers 0.1cm across; stamens 20. Female panicles 4-8cm; flowers shortly pedicellate; calyx 0.15cm, 4-lobed; ovary bilobed, glandular; styles 2, recurved. Capsules 0.85cm in diam., brownish tomentose, with persistent styles.

Flr.: Oct. - Nov. *Fr.:* Dec. - Feb.

Specimen Cited: Below Reshete, 900m, **AP Das & PC Rai** 0568, dated 16.10.1994.

Status: Common.

Local Distrib.: Reshete, Sakam, Samsing-Phari, Lava, Pankhasari. 1200-2200m.

General Distrib.: Himalayas (Kumaon-Sikkim).

MALLOTUS Lour.

Mallotus philippensis (Lamk.) Mueller in Linnaea 34:196. 1865; FBI 5:442. 1887; FEH 1:180. 1966; EFPN 3:197. 1987; FB 1(3): 802. 1987.

Croton philippense Lamk., Encycl. Meth. B. 209. 1786.

Local Name: Sinduray (Nep.).

Small trees, 5-12m high, evergreen. Branchlets rusty pubescent. Leaves alternate; stipules minute; petioles 3-7.5cm long; lamina 9.5-20 x 4.5-9.5cm, ovate-lanceolate, entire, acuminate, base rounded or cuneate, coriaceous, basally 3-veined, minutely tomentose beneath, minutely red glandular. Spikes 8-15cm long, slender, stellate-pubescent, male ones much-branched, females simple. Male flowers subsessile, clustered; sepals 3, greenish; stamens many. Female flowers sessile; sepals upto 0.2cm, lanceolate; styles 3, upto 0.5cm long, papillose. Capsules 0.9-1.1cm across, 3-lobed, red-glandular.

Flr.: Sep. - Nov. *Fr.:* Dec. - Apr.

Specimen Cited: Phari, 900m, **AP Das & PC Rai** 1779, dated 10.9.1997.

Status: Abundant at lower hill forests.

Local Distrib.: Pareng, Samsing, Suntalay. 600-1300m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, Sri Lanka, China, Malaysia, Australia.

Note: Foliage is a good fodder for cattle. Glandular capsule powders processed to prepare red dye.

***OSTODES* Blume.**

Ostodes paniculata Bl., Bijdr. 620. 1826; FBI 5: 400. 1887; Man. Ind. Timb. 616. 1902; Ind. Trees 580. 1906, Fl. Asm. 4: 197. 1940; Fl. Meg. 2: 197. 1987; TBRI 50 (4):121. 1987.

Local Name: Bepari (Nep.).

Trees upto 23 m tall, crown dense and spreading. Bark grayish or brownish. Petioles long upto 20 cm. Leaves often crowded at branchlet ends, 7.5 - 20 x 3-9.5 cm, ovate or ovate-elliptic, margin serrate distantly, acuminate, base rounded or rarely oblique, glabrous, dark green above, paler beneath, 3- nerved. Panicles upto 15 cm long, hairy. Flowers 0.55-0.8 cm diam., pinkish-white; sepals 3; petals 4-5, shortly clawed; stamens many (more than 20); filaments free, basally hairy. Capsules upto 3.5 cm long, subglobose.

Flr. & Frt.: Mar. - Aug.

Specimen Cited: Kuwapaani, 1850 m, AP Das & PC Rai 1481, dated 18.3.1996.

Status: Less Frequent.

Local Distrib.: Kuwapaani, Sakam, Machuki. 1200-2050m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, Meghalaya, Myanmar, S. China, W. Malaysia.

***PHYLLANTHUS* L.**

Phyllanthus emblica L., Sp. Pl. ed. 1:982. 1753; FBI 5: 289. 1887; FEH 1:180. 1966; EFPN 3:198. 1982; FB 1(3):772. 1987; TBRI 50(4): 122. 1987.

Emblica officinalis Gaertner, Fruct. 2:122. 1791.

P. niinami Hayata in J. Coll. Sci. Tokyo 20(3): 14. 1904.

Local Name : Amala (Nep.).

Deciduous small tree, 4-8m. Young shoot pubescent, bark gray. Leaves sessile, distichous, dwarf shoots looking like pinnate leaves, appearing with flowers; lamina 0.65-1.2 x 0.2-0.25cm, linear-oblong, subacute, glabrous, paler beneath. Stipules upto 0.12cm long, triangular. Flowers in axillary clusters, yellowish. Male flowers shortly pedicellate; 1.2-1.4cm across; sepals 6, ovate-lanceolate; stamens 3, free. Female flowers sessile, 1.8-2cm diam., with dissected teeth; sepals 6; ovary 3-celled; style stout, exerted. Fruits 1.2-2.2cm across, globose, greenish yellow; stone 1-1.2 cm across; seeds 6, trigonous.

Flr.: Mar. - May *Frt.:* Sep. - Feb.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1479, dated 15.11.1995.

Status: Frequent.

Local Distrib.: Phari, Samsing, Gorubathan, Suntalay. 600-1250m.

General Distrib.: India, Himalayas (Kumaon-Bhutan), Assam, N. Myanmar, S. China, Malaysia.

SAUROPLUS Blume

Sauropus quadrangularis (Willd.) Muell.-Arg. in *Linnaea* 32:73. 1863; FBI 5:335. 1887; TBRI 50(4):126. 1987.

var. *compressus* (Muell.) Airy Shaw in KB. 26:337. 1972; EFPN 3:199. 1982; FB 1(3):783. 1987.

S. compressus Muell. in DC., *Prodr.* 15 (2):243. 1866; FBI 5:336. 1887; FEH 1:182. 1966.

Bushy, much branched shrub, 1-2.5m high, glabrous throughout. Branches angled and compressed. Leaves alternate; petioles 0.15–0.25cm; lamina 1.4-2.6 x 0.9-1.65cm, elliptic, often becoming ovate or obovate, subacute or obtuse, base rounded, glabrous. Stipules upto 0.15cm long. Pedicels 0.25-0.5cm, slender. Flowers dark red, males towards base of branchlets, calyx lobes obreniform, often truncate, stamens united by filaments; female calyx 0.35-0.4cm, lobes deep, obovate, subacute; ovary 3-celled. Fruits 0.5-0.65cm, globose; fruiting calyx enlarged.

Flr.: Apr. - Jul. *Frt.:* Sep. - Dec.

Specimen Cited: Samsing, 600m, AP Das & PC Rai 1781, dated 10.9.1997.

Status: Abundant at foot hill region.

Local Distrib.: Gorubathan, Samsing, Suntalay, Phari. 400-700m.

General Distrib.: Himalaya (Nepal - Bhutan), Myanmar.

BUXACEAE Dumort

SARCOCOCCA Lindl.

Sarcococca hookeriana Baillon, *Monogr. Bux.* 53. 1859; FEH 1: 185. 1966; FB 2(1): 131. 1991.

S. pruniformis var. *hookeriana* (Baillon)Hk.f., FBI 5: 267. 1887.

Local Name: Chille Kaath (Nep.).

Shrub upto 2m. Stem terete, branched. Leaves alternate; petiole 0.5-0.9; lamina 3.5-8 x 1.3-2.5 cm, narrowly elliptic-lanceolate, entire, acute or acuminate, cuneate, both surfaces glabrous, mid-rib faint and impressed above, nervules obscure. Racemes axillary, few to many flowered, short. Bracts ovate. Flowers fragrant. Tepals 0.2-0.3 cm, imbricate, pinkish or pale-yellow; stamens long, exerted, whitish; ovary 0.2 cm, globular.

Flr.: Apr. - Jun. *Frt.:* Jun. - Aug.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 0508, dated 15.10.1994; Alubari, 2280 m, AP Das & PC Rai 0518, dated 16.10.1994.

Status: Rare.

Local Distrib.: Jaributti, Left Hill crest of Alubari. 2100-2300 m.

General Distrib.: E. Himalaya (E. Nepal-Bhutan), N. Assam and S. Tibet.

Note: Grown as ornament for its fragrant flowers in the courtyard.

DAPHNIPHYLLACEAE Muell.

DAPHNIPHYLLUM Blume

Daphniphyllum himalense (Benth.) Muell. in DC., Prodr. 16(1): 113. 1869, p.p.; FBI 5: 354. 1887, p.p.; FEH 1: 184. 1966; EFPN 3: 200. 1982; FB 1(3): 814. 1987; TBRI 50(4): 111. 1987.

Goughia himalensis Benth. in Hk. Journ. Bot. Kew. Misc. 6:9. 1854.

Local Name: Lal Chandan (Nep.).

Small evergreen tree to 6-10m, glabrous. Branches robust, leafy at the tips. Terminal bud scales obtuse. Leaves simple, crowded at the branch ends; petioles 1.5-3.5 cm; lamina 5.5-18 x 2-4.3 cm, oblanceolate, entire, acute, base attenuate, coriaceous, glaucous below. Flowers in axillary racemes of 3-8 cm, unisexual; perianth absent; male flowers with 5 stamens; filament free; anthers 0.25 x 0.1 cm, narrow, dorsally compressed, apiculate; female Flowers with 2-chambered superior ovary; ovules 2 in each chamber; styles thick, recurved. Drupe 0.5-1 x 0.3-0.5 cm, ellipsoid with almost round tip, one seeded.

Flr.: May - Jul. *Fr.:* Sep. - Dec.

Specimen Cited: Jaributti-Alubari, 2195-2280 m, AP Das & PC Rai 078, dated 14.6.1994.

Status: Rare.

Local Distrib.: Jaributti-Alubari. 2195-2280m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, S. Tibet, Myanmar.

ULMACEAE Mirbel

Key to the Genera:

1. Large trees; leaves pubescent on veins beneath; male perianth segments elliptic-ovate.....*Celtis*
1. Small shrubs to trees; leaves whitish papillate above, male perianth segments linear-lanceolate.....*Trema*

CELTIS L.

Celtis tetrandra Roxb., Fl. Ind. ed. 2(2):63. 1832; FBI 5:482. 1888; FEH 1:52. 1966; 2: 19. 1971; EFPN 3:207. 1982; FB 1(1):84. 1983; TBRI 50 (4):100. 1987.

Local Name: Khari (Nep.).

Large deciduous trees, 20-30m high, young parts pubescent. Bark dark grey. Leaves alternate; petioles 0.45-1 cm long; lamina 4-9 x 2-5 cm, ovate-elliptic, serrate above the middle, acuminate, base obliquely rounded or cuneate, coriaceous, pubescent on veins beneath. Stipules linear-lanceolate. Flowers 4-merous, greenish. Male racemes 1.5-2.5 cm, perianth segments 4, upto 0.25cm, elliptic-ovate. Female flowers axillary; ovary to 0.2 cm; style 0.3-0.35 cm. Drupes 0.55-0.65cm, ellipsoid or subglobose, hairy at both the terminal ends, orange red.

Flr. & Frt.: Feb. - Oct.

Specimen Cited: Near Sakam, 1700m, **AP Das & PC Rai** 1305, dated 05.5.1995.

Status: Less Frequent.

Local Distrib.: Today -Tangta, Machuki, Reshete, Sakam. 1600-2300m.

General Distrib.: Himalaya (Kumaon - Bhutan), India, Myanmar, Malaysia.

Note: A fodder plant.

TREMA Lour

Key to the species:

1. Evergreen trees with drooping branchlets; leaf base cordate, scabrous above
.....*T. orientalis*
1. Scabrid shrubs; leaf base rounded, rough with papillae above.....*T. politoria*

Trema orientalis (L.) Blume, Mus. Bot. Lugd. - Bot. 2:58. 1856; FBI 5:484. 1888; FEH 1:52. 1966; EFPN 3: 207. 1982; FB 1(1): 86. 1983; Fl. Meg. 2:808. 1987.

Sponia politoria Planch. in Ann. Sci. Nat. Ser. 3(10):326. 1848.

Local Name: Kunyel (Nep.).

Evergreen, dioecious tree, upto 8m high with drooping branchlets, appressed pubescent. Bark silver-grey. Lamina 8-16 x 4-7cm, ovate-lanceolate, closely serrate, acute-acuminate, base cordate, scabrous above, silvery white beneath, thinly appressed hairy. Cymes 2-3cm diam., lax. Drupes ovoid, black.

Flr.: Mar. - Jul. *Frt.:* Jun. - Oct.

Specimen Cited: Suntalay, 500m, **AP Das & PC Rai** 1906, dated 28.10.1997.

Status: Common only in the lower range.

Local Distrib.: Gorubathan, Samsing, Suntalay, Phari. Upto 900m.

General Distrib.: Tropical Africa, Himalayas(Kumaon-Bhutan), India, Sri Lanka, W. & S. China, Australia.

Trema politoria (Planch.) Bl., Mus. Bot. Lugd.- Bat. 2:58.1856; FBI 5:484. 1888; FEH 2: 82.1960; FB 1(1): 86. 1983.

Small scabrid shrub to tree, 2-8m high. Petioles 0.6-1 cm long, rough in texture; lamina 4.5-12 x 2.5-5.2 cm, ovate-lanceolate, serrate, acuminate, base rounded, margins serrate, pale green beneath, dark green when dry, rough above with whitish papillae, pinnately veined, basally 3-veined. Cymes axillary, consisting of numerous Flowers, upto 1.6cm. Male Flowers 4-merous, perianth segments to 0.1cm, linear-lanceolate; stamens 0.1 cm. Female flrs: perianth segment narrow; ovary sessile, 0.1cm, ovoid; stls. 0.1cm, bifid. Drupe 0.2cm, ovoid and black.

Flr. & Frt.: May - Aug.

Specimen Cited: Below Phaparkheti, 1450m, AP Das & PC Rai 1489, dated 22.3.1996.

Status: Less Frequent.

Local Distrib.: Kuwapani, Phaparkheti, Machuki, Phari 900-1600 m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, S. W. China.

Note: A.J.C. Grierson and D. G. Long (1983) have given the remark regarding *Trema orientalis* and *T. politoria* that they may only be supspecifically distinct.

CANNABACEAE Lindl.

CANNABIS Tournef.

Cannabis sativa L., Sp. Pl. ed. 1. 1827. 1753; FBI 5: 487. 1888; Fl. Males 4(3): 223, t.1. 1951; FEH 1: 53. 1966; FB 1(1): 134. 1983.

Local Name: Bhang, Gaanja (Nep.).

Eng. Name : Hemp.

Erect annual herb, 1-1.6m tall. Leaves usually alternate but opposite at base, palmately compound; petioles upto 7.2cm long. Stipules 0.5-0.62cm long, linear; leaflets 5-16.5 x 0.4-1.4 cm, narrow elliptic or lanceolate, narrowly acuminate, base attenuate, margins serrate, scabrid above, pubescent beneath. Male panicles upto 5.2cm long, pendulous; perianth segments 5, free, 0.3cm, elliptic. Female flowers sessile, arranged in leafy spikes of 2-3 cm, perianth unlobed, minutely resinous-glandular, ovary sessile, unilocular; style deeply bifid, filiform; ovule pendulous. Achenes 0.3-0.35cm, ovoid, greenish-brown, with persistent perianth.

Flr. & Frt.: Jun. - Aug.

Specimen Cited: Near Samsing, 750m, AP Das & PC Rai 1810, dated 09.9.1997.

Status: Rare, probably accidentally introduced.

Local Distrib.: Samsing, Phari. 700-900m.

General Distrib.: Native of C. Asia, cultivated and naturalised in temperate and tropical world.

Note: Used as an intoxicant.

MORACEAE Link

Key to the Genera:

1. Flowers not enclosed but partially crowded into the surface of globose receptacles.....2
1. Flowers enclosed on inner wall of hollow receptacles (figs).....*Ficus*
2. Monoecious trees; male flowers with solitary stamen.....*Artocarpus*
2. Dioecious shrubs or trees; stamens 4.....*Morus*

ARTOCARPUS Forst.

Artocarpus lacucha Buch.-Ham. in Mem. Wern Soc. 5:333. 1826; Taxon 26: 529. 1977; EFPN 3:209.1979; Nam. Chang. Fl. Pl. 1987; FB 1(1):101.1983.

A. lakoocha Roxb., Fl. Ind. 3:524.1832; FBI 5:543.1888 p.p.; JAA 41:111. 1160; EFPN 3:209. 1982.

Deciduous, erect trees to 33m high. Petioles 2-5cm long. Leaves alternate, lamina to 25-34 x 12-21cm, elliptic-obovate, glossy greenish and glabrous above; juvenile foliage often pinnatifid. Stipules lateral, smooth. Flowers partially crowded into fleshy and subglobose heads. Syncarps subglobose, smooth and irregularly lobed.

Flr. & Frt.: Feb. - May.

Specimen Cited: Near Sakam, 1250m, AP Das & PC Rai 1476, dated 14.11.1995.

Status: Less Frequent.

Local Distrib.: Phari, Machuki, Phaparkheti. 700-1300 m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, Sri Lanka, Myanmar, Malaysia.

Note: Fruits are eaten.

FICUS L.

Key to the species:

1. Figs pedunculate, solitary or grouped on main stem and branches.....2
1. Figs sessile to subsessile, on stem branches or racemes borne on scaly branches.....4
2. Figs borne on leafless old stem.....*F. auriculata*
2. Figs borne on leafy new stem.....3
3. Plant erect shrub or small tree; peduncles less than 0.6cm.....*F. subincisa*
3. Plant climbing shrub; peduncles 0.8-1.3cm long.....*F. hederacea*

4. Stipules more than 3cm; petiole 5-11cm long.....*F. hookeriana*
 4. Stipules absent or when present not larger than 1.2cm; petioles 1-2cm long.....5
 5. Lamina 5-12cm long, apex abruptly acuminate.....*F. benjamina*
 5. Lamina 9.5-38cm, apex acuminate.....6
 6. Trees, upto 10m tall; leaves entire, not scabrid.....*F. neriiifolia*
 6. Shrubs; leaves serrulate, scabrid above.....*F. hirta*

Ficus auriculata Lour., Fl. Cochinch. 666. 1790; Gard. Bull. Singap. 18:33. 1960; FEH 1:53. 1966; EFPN 3:209. 1983; FB 1(1):92. 1983.

F. roxburghii Wallich [Cat. No. 4508. 1831, *nom. nud.*] ex Miq. in Ann. Mus. Lugd.-Bat. 3: 296. 1867; FBI 5: 534. 1888; Symb. Sin.7:100. 1929.

Local Name: Nebhara (Nep.).

Tree to 9 m tall. Petioles 6-9.5cm. Stipules triangular. Lamina 13-29 x 9-24 cm, broadly ovate, acute, base cordate, margins toothed, glabrous above, sparsely pubescent beneath, lateral nerves 5-7 pairs, raised beneath, basally 5-veined. Peduncles 3cm long, borne on short leafless branches. Male flowers with 1-3 stamens Female flowers ovary oblique; style simple. Figs with an opening at apex.

Flr. & Frt.: Apr. - Sep. *Ripe figs.:* Jun. - Sep.

Specimen Cited: Near Kuwapaani, 1850m **AP Das & PC Rai** 1482 dated 18.3.1996.

Status: Frequent in lower part.

Local Distrib.: Machuki, Phari, Kuwapaani, Pharparkheti. 900-1700 m.

General Distrib.: Himalayas (Kashmir-Bhutan), India, Myanmar, S. China.

Note: Figs are eaten. Foliage used as fodder.

Ficus benjamina L., Mant. Pl. 129. 1767; FBI 5:508. 1888; Faun. & Fl. Nep. Him.109, t. 3. 1955; Gard. Bull. Singap. 21:21. 1965; EFPN 3:209. 1979; FB 1(1): 95. 1983.

Local Name: Kabra (Nep.).

12-18m high trees Branches drooping. Petioles 1-2.2cm long. Lamina 5-12 x 4-5.9cm, ovate-elliptic, abruptly acuminate, base cuneate or rounded, glabrous, veins many and parallel. Figs to 2cm when ripe, red, sessile and axillary; bracts 3, upto 0.1cm.

Flr. & Frt.: Oct. - Apr. *Ripe figs.:* Feb. - Apr.

Specimen Cited: Above Chel Khola, 1200m, **AP Das & PC Rai** 1492, dated. 22.3.1996.

Status: Frequent.

Local Distrib.: Phari, Samsing, Chel Khola. 500-1200 m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, S.China, Thailand, Philipines, New Guinea.

Note: A tasty pickle is prepared from young leaf buds. Young leaf buds are also cooked as vegetable.

Ficus hederacea Roxb., Fl. Ind. ed. 2(3):538. 1832; FEH 1:53. 1966; EFPN 3:210. 1982; FB 1(1):98. 1983; TBRI 50(4):100. 1987.

F. scandens Roxb., Fl. Ind. ed. 2 (3):536. 1832; FBI 5:526. 1888, *non* Lamarck.

Shrubby climber on rocks and trees, rooting from nodes. Leaves alternate; petioles 0.75-1.2 cm; lamina 4.8-8.8 x 3.2-5.8cm, ovate-elliptic, acute, base rounded, margin entire, coriaceous, scabrid above, pubescent beneath, lateral nerves upto 5 pairs. Stipules 0.6-0.8cm, ovate. Hypanthodia 0.9-1.25 cm, globose, either solitary or axillary pairs, hairy, greenish yellow on ripening. Peduncles 0.8-1.3 cm long. Basal bracts 3, ovate, persistent. Male flowers sessile with perianth segments 4. Female flowers borne in separate receptacle (figs), with subcapitate stigma. Achenes oblong.

Flr. & Frt.: Jul. - Dec. *Ripe figs:* Oct. - Dec.

Specimen Cited: Sakam, 1150m, **AP Das & PC Rai** 1477, dated 14.11.1995.

Status: Common.

Local Distrib.: Samsing, Phari, Sakam, Gorubathan. 600-1400m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Assam, Myanmar, S. China.

Ficus hirta Vahl, Enum. Pl. 2:201. 1806; FBI 5:531. 1888; Fl. Ind. ed. 2, 3:534. 1832; Gard. Bull. Singap. 21:45. 1965; EFPN 3:210. 1982; FB 1(1): 93. 1983.

F. triloba Wallich, Cat. 160, n. 4491.1831, *nom. nud.*

F. hirsuta Roxb., Fl. Ind. ed. 2, 3:528. 1832.

Local Name: Khasray (Nep.).

Shrub to small tree, 2-3.5m high, hirsute. Petioles 4-13cm long. Lamina 12-38 x 9-30 cm, broadly ovate, usually unlobed or sometimes 3-5 lobed, acuminate, base rounded, margins serrulate, rarely cordate, thickly hirsute beneath, scabrid above. Figs sessile, axillary and in pairs, 2-4 cm, globose or ovoid, brownish hirsute.

Flr. & Frt.: Jun. - Dec. *Ripe figs.:* Oct. - Mar.

Specimen Cited: Above Samsing 700m, **AP Das & PC Rai** 1563, dated 06.6.1996.

Status: Fairly frequent in lower altitudes.

Local Distrib.: Phari, Samsing, Suntalay. 500-1250m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Myanmar, S. China, Malaysia.

Note: Figs are edible.

Ficus hookeriana Corner in Gard. Bull. Singap. 17:378. 1959; Nam. Chang. Flr. Pl. 233. 1987; FB 1(1): 97. 1983.

F. hookeri Miq., Ann. Mus. Bot. Lugd. Bot. 3:215, 286. 1867; FBI 5:505. 1888.

Local Name: Nebhara (Nep.).

Tree to 5-8m. Petioles 5-10.5 cm long. Stipules 3-8.9cm, linear-lanceolate. Lamina 10-24.5 x 9-17.5cm, broadly elliptic, apiculate, base rounded, basally 3-veined, lateral veins 6-8 pairs. Figs 1.6-2.45cm across, sessile to subsessile, obovoid, apically depressed; basal bracts connate into a conspicuous cup.

Flr. & Frt.: Jul. - Mar. *Ripe figs:* Nov. - Mar.

Specimen Cited: Suntalay, 655m, **AP Das & PC Rai** 1524, dated 04.6.1996.

Status: Frequent.

Local Distrib.: Suntalay, Machuki, Chel Khola. 500-1550 m.

General Distrib.: E. Himalaya (Nepal-Sikkim), Assam, Meghalaya, S.W. China

Note: Leaves are used to make table-plates.

Ficus nerifolia J.E. Smith in Rees, Cyclop. 14. no. 21. 1810; FEH 1: 54. 1966; FB 1(1): 95. 1983; Nam. Chang. Flr. Pl. 234. 1987; TBRI 50 (4): 114. 1987.

F. gemella Wallich ex Miq. in Hooker's Lond. J. Bot. 7: 454. 1848.

F. nemoralis Wallich ex Miq. var. *gemella* (Wallich ex Miq.) King in ARBGC 1(2): 162. 1888; FBI 5: 534. 1888.

Local Name: Dudhilo (Nep.).

Shrub or small tree, 4-9 m tall. Stem much branched. Branchlets reddish. Stipules upto 1.8 cm, lanceolate. Petioles 1-2 cm long, light red; lamina 9.5-14.5 x 2.5-5 cm, lanceolate or elliptic-lanceolate, entire, sharply acuminate, base cuneate, glabrous both surfaces, lateral nerves 10-12 on either half, reticulation conspicuous and dark coloured beneath. Figs 0.55-0.85 cm across, ellipsoidal-globose, scaly at base, sessile, sometimes peduncled.

Flr. & Frt.: Jul. - Dec. *Figs ripe during* Dec. - Feb.

Specimen Cited: Choudha Feri, 2285 m, **AP Das & PC Rai** 1293, dated 05.5.1995.

Status : Common.

Local Distrib.: Lava, Todey-Tangta, Kuwapaani, Zero Point. 1400-2200 m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), E. Tibet, S.W. China.

Note: Figs are edible. Foliage excellent fodder for cattle.

Ficus subincisa Buch.-Ham. ex J.E. Smith in Rees, Cyclop 14: 91. 1810; FB 1(1): 98. 1983; Nam. Chang. Flr. Pl. 236. 1987.

F. clavata Wallich ex Miq. in Hooker's Lond. J. Bot. 7: 431. 1848; FBI 5: 520. 1888.

Local Name: Garulay (Nep.).

Shrub to tree, 2.5-6.5 m tall. Young twigs scabrid. Bark gray-brown, warty. Stipules caducous, lanceolate. Petioles 0.5-1.2 cm long. Leaves alternate; lamina 9.5-13 x 3-5 cm, elliptic-oblongate, margin coarsely toothed above the middle, lower half entire, caudate-acuminate, base attenuate, lateral nerves 4-7 on either half. Peduncles upto 0.6cm long. Figs borne on leafy stem, 1.2-1.9 x 1.1-1.5 cm, obovoid, strigose at young stage, glabrous becoming yellowish at ripening, borne on 0.55 cm long peduncle

Flr. & Frt.: Sep. - Apr. *Ripe figs:* Mar. - May

Specimen Cited: Phari-Samsing, 630-660 m, **AP Das & PC Rai** 1593, dated 07.6.1996.

Status: Common.

Local Distrib.: Phari, Samsing, Todey-Godak, Machuki. 600-1600m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), N. Myanmar, S.W. China.

Note: Figs are edible. Good fodder for cattle and goats. Foliage is given to cows when they are feeding their milks to the calves. This fodder is believed to stimulate body metabolism in female cattle for more milk production.

MORUS L.

Key to the species:

1. Shrub to small trees, 4-9m tall; petioles upto 2cm long; lamina ovate; style upto 0.4-0.5cm long.....*M. australis*
1. Trees, upto 30m tall; petioles 2.5-4.5cm long; lamina elliptic-ovate; style to 0.22cm.....*M. macroura*

Morus australis Poiret in Lamk., Ency. 4:380.1797; JAA 8:236. 1927; JAA 10:123. 1929; Nam. Chang. Flr. Pl. 376. 1987; FB 1(1): 101. 1983.

M. indica auct. non L.: Hk.f., FBI 5:492. 1888.

Local Name: Sano Kimbu (Nep.).

Deciduous shrub to tree, 4-9m high. Leaves alternate; Petioles 1-2cm; Stipules upto 1cm, lateral; lamina 3-8.5x2-5.8cm, ovate, caudate-acuminate, base cordate or rounded, coarsely serrate, sometimes deeply trilobed, pubescent beneath, minutely strigose above. Male spikes 2-2.5cm, axillary, perianth segments 0.2cm; stamens 0.4cm. Female spikes shorter, perianth segments 4, short to 0.1cm, ovate., overlapping, becoming succulent in fruit; style 0.4-0.5cm, bifid. Fruiting spikes 0.8-2 x 0.7-0.75cm, purplish-black.

Flr. & Frt.: Mar. - May.

Specimen Cited: Near Kuwapaani, 1750m, **AP Das & PC Rai** 1483, dated 18.3.1996.

Status: Sparse.

Local Distrib.: Kuwapaani, Sakam. 1500-1750m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, Myanmar, W. China.

Note: Fruits are eaten.

Morus macroura Miquel, Pl. Jungh. 42. 1851; FEH 1:55. 1966; 2:20. 1971; EFPN 3:212. 1982; FB 1(1):102. 1983.

M. laevigata Wallich *ex* Brandis, For. Fl. Ind. 409. 1874; FBI 5:492. 1885.

Local Name: Kimbu (Nep.).

Large deciduous tree, upto 30m high. Petioles 2.5-4.5cm long. Leaves alternate; lamina 6-16.5 x 6-13cm, elliptic-ovate, unlobed, base rounded, margin finely serrate, thinly pubescent. Stipules upto 1.45cm. Male catkins subsessile, 8-14cm long, villous. Female catkins 3.2 -5.2cm; style 0.22 cm, bifid. Fruiting catkins 5-7cm or more elongated, yellowish white on ripening.

Flr.: Mar. - Apr. *Frt.:* May - Jun.

Specimen Cited: Near Machuki, 1200m, AP Das & PC Rai 1811, dated 09.9.1997.

Status: Only few plants seen.

Local Distrib.: Gorubathan, Samsing-Phari, Chouda Feri, Reshete. 400-2200m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, S.W. China.

URTICACEAE Juss.

Key to the Genera:

1. Plants with stinging hairs..... 2
1. Plants without stinging hairs.....5
2. Leaves opposite.....*Urtica*
2. Leaves alternate.....3
3. Leaves palmately lobed.....*Girardinia*
3. Leaves unlobed.....4
4. Plants herbaceous; lamina sharply serrate; achenes flattened.....*Laportea*
4. Plants shrubby or tree; leaf entire or crenate to sinuate; achenes not flattened
.....*Dendrocnide*
5. Leaves 3-nerved at base, often pinnately veined at base.....6
5. Leaves 3-veined, sometimes pinnately veined.....9
6. Plants erect, prostrate or decumbent herbs; leaves linear.....*Pilea*
6. Plants bushy undershrubs to small trees; leaves elliptic.....7
7. Flowers cluster sessile or forming cymes; achenes subtended by fleshy perianth cup
.....*Oreocnide*

7. Flowers clustered on leaf axils, cluster sessile or grouped into simple naked spikes; achenes not subtended by perianth.....8
8. Fruiting styles deciduous.....*Pouzolzia*
8. Fruiting styles persistent.....*Boehmeria*
9. Lamina asymmetric, base oblique; stipules axillary.....10
9. Lamina symmetric, base not oblique; stipules lateral, rarely axillary and bifid.....11
10. Leaves alternate; flowers on bracteate receptacles.....*Elatostema*
10. Leaves opposite; flowers on pedunculate fleshy receptacle.....*Lecanthus*
11. Erect tree or diffused herbs.....12
11. Plant twinner, hispid.....*Tragia*
12. Diffuse or tufted herb; stipules 0.3-0.5cm long, simple.....*Chamabiana*
12. Large evergreen shrub; stipules 0.55-0.7cm long, bifid.....*Debregeasia*

***BOEHMERIA* Jacq.**

Key to the species:

1. Undershrubs or shrubs, 1-3m high.....2
1. Small trees, upto 9m high.....*B. rugulosa*
2. Plant a robust sub-shrub; branches glabrous; almina lanceolate.....*B. hamiltoniana*
2. Plant a shrub; branches pubescent; lamina ovate.....*B. glomerulifera*

Boehmeria glomerulifera Mig. in Zoll., Syst. Verz. Ind. Archip. 101, 104 1854; FB 1(1): 124. 1983, Nam. Chang. Flr. Pl. 66. 1987.

B. malabarica Wedd. in Arch. Mus. Hist. Nat. Paris 8: 355. 1855-56; FBI 5: 575. 1888.

Local Name: Kamle (Nep.).

Shrubs upto 3 m tall, branches pubescent. Leaves alternete; petioles 2.2-5.5 cm long; stipules upto 7 cm, lanceolate; lamina 10-19 x 4.5-9 cm, ovate, acuminate, base rounded, margins crenulate or sometimes serrulate, glabrous and rugose above, minutely hairy beneath. Flowers aggregated in globose clusters, 0.4-0.7 cm in diam., pubescent female ones on upper sides of old branches, 0.01 cm across, males towards base.

Flr. & Frt.: Mar. - Jul.

Specimen Cited: Suntalay, 655 m, **AP Das & PC Rai** 1520, dated 04.6.1996.

Status : Frequent.

Local Distrib.: Phari, Samsing, Gorubathan. 700-1150m.

General Distrib.: E. Himalaya (Darjeeling-Bhutan), Meghalaya, Sri Lanka.

Boehmeria hamiltoniana Weddell in Ann. Sci. nat. ser. 4, 1; 199. 1854; Monogr. Urt. 371. 1856; FBI 5: 579. 1888; Symb. Sin. 7: 151. 1929; Fl. Asm. 4: 289. 1940; FEH 1: 56. 1966; FB 1(1): 127. 1983.

Local Name: Kamley, Chiplay (Nep.).

A robust subshrubs, 1-3 m high. Branches slender, glabrous. Petioles 1-2.5 cm long. Lamina 7-10.5 x 3-5 cm, lanceolate, margin crenulate or serrulate, acuminate, base

cuneate or narrowly rounded, membranous, glabrous, basally 3-nerved, veins sparsely pubescent beneath. Spikes 12 cm long, slender. Achenes ellipsoid, glabrous, with the crown of persistent style

Flr.: Sep. - Nov. *Fr.*: Nov. - Feb.

Specimen Cited: Hattidara, 2300 m, AP Das & PC Rai 0626, dated 17.10.1994.

Status: Frequent.

Local Distrib.: Todey, Samsing, Hattidara, Machuki. 800-2300m.

General Distrib.: Tropical Himalayas (Nepal-Bhutan), Khasia and Mishmi Hills.

Note: Foliage commonly used as fodder.

Boehmeria rugulosa Weddell in Ann. Sci. Nat. Ser. 4, 1:200. 1854; Monogr. Urt. 373. 1856; FBI 5:577. 1888; FEH 1:57. 1966; FB 1(1):125. 1983.

Local Name: Daar (Nep.).

Small trees to 9m tall, dioecious. Leaves opposite, sometimes few. Leaves alternate; petioles upto 4.2 cm long; stipules 0.6 cm, ovate, deciduous; lamina 9-19 x 3.3-6.8 cm, ovate-lanceolate, acute to shortly acuminate, base subcuneate or rounded, margins crenulate, coriaceous, strongly 3-veined, rugulose above, whitish pubescent beneath. Flowers clusters forming elongate simple axillary spikes upto 6-14.5 cm. Male flowers 0.16cm diam., globose, 4-5 merous with free perianth segments. Female flowers 0.1cm, perianth ovoid at later stage, compressed, white hairy; style filiform. Achenes enclosed by persistent perianth.

Flr. & Fr.: Sep. - Dec.

Specimen Cited: Below Phapar Kheti, 1300 m, AP Das & PC Rai 1807, dated 09.9.1997.

Status: Rare.

Local Distrib.: Machuki, Phari, Phapar Kheti. 900-1350m.

General Distrib.: Himalayas (Garhwal-Bhutan).

Note: Different types of traditional bowls and domestic utensils are made from its wood by a community called Chundaray.

CHAMABIANA Wight

Chamabiana cuspidata Wight, Icon. t. 1981. 1853; Monogr. Urtic. 387, t.12. 1856; FBI 5: 580. 1888; FEH 1: 57. 1966; 3: 19. 1975; EFPN 3: 202. 1982; FB 1(1): 128. 1983; TBRI 50 (4): 109. 1987.

C. squamigera Weddell in DC., Prodr. 16 (1) : 218. 1869,

Local Name: Kurkuray Jhar (Nep.).

Slender diffuse, creeping or densely tufted herbs. Stem densely pubescent. Leaves opposite; stipules 0.3-0.5 cm, 4 at base, broadly ovate, membranous; petioles upto 0.25 cm; lamina 1.1-1.6 x 0.5-1.1 cm, ovate, serrate, acute, base rounded or cuneate, basally 3-nerved, nerves obscure above, thinly pubescent. Flowers in axillary sessile clusters of 0.9 cm diam., 4-merous, male above, female below; male flowers shortly pedicellate, perianth deeply divided, lobes many and mucronate; female flowers with hirsute tubular perianth, minutely 4-toothed; stigma ovate, fimbriate, persistent and spreading. Achenes compressed and enclosed in persistent dry perianth.

Flr. & Frt.: Mar. - Nov.

Specimen Cited: PHE Source, 2155m, AP Das & PC Rai 0292, dated 17.6.1994.

Status: Abundant.

Local Distrib.: Jaributti, PHE Source, Rechila Middle, Lava. 1900-2450m.

General Distrib.: Himalayas (Garhwal-Bhutan), India, Sri Lanka, Myanmar, east to China, Formosa, Java.

DEBREGEASIA Gaud.

Debregeasia longifolia (Burm. f.) Wedd. in DC.; Prodr. 16(1):235. 1869; Fl. Asm. 4:295. 1840; FEH 1:56. 1966; Fl. Jow. 2: 453. 1983; FBI (1):132. 1983; Fl. Meg. 2: 842. 1987; Nam Chang. Flr. Pl. 171. 1987.

Urtica longifolia Burm. f., Fl. Ind. 297. 1768.

Debregeasia velutina Gau., Bot. Bonite Voy. t. 90. 1842-43; FBI 5:590. 1888; Man. Ind. Timb. 660. 1902; Ind. Trees 618. 1906.

Local Name: Tusaray (Nep.)

Large evergreen shrubs, 2.5-7.5 m high. Bark dark brown. Young parts silky pubescent. Stipules 0.55-0.75 cm long, 2-fid, scarious. Leaves alternate; petioles 0.75-3 cm; lamina 7.5-18 x 2-6 cm, elliptic-lanceolate, margin finely serrate, acuminate, base rounded, 3-veined at base, laterally 3-7 veined on upper part of leaf, white tomentose beneath, veins pubescent. Male flowers usually 4-merous, clustered into a compact cyme of 0.6 cm diam., perianth deeply divided. Female cymes 1-1.5 cm diam., perianth ovoid; stigmas sessile. Achenes enclosed by fleshy perianth, orange yellow.

Flr. & Frt.: May - Nov.

Specimen Cited: Near Mulkharka, 2100 m, AP Das & PC Rai 1770, dated 30.5.1997.

Status: Common.

Local Distrib.: Lava, Mulkharka, Thartharay, Sakam Forest, Rechila Middle. 1600-2400m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), India, Sri Lanka, Myanmar, W. E. China, Malaysia.

Note: The fibres obtained from the stem is commonly used to make rope and fishing nets. Fruit is also edible.

DENDROCNIDE Miquel

Dendrocnide sinuata (Bl.) Chew in Gard. Bull. Singap. 21:206. 1965 & 25:36. 1969, FB 1(1):111. 1983; Nam. Chang. Flr. Pl. 175. 1987.

Urtica sinuata Bl., Bijdr. 505. 1825.

U. Crenulata Roxb., Fl. Ind. 3: 591. 1032, non. Sev. 1785.

Laportea crenulata Wedd., Arch. Mus. Hist. Nat. Paris 9: 133. 1856, FBI 5: 550. 1888.

Local Name: Morungay (Nep.).

2-4 m tall shrubs or often small tree to 9 m high. Petioles 3.5-10 cm, sometimes even longer to 16 cm; stipules 1.4-1.9 cm long, ovate; lamina 18-30 x 7.5-16 cm, sometimes even longer, elliptic or ovate, entire or crenate-sinuuate, acute to acuminate, base cordate or rounded, sparsely stinging hairy beneath. Panicles 4.5-16 cm long, males smaller than females. Flowers (male) being 0.2-0.3 cm; ovary upto 0.2 cm long, apically beaked; style 0.4-0.5 cm. Achenes 0.3-0.45 x 0.25-0.4 cm, obliquely ovate, whitish.

Flr. & Frt.: May - Sep.

Specimen Cited: Neora Khola at Samsing, 730 m, **AP Das & PC Rai** 1703, dated 18.5.1997.

Status: Sparse.

Local Distrib.: Suntalay, Phari, Samsing. 400-900m.

General Distrib.: Subtropical Himalayas (Nepal-Bhutan), India, Sri Lanka, Myanmar, east to China, Malaysia.

ELASTOTEMA Forst.

Key to the species:

1. Only leaf apex or upper half margin serrate or toothed.....2
1. Leaf margin sharply serrate throughout.....*E. sessile*
2. Glabrous herbs; receptacle generally sessile or shortly stalked.....3
2. Hairy herbs; receptacle distinctly pedunculate, sometimes sessile.....4
3. Lamina 3-6.5cm long, asymmetric elliptic, upper margin coarsely crenate-serrate.....*E. acuminatum*
3. Lamina 4.5-8cm long, oblong-elliptic; margin serrate on upper half*E. hookerianum*
4. Lamina ovate-lanceolate or oblanceolate, upper half of margin sharply serrate.....5
4. Lamina obovate or elliptic oblong, 3-7 toothed near apex.....6
5. Leaves pubescent above; stipules minute.....*E. monandrum*
5. Leaves glabrous; stipules upto 0.5cm long.....*E. subincisum*
6. Much branched herb, suberect, eglandular; stipules upto 1.1cm.....*E. sikkimense*
6. Slender herb, stem creeping, glandular; stipules upto 0.3cm.....*E. obtusum*

Elatostema acuminatum Brongn., Bot. Voy. Coq. 211. 1842-43; Monogr. Urt. 311, t. 9. 1856; Prodr. 16 (1):181. 1869; FBI 5:566. 1888; TBRI 50 (4):112. 1987; FB 1(1): 119. 1983.

Herbs to 20 cm. Stem weak, almost glabrous. Stipules 0.35-0.55 cm, lanceolate, caducous. Leaves subsessile-sessile, alternate; lamina 3-6.5 x 1.4-2.5 cm, asymmetric elliptic, margins coarsely crenate-serrate, basal part below the middle entire, caudate-acuminate, acumen upto 1 cm, entire, base obliquely cuneate, texture rigid, membranous, dark green, nearly glabrous, nerves 3-4 from the base. Flower heads apparently solitary, 0.45-1 cm in diam. Achenes ellipsoidal.

Flr.: Jun. - Jul. *Fr.*: Jul. - Aug.

Specimen Cited: Jaributti, 2195 m, **AP Das & PC Rai** 0497, dated 15.10.1994.

Status: Common.

Local Distrib.: Alubari, Pankhasari, Jaributti, Thartharay. 1900-2300m.

General Distrib.: E. Himalaya, Myanmar, Malaysia, etc.

Elatostema hookerianum Wedd., Monogr. Urtic. 309. 1856; FBI 5: 567. 1888; FEH 1:58. 1966; 3:20. 1975; FB 1(2):122. 1983; TBRI 50 (4): 112. 1987.

Perennial, dioecious erect herb, 12-30cm, glabrous; lower stem creeping. Leaves sessile, 4.5-8 x 1.2-2.4cm, obscurely oblong-elliptic, acuminate, base obliquely cordate-auriculate, margin serrate on upper half, basally 3-5 veined. Stipules 0.55-0.75cm, linear. Coenanthium sessile, 0.45-0.7cm across. Flowers dioecious. Bracts free in male heads, mucronate, that of female heads fused into a receptacle, ciliate. Achenes ellipsoid, irregularly ribbed.

Flr.: Apr. - Jun. *Fr.*: Jul. - Sep.

Specimen Cited: Rechila Park, 2280 m, **AP Das & PC Rai** 1911 dated 28.10.1997.

Status: Abundant.

Local Distrib.: Reshete, Chitray, Kolbong, Rechila Park, PHE Source, Jaributti. 1800-2600m.

General Distrib.: E. Himalaya (Darjeeling-Arunachal Pradesh), Meghalaya, Naga Hills, S. Tibet.

Elatostema monandrum (Buch.-Ham. ex D. Don) Hara in FEH 3:21. 1975; EFPN 3: 203. 1982; FB 1(1): 122. 1983; TBRI 50 (4): 112. 1987.

Procris monandra Buch.-Ham. ex D. Don, Prodr. 61. 1825.

Elatostema surculosum Wight, Icon. t. 2091, f. 4. 1853; FBI 5: 572. 1888; FEH 1: 59. 1966, p.p.

E. surculosum var. *elegans* Hk. f., FBI 5: 573. 1888.

Small erect herbs, 6-18 cm. Stems either glabrous or puberulous. Stipules minute, axillary. Leaves sessile, apparently alternate but a small rudimentary leaf placed oppositely; lamina 2-5 x 0.4-1.2 cm, lower leaves smaller, subentire and becoming fleshy, ovate-lanceolate, margin deeply serrate from middle or often below middle, acute or acuminate, base obliquely cuneate-rounded, pale-green, pubescent above; small opposite rudimentary leaves lateral, upto 1cm long, oblong, entire. Heads of male flowers usually sessile, rarely pedunculate, subtended by free broad bracts. Female receptacles sessile and enclosed by connate bracts. Achenes fusiform.

Flr.: Jun. - Aug. *Fr.:* Aug. - Oct.

Specimen Cited: Rechila, 2200 m, **AP Das & PC Rai** 0405, dated 15.10.1994.

Status: Fairly Common.

Local Distrib.: Thosum beat, Ruka Hill, Jorpokharai, Rechila Chowk, Sakam. 1700-3050m.

General Distrib.: Himalayas (Simla-Bhutan), India, Sri Lanka, Myanmar, W. China.

Elastostema obtusum Wedd. in Ann. Sci. Nat. ser. 4, 1: 190. 1854; Monogr. Urtic. 324. 1856; FBI 5: 573. 1888; Rep. Beih. 83(1): 30. 1935; FEH 1: 58. 1966; FB 1(1): 121. 1983; TBRI 50 (4) : 113. 1987.

Local Name: Gagleto (Nep.).

Slender herbs, 10-19 cm. Stems creeping, pubescent and covered with reddish minute glands. Stipules solitary, 0.2-0.3 cm long, linear-lanceolate. Leaves alternate, sessile; lamina 0.6-1.7 x 0.35-0.7 cm, obovate, margin toothed with few blunt teeth towards apex, obtuse, base cuneate on one side and articulate on the other, basally 2-nerved, veins pubescent. Peduncles 1-2 cm long. Bracts 4, upto 0.4 cm long, ovate-oblong. Male-heads 3-4 flowered. Flowers 0.2 cm across; perianth segments 3, obovate, horned. Female flower and fruit not observed.

Flr.: May - Jul.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 089, dated 14.6.1994; Jaributti, 2195 m, **AP Das & PC Rai** 0432 dated 17.10.1994.

Status: Common.

Local Distrib.: Jaributti, Alubari, Hattidara, Chiutray, Tinsiman. 1900-2900m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, Myanmar, W. China.

Elatostema sessile Forster, Char. Gen. 106. 1776; Monogr. Urtic. 294, t. 9. 1856; FBI 5: 563. 1888; Rep. Beih. 83. (1): 30. 1935; Fl. Asm. 4: 284. 1984; Faun. & Fl. Nep. Him. 111. 1955; FEH 1: 59. 1966; FB 1(1): 118. 1983; TBRI 50 (4): 113. 1987.

Local Name: Gagleto (Nep.).

Comparatively larger herbs, 20-60 cm, often appearing undershrub. Stem hollow, creeping at base. Stipules 1.2-1.5 cm long, oblong. Leaves sessile, alternate; lamina 5.5-16.5 x 1.5-4.8 cm, asymmetrically elliptic, margin deeply serrate, acuminate, base obliquely cuneate, dark green, scarcely appressed pilose. Flowers heads axillary, usually sessile or rarely short peduncled, 0.4-1.2 cm across. Male flowers spurred at apex, perianth segments 0.1-0.15cm long, oblong. Female flowers accompanied with linear bracteoles, hairy. Achenes ellipsoidal.

Flr.: May - Aug. *Fr.*: Aug. - Nov.

Specimen Cited: Hattidara, 2580m, **AP Das & PC Rai** 0630, dated 17.10.1994.

Status: Common.

Local Distrib.: Hattidara, Dhamdhamay Dara, Sakam Forest, Middle Rechila Chowk. 1750-2600m.

General Distrib.: Himalayas (Garhwal-Bhutan), India, Myanmar, east to China, Malayasia

Elatostema sikkimense C.B. Clarke in Jour. Lin. Soc. Bot. 15: 125. 1877; FBI 5:571. 1888; FB 1(1): 121. 1983; TBRI 50 (4):113. 1987.

Much branched, rusty puberulous suberect herbs, 25-40cm high. Stem creeping, succulent. Petioles 0.4-0.6cm long; stipules upto 1.1 cm long, lanceolate; lamina asymmetric, 5.5-12 x 2.5-4cm, elliptic-oblong, acuminate, base cuneate, margin sharply serrate toward the apex, shallowly serrate on the other, glabrous. Flowers monoecious. Male and female heads 0.9-1.2cm diam., shortly pedunculate. Involucral bracts forming 0.5 cm long horny spur. Perianth lobes rounded and gibbous. Achenes fusiform, ribbed.

Flr.: Jun. - Aug. *Fr.*: Jul. - Nov.

Specimen Cited: Alubari Khasmahal, 2280 m, **AP Das & PC Rai** 1912, dated 28.10.1997.

Status: Abundant.

Local Distrib.: Sakam, Zero Point, Reshete, Pankhasari, Alubari. 1600-2300 m.

General Distrib.: E. Himakaya (Darjeeling-Sikkim).

Note: Abundantly growing on wet rocks and shady slopes.

Elatostema subincisum Wedd., Monogr. Urtic. 314. 1856; FBI 5: 566. 1888; FEH 3: 23. 1975; EFPN 3: 203. 1982; FB 1(1) : 122. 1983.

Erect herbs, upto 30 cm high. Stipules 0.4-0.5 cm, linear-lanceolate. Leaves alternate, sessile; stipules 0.4-0.5cm long; lamina 1-4 x 0.8-2 cm, oblong lanceolate, terminal leaves quite larger than lower leaves, margin deeply serrate, acuminate, base cuneate, glabrous or ciliate. Flowers heads usually sessile, sometimes shortly pedunculate (male

flowers heads), enclosed by apically horned bracts; bracts free in male heads, connate in female flowers heads. Achenes fusiform.

Flr.: Jun. - Aug. *Fr.*: Aug. - Nov.

Speciman Cited: Alubari, 2280 m, AP Das & PC Rai 047, dated 14.6.1994.

Status: Common.

Local Distrib.: Alubari, Thosum Peak, Ruka Hill, Tinsimana. 2200-2900m.

General Distrib.: Endemic to E. Himalaya (Nepal-Darjeeling).

GIRARDINIA Gaud.

Girardinia diversifolia (Link) Fries in KB 36: 145. 1981; Nam. Chang. Flr. Pl. 257. 1987; FB 1(1): 111. 1983; TBRI 50 (4):150. 1987.

Urtica diversifolia Link, Enum. 2: 385.1822, non Bl. 1825.

U. palmata Forssk., Fl. Aeg.- Arab. 159. 1775, non *Girardinia*.

U. heterophylla Vahl, Symb. Bot. 1:76.1790 nom. illeg.

Girardinia heterophylla Decne in jacquemont Voy. Inde. 4, Bot. 151. t. 153. 1844; Hk. f. FBI 5: 550. 1888; Fl. Jow. 2: 446. 1983.

Local Name: Bhangray Sisnu (Nep.).

Perennial herbs upto 2m high with stinging hairs throughout. Leaves alternate; petioles upto 10.2cm long; stipules 2-2.6cm, ovate connate; lamina 9-20.5 x 7.5- 20.2cm, broadly ovate, deeply palmately lobed, sometimes lower leaves unlobed, acuminate, base rounded, coarsely serrate, strongly 3-nerved at base. Male panicles axillary and spreading; flowers 0.15cm diam, perianth segments 4, free. Female panicles prickly, condensed to spike-like; flowers equal to male flowers, perianth united, 3-toothed; style subulate. Achens 0.25 cm diam., compressed and blackish.

Flr. & Fr.: Jun. - Sep.

Specimen Cited: Below Alubari, 2100m, AP Das & PC Rai 1809, dated 09.9.1997.

Status: Common.

Local Distrib.: Machuki, Tiffin Dara, Rechila Middle, Jaributti, Pankhasari. 1400-2500m.

General Distrib.: Himalayas (Punjab-Bhutan), India, Sri Lanka, Myanmar, east to C. China, Malaysia.

Note: Bow-strings and ropes are made from the fibres.

LAPORTEA Gaud. (nom. cons.)

Laportea terminalis Wight., Icon. t. 1972. 1853; Monogr. Urtic. 125, t. 2c. 1856; FBI 5: 549. 1888; FEH 1: 60. 1966; EFPN 3: 204. 1982; FB 1(1): 110. 1983; TBRI 50 (4):118. 1987.

L. bulbifera auct non Wedd., Chew in Gard. Bull. Singap. 25: 121, f 2. 1969, p.p.

L. oleracea Wedd., Monogr. Urtic. 141. 1856.

Local Name: Patle Sisnu (Nep.).

A perennial suffrutescent plant upto 125 cm high with white stinging hairs. Stipules bifid, 0.9-1 cm long, lanceolate. Petioles 1-9 cm long, slender. Leaves alternate, 5.5-16.5 x 2.8-10 cm, ovate, margin sharply serrate, acute to acuminate, base rounded, pinnately veined with 3 nerves at base, nerves raised beneath, scaberulous and deep green above, pale green beneath. Male panicles upto 8.2 cm long. Male flowers 0.2 cm across, perianth segments 4-5, equal, hairy; stamens 4-5. Female flowers on winged stalks, perianth segments 4, unequal; ovary 0.1 cm; style upto 0.3 cm, slender. Achenes 0.35-4 x 0.21-0.24 cm, flattened; fruiting pedicels elongated.

Flr.: May - Aug. *Fr.:* Sep. - Feb.

Specimen Cited: Jaributti, 2195 m **AP Das & PC Rai** 0460, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Ruka Hill, Thosum Beat, Jaributti, Pankhasari, Sakam. 1600-2800m.

General Distrib.: Himalayas (Kumaon-Bhutan), India, Sri Lanka, Tibet, Myanmar, east to China, Malaysia.

LECANTHUS Wedd.

Lecanthus peduncularis (Royle) Weddell in DC., Prodr. 16(1): 164. 1869; FEH 1:60. 1966; FB 1(1): 116. 1983; Nam. Chang. Flr. Pl. 318. 1987; TBRI 50 (4):118. 1987.

Procris peduncularis Royle, III. Bot. Himal t. 83. 1836.

Lecanthus wightii Wedd. in Ann. Sci. Nat. "Ser. 4", 1: 187. 1854; FBI 5:559. 1888.

Small succulent, dioecious herb with leafy shoots, upto 45 cm high. Stipules 0.4-0.5cm. Petioles ca 6 cm. Leaves opposite; lamina asymmetric, as small as 1.45 x 0.9-1cm to 4.5-11 x 2.5-5cm, ovate, margin sharply serrate, acuminate, base cuneate or oblique-round, pilose hairy above, 3-nerved from base, veins pilose hairy beneath. Peduncles upto 25cm long, simple. Receptacles upto 2.6cm across, fleshy. Peduncles upto 25.2cm long. Flowers reddish-green: male flowers 4-5 merous; female flowers: perianth segmented into 3 unequal lobes; stigmas sessile. Achenes small (0.1 cm), ovoid, compressed and minutely warted.

Flr. & Fr.: Jul. - Oct.

Specimen: Below Pankhasari, 1920m, **AP Das & PC Rai** 1808, dated 09.9.1997.

Status: Very Common.

Local Distrib.: Jaributti, Thartharay, Neora Khola, Chitray, Chonkobhir. 1800-2600m.

General Distrib.: Africa, Himalayas, India, Myanmar, W. & C. China, Taiwan, Java.

OREOCNIDE Miquel

Oreocnide frutescens (Thunb.) Miquel, Ann. Mus. Bot. Lugd.-Bat. 3:131. 1867; FEH 3:23. 1975; EFPN 3:204. 1982; FB 1(1):131. 1983; TBRI 50(4):121. 1987.

Urtica frutescens Thunb., Fl. Jap. 70. 1784.

Villebrunea frutescens (Thunb.) Blume, Mus. Bot. Lugd.-Bat. 2:168. 1875; FBI 5:590. 1888; FEH 1:162. 1966.

Local Name: Kirma (Nep.).

Bushy shrubs, 2-4 m high, young twigs lenticellate, silky pubescent. Branches slender, brownish. Leaves alternate; petioles upto 6 cm long; lamina 7-14.5 x 2.5-5.5 cm, elliptic-lanceolate, acuminate, rounded at base, margin serrate-crenate, 3-veined from base, whitish pubescent beneath, pustulate above. Stipules upto 1.1 cm long, lanceolate. Flowers dioecious, clustered. Male heads subsessile, 0.6-1 cm diam.; perianth 4-partite with lanceolate lobes; stamens 4. Female heads smaller than male heads or forming short cyme to 1 cm, with perianth adnate to ovary; stigma sessile. Achenes 0.65-0.75 cm, ovoid, orange red on ripening, subtended by persistent perianth.

Flr.: Mar. - Sep. *Fr.:* Sep. - Nov.

Specimen Cited: Near Labha, 1960 m, AP Das & PC Rai 1913, dated 28.10.1997.

Status: Less Frequent.

Local Distrib.: Sakam, Labha, Jaributti, Chouda Feri. 1500-2200 m.

General Distrib.: Himalayas (Punjab-Bhutan), N. India, Myanmar, W. and S. China, S. Japan.

PILEA Lindl. (nom. cons.)

Key to the species:

- 1. Inflorescence upto 3cm long or often subsessile.....2
- 1. Inflorescence large, 5-20cm long.....3
- 2. Plant epiphytic herb; leaves linear-oblong.....*P. ternifolia*
- 2. Plant not epiphyte; leaves ovate.....*P. wightii*
- 3. Plants hairy.....*P. umbrosa*
- 3. Plants glabrous; leaves rarely sparsely hairy.....4
- 4. Stipules 0.7-1cm long, ovate-oblong.....*P. bracteosa*
- 4. Stipules upto 0.35cm long, lanceolate.....*P. symmeria*

Pilea bracteosa Wedd., Monogr. Urtic. 245. 1856; FBI 5: 555. 1888; FEH 3:24. 1975; EFPN 3: 205. 1982; FB 1(1): 114. 1983; TBRI 50 (4): 123. 1987.

Glabrous herbs, 30-52 cm high. Stem woody. Stipules 0.75-1 cm long, ovate-oblong. Petioles 1-3.5 cm long. Leaves opposite; lamina 7-12.2 x 2.5-4.9 cm, broadly ovate, margin sharply serrate, acuminate, base rounded, glabrous or rarely sparsely pubescent above, strongly 3-veined. Panicles upto 7 cm long, spreading. Male flowers 3-merous. Perianth segments in female flowers 3, unequal; stigmas brush-like. Fruits not seen.

Flr.: May - Aug.

Specimen Cited: Rechila, 2190 m, AP Das & PC Rai 0499, dated 15.10.1994.

Status: Common.

Local Distrib.: Todey-Tangta, Sikkim-Neora Boundary, Reshete, Rechila Middle. 1500-2400m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Myanmar, W. China.

Pilea symmeria Weddell, Monogr. Urtic. 246. 1856; FBI 5: 554. 1888; FEH 1: 62. 1966; 3: 25. 1975; EFPN 3: 206. 1982; FB 1(1): 113. 1983; TBRI 50 (4): 123. 1987.

P. wightii sensu FBI 5: 554. 1888, *non* Wedd.

Local Name: Phusray Gakleto (Nep.).

Small robust herb, 14-30 cm. Stem woody at base, usually glabrous. Stipules upto 0.35 cm, lanceolate, membranous. Petioles 0.5-4 cm. Lamina 1.5-3 x 1-2 cm, ovate, margini serrate, acute, base rounded, dark green, usually glabrous, rarely sparsely pilose above, strongly 3-veined, reticulation conspicuous beneath. Panicles 1.5-3 cm long, axillary. Male flowers 3-merous. Female flowers with 3 minute and unequal perianth segments. Achenes compressed, smooth.

Flr.: May - Jul. *Frt.:* Jul. - Oct.

Specimen Cited: Thosum Hill, 2590 m, AP Das & PC Rai 0894, dated 23.10.1994.

Status: Common.

Local Distrib.: Left Hill top of Ruka Hill, Tinsimana, Dhamdhamay Dara, Rechila Chowk. 2200-2900m.

General Distrib.: Himalayas (Kumaon-Bhutan), Meghalaya, W. & C. China.

Pilea ternifolia Wedd., Monogr. Urtic. 202.1856; FBI 5:552. 1888; FEH 1:62. 1966; 3:26. 1975; EFPN 3:206. 1982; FB 1(1): 116. 1983; TBRI 50 (4):123. 1987.

Small epiphytic erect herb, upto 30 cm high, with tuberous base. Stem unbranched, glabrous. Leaves opposite or ternately whorled, subsessile or shortly petiolate (petiole 0.5 cm long); lamina 3-6 x 0.5-1 cm, linear-oblong, acuminate, base rounded to obliquely cordate, margin coarsely serrate, glaucous beneath, nerves numerous. Cymes 1-2cm, axillary, densely flowered, weak. Peduncles 0.3-0.6cm long. Flowers dioecious, whitish; perianth to 0.1 cm diam. Achenes minute, oblong, smooth.

Flr.: Jul. - Sep. *Frt.:* Sep. - Dec.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 1914, dated 28.10.1997.

Status: Common.

Local Distrib.: Labha, Alubari, Zero Point, Rechila Middle, Helipad region. 1900-2400m.

General Distrib.: E. Himalaya (Nepal-Sikkim).

Note: Growing on mosses of trees and commonly found on the trunks of oak trees.

Pilea umbrosa Wedd. in Ann. Sci. Nat. ser. 4, 1: 187. 1854; Monogr. Urtic. 243. 1856; FBI 5: 556. 1888; Symb. Sin. 7: 121 *et* 130. 1929; Fl. Asm. 4: 283. 1940; FEH 1: 62. 1966; FB 1(1): 113. 1983; TBRI 50 (4):123. 1987.

Annual herbs, 28-45 cm high, more or less pubescent. Stipules 0.45-0.55 cm long, membranous, often persistent. Petioles 1-4.5 cm long. Leaves opposite; lamina 6.5-13 x 2-5.5 cm, broadly elliptic-ovate, margin coarsely serrate, caudate-acuminate with entire and 1.5 cm long acumen, base sub-cuneate or rounded, 3-nerved at base, dark greenish. Male panicles upto 12 cm long, much branched. Female panicles shorter than male ones. Achenes 0.1 cm long, smooth, flattened and with a few intra-marginal ridge.

Flr.: May - Aug. *Fr.:* Aug. - Nov.

Specimen Cited: Near Lava, 2118 m, **AP Das & PC Rai** 0325, dated 18.6.1994; Rechila, 2280 m, **AP Das & PC Rai** 0740, dated 19.10.1994.

Status: Common.

Local Distrib.: Todey-Tangta, Lava, Middle Rechila, Helipad region, Pankhasari. 1800-2400m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, Myanmar, W. China.

Pilea wightii Wedd. in Ann. Sci. Nat. ser. 4, 1. 186. 1854; Monogr. Urtic. 205. 1856; DC., Prodr. 16 (1) :125. 1869; FBI 5: 554. 1888; FEH 1: 61. 1966.

Monoecious glabrous, dwarf herb with tuberous rhizome. Stem 10-28 cm, stout. Petioles 0.3-1 cm long. Stipules minute, minute, triangular. Leaves 1.5-3.1 x 1-2.2 cm, ovate, flaccid, margin coarsely serrate, acute, base rounded or subacute, conspicuously 3-nerved, mostly glabrous both sides or rarely thinly hairy above. Cymes peduncled, loosely branched, suberect to erect; male sepals spurred; female flowers in open paniculate cymes or in small clusters. Achenes ovoid, straight and smooth.

Flr.: May - Jul. *Fr.:* Jul. - Sep.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 1644, dated 15.6.1996.

Status: Rare.

Local Distrib.: Alubari, Neora Khola at Alubari Chowk. 2000-2500m.

General Distrib.: Temperate regions of India, Sri Lanka, Java, etc.

POUZOLZIA Gaud.

Key to the species:

1. Herbs upto 55cm high; leaves sessile.....*P. hirta*
1. Shrubs, 1-2.5m high; leaves petiolate.....*P. sanguinea*

Pouzolzia hirta (Bl.) Hassk., Cat. Hort. Bogor. 80. 1844; FBI 5:586. 1888; FEH 1: 59. 1966; FB 1(1): 130. 1983.

Urtica hirta Bl., Bijdr. 495. 1825.

Gonostegia hirta (Bl.) Miq., Ann. Mus. Bot. Lugd.-Bat. 4:303. 1869; FEH 1:59. 1966; EFPN 3:204. 1982.

Local Name: Chiplay (Nep.).

Prostrate to suberect herbs, upto 55cm high. Leaves sessile, opposite. Stipules 0.3cm, ovate, interpetiolar, connate and acute; lamina 1.8–9.5 x 0.8–3 cm, ovate to lanceolate, acuminate, base subcordate to rounded, margins entire, 3–veined, veins unbranched, subglabrous to minutely pubescent. Flowers in globose clusters around nodes, 1.2–1.6cm diam., either monoecious or dioecious. Male flowers subglobose, flattened on the top, pentamerous, segments ciliate and angled. Perianth in female flowers 0.25 cm, ovoid, ribbed; style jointed on to ovary, deciduous. Fruit 2-4 winged.

Flr. & Frt.: Jun. - Aug.

Specimen Cited: Rechila Park, 2280 m, **AP Das & PC Rai** 1805, dated 09.9.1997.

Status: Abundant.

Local Distrib.: Machuki, Sakam, Rechila Park, Todey, Pankhasari, Reshete. 1000-2500m.

General Distrib.: Himalayas, India, Myanmar, east to S. China, S. Japan, Malaysia, Australia.

Note: Roots are medicinally used for treating the bone dislocation and fractures.

Pouzolzia sanguinea (Bl.) Merr. in J. Stree Branch As. S. Spec. no. 84:233. 1921; Contree Arn. Arb. 8:52. 1934; FEH 3:27. 1975; EFPN 3:206. 1979; FB 1(1):128. 1983.

Urtica sanguinea Bl., Bijdr. 500. 1826.

U. viminea Wallich, Cat. 164, n. 4616 A. 1831, *nom. nud.*

Boehmeria sanguinea (Bl.) Hassk., Cat. H. Bogor. 79. 1844.

B. ovalis Miq. in Zolling., Syst. Verz. 2:100. 1854.

Local Name: Chiplay (Nep.).

Shrubs, 1-2.5m high. Stem reddish, sometimes scrambling. Leaves simple, alternate; petioles upto 2.6 cm long; stipules 0.3cm, lanceolate; lamina 6-14.9 x 1.8-6.5cm, lanceolate to ovate, acuminate, base cuneate or rounded, margins serrate or crenate, glabrous above, appressed white tomentose beneath. Flowers in axillary globose clusters, unisexual or with both male and female flowers mixed, reddish. Male flowers 4-5 merous

with deeply lobed perianth. Female flowers: perianth tubular, 2-4 toothed; ovary enclosed within tubular perianth; styles filiform. Achenes to 0.15cm, ellipsoid, compressed.

Flr. & Frt.: Jun. - Aug.

Specimen Cited: Below Choudha Feri, 1800m, AP Das & PC Rai 1806, dated 09.9.1996.

Status: Common.

Local Distrib.: Rechila Durpinay, Jaributti, PHE Source, Zero Point, Sakam. 1500-2200m.

General Distrib.: Himalayas (Kumaon-Bhutan), Assam, Mynamar, S. E. China, Taiwan, Malaysia.

TRAGIA L.

Tragia involucrata L., Sp. Pl. 980. 1753; FBI 5:465. 1887; Fl. Calicut 267. 1982.

Perennial twinner, stinky with hispid hairs. Leaves alternate, petiolate (petiole 0.5-2.5 cm long); lamina 2.5-10 x 1.25-5 cm, ovate or oblong, serrate, acuminate, base cordate or rounded hispid, lateral nerves 4-5 on each half. Racemes terminal leaf opposed and androgynous. Flowers monoecious, male ones on the top; female below. Male flowers: sepals 3-5, valvate; stamens 1-3, anther-cells contigious. Female flowers: sepals 6, imbricate; ovary trilocular; ovule single in each ovary chamber; styles free, spreading upwards. Capsule 0.75-1.5 cm across, bivalved and hispid; seeds globose.

Flr.: Jun. - Aug. *Frt.:* Aug. - Oct.

Specimen Cited: Suntalay, 530 m AP Das & PC Rai 1758, dated 18.5.1997.

Status : Frequent.

Local Distrib.: Samsing, Phaparkheti, Suntalay, Gorubathan. 300-900m.

General Distrib.: India (Punjab, eastward to Assam), southward to Myanmar, Sri Lanka.

URTICA L.

Key to the species:

- 1. Bushy stinge-hairy shrub; stipules to 1.6cm long, ovate-oblong.....*U. ardens*
- 1. Undershrub with stiff stinge hairs; stipules 0.8-1cm long; ovate-lanceolate
.....*U. mairei*

Urtica ardens Link., En. Hort. Berl. 2:385. 1822; FEH 3:28. 1975; EFPN 3:207. 1982; FB 1(1):108. 1983; TBRI 50(4):129. 1987.

Urtica himalayensis Kunth and Bouche in Ann. Sci. Nat. Ser. 3(7):182. 1847.

Local Name: Ghario Sisnu (Nep.).

Small bushy shrub, 1-2 m high, densely covered with stinging bristly hairs throughout. Branches slender. Leaves opposite; petioles upto 3.2 cm long; stipules upto 1.6 cm long, ovate-oblong; lamina 3.5-8 x 3-5 cm, ovate, acuminate, cordate at base, margin doubly crenate-serrate, surfaces wrinkled. Cymes in slender peduncled catkins. Flowers monoecious; perianth to 0.2 cm, white.

Flr.: May - Jul. *Fr.*: Aug. - Dec.

Specimen Cited: Below Machuki, 1250 m, **AP Das & PC Rai** 1915, dated 28.10.1997.

Status: Frequent.

Local Distrib.: Sakam, Machuki, Chouda Feri, Alubari. 1200-2300 m.

General Distrib.: Himalayas (Kashmir-Bhutan), Meghalaya, W. China.

Note: Young shoot edible. An important medicinal plant.

Urtica mairei H. Lev., Fedde Repert. 12: 183. 1913; FEH 3:28. 1975; Fl. Meg. 2: 848. 1987.

U. parviflora Roxb., Fl. Ind. ed. 2, 3: 581. 1832; Monogr. Urt. 85. 1856; Icon. t. 690. 1843; FBI 5:548. 1888; Journ. Lin. Soc. 26:472. 1899; Fl. Asm. 4: 280. 1940; Faun. & Fl. Nep. Him. 113. 1955; FB 1(1): 108. 1983.

Local Name: Sisnu (Nep.).

Undershrubs upto 3m tall, pubescent, woody at base. Branches quadrangular, covered with stiff stinging hairs. Stipules 0.8-1 x 0.3-0.4 cm, ovate-lanceolate, acute or acuminate. Petioles 2-6.5 cm, slender, stinging hairy. Leaves opposite; lamina 7-12 x 3.5-7.5 cm, ovate-lanceolate or lanceolate, rarely ovate, margin doubly crenate or serrate, acuminate, base rounded or cordate, surface smooth, veins covered with stiff stinging hairs. Panicles 5- 10 cm long, lax. Male flowers with 4-lobed perianth and 4 stamens. Perianth in female flowers 4-lobed with dissimilar segments; ovary ovoid; stigmas sessile and brush-like. Achenes compressed with 2 enlarged broadly ovate perianth segments.

Flr.: Mar. - Jul. *Fr.*: Aug. - Jan.

Specimen Cited: Jaributti, 2195 m, **AP Das & PC Rai** 0500, dated 15.10.1994.

Status: Common.

Local Distrib.: Jaributti, Thartharay, Reshete, Sakam, Tiffin Dara. 1600-2200m.

General Distrib.: Temperate Himalayas and Nilgiris.

JUGLANDACEAE A. Rich. ex Kunth.

ENGELHARDIA Leschen.

Engelhardia spicata Leschen. ex Bl., Bijdr. 528. 1826; FBI 5: 595. 1888; Man. Ind. Timb. 663. 1902; Ind. Trees 620. 1906; Fl. Asm. 4: 299. 1940; Fl. Males 6:151. 1960; Bull. Torrey Bot. Cl. 93: 41. 1966; Fl. Meg. 2: 850. 1987; TBRI 50 (4):113. 1987.

Local Name: Mauwa (Nep.).

Large deciduous trees to 20-32 m tall, base sometimes buttressed. Bark peeling off in small flakes, gray or grayish-brown, rough. Leaves upto 30 m long; petioles 0.12 - 0.75 cm long, glabrous, sometimes pubescent; leaflets 4-13, sub-opposite; leaflets 4.5-15.5 x 1.7-5 cm, ablong- oblanceolate or oblong-elliptic, margin almost entire, acute to shortly acuminate, base rounded oblique, pubescent beneath but ultimately glabrate, lateral nerves 8-12 on each half. Male catkins 5-20 cm, usually in short racemes, individual Flowers composed of 6-10 sessile anthers. Female catkins 5.6-30 cm, pendulous; female flowers numerous, perianth 4- lobed; style branched and warted; bract to 0.5cm, 3-lobed. Fruiting catkins elongating upto 42cm; fruits nut-like, globose and bristly hairy, borne on enlarged and oblanceolate bract, pale brown on maturity, 3-winged, median wing upto 3.6 cm long.

Flr.: Nov. - Jan. *Frt.:* Mar. - May.

Specimen Cited: Neora Valley and Sikkim Border, 1900 m, **AP Das & PC Rai** 1766, dated 27.5.1997.

Status: Less Frequent.

Local Distrib.: Chouda Feri, Todey, Pankhasari. 1600-2200m.

General Distrib.: Himalayas (Nepal-Bhutan), Assam, S. Tibet, east to W. Chinam Malaysia.

Note: Wood used as timber.

BETULACEAE S.F. Gray

Key to the Genera:

1. Leaves broadly elliptic, entire; achenes triangular.....*Alnus*
1. Leaves ovate or elliptic, serrulate; achenes winged or surrounded by involucre.....2
2. Stamens 2; styles filiform; fruit winged.....*Betula*
2. Stamens 10; styles linear; fruit wingless but subtended by spiny involucre.....*Corylus*

ALNUS Gaertn.

Alnus nepalensis D. Don, Prodr. Fl. Nep. 58. 1825; FBI 5: 600. 1888; FEH 1: 48. 1966; 2: 17. 1971; EFPN 3: 213. 1982; FB 1(1): 72. 1983; TBRI 50 (4) : 105. 1987.

Local Name: Utis (Nep.).

Deciduous trees upto 21m. Leaves alternate; stipules upto 0.9cm, oblong, auriculate; Petioles 1-1.8 cm; lamina 4-12 x 2.5-6 cm, broadly elliptic, entire, acute, base cuneate or rounded, coriaceous, brownish glandular below, veins scantly pubescent. Flowers unisexual, monoecious; male catkins longer, 4.5-6.5 x 0.28-0.39 cm, drooping, paniculate; female spikes shorter, 1-1.5 x 0.2-0.8 cm, ellipsoid, erect, clustered; scales about 0.29 cm long, woody in female catkins on maturity. Achenes triangular; wings 0.1 cm, membranous; embryo elliptic.

Flr.: Oct. - Dec. *Fr.*: Feb. - May.

Specimen Cited: Rechila Durpinay, 2300 m, **AP Das & PC Rai** 1353, dated 06.5.1995.

Status: Frequent.

Local Distrib.: Sakam, Rechila Durpinay, Lava, Todey-Tangta. 1500-2300m.

General Distrib.: Himalayas (Garhwal-Bhutan), Assam, Myanmar, Tibet, W. China.

Note: Used as excellent firewood.

BETULA Tourn.

Key to the species:

1. Bark whitish-pink; leaf base truncate, glandular beneath; scales to 0.2cm, orbicular.....*B. utilis*
1. Bark reddish-brown; leaf base rounded, pubescent beneath; scales to 0.3cm, lanceolate.....*B. alnoides*

Betula alnoides D. Don, Prodr. Fl. Nep. 58. 1825; FBI 5: 599. 1888; FEH 1: 48. 1966; 2: 18. 1971; EFPN 3: 213. 1982; FB 1(1):71. 1983; TBRI 50 (4):107. 1987.

B. acuminata Wallich, Pl. As. Rar. 2: 7, t. 109. 1831.

B. cylindrostachya Wallich, Pl. As. Rar. 2: 7. 1831.

Local Name: Saur (Nep.).

Tall deciduous trees to 16 m high. Bark with vertical strips, reddish brown. Young shoot tomentose. Lamina 6-12 x 3-7 cm, ovate, unequally serrate, acuminate, base rounded, subglabrous upper surface, pubescent beneath. Male catkins 0.4 cm broad, fascicled, slender, pendulous; female catkins in shorter raceme, 4-6.8 x 0.7-0.9 cm; scales about 0.3 cm, lanceolate. Achenes broadly winged, wings 0.12-0.2 cm broad; embryo 0.02-0.12 cm, elliptic. (**Plate V: 55**).

Flr.: Jan. - Apr. *Fr.*: Mar. - Jun.

Specimen Cited: Rechila-Hattidara, 2280-2549 m, **AP Das & PC Rai** 0640, dated 17.10.1994; Jorpokhari Belt, 3040 m, **AP Das & PC Rai** 1213, dated 03.5.1995.

Status: Common.

Local Distrib.: Hattidara, Rechila Chowk, Lava, Tiffin Dara, Kuwapaani. 1700-2250m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Tibet, W. China.

Betula utilis D. Don, Prodr. Fl. Nep. 58. 1825; FBI 5: 599. 1888; FEH 1: 48. 1966; 2: 18. 1971; EFPN 3: 214. 1982; FB 1(1): 71. 1983.

B. bhojpatra Lindl. in Wallich, Pl. As. Rar. 2: 7. 1831.

Local Name: Bhujpat (Nep.).

Trees to 16 m tall. Barks papery, folding like paper sheets, whitish pink. Shoot pubescent. Branchlets often glandular. Stipules 1.1 cm, ovate, deciduous; petioles 1 cm; lamina 3-9 x 2-7 cm, ovate, serrate, acute, base more or less truncate, veins pubescent above and glandular beneath. Solitary male catkins axillary, 6-11 x 0.5-0.7 cm, borne towards shoot tips appearing with young leaves; scales 0.2 cm, orbicular; perianth minute, 4-lobed; stamens 2. Female spikes terminal on side shoots, 2-5 x 1-1.6 cm; scales having 3-linear lobes with 1-3 ovaries at base; perianth absent; stls. 2, simple, filiform. Fruits a winged achene, wing 0.7 cm; embryo 0.2 x 0.16 cm, obovate.

Flr.: Apr. - Jun. *Frt.*: Jul. - Oct.

Specimen Cited: Tinsimana-Jorpokhari, 2900-3040m, AP Das & PC Rai 0651, dated 17. 10. 1994.

Status : Less Common.

Local Distrib.: Jorpokhari, Tinsimana, Rechila Middle, Thosum Peak, Chitray. 2400-3050m.

General Distrib.: Himalayas , Tibet, W. China.

Note: Bark used as a substitute to paper and medicines. Leaves are good fodder for cattle. Trunk used as timber.

CORYLUS L.

Corylus ferox: Wallich, Pl. As. Rar. 1:77, to 87. 1830; FBI 5: 625. 1888; Pfl.-reich IV-61, Ht. 19: 44, f. 13.1904; Pl. Wilson. 2: 448.1916; FEH 1:49. 1966; FB 1(1):72.1983.

Local Name: Lekh Katus (Nep.).

Small trees to 5-10.5m, silky-pubescent when young. Petioles 0.9-1.5cm, appressed pubescent; lamina 7.5-11.5 x 3.2-4.8 cm, ovate or elliptic, acuminate, base rounded, margin serrate, pubescent and glandular-hairy beneath, sparsely pubescent above, lateral veins 11-15 pairs, parallel, thick and prominent. Male catkins 3-6 cm long, pendulous, scales to 0.2 cm, ovate, pointed and pubescent, perianth 0; stamens 10, crimson; anthers apically pilose. Female flowers inconspicuous, usually 6-8 in small pubescent scaly bud, perianth adnate to ovary; ovary inferior; styles 2, linear, exerted, reddish. Fruits in dense clusters; nut 1.5 cm, broadly aoid, woody, slightly compressed, surrounded by spiny involucre.

Flr. & Frt.: Oct. - Dec.

Specimen Cited: Near Alubari, 2200m, AP Das & PC Rai 1797, dated 10.9.1997.

Status: Rare.

Local Distrib.: Chitray Bunglow, Jorpokhari, Tinsimana. 2400-3050m.

General Distrib.: Himalayas (Nepal-Bhutan), Meghalaya, Tibet, N. Myanmar, W. China.

Note: Nuts edible.

FAGACEAE Dumort

Key to the Genera:

1. Male and female flowers borne on separate shoots; male catkins pendulous; female flowers usually solitary, sometimes in short spikes of few flowers.....*Quercus*
1. Male and female flowers borne on the same inflorescence; spikes simple, erect.....2
2. Pistillode absent in male flowers; styles 6-9, filiform.....*Castanea*
2. Pistillode present in male flowers; styles 3, columnar.....3
3. Acorn solitary and without spines; lamina entire; pistillode not villous; styles spreading.....*Lithocarpus*
3. Nuts 1-4, densely spinous, spines branched; lamina serrate or entire; pistillode villous; styles cylindrical.....*Castanopsis*

CASTANEA Miller

Castanea sativa Miller, Gard. Dict. ed. 8, 1. 1768; Fl. Asm. 4: 325. 1940; Fl. Meg. 2: 854. 1987.

Local Name: Katus (Nep.).

Deciduous trees. Leaves simple, alternate; petioles 1-1.9 cm long; lamina 6-12.5 x 2.7-5.7 cm, ovate-elliptic, closely serrate, acute-acuminate, base cuneate, glabrous both sides. Inflorescence unbranched, spicate, erect. Male flowers 6-16, staminate and without pistillode. Female flowers with 6-9 filiform styles. Cupule 4-5.2 cm in diam., subglobose, spiny, spines 0.9-1.3 cm long.

Flr. & Frt.: May - Nov.

Specimen Cited: Rechila-Dhamdhamay Dara, 2280-2520 m, AP Das & PC Rai 0654, dated 18.10.1994.

Status: Frequent.

Local Distrib.: Dhamdhamay Dara, Left Hill patch of Hattidara, Chitray.. 2250-2600 m

General Distrib.: Native of South America

Note: Seeds edible.

CASTANOPSIS Spach.

Key to the species:

1. Petiole 0.5-1 cm long; lamina 10-20 cm, oblong-elliptic; nuts pubescent towards apex.....*C. indica*
1. Petiole 1-2 cm long; lamina 7-14 cm, ovate-lanceolate; nuts glabrous.....*C. tribuloides*

Castanopsis indica (Roxb.) A. DC. in Journ. Bot. 1: 182. 1863; FBI 5: 620. 1888; Les Chataigniers 280. 1929; Fl. Asm. 4: 321. 1940; FEH 1: 49. 1966; FB 1(1): 80. 1983.

Castanea indica Roxb. [Hort. Beng. 68. 1814, *nom. nud.*] Fl. Ind. ed. 2, 3: 643. 1832.

Local Name: Aulay Katus (Nep.).

Evergreen trees, 5-20m tall with gray, warty and deeply fissured barks. Young shoots pubescent rusty-tomentose. Petioles 0.5-1 cm long. Leaves 10-20 x 4-8 cm, oblong-elliptic, margins sharply serrate with subulate teeth, acute to acuminate, base cuneate or often rounded, occasionally unequal sided, coriaceous, glabrous above, rusty-tomentose beneath; mid-rib depressed above and often pubescent, lateral veins 12-19 on either halves, prominent beneath. Spikes 10-15 cm long, in lax panicles, suberect and tomentose. Male spikes many; female spikes 1-2, placed below male spikes and terminal. Male flowers clustered, 0.2-0.3 cm in diam., developed in minute bract axils; stamens 12; pistillode villous. Female flowers usually solitary, densely pubescent; styles 3, cylindric. Cupule upto 2.6 cm across including branched spines (0.5-0.9 cm), globose. Nuts 1.25 x 0.8-1 cm, ovoid, pubescent towards apex.

Flr.: Feb. - Apr. *Fr.:* Oct. - Dec.

Specimen Cited: Phari-Samsing, 680 m, AP Das & PC Rai 1643, dated 07.6.1996.

Status: Common.

Local Distrib.: Phari, Samsing, Machuki, Sakam. 600 -1600 m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Meghalaya, Myanmar, W. China.

Note: Nuts edible.

Castanopsis tribuloides (Smith) A. DC. in Journ. Bot. 1: 182. 1836; FBI 5: 622. 1888; Les Chataigners 382. 1929; Fl. Asm. 4: 324. 1940; FEH 1: 49. 1966; FB 1 (1): 82. 1983; TBRI 50 (4) : 108. 1987.

Quercus tribuloides Smith in Rees, Cyclop. 29: no. 13. 1819.

Local Name: Musre Katus (Nep.).

Evergreen, medium-sized to large trees. Young twigs usually pubescent. Bark dark gray. Petioles 1-2 cm long. Leaves 7.5-14 x 2.3-5 cm, ovate-lanceolate, margin serrate towards apex, acuminate, base acute, coriaceous, lateral nerves 7-14 pairs. Male spikes paniculate or fascicled, sparsely flowered, more slender, pubescent. Female spikes solitary, pale. Cupules 2.1-2.4 cm across including basally branched bands of spines. Nuts 1-3, 1cm across, ovoid, glabrous and mucronate.

Flr.: Apr. - Sep. *Fr.:* Oct. - Dec.

Specimen Cited: Zero Point, 2285 m, AP Das & PC Rai 1382 and 1392 dated. 07.5.1995.

Status : Common.

Local Distrib.: Rechila Middle, Zero Point, Left Hill ridge of Alubari. 1800-2400 m.

General Distrib.: Himalayas (Kumaon-Arunachal Pradesh), Meghalaya, Myanmar, S. W. China.

LITHOCARPUS Blume

Lithocarpus pachyphylla (Kurz) Rehder in JAA 1: 129. 1919; EFPN 3: 215. 1982; FB 1(1): 80. 1983; TBRI 50 (4): 118. 1987.

Quercus pachyphylla Kurz in JASB 2: 197, t. 14, f. 1-4. 1875; FBI 5: 608. 1888; FEH 1: 51. 1966.

Local Name: Sunguray Katus (Nep.).

Large evergreen trees to 9-20 m tall. Branches stout, glabrous. Leaves 7-19 x 2.7-6cm, elliptic-oblongate, margin entire, caudate-acuminate, base acute, coriaceous, glabrous, nerves impressed above, prominent below. Male flowers clusters (catkin) stout, erect; subtending bracts 0.2-0.3 cm, ovate, subulate; stamens 12, pistillode present. Female flowers below, usually few, with spreading stls. Cupules nearly 3 cm in diam.; bracts fused together at base. Acorn 1.8-2.4 cm, ovoid, turbinate, half or almost entirely enclosed by scaly cupule, glabrous.

Flr.: May - Jul. *Frt.:* Aug. - Jan.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 022, dated 13.6.1994; Jaributti-Rechila, 2195-2280 m, AP Das & PC Rai 063, dated 14.6.1994.

Status: Common.

Local Distrib.: Left Hill ridge of Chitray, Alubari Chowk, Ruka Hill, Below Jorpokhari. 2200-3000 m.

General Distrib.: E. Himalaya (Nepal-Arunachal Pradesh), Meghalaya, Myanmar.

Note: Wood used as fuel and timber.

QUERCUS L.

Key to the species:

1. Lamina oblong-lanceolate.....2
1. Lamina elliptic.....*Q. glauca*
2. Trees evergreen; lamina sharply serrate to spinous serrate to base; lateral veins 12-21 pairs.....3
2. Trees deciduous; lamina repund-serrate, lateral veins 12-14 pairs.....*Q. semiserrata*
3. Branches hoary; leaf margin sharply serrate.....4
3. Branches glabrous; leaf margin spinous serrate to base.....*Q. lineata*
4. Styles linear; cupules 1.2cm across, pubescent; nuts ovate-ellipsoid.....*Q. incana*
4. Styles recurved; cupules 4-6.5cm, lamellate with concentric rings; nuts oblong.....*Q. lamellosa*

Quercus glauca Thunb., Fl. Jap. 175. 1784; FBI 5:604. 1888; FEH 1:50. 1966; 3:17. 1975; EFPN 3:216. 1982; FB 1(1): 76. 1983; TBRI 50(4):124. 1987.

Local Name: Masuray Phalant (Nep.).

Large evergreen trees, 12-24m tall, with fissured barks. Petioles 1.5-3.2cm; lamina 7.5-15.5 x 3.5-5.5cm, elliptic, sharply serrate above middle, acuminate, base cuneate, silky hairy, glabrous above when matured, lateral nerves 9-12 pairs. Flowers monocious, borne in spikes. Male spikes upto 8.5cm long, drooping; flowers 0.3-0.35cm across, globose; bracts 0.55-0.6cm long, lanceolate; perianth 5-6 lobed; stamens 5-8. Female spikes 1.6-3cm long, erect, 2-5 flowered; styles 3. Capsule 0.9-1.4cm diam, hemispheric, bearing 5-7 overlapping lamellae covering half of the nut. Acorn (nuts) 1.2-1.5 x 0.95-1cm, ellipsoid, with conical tip, glabrous.

Flr.: Mar. - May *Fr.:* Sep. - Jan.

Specimen Cited: Rechila Chowk, 2320m, **AP Das & PC Rai** 1782, dated 08.9. 1997.

Status: Abundant.

Local Distrib.: Reshete, Pankhasari, Dhamdhamay, Rechila. 1600-2400m.

General Distrib.: Himalayas (Kashmir-Arunachal Pradesh), Meghalaya Myanmar, China, Korea, Taiwan, Japan.

Note: An ideal firewood species.

Quercus incana Roxb., Fl. Ind. ed. 2, 3:142. 1832; FBI 5:603. 1888; Trs. N. Beng. 131. 1929; FEH 1:50.1966; FPK 102. 1981; TBRI 50(4):101. 1987.

Q. leucotricophora A. Camus in Riviera Scientif. 12:66. 1935; FB 1(1):78. 1983.

Medium evergreen tree, 12-20m high. Branches hoary. Lamina 6-14.5 x 3.5-8.5cm, narrowly ovate-elliptic or lanceolate, sharply serrate, acute, base rounded, mucronate, tomentose beneath, nerves many, parallel, well impressed beneath, coriaceous. Male catkins 4.5-6cm long, pendulous, soft-hairy; styles linear, spreading. Capsules 1.2cm diam., scaly, pubescent. Nut 1.1-1.3cm, ovoid-ellipsoid, turbinate apically, persistent stylar remains tomentose.

Flr.: Apr. - Jun. *Fr.:* Jul. - Sep.

Specimen Cited: Below Choudha Feri, 1900m, **AP Das & PC Rai** 1783, dated 08.9.1997.

Status: Common.

Local Distrib.: Reshate, Alubari, Choudha Feri, Chowkobhir. 1600-2320m.

General Distrib.: Pakistan, Kashmir-Bhutan, Myanmar, Thailand and Indochina

Quercus lamellosa Smith in Rees Cyclop. 29: no. 23. 1819; FBI 5: 606. 1888; FEH 1:51. 1966; EFPN 3: 216. 1982; FB 1(1): 76. 1983; TBRI 50 (4) : 124. 1987.

Local Name: Bajranth (Nep.).

Large evergreen, gregarious tree to 6-20 m. Petioles long upto 3-5 cm; lamina 11-19 x 2.5-4.5 cm, oblong-lanceolate, conspicuously toothed and veined, dark green above, blue-

green beneath, nerves 18-25 pairs, straight, elevated below; young Leaves silvery or buff-hairy beneath. Male flowers in drooping, long and flexuous catkins. Female flowers solitary or crowded in short, erect spikes; styles 3, recurved. Cupules 4-6.5 cm in diam., with concentric lamellate rings, woody. Nuts 3-4 cm in diam., oblong, solitary or paired, half enclosed by the involucre cup (cupule).

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Reshete, 2240 m, **AP Das & PC Rai** 1322, dated 06.5.1995.

Status: Very Common.

Local Distrib.: Reshete, Pankhasari Hill, Hattidara, Right Hill peak of Alubari, Thosum Beat. 1900-2800 m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), N. Myanmar, S. W. China.

Note: Timber used in making furniture, houses and also used as firewood.

Quercus lineata Bl. var. *oxydon* (Miq.) Wenzig in Jahrb. Bot. Gart. Berlin 4:232. 1886; FBI 5:506. 1888; FEH 1:51. 1966; TBRI 50(4):124. 1987.

Quercus oxydon Miq. in Ann. Mus. Bot. Lugd.- Bat. 1: 114. 1863; EFPN 3:216. 1982; FB 1(1):76. 1983.

Local Name: Phalant (Nep.).

Like *Q. glauca* but small deciduous tree with glabrous branches. Lamina oblong-lanceolate, margins spinous serrate to base, glaucous beneath, veins 12-21 pairs. Cupule 1.6-2cm diam. Nuts 1.2-1.5cm long; subglobose.

Flr.: May - Jul. *Frt.:* Oct. - Jan.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 1784, dated 10.9.1997.

Status: Frequent.

Local Distrib.: Zero Point, Jaributti, Pankhasari, Alubari 2000-25000m.

General Distrib.: Himalayas (Nepal-Arunachal Pradesh), Myanmar, S. Schina, Malaysia.

Quercus semiserrata Roxb., Fl. Ind. ed. 2, 3:641. 1832; Prodr. 16 (2):99. 1864; FBI 5:604. 1888; Trs. N. Beng. 132. 1929; FB 1(1):76. 1983; TBRI 50(4):101. 1987.

Similar to *Q. glauca*. Medium deciduous tree, young parts brownish tomentose. Lamina comparatively longer (14-23 x 2.5-5.5cm), more narrowly oblong to lanceolate, bluntly repund-serrate toward tip, acuminate, base obtuse, veins 12-14 pairs, glabrous beneath. Male catkins slender, 2-3 flowered, villous; female solitary or paired. Cupule 3-3.5cm across, annular, villous. Nuts upto 5cm long, ovoid, beaked.

Flr. & Frt.: Nov. - Apr.

Specimen Cited: Rechila Durpinay, 2100m, AP Das & PC Rai 0356, dated 14.10.1994.

Status: Sparse.

Local Distrib.: Not seen in other parts of Valley except Rechila Durpinay.

General Distrib.: Darjeeling, Meghalaya and Assam.

Note: Only a couple of this plant was noted in the adjoining areas of the Valley which was probably planted.

SALICACEAE Mirbel.

POPULUS L.

Key to the species:

1. Trees, much branched; leaf serrulate, appressed hairy but becoming glabrous later.....*P. glauca*
1. Trees, less branched with resinous leaf buds; leaf finely crenate-serrate, ciliate, thinly hairy.....*P. ciliata*

Populus ciliata Wallich ex Royle, Ill. Bot. Him. 346, t. 98(84a), f. 1. 1839; Prodr. 16(2):329. 1868; FBI 5:638. 1888; Ind. Trees 640. 1906; Ind. Med. Pl. 2: 1222, t. 920. 1918; FEH 1:44. 1966; EFPN 3:217. 1982; FB 1(1):60. 1983; TBRI 50(4):101. 1987.

P. rotundifolia Griffith, Itin. Notes 172. 1848.

P. balsamifera (non L.) Wesmael in Bull. Soc. Bot. Balg. 26:379. 1886.

Local Name: Dude Malata (Nep.).

18to 20m high deciduous tree with resinous leaf buds. Branches angled. Leaves alternate; petioles 6-10cm long; lamina 9-16 x 6-11cm, ovate or ovate-cordate, finely crenate-serrate, ciliate, acuminate, base cordate, rarely rounded, 3-nerved at base, thinly hairy. Male catkins to 9.5cm long, with 1 cm long fimbriate bract. Female catkins upto 28cm, with flat to obscurely concave disc; ovary to 0.5cm, ovoid; styles 0.35-0.4cm long, 2-lobed. Capsule to 1cm, glabrous.

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Rechila Middle, 2440m, AP Das & PC Rai 1880, dated 26.10.1997.

Status: Less Common.

Local Distrib.: Hattidara, Halipad, Rechila Middle, Pankhasari. 2200-2600m.

General Distrib.: Temperate Himalayas.

Populus glauca Haines in Journ. Lin. Soc. Bot. 37: 408. 1906; Trs. N. Beng. 135. 1929; FB 1(1): 60. 1983.

Local Name: Lekh ko Malata, Dude Malata (Nep.).

Small trees. Stem much branched, pinkish brown. Leaves simple, alternate; petioles 4-9 cm, slender, pinkish-red, whitish hairy in developing leaves; lamina 7-14 x 5.5-10.5 cm, broadly ovate, serrulate, acute, base slightly cordate, white adpressed-hairy both sides when young, glabrous later, distinctly 3-nerved at base, lateral nerves 5-6 pairs and light pink-brown. Catkins drooping, upto 16 cm long; rachis densely white hairy. Flowers bisexual. Capsule 0.65 cm across, subglobose, white pubescent. (**Plate V: 54**).

Flr.: Apr. - Jun. *Frt.*: Jul. - Oct.

Specimen Cited: Helipad, 2400 m, **AP Das & PC Rai** 0356, dated 15.10.1994.

Local Distrib.: Rechila Chowk, Jaributti, Hattidara, Helipad region, Thosum Peak. 2200-2850m.

General Distrib.: Endemic to E. Himalaya (Nepal-W. Bhutan).

3.2.2. GYMNOSPERMS

There are only four conifer species in the entire forests of the Neora Valley. Out of these, two species viz., *Cryptomeria japonica* and *Pinus longifolia* are the planted species of the plantation forests at Chouda Feri, Zero Point (upto 2300m) etc. Other two species growing in the cold temperate (2400-2800m) and the Rhododendron/Sub-Alpine forest (2800-3000m) zones include *Taxus baccata* and *Tsuga dumosa*. However, these two species are very less in number and are distantly scattered in the upper areas of the valley. Following is the enumeration of conifer species from Neora Valley National Park.

TAXACEAE S.F. Gray

TAXUS Tournef.

Taxus baccata L., Sp. Pl. ed. 1, 2: 1040; 1753, FEH 1: 40. 1966; FB 1(1): 56. 1983.

Local Name: Dhengre Salla (Nep.).

Trees to 25 m high; branchlets glabrous. Leaves distichous, lamina 1.5-3.5 x 0.2-0.3 cm, linear, entire, slightly acuminate, base obtuse, leathery, dark green above, pale beneath. Male cones upto 0.8 cm, globular, with scales bearing the anthers beneath. Female cones 0.3-0.4 cm, ovoid. Seeds ovoid, slightly compressed; aril fleshy red on ripening.

Flr.: Mar. - May *Seed:* Sep. - Oct.

Specimen Cited: Alubari, 2490 m, **AP Das & PC Rai**, 0180, dated 15.6.1994; Thosum, 2590 m, **AP Das & PC Rai** 0899, dated 23.10.1994.

Status: Frequent.

Local Distrib.: Reshete, Pankhasari, Thosum, Alubari. 2300-2600m.

General Distrib.: E. Afganistan, Himalayas, Khasia Hills, N. Myanmar, Indo-China, W. China and Malaysia.

Use : Wood used as incense. Leaves may be poisonous to livestock.

PINACEAE Lindl.

TSUGA Carriere.

Tsuga dumosa (D. Don) Eichler in Engl., Pfl. - fam. II, 1: 30, 1889; Bibl. 18. 1949; FEH 1: 41. 1966; FB 1(1): 50. 1983.

Pinus dumosa D. Don, Prodr. Fl. Nep. 55. 1825

P. brunoniana Wallich, Pl. As. Rar. 3: 24, t. 247. 1832.

Tsuga brunoniana (Wallich) Carriere, Trait, Conif. 188. 1855; FBI 5: 654. 1888.

Local Name: Thengre Salla (Nep.).

Large evergreen trees, 15-40m tall; branches puberulous. Leaves spiral, flattened; lamina 1.5-2.5 x 0.15-0.2cm, linear, margin usually inrolled downward, sometimes minutely

toothed, acute or obtuse, shiny white beneath, greenish above. Male cones borne on shoot axils, 0.25-0.3cm, almost globose; cone stalks 0.55-0.65cm, slender and with orbicular scales. Female cones terminal, pendulous, 1-2.5cm long, ovoid; ovuliferous scales upto 1cm broad, rounded, leathery and persistent; seeds 0.35 x 0.2cm, ovoid, compressed, winged.

Flr.: May - Jul.

Specimen Cited: Reshete-Pankhasari, 2100-2250m, AP Das & PC Rai 186, dated 15.6.1994.

Status: Sparse.

Local Distrib.: Reshete, Pankhasari. 2100-2250m.

General Distrib.: Nepal, India (Kumaon, Sikkim, Darjeeling), Bhutan, N. Myanmar.

TAXODIACEAE Warming

PINUS L.

Pinus roxburghii Sarg., Silva N. Amer. 11:9. 1897; Faun. & Fl. Nep. Him. 82, t. 1955; FEH 1:40. 1966; Dept. Med. Pl. Nep. Bull. 1:4. 1967; Phot. Aibum Pl. E. Him. 13, f. 112 & 116-118. 1968; Journ. Roy. Hort. Soc. 94:22. 1969; Dept. Med. Pl. Nep. Bull. 2:1. 1969; FEH 2:12. 1971; EFPN 1:26. 1978; FB 1 (1):46. 1983.

P. longifolia Roxb. ex Lambert, Descr. Gen. Pinus 1:29, 21. 1803; Fl. Ind. ed. 2, 3:651. 1832; non *longifolia* Salisb. 1796.

Local Name: Dhuppi (Nep.)

Evergreen trees, upto 28m. Leaves upto 29cm long, drooping, covered basally by fimbriate scales. Male cones aggregated in larger clusters. Female cones sessile, 8-19 x 7-9.5cm, ovoid; scales upto 2.2cm broad, woody, reflexed, curved upwardly at apex; seeds 0.7-0.8 x 0.5cm, winged; wings upto 1.5cm.

Flr.: Mar. - May *Seeds*: May - Jul.

Specimen Cited: Chouda Feri, 2240m, AP Das & PC Rai 087, dated 14.6.1994.

Status: Frequent. Planted in Chouda Feri region.

Local Distrib.: Chouda Feri, Chonko Bhir, Zero Point. 2000-2300m.

General Distrib.: Afganistan, Himalaya (Kashmir-Bhutan).

CRYPTOMERIA D. Don

Cryptomeria japonica (L. f.) D. Don. in Trans. Lin. Soc. 18: 167, t. 13, f. 1. 1841; Conif. and Tax. Jap. 66. 1966; JAA 7: 59. 1926; Bibl. 43. 1949; Taiwania 10: 51. 1964; FEH 1: 41. 1966.

Cupressus japonica L. f., Suppl. Pl. 421. 1781.

Local Name: Dhuppi (Nep.).

Tall tree to 35m or more with drooping branches. Leaves 0.65-1.1 cm, quadrangular, curved inwardly, acuminate, base broad and decurrent. Male cones smaller, 0.65 - 0.95 x 0.28 - 0.35 cm. Female cones 1.2-1.4 cm, scales 3-6 toothed at apex; bracts adnate to scale, usually exerted. Seeds 0.4 x 0.14 cm, narrow elliptic.

Flr.: Mar. - May *Seeds:* Oct. - Dec.

Specimen Cited: Rechila Road near Chouda Feri 2220m, AP Das & PC Rai 1704, dated 14.5.1997.

Status: Frequent. Planted in Chouda Feri region.

Local Distrib.: Chouda Feri, Chonkobhir, Zero Point. 2100-2300m.

General Distrib.: Japan, China, introduced in India.

3.2.3. LILIOPSIDA (MONOCOTYLEDONS)

Following is the distribution of Monocotyledonous Families collected from the Neora Valley National Park.

Class: MONOCOTYLEDONS

Series: MICROSPERMAE

Family: 1. Orchidaceae

Series: EPIGYNAE

Families: 2. Hypoxidaceae

3. Zingiberaceae

4. Costaceae

Series: CORONARIEAE

Families: 5. Dioscoreaceae

6. Trilliaceae

7. Smilacaceae

8. Convallariaceae

9. Alliaceae

10. Liliaceae

11. Uvulariaceae

12. Commelinaceae

13. Juncaceae

Series: CALYCINEAE

Family: 14. Palmae (Arecaceae)

Series: NUDIFLORAE

Families: 15. Pandanaceae

16. Araceae

17. Cyperaceae

18. Gramineae

ORCHIDACEAE Juss.

Key to the Genera:

1. Plants saprophytic; stem without green leaves.....*Galeola*
1. Plants not saprophytic; stem with green or variegated leaves.....2
2. Plants tuberous.....3
2. Plants rhizomatous and pseudobulbous.....4
3. Tubers nodulated.....*Cremastra*
3. Tubers not nodulated.....5
4. Plants upto 25cm long; stem decumbent and rooting below.....*Herpysma*
4. Plants larger; stem erect and not rooting in the soil.....6
5. Stem upto 50cm long; tubers ellipsoidal; flowers upto 1.3cm across, rose-pink or white
.....*Satyrium*
5. Stem upto 60cm long; tubers oblong; flowers to 0.55cm across, green.....*Herminium*
6. Epiphytic herb or often growing on rocks.....7
6. Plant terrestrial but not epiphytic.....10
7. Flowers white, in racemes.....*Coelogyne*
7. Flowers not white and not in racemes.....8
8. Plants pseudobulbous.....9
8. Plants with no pseudobulb, pendulous.....*Gastrochilus*
9. Pseudobulbs 1.6-4cm across, partially covered with fibrous sheaths; leaves petiolate;
pollinia elliptic.....*Pleione*
9. Pseudobulbs 1.3-1.65cm long, obpyriform; leaves sessile; pollinia ovoid ...*Sunipia*
10. Leaves 2-3.....*Calanthe*
10. Leaves more.....11
11. Leaves linear-lanceolate or linear-oblong; flowers white or yellowish with purple
spots.....*Bulbophyllum*
11. Leaves oblong or ovate; flowers pink to white.....*Zeuxine*

BULBOPHYLLUM Thouars.

Key to the species:

1. Pseudobulbs sub-cylindric; scapes not decurved; flowers white.....*B. odoratissimum*
1. Pseudobulbs obpyriform; scapes obscurely decurved; flowers yellowish or buff, often
purple-spotted.....*B. reptans*

Bulbophyllum odoratissimum (Smith) Lindley, Gen. and Spec. Orch. 55. 1830; FBI 5: 758. 1890; Orch. Sik. Him. 79 t. 109 1898; Orch. Sino-Jap. 249. 1919; Orch. Thail. 400, f. 302. 1961; FEH 1: 427. 1966; Fl. Sik. 1: 36. 1996.

Stelis odoratissima Smith in Rees Cyclop. 34. 1816.

S. caudata Don, Prodr. Fl. Nep. 32. 1825.

Plants with woody prostrate rhizome. Pseudobulbs 1.85-2.4cm, subcylindric, smooth. Lamina 2.8-8 x 1-2.2 cm, linear-oblong or lanceolate, margin entire, notched at the middle of the tips; base narrowed. Scape almost equal to leaves in length, covered with pale sheathing bracts. Inflorescence either capitulum or umbel, 1.3-1.7 cm in diam., compact, many flowered. Floral bracts lanceolate, entire. Flowers 0.6-0.8 cm long, white, sweet smelling; sepals lanceolate, subequal acuminate, yellow-tinged; petals, smaller than

sepals, ovate. Lip oblong- lanceolate, fleshy, central groove and margins beset with capitate hairs. Column stout, slightly winged below; anthers with papillose crest.

Flr.: May - Sep.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 0256, dated 16.6.1994; Rechila-Hattidara, 2280-2549 m, AP Das & PC Rai 0651, dated 17.10.1994

Status : Common.

Local Distrib.: Alubari, Hattidara, Reshete, Chouda Feri. 1800-2600m.

General Distrib.: Subtropical E. Himalaya, Khasia Hills, Myanmar and China.

Bulbophyllum reptans Lindley, Gen. and Spec. Orch. 51.1830; FBI 5.768. 1890; Orchid. Sik. Him. 77, t. 1898; A Gui. Orch. Sik. 205. 1926; FEH 1: 427. 1966; TBRI 50(4): 107. 1987; Fl. Sik. 1: 37. 1996.

Pseudobulbous plant with thin rhizome. Pseudobulbs 2 cm long, 0.55-0.7 cm apart, obpyriform and smooth. Petioles 0.5-0.7 cm long; lamina 7.5-14.5 x 0.55-0.8 cm, linear-lanceolate, subacute, apex obliqually notched, base narrowed. Scapes in pairs, shorter or even exceeding the leaves, obscurely decurved. Peduncles basally sheathed, bracteate. Raceme all-sided, laxly flowered. Floral bracts oblanceolate. Flowers 0.55-0.8 cm long, yellowish or buff, purple-spotted; sepals sub-equal, lanceolate, distinctly 3-nerved, bases dilated in lateral pairs, buff coloured; petals shorter than sepals, oblong, 1-nerved. Lip stipitate, oblong, apex sub-acute, margin nearly winged, yellowish at the tip, column with lateral wings; foot slightly curved, ovary green with red spots.

Flr.: Oct. - Dec.

Specimen Cited: Chouda Feri, 2150m, AP Das & PC Rai 0344, dated 14.10.1994.

Status: Frequent.

Local Distrib.: Alubari, Chouda Feri, Pankhasari, Reshete. 1600-2400m.

General Distrib.: Temperate E. Himalaya, Khasia and Naga Hills.

CALANTHE R. Br.

Calanthe tricarinata Lindley in Wallich Cat., 7339; Gen. and Spec. Orch. 18 1830; Lindley, Fol. Orch. 2. 1828-29; Walp. Ann. 6: 912. 1861; FBI 5:848. 1890; Orch. Sik. Him. 166. 1898; A Gui. Orch. Sik. 104. 1926; TBRI 50(4):108. 1987; Fl. Sik. 1: 43. 1996.

C. occidentatis Lindley, Fol. Orch. 3. 1828-29; Walp. Ann. 6: 848. 1961.

Terrestrial orchids with broadly ovoid and 1.7-2.5 cm long pseudobulb. Stem 26 - 45 cm long. Leaves 2-3, petiolate or sessile; lamina 19-36 x 5-7.6 cm, broadly oblanceolate, acute. Inflorescence sheathed by young leaves and longer than leaves. Raceme, terminal, laxly-flowered. Rachis pubescent. Floral bract lanceolate. Flowers upto 2cm in diam.; sepals and petals subequal, lanceolate greenish-yellow; lip adnate to the column, 3-lobed, reddish-brown, mid-lobe rounded with fleshy ridges and undulate greenish edges, basal

lobe short, rounded and erect. Column short with hispid anterior surface. (**Plate VII: 65**).

Flr.: Apr. - Jun.

Specimen Cited: Chouda Feri-Rechila Middle, 2285-2490 m, **AP Das & PC Rai** 1288, dated 05.5.1995.

Status: Frequent.

Local Distrib.: Rechila Durpinay, Chouda Feri, Middle Rechila. 2000-2500m.

General Distrib.: Temperate Himalayas.

COELOGYNE Lindl.

Coelogyne corymbosa Lindl., Fol. Orchid 7. 1855; FBI 5:831. 1890; Ann. Roy. Bot. Gard. Calc. 8:134, t. 185. 1898; SFSH 128, f. 204. 1963; FEH 1:428. 1966; 2:181. 1971; EFPN 3:36. 1978; Orch. Nep. 49. 1978; FPK 105. 1981.

Epiphytic or growing on rocks; pseudobulbs ovoid. Leaves sessile, coriaceous; lamina 10-16cm long, elliptic-lanceolate; scape erect, sheathed. Flowers 2-4, white, fragrant; sepals narrow, lanceolate; petals broader, lanceolate, lips white and with 4 yellow spots, mid-lobe ovate, disc with 3 ridges. (**Plate VII: 67**).

Flr.: Mar. - May

Specimen Cited: Chouda Feri, 2240m, **AP Das & PC Rai** 1270, dated 05.5.1995.

Status: Less Common.

Local Distrib.: Found only at Chouda Feri and Jaributti. 2200-2400m.

General Distrib.: Temperate E. Himalayas, Khasia Hills.

CREMASTRA Lindl.

Cremastra appendiculata (D. Don) Makino in Bot. Mag. Tokyo 18:24. 1904; FEH 1: 429. 1966; Nam. Chang. Flr. Pl. 152. 1987; TBRI 50 (4):110. 1987; Fl. Sik. 1:51. 1996.

Cymbidium appendiculata D. Don, Prodr. Fl. Nep. 36. 1825.

Cremastra wallichiana. Lindley, Gen and Speci. Orchid. 173. 1833; FBI 6: 16. 1890.

Terrestrial herb with large and nodulated tuber. Stem erect and bulbous at the base. Leaves radical, usually 2, long petioled; lamina 15-29 x 3-5 cm, elliptic, plicate, long acuminate, dark green both sides. Inflorescence shorter than leaves Raceme 10-15 cm long, conical. Floral bracts lanceolate. Flowers 3-3.5 cm long, drooping, pink; sepals and petals narrowly lanceolate, nearly erect; lip spoon-like, slightly 3-lobed towards the apex. (**Plate VII: 66**).

Flr.: Apr. - May

Specimen Cited: Reshete, 2240 m, **AP Das & PC Rai** 1333, dated 06.5.1995

Status : Less Common.

Local Distrib.: Pankhasari, Reshete, Chitray. 2000-2600m.

General Distrib.: Temperate E. Himalaya.

GALEOLA Lour.

Galeola lindleyana Reichenbach f., Xen. Orchid 2: 78. 1865; FBI 6:88.1890; Orch. Sik. Him 264. 1898; A Gui. Orch. Sik. 155 1926; Ind. Orch. Gui. Ident. Cul. 1: 154. 1976; TBRI 50(4): 114. 1987; Fl. Sik. 1:73. 1996.

Erythrorchis lindleyana Reichbach f. in Bonplanda 5: 37. 1857.

Saprophytic and remarkably strange orchid without green leaves. Rhizome 2.5 cm thick, reddish, covered by large fleshy scales. Stem 110-140 cm high, brownish-purple, lower portion bearing brown scale-like sheaths. Panicles 30-40 cm long, lax, few flowered, branches drooping and 4-6cm long. Floral bract ovate. Flowers 3.5 cm across, nearly globular, spongy bright yellow; sepals sharply toothed and wavy ribbed externally; petals broadly ovate, ribbed and spongy, margin ciliate. Lip cup-shaped, narrowly 3-lobed, papillose dorsally with two red patches, chamber at base glabrous below the column, disc lamellate with ciliate margin; column clavate; anther papillose; pollinia compressed. Capsule 15-18 x 3 cm, with 3 sharp ridges. (**Plate VII: 68**).

Flr. & Frt.: Jul. - Aug.

Specimen Cited: Near Zero Point, 2285 m, **AP Das & PC Rai** 0272, dated 16.6.1994.

Status : Extremely Rare.

Local Distrib.: Chouda Feri Goth, Zero Point. 2000-2300m.

General Distrib.: Temperate Sikkim and Darjeeling Himalayas, Khasia and Naga Hills.

GASTROCHILUS D. Don

Gastrochilus distichus (Lindl.) Kuntze, Rev. Gen. Pl. 2:661. 1891; FEH 1:435. 1966; EFPN 1:44. 1978; Orch. Nep. 116. 1978; Nam. Chang. Flr. Pl. 252. 1987.

Saccolabium distichum Lindl. in J. Lin. Soc. Bot. 3:36. 1859; FBI 6:64. 1890.

Pendulous, epiphytic perennial herb. Stems filiform. Leaves sessile, upto 2.4cm long, lanceolate, entire, acute to acuminate, base broader, fleshy. Inflorescence always produced from lower side of branches, equaling or slightly exceeding leaves. Bracts small. Flowers 2-3, alternate; sepals and petals alike, greenish, spotted with brown, obovate to oblong, fleshy, lip with a saccate spur, semihemispheric, mid-lobe subcircular, entire. Capsule fusiform. (**Plate VII: 71**).

Flr. & Frt.: Jan. - Mar.

Specimen Cited: Pankhasari Forest, 2260m, **AP Das & PC Rai** 1272, dated 05.5.1995.

Status: Less Common.

Local Distrib.: Pankhasari, Reshete, Alubari. 2000-2500m.

General Distrib.: E. Himalaya (Sikkim, Darjeeling) and Khasia Hills.

HERMINIUM L.

Herminium lanceum (Thunb. ex Sw.) J. Vuijk in Blumea 11: 228. 1961; Nam. Chang. Flr. Pl. 280. 1987; TBRI 50(4): 116. 1987; Fl. Sik. 1:80. 1996.

Ophrys lancea Thunb. ex Sw., Kongl. Vet. Handl. Stockh 21: 223. 1800.

Herminium angustifolium (Lindley) Benth. et Hk. f., Gen Pl. 3: 622. 1880; FBI 6: 129 1890; Orch. Sik. Him. 332. 1898; A Gui. Orch. Sik. 192. 1926; Ind. Orch. Gui. Ident Cult. 50. 1976.

Tuber small, oblong. Stem 25-60 cm, with sheathing base. Leaves 2-3; lamina 13-18 x 1.3-1.5 cm, linear, acuminate. Spike 10-25 cm long, narrow, dense. Floral bract linear-lanceolate, greenish. Flowers 0.55 cm across, green; sepals, oblong, obtuse, dorsal sepal and petals united forming hood, lateral sepals spreading; petals narrowly linear, 1-nerved; lip oblong, deflexed much longer than sepals, with two auricles near the base and two curved lobes; spur absent; anther-cells parallel; pollinia pyriform.

Flr: Jul. - Aug.

Specimen Cited: Dhamdhamay Dara, 2490 m, AP Das & PC Rai 1708, dated 16.5.1997.

Status: Frequent.

Local Distrib.: Thartharay, Dhamdhamay Dara, Middle Alubari Chowk. 2100-2500m.

General Distrib.: Temperate regions of India, Myanmar, Thailand, Indochina, Malaysia, China, Korea and Japan.

HERPYSMA Lindl.

Herpysma longicaulis Lindley in Wallich Cat. 7389. 1831; Bot. Reg. under t. 1618. 1823; Gen. and Spec. Orch. 506. 1833; Journ. Lin. Soc. I. 178, 190, 1859; FBI 6: 98, 1890; Ann. Roy. Bot. Gard. Cal. 5, 59, t. 88. 1898; Orch. Sik. Him. 276. 1898; A Gui. Orch. Sik. 162. 1926; Ind. Orch. Gui. Ident. Cult. 102. 1976; TBRI 50(4): 116. 1987; Fl. Sik. 1:81. 1996.

Plant upto 25 cm high. Stem decumbent, rooting below; nodes and internodes distinct. Leaves scattered; petioles 0.8-1.2 cm long, with longer sheathing; lamina 3.5-6.5 x 1.5-2.2 cm, ovate-lanceolate or narrowly elliptic, narrowing at both ends. Racemes terminal, 2.5-4 cm long, sessile, pubescent, 5-7 flowered. Floral bracts ovate - lanceolate, obtuse, distinctly nerved. Flowers 1.2-1.3 cm long, pale pink; sepals subequal, free, hairy, lateral ones orange or white strapped pink; petals shorter, oblong and obtuse, forming a hood with dorsal sepal, spur parallel and as long as ovary, narrowing, bilobed apically; lip oblong, deflexed with 2 rounded and erect basal lobes; column contracted below; pollinia elongated with flattened pollen grain within; ovary exceeding flowers length; stigma pulvinate.

Flr.: Aug. - Sep.

Specimen Cited: Right Hill top of Alubari, 2424m, AP Das & PC Rai 0598, dated 16.10.1994.

Status: Common.

Local Distrib.: Todey-Tangta, Alubari Area, Lower ridge of Ruka Hill, Reshete. 2200-2550m.

General Distrib.: Temperate E. Himalaya.

PLEIONE D. Don

Key to the species:

1. Pseudobulbs narrow ovoid or triangular cylindrical; petioles upto 1.7cm long; floral bracts obtuse; petals whitish; lip sub-orbicular*P. humilus*
1. Pseudobulbs barrel shaped; petioles 1.6-2.5cm long; floral bracts inrolled; petals rose-pink; lip funnel-shaped.....*P. praecox*

Pleione humilus (Smith) D. Don, Prodr. Fl. Nep. 37. 1825; FEH 1: 448. 1966; KB 25: 428. 1971; EFPN 1: 55. 1978; FPK 111. 1981; Nam. Chang. Flr. Pl. 439. 1987; Fl. Sik. 1:106. 1996.

Epidendrum humile Smith, Exot. Bot. 2: 75, t. 98. 1806.

Cymbidium humile Smith in Rees, Cyclop. 10. 1809.

Coelogyne humilis (Smith) Lindley, Coll. Bot. 37. 1821; Gen. Sp. Orch. 43. 1830; FBI 5: 840. 1890; Ann. Roy. Bot. Gard. Calc. 8 (1): 139, t. 194. 1898.

Small epiphytic orchids, sometimes growing on rocks also. Pseudobulbs 1.6-3 cm, slender, narrow ovoid to triangular cylindrical, partially covered with loose and thin fibrous sheaths. Leaves usually in pair arising from pseudobulb base; petioles 1.2-1.7 cm long; lamina 10-13 x 3-4 cm, narrow elliptic, entire, acute, base narrow, tapering, membranous. Leaf sheaths smooth. Bract obtuse. Flowers 1-2 in number, 5-7 cm in diam., whitish; sepals spreading, oblong and acute; petals obtuse; lip sub-orbicular, shortly clawed, margin being denticulate, 7-9 fringed lamellae on upper surface ; pollinia elliptic.

Flr.: Feb. - Mar.

Specimen Cited: Dhamdhamay Dara, 2500 m, AP Das & PC Rai 0667, dated 18.10.1994

Status: Rare.

Local Distrib.: Chouda Feri, Thartharay, Dhamdhamay Dara. 2100-2500m.

General Distrib.: Temperate E. Himalaya, Manipur.

Pleione praecox (Smith) D. Don., Prodr. Fl. Nep. 37. 1825; FEH 1: 449. 1966; KB 25: 429. 1971; Nam. Chang. Flr. Pl. 439. 1987; TBRI 50(4):123. 1987; Fl. Sik. 1:106. 1996.

Epidendrum praecox Smith, Exot. Bot. 2: 73, t. 97. 1806.

Coelogyne praecox (Smith) Lindley, Collect Bot. Sub. t. 37. 1821; FBI 5: 840. 1890; King et Pantling in Ann.Roy. Bot. Gard. Calc. 8 (1): 141. 1898.

C. reichenbachiana T. Moore and Veith in Gard. Chron. 1868: 1210. 1868; FBI 5: 841. 1890.

Pseudobulbs 2.5-4 cm in diam., barrel shaped, often shortly cylindric, imperfectly sheathed by loose brown fibres. Leaves paired; petioles 1.6-2.5 cm long; lamina 10-19.5 x 3.3-6.7cm, elliptic or elliptic-oblong, margin entire, subacute, base narrowed, nerves many. Floral bract oval or obovoid, inrolled. Flowers 5.5-9 cm across, borne on stalk arose from pseudobulb base; sepals sub-equal, lanceolate or oblanceolate, spreading; petals rose-pink, lanceolate, spreading. Lip funnel-shaped with basal part convolute round the column, margin toothed, white within. Column base with a short sac, apex being expanded into an undulate hood. (**Plate VII: 70**).

Flr.: Oct. - Nov.

Specimen Cited: Chouda Feri, 2285m, **AP Das & PC Rai** 0343, dated 14.10.1994.

Status: Common.

Local Distrib.: Rechila Chowk, Chouda Feri, Zero Point, Left Hill ridge of Chouda Feri. 2000-24000m.

General Distrib.: Temperate Himalayas, Khasia Hills, Myanmar, Thailand and China.

SATYRIUM Swartz.

Satyrium nepalense D. Don, Prodr. Fl. Nep. 26. 1825; Gen. and Spec. Orch. 340. 1838; Journ. Lin. Soc. 3:44. 1859; Bot. Mag., t. 6625. 1887; FBI 6: 168. 1890; Orch. Sik. Him. 338, t. 444. 1898; A Gui. Orch. Sik. 194. 1926; Ind. Orch. Gui. Ident. Cult. 1: 42. 1976; Nam. Chang. Flr. Pl. 503. 1987; Fl. Sik. 1:110. 1996.

S. nepalense var. *ciliata* (Lindley) Hk. f., FBI 6: 168. 1890.

S. ciliatum Lindley, Gen. and Spec. Orch. 341. 1838.

Small orchid to 50 cm, tubers ellipsoidal. Stem glabrous, basally sheathed. Leaves 2 to 3, semifleshy; lamina 8-22 x 2.2-7.2 cm, elliptic-oblong, sub-acute, base sheathing, greenish. Floral bract upto 2.5 cm long, lanceolate, reflexed. Flowers upto 1.3 cm across, rose-pink or white; sepals linear-oblong, obtuse, spreading; petals narrower than sepals, entire, recurved; lip superior, hooded, spurs 2, twice longer than ovary, column curved and expanded at apex; stigma convex; pollinia 2, pyriform. Staminodes hemispheric, rugulose; rostellum triangular. (**Plate VII: 69**).

Flr.: Sep. - Oct.

Specimen Cited: Alubari, 2280 m, **AP Das & PC Rai** 0400, dated 15.10.1994; Rechila, 2300 m, **AP Das & PC Rai**, 1706 dated 16.5.1997.

Status: Frequent.

Local Distrib.: Alubari, Rechila Chowk, Chitray, Todey. 1900-2600m.

General Distrib.: Temperate Himaslayas, Khasia Hills, Myanmar, Sri Lanka.

SUNIPIA Lindl.

Sunipia bicolor Lindley, Gen. Spec. Orch. 179. 1833; EFPN 1:57. 1978; Nam. Chang. Flr. Pl. 545. 1987.

Ione bicolor (Lindley) Lindley, Fol. Orch. 3: 1853; FEH 1: 440 1966.
Bulbophyllum bicolor (Lindley) Hk. f., FBI 5: 770. 1890 *non* Lindley 1830.
Sunipa Lindley has priority over *Ione* Lindley-Seidenfaden in Bot. Tidsskr. 67 (1-2): 114. 1972.

Small rhizomatous epiphytic plants. Pseudobulbs 1.3-1.65 cm long, obpyriform. Leaves subsessile 5-8 x 0.9-1.2 cm, linear, apex obliquely bifid, base narrowed, parallel nerves upto 10 in nos., distinct beneath. Flowers bearing scapes usually solitary, rarely in pairs. Peduncle minutely bracteate. Floral bract lanceolate. Flowers in two rows, upto 1cm long; sepals subequal, lanceolate, acute, pale and translucent, nerves claret coloured; petals elliptic, blunt, pale and translucent like sepals. Lip basally truncate and minutely 2-auricled, outer part of margins serrate, upper surface slightly concave. Column short. Pollinia ovoid.

Flr.: Oct. - Dec.

Specimen Cited: Jaributti, 2195 m, **AP Das & PC Rai** 0475, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Jaributti, Rechila, Neora-Sikkim Border, Reshete. 1900-2400m.

General Distrib.: Temperate E. Himalaya (Nepal-Bhutan), and Khasia.

ZEUXINE Lindl.

Zeuxine goodyeroides Lindley in Gen. and Spec. Orch. 486. 1840, FBI 6: 107. 1890; Ic. Plantar., t. 2172, 1891 Ann. Roy. Bot. Gard. Cal. 5, 60, t. 90. 1898; Orch. Sik. Him. 287. 1898; A Gui. Orch. Sik. 170. 1926; Ind. Orch. Gui. Ident. Cul. 1: 118. 1976; TBRI 50 (4): 130. 1987.

Plants 12 to 18 cm. Leaves 4-6 ; petioles short with coloured sheaths at the base; lamina 2.5-4.5 x 1.2-2.1 cm, oblong, ovate, acute, base rounded, coriaceous, velvety green, midrib distinct and stripy white. Peduncles laxly pubescent; bracts 1-2, linear-lanceolate. Racemes lax 2.8-5.4 cm long, 2-7 flowered, rachis thinly hairy. Flowers 0.6-0.7 cm long, pink to white; sepals unequal, dorsal ones ovate, acute, lateral pair lanceolate, often greenish; petals falcate and connivent, lip saccately cymbiform with minute apical lobe and introflexed margins, sac dentate inside, column margin winged; anthers beaked with clavate pollinia; stigma oval.

Flr.: Sep. - Oct.

Specimen Cited: Thosum Forest, 2590-2780m, **AP Das & PC Rai** 0881, dated 23.10.1994, Rechila Middle, 2490 m, **AP Das & PC Rai** 1218, dated 04.5.1995.

Status: Frequent.

Local Distrib.: Rechila Park, Thosum Forest, Tharthgaray. 2200-2600m.

General Distrib.: Temperate E. Himalaya, Mishmi Hills, etc.

ZINGIBERACEAE R. Br.

Key to the Genera:

1. Plant 40-60cm high.....2
1. Plant 1-2 m high.....*Hedychium*
2. Shoot upto 40cm tall; lamina 10-15cm long, sub-acute; calyx yellowish.....*Globba*
2. Shoot upto 60cm tall; lamina 13-26cm, acute-acuminate; sepals red.....*Cautleya*

CAUTLEYA Royle

Key to the species:

1. Lamina lanceolate or oblong-lanceolate; spike upto 10.5cm, lax; bracts green; petal-tube longer than sepals.....*C. gracilis*
1. Lamina narrow elliptic; spike upto 13cm long; bracts red; petal-tube shorter or equal to sepals.....*C. spicata*

Cautleya gracilis (Smith) Dandy in J. Bot. 70: 328. 1932; FEH 1: 421. 1966; Nam. Chang. Flr. Pl. 109. 1987; TBRI 50(4): 108. 1987; FB 3(1): 193. 1994; Fl. Sik. 1:123. 1996.

Roscoea gracilis Smith in Trans. Linn. Soc. 13: 460. 1822.

Cautleya lutea (Royle) Hk. f. in Bot. Mag. t. 6991. 1888; FBI 6: 1890.

Local Name: Tembok (Nep.).

Green herbs upto 50 cm tall. Stem slender, glabrous. Leaves alternate; lamina 15-25.5 x 2-4cm, lanceolate or oblong - lanceolate, entire, acuminate, base narrowed, lateral nerves many, parallel, dark green above, purple to tinged red beneath, glabrous both sides. Spikes lax, 5-10.5 cm, slightly drooping Bracts oblong, green. Flowers few yellowish; sepals longer than bracts, red, minutely toothed; petal-tube longer than sepals, upper petal concave, lateral ones more broader, oblong- cuneate, limb bright yellow; staminodes forming hood, bases spurred on inner side, lip 2-lobed below the middle, reflexed. Capsule globular, bright red, seeds glossy-black, partly covered in a white aril.

Flr. , & Frt.: May - Sep.

Specimen Cited: Pankhasari, 2240m, AP Das & PC Rai 0347, dated 14.10.1994, Jaributti, 2195 m, AP Das & PC Rai 0395, dated 15.10.1994.

Status: Abundant.

Local Distrib.: Jaributti, Pankhasari, Reshete, Rechila Chowk, Sakam. 1500-2350m.

General Distrib.: Temperate Himalayas and Khasia Hills.

Cautleya spicata (Smith) Baker in FBI 6: 209. 1890; Pfl.-reich IV-46, Ht. 20: 125. 1904; Fl. Siml. 512, f. 170. 1921; FEH 1: 421. 1966; TBRI 50(4): 109. 1987; FB 3(1): 193. 1994; Fl. Sik. 1:124. 1996.

Local Name: Pahinlo Sana (Nep.).

Herbs upto 60 cm. Stem glabrous. Leaves shortly petiolate (petioles upto 1.2 cm long), much broader; lamina 13-22 x 3-5cm, narrow elliptic, entire, acute to acuminate, base narrow round, green, glabrous, lateral nerves upto 16 pairs on either sides, more prominent above. Spike upto 13 cm long, shortly peduncled, terminal and erect. Bracts oblong, as long as sepals, red. Flowers few or many, yellow; sepals upto 2.1 cm long, red, obtusely toothed; petal-tube shorter or hardly equal to sepal, upper segment upto 2.1 cm, lip bright yellow; staminodes nearly as long as the petal, oblanceolate-oblong. Capsule globose, red; seeds black, enclosed in white aril.

Flr. & Frt.: Jun. - Sep.

Specimen Cited: Ruka Hill, 2480 m, **AP Das & PC Rai** 0929, dated 24.10.1994.

Status: Less Common.

Local Distrib.: Pankhasari, Ruka Hill, Chouda Feri., Lava. 1900-2500m.

General Distrib.: Temperate Himalayas.

GLOBBA L.

Globba racemosa Smith, *Exot. Bot.* 2: 15. t. 117. 1804; *FBI* 6: 201. 1890, *IJF* 4: 230. 1981; *Nam. Chang. Flr. Pl.* 1987; *FB* 3(1): 191. 1994; *Fl. Sik.* 1:127. 1996.

G. orixensis Roxb. in *As. Res.* 11: 358. 1810; *FBI* 6: 201. 1890.

G. clarkei Baker in *FBI* 6:201. 1890; *FEH* 1:421.1966.

G. hookeri Cl. *ex* Baker in *FBI* 6: 201 1890.

Herbs, upto 40 cm tall. Rhizome short. Stem erect, leafy. Petioles 0.5–2.5 cm; lamina 10-15 x 4-5.5 cm, oblong-lanceolate, entire, subcaudate, base narrowed, dark green, glabrous or scantily hairy beneath. Panicles 10-17 cm long, narrow. Bracts small, caducous. Calyx 0.6 cm, nearly funnel-shaped, shortly lobed, yellowish; corolla-tube 1.2-1.8 cm long, deep yellow, segments 0.5 cm long, ovate, reflexed; filaments 1-1.5 cm long. Capsule smooth.

Flr. & Frt.: Jun. - Sep.

Specimen Cited: Below Jaributti, 1780 m, **AP Das & PC Rai** 0181, dated 15.6.1994.

Status: Frequent.

Local Distrib.: Sakam, Phari, Chouda Feri, Jaributti. 700-1800m.

General Distrib.: E. Himalaya, Assam, Meghalaya, Manipur.

HEDYCHIUM Koenig.

Hedychium spicatum var. *acuminatum* (Roscoe) Wallich in *J. Bot. Kew Gard.* 5:328. 1853; *FBI* 6:227. 1892; *EFPN* 1:61. 1978; *FEH* 1:422. 1966; *Nam. Chang. Flr. Pl.* 273. 1987; *FB* 3(1):203. 1994.

Hedychium acuminatum Roscoe, *Monandr. Pl.* t. 47. 1828; *Symb. Sin.*7: 1320. 1936; *FEH* 1:422. 1966; *Nam. Chang. Flr. Pl.* 273. 1987.

Local Name : Ruksana (Nep.).

Robust plants to 1-2m high. Shoots leafy. Leaves 9-40 x 3.2-9.5 cm, lanceolate, acuminate, glabrous above, pubescent beneath; ligule upto 2 cm long, entire, glabrous or pubescent. Inflorescence 16-28cm, narrow cylindrical, many-flowered. Bracts 2.2-3 x 0.85-1 cm, oblong, obtuse, convolute, each subtending a flower. Bracteoles 1.1-1.5 cm long, tubular. Flower creamy white-yellow, reddish at base; corolla tube 5.2-6.1 cm; petals 2-3.1 cm, linear. Lateral staminodes upto 3 cm long, narrow lanceolate; lip 3.3-4 cm; limb shortly clawed, emarginate, sometimes limb deeply notched into 2 lobes; stamens usually shorter than lip, sometimes slightly exceeding, orange coloured; anther thecae free at base, ecristate; ovary trilocular with axile placentation

Flr.: Jan. - Aug.

Specimen Cited: Above Labha, 2100m, **AP Das & PC Rai** 1759, dated 18.5.1997.

Status: Common.

Local Distrib.: Lava, Durpinay, PHE Source, right Hill ridge of Alubari. 1800-2350m.

General Distrib.: Subtropical and temperate Himalayas (Kumaon-Sikkim).

COSTACEAE (Schum.) Nak

COSTUS L.

Costus lacerus Gangep. in Bull. Soc. Bot. France 3, 50:261. 1903; EFPN 1:59.1978; FIEM 291. 1989; FB 3 (1): 203. 1994; Fl. Sik. 1:124.1996.

Plants with leafy stems, 1.2-3m high. Leaves arranged spirally; petioles upto 1 cm long, densely pubescent; lamina 18-40 x 5-13 cm, elliptic-obovate, acute or shortly acuminate, usually thickly hairy on the lower side. Sheaths tubular. Inflorescence dense, terminal 4-7.9 x 3.8-6.9 cm, ovoid. Bracts 2.2-5 cm, ovate, imbricate, reddish, villous or glabrous. Bracteoles upto 2 cm long. Calyx 2-3 cm, reddish. Corolla tube 1.6-2.1 cm, whitish; lip 5.2-7.1 x 3.6- 8.5 cm, broadly ovate on spreading, whitish but yellowish tinged at the middle; stamens white; filaments slender; anther thecae centrally placed. Ovary trilocular with axile placentation. Capsule dehiscent, 1.6-2.8 cm, ellipsoidal, woody.

Flr. & Frt.: May - Aug.

Specimen Cited: Near Machuki, 1220 m, **AP Das & PC Rai** 1516, dated 04.6.1996.

Status: Frequent in low altitude places only.

Local Distrib.: Phari, Samsing, Machuki. 600-1250m.

General Distrib.: Himalayas, south to Sri Lanka, Indo-China, Formosa and Malaysia, south to New Guinea.

HYPOXIDACEAE R. Br.

Key to the Genera:

1. Inflorescence a capitate raceme; perianth lobes oblong-ovate; ovary not beaked
.....*Molineria*
1. Inflorescence a spike; perianth lobes lanceolate; ovary extended upwards into a slender beak.....*Curculigo*

CURCULIGO Gaertn.

Curculigo orchoides Gaertn., Fruct. 1: 63, t. 13. 1788; FBI 6: 279. 1892; FIEM 82. 1989; FB 3(1): 69. 1994; Fl. Sik. 1:139. 1996.

C. brevifolia Dryand. in Ait., Hort. Kew. ed. 2. 2: 253. 1811.

C. malabarica Wight, Ic. t. 2043 A, f. 1. 1853.

Small herb with rhizomatous rootstock. Leaves subsessile; lamina 20-45 x 1.5- 3.5 cm, lanceolate, entire, acute-acuminate, base narrowed, membranous, plicate glabrous, nerves thick, scape short, subterranean, clavate, covered with leaf sheaths. Bracts lanceolate, thin, membranous. Flowers subsessile, distichous; lower ones bisexual, others male; perianth segments 1-2 cm long; ovary small, villous; stigma 3-cleft. Capsule sessile, 1.2 cm, oblong; seeds a few, shiny black, wavy.

Flr. & Frt.: May - Aug.

Specimen Cited: Below Rechila Durpinay, 1800 m, **AP Das & PC Rai** 1380 dated 06.5.1995; Near Machuki, 1120m, **AP Das & PC Rai** 1820, dated 13.9.1997.

Status: Less Frequent: occur in dry grassy slopes.

Local Distrib.: Sakam, Machuki, Rechila Durpinay. 1000-1800m.

General Distrib.: Sub-tropical Himalaya (Kumaon and eastward upto 1800m), Khasi Hills, Manipur, Western Ghat.

MOLINERIA Colla

Molineria capitulata (Lour.) Herbert in Amaryll 84. 1837; Fl. Jow. 2: 533. 1987; FIEM 82. 1989; FB 3 (1): 67. 1994.

Leucojum capitulatum Lour., Fl. Cochin. 199. 1790.

Curculigo recurvata Dryander in Aiton, Hort. Kew ed. 2, 2: 253. 1811; FBI 6: 278. 1892.

C. capitulata (Lour.) Kuntze, Rev. Gen. Pl. 2: 703. 1891.

Local Name : Dhoti Saro (Nep.).

Perennial herb with stout rhizome. Leaves in basal rosette, 40-90 x 1.4-9cm, lanceolate, acute, base narrowed into tomentose petiole, usually glabrous above, beneath with dense appressed and scattered hairs. Scape longer upto 22cm, sometimes very shorter, densely brownish tomentose. Inflorescence capitate raceme, 4-6 x 3-4cm, very condensed, ovoid. Bracts, exceeding Flowers lanceolate, glabrous above and hairy underside. Pedicels short, glabrous or hairy. Flowers upto 1.5cm across; perianth lobes oblong-ovate, yellowish within, tube funnel-shaped; filaments very short; anthers united round the slender and

0.7 cm long style; stigma capitate; ovary 0.35 - 0.65 cm long, narrowed above. Fruits not observed.

Flr.: Apr. - May

Specimen Cited: Below Dhamdhamay Dara, 2100m, **AP Das & PC Rai** 0663, dated 18.10.1994; Above Phari, 1300m, **AP Das & PC Rai** 1825, dated 13.9.1997.

Status: Less Frequent.

Local Distrib.: Reshete, Thartharay, Below Dhamdmamay Dara, Above Phari. 1300-2100 m.

General Distrib.: Subtropical and temperate Himalayas, Sri Lanka, Myanmar, Indochin, Malaysia, China and Australia.

DIOSCOREACEAE R. Br.

DIOSCOREA L.

Key to the species:

1. Stems prickly.....*D. pentaphylla*
1. Stems not prickly.....2
2. Tubers whitish, bulbils not warty; leaves opposite; petioles not auricled
.....*D. bellophylla*
2. Tubers pale yellow, bulbils warty; leaves alternate; petioles auricled at base.....*D. bulbifera*

Dioscorea bellophylla Voigt ex Haines, For. Pl. Chota Nagpur 530. 1910; FWP 53: 3. 1973; Nam. Chang. Flr. Pl. 191. 1987; FIEM 73. 1989; FB 3 (1): 188. 1994.

D. nummularia var. *bellophylla* Prain, Beng. Pl. 2:1065, 1067. 1903.

D. glabra auct. non Roxb. Hk. f., FBI 6: 294. 1892 p.p.

Local Name: Singolbhok (Lep.); Gittha (Nep.).

Twinning herbaceous glabrous plant with elongated whitish tubers. Stems terete. Bulbils numerous. Leaves opposite, 6-12 x 3-6.5cm, upper ones usually lanceolate, acuminate, sagittate with angular lobes, thick-textured, secondary veins more distinct below and joined into mat-like structure about the midrib. Inflorescence stouter and often contracted; flowers grouped in axillary spikes when inflorescence axis not developed. Male flowers large; sepals and petals erect with scarious margins, former being triangular-ovate, latter oblanceolate and thick-textured; female flowers like male; style very short. Capsule 1.5-2 cm, obovate, wings narrow.

Flr.: Sep. - Dec. *Fr.:* Jan.

Specimen cited: Samsing, 710 m, **AP Das & PC Rai** 1707, dated 17.5.1997.

Status: Less Frequent.

Local Distrib.: Samsing, Phari, Suntalay, Machuki. Upto 1500m.

General Distrib.: India, Sri Lanka, Nepal, Myanmar, Malaysia, etc.

Note: Tubers are tasty.

Dioscorea bulbifera L., Sp. Pl. ed. 1:1033. 1753; Ann. Roy. Bot. Gard. Calc. 14(1):111. 1936; Fl. Males 4:311. 1951; FEH 1:419. 1966; Nam. Chang. Flr. Pl. 191.1987; FB 3(1):9. 1994.

D. sativa Thunb., Fl. Jap. 151. 1784; *non* L. (1753); FBI 6:295. 1892.

Local Name : Kuching (Lep.); Gittha (Nep.).

Glabrous twinning plant. Tubers globose, pale yellow when cut. Stem twining left without prickles, sharply angled. Bulbils many and warty. Leaves alternate; petioles as long as leaf blade, winged above and auriculate at base; lamina 8-24 x 6-15cm (lower ones comparatively larger to 30.5 x 29.5cm), ovate, acuminate, base cordate. Male inflorescence spikes in fascicles on axillary axes, even in groups of 4-6 in main stem axils, spikes long to 15cm. Flowers sessile and borne singly. Bracts lanceolate, acuminate, membranous. Male flowers: sepals and petals alike, 0.2-0.5 x 0.65-0.85cm, linear-lanceolate, sub-acute, whitish in bud condition becoming brown to purple later; stamens 6; anthers and filaments short (0.045 x 0.02cm). Female spikes axillary and in groups of 2-5; flowers overlapping; sepals and petals like that of male flowers, whitish, scented; stigma short (upto 0.08cm). Capsules 1.9-2.5cm, oblong-elliptic, reflexed with 0.65-0.7cm wide wings. Seeds surrounded by oblong wings of 0.75-0.8 x 0.38-0.4cm.

Flr.: Jun. - Sep. *Fr.:* Sep. - Oct.

Specimen Cited: Below Reshete, 1800m, AP Das & PC Rai 1761, dated 19.5.1997.

Status: Frequent.

Local Distrib.: Reshete, Sakam, Machuki. Upto 2100m.

General Distrib.: Tropics of the old World.

Dioscorea pentaphylla L., Sp. Pl. ed.1, 1032. 1753; FBI 6:289. 1892; Ann. Roy. Bot. Gard. Calc. 14(1):160. 1936; Fl. Males 4:315. 1951; FEH 1:420. 1966; Nam. Chang. Flr. Pl. 192. 1987; FB 3(1):10. 1994.

D. Jacquemontii Hk. f., FBI 6:290. 1892.

Local Name: Bhegur (Nep.); Sili Kussok (Lep.).

Twinning greyish-white plant. Tubers ovoid-globose, sometimes with rootlets on surface. Stems subglabrous to appressed pubescent, sometimes often bearing prickles. Leaves 3 to 5 foliolate; petiole 4.5-6.2cm; petiolule 0.35-0.5cm; leaflets 7-19 x 2.6-6.5cm, elliptic to oblanceolate, middle one generally largest, cuspidate, base narrowed, densely white-hairy above, subglabrous beneath. Spikes in male inflorescence dense, borne on hairy and branched inflorescence axis, solitary or pairs, greyish-white, pubescent. Bracts ovate, cuspidate, brownish. Male flowers sessile, globose, borne singly; sepals 0.11-0.14 x 0.055-0.08cm, lanceolate, acute, pubescent, brownish; petals 0.09-0.12 x 0.075-0.09cm,

oblanceolate, rounded, glabrous and brownish; anthers 3, 0.027-0.03cm; staminodes 3; pistillode columnar. Female spikes slender with flowers mostly in upper part; female flowers: sepals 0.02-0.022 x 0.086-0.09 cm, lanceolate, acute, scarcely bristly; petals glabrous; ovary whitish and hairy. Capsules 2.2-2.5cm, oblong, reflexed, with wings 0.65-0.7cm wide; seeds 0.32 x 0.41cm, basal.

Flr.: Jul. - Sep. *Frt.*: Nov. - Dec.

Specimen Cited: Above Phari, 1020m, **AP Das & PC Rai** 1552, dated 06.6.1996.

Status: Sparse.

Local Distrib.: Sakam, Phari, Machuki. Upto 1550m.

General Distrib.: Himalayas (Simla-Mishmi), India, Myanmar, Thailand, Indo-China, Malaysia, China.

LILIACEAE Juss.

Key to the Genera:

1. Leaves 3-5, all basal, oblong linear, keeled beneath.....*Allium*
1. Leaves many, both basal and on stems, not keeled.....2
2. Basal leaves in rosette, stem leaves smaller.....*Cardiocrinum*
2. Leaves not in rosette.....3
3. Flowers in few flowered axillary clusters.....*Polygonatum*
3. Flowers in 2-9 flowered terminal fascicles, sometimes on short lateral shoot
.....*Disporum*

Allium L.

Allium wallichii Kunth., Enum. Pl. 4:443. 1834; FBI 6:341. 1892; FIEM 90. 1989; FB 3(1):79. 1994; Fl. Sik. 1:145. 1996.

Local Name: Jangali Pyaj/Gopa (Nep.).

Bulbous perennial plants. Bulbs cylindric, clustered. Stem 30-60cm, erect, triangular. Leaves 3-5, all basal, shorter or equalling stem, 0.85-2.2cm broad, oblong-linear, flat, midrib raised on the undersurface, keeled beneath. Umbel lax, 4-7cm across, hemispheric, many flowered. Pedicels upto 3.9cm long, elongated. Flowers purple-pink; tepals 0.55-1 x 0.16-0.32cm, oblong-elliptic, acute, reflexed at a later stage; stamens shorter than tepals, erect, purple; filaments 0.4-0.65cm long; anthers upto 0.2cm; ovary 0.25-0.35 x 0.2-0.4cm; styles upto 0.5cm long. (**Plate VI: 57**).

Flr.: Jul. - Sep.

Specimen Cited: Middle Alubari, 2350m, **AP Das & PC Rai** 0312, dated 18.6.1994.

Status : Rare.

Local Distrib.: Middle Rechila, 2300-2450m.

General Distrib.: Temperate Himalayas (Kashmir-Sikkim, Darjeeling).

CARDIOCRINUM Lindl.

Cardiocrinum giganteum (Wallich) Makina, Bot. Mag. Tokyo 27:125. 1913; TBRI 50(4):108. 1987; FB 3(1):104. 1994; Fl. Sik. 1:146. 1996.

Lilium giganteum Wallich, Tent. Fl. Nep. 21, t. 12-13. 1824, excl. *syn.*, FBI 6:349. 1892.

Bulbous herbs, 1-2.5m high. Bulbs with ovate scales. Stem fistular. Basal leaves in rosette, upto 42 x 36cm, ovate, obscurely acute, base deeply cordate, lateral veins dichotomous. Petioles upto 23cm long. Stem leaves smaller than basal ones, acuminate, cordate. Raceme few to 25-flowered. Bracteoles deciduous. Pedicels upto 0.95cm long. Flowers purple white, fragrant; tepals 10-18 x 1.5-3cm, narrow-oblongate, rounded and reflexed at tip, base saccate; filaments 6-7.5cm; anthers upto 1.5cm, purple-yellow; ovary to 3cm, cylindric; style 4-5.5cm long, yellowish; stigma trilobed. Capsule oblong; seeds reniform and with membranous wing.

Flr. & Frt.: Jun. - Sep.

Specimen Cited: Chitray, 2600m, AP Das & PC Rai 0144, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Pankhasari, Alubari, Chitray, Jaributti. 2100-2600m.

General Distrib.: Temperate Himalayas (Garhwal-Sikkim, Darjeeling), Khasia Hills.

DISPORUM Salisb.

Key to the species:

1. Stem 40-60cm tall, dichotomously branched above; petioles less than 0.3cm; pedicels deflexed in fruits; filaments not thickened below.....*D. calcaratum*
1. Stem 25-52cm tall, simple or rarely branched; petioles 0.2-0.5cm long; pedicels not deflexed in fruits; filaments thickened below.....*D. cantoniense*

Disporum calcaratum D. Don, Trans. Linn. Soc. 18:516.1841; FBI 6:359.1892; Nam. Chang. Flr. Pl. 195. 1987; FIEM 93. 1989; Fl. Sik. 1:148. 1996.

40-60cm tall plant. Roots fleshy, pale white. Stem branched above dichotomously with ascending branches. Scale leaves 7 or more, loosely sheathing, membranous. Leaves shortly petiolate, 3-10.5 x 1.3-3 cm, lanceolate, acute to acuminate, base cuneate, veins elevated and papillose beneath. Inflorescence lateral. Pedicels 1-1.9 cm long, papillose, deflexed in fruits. Tepals oblong to oblongate, creamy or dull purple, spurred at base, spurs 0.41-0.5 cm long, often divergent from pedicel; filaments 0.31- 0.8 cm, papillose; anthers oblong; ovary 0.25- 0.39 x 0.2-0.3 cm, obovoid; style 0.52-1cm; stigma lobes extending. Berry 0.65-0.75 cm wide, black.

Flr. & Frt.: Apr. - Sep.

Specimen Cited: PHE Source, 2195m, AP Das & PC Rai 0430, dated 15.10.1994; Pankhasari, 2490m, AP Das & PC Rai 1312, dated 05.5.1995.

Status: Frequent.

Local Distrib.: Pankhasari, PHE Source, Neora- Sikkim Border. 2000-2500m.

General Distrib.: Temperate E. Himalayas, Meghalaya, Manipur and Myanmar.

Disporum cantoniense (Lour.) Merrill in Philip. J. Sci. 15:229.1919; FEH 1:407.1966; FM 9 (1): 218. 1979; Nam. Chang. Flr. Pl. 195. 1987; FIEM 93. 1989.

Fritillaria cantoniensis Lour., Fl. Cochinch 206. 1790.

Uvularia chinensis Ker- Gaul in Bot. Mag. t. 916. 1806.

D. pullum Salisburg in Trans. Hort. Soc. Lond. 1:331. 1812; FBI 6:360. 1892 p.p.

Local Name: Bhuin Harchur (Nep.)

Erect simple or branched herbs, 20-52 cm tall. Stem loosely sheathed with membranous, brownish scale, root-stock creeping. Petioles 0.2-0.5 cm; lamina 4.5-7.5 x 1.2-3cm, lanceolate, acuminate, base cuneate, nerves raised beneath. Inflorescence apparently lateral, few flowered. Pedicels 1-2 cm long, papillose. Flowers 1-2 cm long, pendulous; tepals oblong to oblanceolate, tapered at apex, creamy or dull purple, saccate at base, sacs 0.1-0.14 cm, rounded; filaments 0.38-1 cm long, thickened below; anthers 0.2-0.4 x 0.14-0.2 cm, oblong; ovary 0.3-0.4 x 0.2-0.3 cm, obscure obovoid; style upto 1cm long; stigma lobed and extending. Berries 0.7-0.8 cm across, blackish.

Flr.: Apr. - Jun.

Specimen Cited: Reshete Area, 2240m, AP Das & PC Rai 1318, dated 06.5.1995; Pankhasari, 2285m, AP Das & PC Rai 1399, dated 05.5.1996.

Status: Common.

Local Distrib.: Mulkharka, Reshete, Pankhasari, Right Hill ridge of Tiffin Dara. 1900-2300m.

General Distrib.: Temperate Himalayas, Khasia Hills, manipur, Myanmar, Thailand, Indo-China, Malaysia.

POLYGONATUM Tourne.

Key to the species:

1. Leaves in whorls of 3, linear, margin inrolled; pedicels 0.7-0.9cm long
.....*P. cirrhifolium*
1. Leaves alternate or subopposite, narrow-elliptic, margin narrowed to pointed tips; pedicels 0.2-0.4cm long.....*P. punctatum*

Polygonatum cirrhifolium (Wallich) Royle, III. Bot. Himal.380. 1839; FBI 6:322. 1892; FEH 1:411. 1966; Fl. Sik. 1:158. 1996.

Convallaria cirrhifolia Wallich in As. Res. 13:382. 1820.

Rhizomes stout, creeping. Stems weak, unspotted. Leaves in whorls of 3; lamina 6-10 x 0.7-1.1 cm, linear, margins often inrolled, strongly coiled at tips. Peduncles 0.75-1 cm, strongly recurved, 2-4 flowered. Pedicels shorter than peduncles. Flowers white-tinged

purplish; filaments upto 0.12 cm, not swollen at apex; anthers 0.15-0.2 cm; ovary 0.14-0.3 x 0.1-0.24 cm, ellipsoid; style 0.1-0.2 cm. (Plate VI: 58).

Flr. & Frt.: Apr. - Aug.

Specimen Cited: Near Tangta, 2500m, AP Das & PC Rai 0806, dated 21.10.1994.

Status: Rare.

Local Distrib.: Today-Tangta, Ruka Hill. 2100-2500m.

General Distrib.: Temperate Himalayas, Manipur and China.

Polygonatum punctatum Royle [III. Bot. Himal. 380. 1839, *nom. nud.*] ex Kunth, Enum. Pl. 5:142. 1850; FBI 6:321. 1892; FEH 1:412. 1966; Fl. Sik. 1:159. 1996.

Smell rhizomatous robust herb, 16-25 cm tall. Stem simple, bearing membranous scale leaves at base. Leaves alternate or subopposite; lamina 4.8-7.2 x 1.3-2 cm, narrow-elliptic, margins cartilaginous, tapered into pointed tips, base narrow, coriaceous, glistening when matured. Inflorescence borne on stem. Peduncle 0.3-0.9 cm long, 2-flowered. Pedicels 0.2-0.4 cm. Corolla tube 0.5-0.65 x 0.2-0.35 cm, urceolate, whitish flushed pink or purplish; lobes 0.12-0.15 cm long; filaments upto 0.1 cm; anthers 0.1-0.14 cm; ovaries 0.2-0.3 x 0.16-0.2 cm, ovoid or ellipsoid; style 0.15-0.2 cm.

Flr. & Frt. Apr. - Jun.

Specimen Cited: Neora Valley Boundary near Mulkharka, 2240m, AP Das & PC Rai 1641, dated 06.6.1996.

Status: Common.

Local Distrib.: Mulkharka, Chitray, Ruka Forest, Above Lava. 2200-2650m.

General Distrib.: C. to E. Himalaya.

CONVALLARIACEAE Horan.

Key to the Genera:

1. Leaves in rosette at rhizome apex; flowers sessile, brownish-green, streaked with purple.....*Tupistra*
1. Leaves not in rosette; flowers pedicellate, greenish or white to pinkish white.....*Maianthemum*

MAIANTHEMUM G.H. Weber ex Wiggers

Key to the species:

1. Plants upto 90cm high; stems flexuous, zigzag; leaves lanceolate-elliptic, entire; inflorescence axis much branched and zigzag.....*M. oleraceum*
1. Plants upto 52cm high; stem slender, not zigzag; leaves ovate-cordate, minutely serrulate or ciliate; inflorescence axis less branched, not zigzag.....*M. fuscum*

Maianthemum fuscum (Wallich) La Frankie, Taxon 35:588. 1986; FB 3(1):47. 1994; Fl. Sik. 1(2):153. 1996.

Smilacina fusca Wallich, Pl. As. Rar. 3:37. t. 257. 1832; FBI 6:323. 1892; TBRI 50(4):127. 1987.

Tovaria fusca Baker, J. Lin. Soc. 14:568. 1875.

Rhizomatous herbs, 15-52cm high. Stem glabrous on lower part, slender. Petioles 1-3.8cm long. Leaves 4.5-15 x 3.4-8.5cm, ovate-cordate, minutely serrulate or ciliate, acuminate to caudate, base cordate or sometimes cuneate, usually glabrous, occasionally with minute white hairs. Panicles upto 16cm long, elongated, deltoid. Pedicels slender, glabrous. Bracteoles lanceolate, brown. Tepals 2-seriate, outer ones 0.25-0.35 x 0.15-0.28cm, orbicular, greenish, inner ones larger than outer tepals, orbicular-elliptic, brown purple; filaments 0.56-1cm diam., globose; anthers 0.4-0.5cm, round, facing upward; ovary 0.1-0.15cm diam., obscurely trigonous; stigma lobed. Berry red. (Plate VI: 59).

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Middle Rechila, 2400m, AP Das & PC Rai 0433, dated 15.10.1994.

Status: Common.

Local Distrib.: Middle Rechila, Thosum Forest, Ruka Hill, Chitray. 2300-2800m.

General Distrib.: Temperate Himalayas (Nepal-Sikkim, Bhutan), Khasia Hills.

Maianthemum oleraceum (Baker) La Frankie in Taxon 35:589. 1986; FIEM 97. 1989; FB 3(1):49. 1994; Fl. Sik. 1:153. 1996.

Tovaria oleracea Baker in J. Lin. Soc. 14:569. 1875.

Smilacina oleracea (Baker) Hk. f., FBI 6:323. 1883; TBRI 50(4):127. 1987.

Rhizomatous herbs, 25-90cm high. Stems simple or slightly zigzag, flexuous. Petioles 0.5-0.75cm. Leaves 10-26 x 4.5-11.5cm, lanceolate-elliptic, entire, acuminate to caudate, base rounded to truncate, glabrous above, appressed hairy on veins. Inflorescence 5-28 x 6-22cm, lax, axis zigzag, much branched, branches hairy. Bracteoles filiform. Pedicels densely hairy. Flowers white to pinkish white; outer tepals 0.2-0.4cm wide, oblanceolate-elliptic; inner tepals 0.5-0.7 x 0.3-0.5cm, elliptic-broadly elliptic; filaments upto 0.3cm long, linear; anthers 0.1-0.17 cm long; ovary upto 0.2cm across, globose, trilobed; style 0.15-0.25cm, 3-lobed to half length; stigmas recurved. Berry upto 0.7-0.8cm across, 1-2 seeded.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Alubari, 2280m. AP Das & PC Rai 096, dated 13.6.1994; Middle Rechila, 2460m, AP Das & PC Rai 0176, dated 15.6.1994.

Status: Common.

Local Distrib.: Chitray, Alubari, Middle Rechila, Ruka Hill. 2300-2800m.

General Distrib.: C. to E. Himalaya.

TUPISTRA L.

Tupistra nutans Wallich ex Lindl., Edgew., Bot. Reg. 15:t. 1223. 1829; FBI 6:324. 1892; FIEM 102. 1989; FB 3(1):56. 1994; Fl. Sik. 1:163. 1996.

T. squalida sensu Baker in J. Lin. Soc. 14:580. 1875 *p.p. non* Ker-Gawl. 1814.

Local Name: Naakima (Nep.).

Small herb with thick, creeping rhizome. Scale leaves membranous, pale brown, persistent, acute, base encircling rhizome. Normal leaves 2-6, in rosette at rhizome-apex, blades 15-52 x 3.5-7cm, narrowly oblanceolate, mid-rib thickened below and narrowed to a distinct petiole. Scape 6-12cm long, stout. Spikes 3-7cm, cylindrical. Bracts membranous, obtuse. Flowers sessile, fleshy, brownish-green streaked with purple; perianth tube 0.5-1cm long, broadly campanulate, lobes 0.65-0.9 x 0.5-0.65cm, triangular; lower part of filament fused to tube; anthers subsessile, 0.1-0.2cm long, oblong; ovary to 0.3cm, globose; style 0.3-0.6cm; stigma 0.3-0.35cm diam., peltate, fleshy. Fruits not recorded. (Plate VI: 60).

Flr.: Sep. - Nov.

Specimen Cited: Left Hill top of Lava, 2380m, AP Das & PC Rai 1272, dated 05.5.1995.

Status: Less Common.

Local Distrib.: Seen only in Left Hill top of Lava. 2380m.

General Distrib.: E. Himalaya, Mismi, Nagaland and Khasia Hills.

TRILLIACEAE Lindl.

PARIS L.

Paris polyphylla Smith in Rees. Cyclop.26: Paris n. 2. 1813; Ill. Him. Pl. t. 24. 1855; FBI 6:362. 1892; SFSH 160. 1963; FEH 1:410. 1966; 2:167, 361. 1971; FPK 116. 1981; TBRI 50 (4):124. 1987; FB 3(1):22. 1994; Fl. Sik. 1:156. 1996.

Plants with much variable forms. Rhizome with annular scales. Stem 20-60cm tall, erect, unbranched. Petioles upto 2cm long. Leaves 4-9, arranged in a solitary whorl above the middle of the stem, lamina 9-15 x 1.5-4cm, oblanceolate to narrowly elliptic, entire, pointed acuminate, base cuneate, glabrous. Pedicels 1-6cm long, often extended in fruit. Flowers solitary, terminal; floral parts numer and sizes inconsistent and variable; sepals 3-6, measuring 3.5-6 x 0.85-2cm, linear-lanceolate, acuminate; petals equalling sepals, longer than sepals, filiform, yellowish-green; stamens 6-12; filaments 0.35-0.75cm long; ovary 0.4-0.5 x 0.55-0.6cm; style 0.2-0.45cm; stigma 4-lobed, recurved.

Flr. & Frt.: Mar. - Jul.

Specimen Cited: Jaributti, 2195m, AP Das & PC Rai 0493, dated 15.10.1994.

Status: Common.

Local Distrib.: Alubari, Pankhasari, Jaributti, Tinsimana. 2100-2900m

General Distrib.: Temperate-subalpine Himalayas, Meghalaya, Manipur, Thailand, China, etc.

SMILACACEAE Vent

SMILAX L.

Key to the species:

1. Leaves triangular to hastate with truncate basal lobes; umbels sessile.....*S. aspera*
1. Leaves not triangular and without truncate basal lobes; umbels peduncled2
2. Branches glandular bristly; prickles usually absent, rarely present.....*S. aspericaulis*
2. Branches without bristles; prickles recurved.....3
3. Lamina ovate-elliptic; inflorescence axis with more than one umbels; peduncles branched.....*S. ovalifolia*
3. Lamina narrowly ovate; umbels one per inflorescence axis; peduncles unbranched.....4
4. Leaves dark green when drying; petioles 2.5-3cm long.....*S. lanceifolia*
4. Leaves not dark green when drying; petioles absent or very short.....5
5. Lamina ovate-cordate, 3-5 costate from base; ovary ovoid.....*S. elegans*
5. Lamina lanceolate to oblong or ovate, sometimes orbicular; costae 3 from base; ovary not ovoid.....6
6. Prickles nearly straight; petioles absent or very short, never winged.....*S. rigida*
6. Prickles recurved; petioles upto 0.78cm long; winged.....*S. ferox*

Smilax aspera L., Sp. Pl. ed. 1:1028. 1753; Monog. Phan. 1:163. 1878, incl. var. *maculata* FBI 6:306. 1892; Adv. Front. Pl. Sci. 4:61. 1961; FEH 1:414. 1966; FB 3(1):27. 1994; Fl. Sik. 1:163. 1996.

S. maculata Roxb., Fl. Ind. ed. 2.3 : 796. 1832.

S. fulgens Wallich [Cat. No. 5122.1830] *nom. nud.*

Climbing with zigzag ridged stems, with stout prickles. Leaves alternate; petioles 1.8-2.6cm, sometime prickly, base narrowly winged; lamina 6-11.5 x 2.4-6.8cm, triangular to hastate, often lanceolate or ovate when lobes not developed, acute or mucronate, base truncate to weakly cordate, margins often with minute spines, costae 5-9, midrib bearing prickles below, coriaceous. Tendrils strong, developed from the apex of petiole wings. Racemes zigzag, arising from axils of prophylls of lateral branch with 8-12 sessile umbels. Female umbels 2-3 flowered; receptacles upto 0.21cm diam., globose; bracteoles brownish; pedicels 0.3-0.41cm; female flowers always smaller than male ones, ovary upto 0.15cm long, ellipsoidal; stigmas 3; staminodes 6. Male umbels consisting of 8-16 flowers; pedicels upto 0.66cm long; tepals reflexing afterward, creamy, outer ones 0.4-0.53 x 0.08-0.14cm, narrow oblanceolate, inner ones upto 0.1cm wide, linear; filaments 0.16-0.28cm; anthers to 0.15 x 0.07cm, oblong. Berries 0.55-0.75cm diam., 3-seeded, reddish; seeds to 0.35cm across.

Flr.: Sep. - Nov. *Frt.:* Apr. - Aug.

Specimen Cited: Below Chitary, 2480m, AP Das & PC Rai 1764, dated 20.5.1997.

Status: Frequent.

Local Distrib.: Rechila Chowk, Chitray, Left Hill crest of Helipad, Pankhasari.

General Distrib.: Mediterranean region throughout Southern Central Asia eastwards to India and southwards to Sri Lanka.

Smilax aspericaulis Wallich ex DC., Monogr. Phan. 1:195. 1878; FBI 6:306. 1982; Trs. N. Beng. 135. 1929; FB 3 (1):29. 1994; Fl. Sik. 1:163. 1996.

Local Name: Kukurdaine (Nep.).

Shrubby tendril climbers. Branches terete, glandular bristly, sometimes with recurved prickles. Tendrils terete, simple, glabrous. Leaves simple, alternate; petioles 1-2.5 cm long, sheathing at the base; lamina 8.5-17 x 4-9 cm, ovate-oblong, sometimes linear-oblong, acute, base cuneate or rounded, margin entire, cartilaginous, costae 3. Umbels bracteate, solitary or 2-3, pedunculate. Male umbels many flowered with globose receptacle, tepals reflexed, biseriate, outer ones upto 0.7 cm long, reddish, inner shorter. Female umbels 18-22 flowered with receptacle to 0.2 cm across, flowers smaller, tepals as in male flowers; ovary 0.2-0.25 x 0.2 cm; stigma lobes recurved, staminodes 3. Berries 0.85-1 cm diam., globose.

Flr.: Oct. - Dec. *Fr.:* Feb. - May

Specimen Cited: Chouda Feri, 2160m, AP Das & PC Rai 1949, dated 02.11.1997.

Status: Less Frequent.

Local Distrib.: Machuki, Sakam, Chouda Feri. 1300-2200 m.

General Distrib.: E. Himalayas (Sikkim-Khasia Hills), Darjeeling, Andaman Island; Myanmar.

Note: Fruits edible.

Smilax ferox Wallich [Cat. No. 5119. 1830, *nom. nud.*] ex Kunth, Enum. Pl. 5:251.1850; Monog. Phan.1:103. 1878; FBI 6:307. 1892; Adv. Front. Pl. Sc. 4:63,f.4. 1961; FB. 3(1):33. 1994; Fl. Sik. 1:164. 1996.

Woody climber. Old stems strongly prickly; prickles strong, recurved. Lateral branches with strong ridges, base covered by brownish prophyll and persistent petiole-base, prophyll upto 1cm long with tip sharply reflexed. Leaves alternate, simple; petioles 0.35-0.78cm, winged throughout the length, wings 0.075-0.2 cm wide, semi-elliptic, membranous and pale; tendrils sometimes developed on older wood; leaf lamina 5-9.5 x 1.9-4.5cm, lanceolate to oblong, mucronate, base cuneate to rounded, coriaceous, glaucous beneath. Umbels pendunculate, borne singly, 12-22 flowered; peduncle upto 2cm long, developing from axil of lowermost leaf of lateral branch; receptacle upto 0.65cm, elongate; bracteoles lanceolate, conspicuous, brown. Flowers unisexual,

differentiated into 2 whorls each of 3 free tepals. Male flowers campanulate, outer tepals 0.3-0.5 x 0.2-0.23cm, inner ones 0.1-0.2cm wide; filaments upto 0.22cm; anthers 0.07-0.1 x 0.04cm, oblong. Female flowers: ovary 0.23-0.24cm; stigmas 3, spreading, upto 0.13cm; staminodes 2-3. Berries of 1.2cm across, red; seeds 0.54cm, reddish-brown. (Plate VII: 64).

Flr.: Apr. - May. *Frt.*: May - Nov.

Specimen Cited: Below Jorpokhari, 2800m, AP Das & PC Rai 0864, dated 22.10.1994.

Status: Fairly Common.

Local Distrib.: Below Jorpokhari, Reshete, Hattidara, Thosum Hill. 1900-3000m.

General Distrib.: E. Himalaya, Manipur.

Smilax elegans Wallich (Cat. No. 5117 B. 1830. *nom. nud.*) ex A. DC., Monogr. Phan. 107. 1878; Trs. N. Beng. 135. 1829; Fl. Sik. 1:163. 1996.

S. glaucophylla Klotz., Reise Prinz. Wald. Bot. 45, t. 91. 1862; Adv. Front. Pl. Sc. 4:67, f. 6. 1961; FEH 1:415. 1966; EFPN 1:89. 1978; TBRI 50 (4):127. 1987; FB 3(1):35. 1994.

S. parviflora Wallich ex Hk. f., FBI 6:304. 1892.

S. longibracteolata Hk.f., FBI 6:305. 1892.

Climbing shrubs. Stem glossy, terete, glabrous. Tendrils simple with sinistrorse coils, glabrous. Petioles upto 1.3 cm long including sheath. Leaves 3-12.5 x 1.4-7.2 cm, ovate-cordate, acute, cordate at base, margin entire, basally 3-5 costate. Umbel many flowered, bracteolate. Flowers pedicelled (pedicels upto 0.3 cm long); sepals linear-oblong; petals 0.2 x 0.1 cm, ovate-oblong, glabrous; stamens 4 with whitish anthers to 0.1 cm; ovary ovoid; staminodes 3. Berries not seen.

Flr.: Apr. - May

Specimen Cited: Chitray, 2600m, AP Das & PC Rai 1950, dated 04.11.1997.

Status: Frequent.

Local Distrib.: Thosum Hill, Chitray, Reshete, Ruka Hill. 2160-2850 m.

General Distrib.: E. Himalaya.

Smilax lanceifolia Roxb., Fl. Ind. ed. 2, 3:792. 1832; Monogr. Phan. 1:57. 1878; FBI 6:308. 1892; Trs. N. Beng. 135. 1929; FEH 1:415. 1966; FPK 116. 1981; TBRI 50(4): 127. 1987; FB 3(1):32. 1994; Fl. Sik. 1:164. 1996.

Tendrillar climbing shrubs. Stem terete, sometime obscurely ridged, glabrous. Tendrils simple, sheathing upto half length of petioles. Petioles 2.5-3 cm long. Leaves 10-14 x 5-8 cm, oblong-lanceolate, cuspidate, base rounded, coriaceous, 5-costae from base. Male umbels upto 23 flowered, on peduncles upto 1.6 cm; flowers subsessile; tepals linear; filament filiform. Female umbels bracteolate, many flowered, borne on stout peduncles

upto 1.3 cm long; staminodes 3; ovary triangular, with obscurely recurved stigma. Berries 0.6-0.75 cm diam., blackish.

Flr.: Sep. - May *Fr.:* Nov. - Jun.

Specimen Cited: Phari, 900m, AP Das & PC Rai 1548, dated 06.6.1996.

Status: Less Common.

Local Distrib.: Machuki, Phari, Pankhasari. 900-2160 m.

General Distrib.: Sub-tropical Himalayas, Khasia Hills, Manipur, Myanmar to China.

Smilax ovalifolia Roxb., Fl. Ind. 3:794. 1832; FEH 1:417. 1966; FB 3(1):30. 1994; Fl. Sik. 1:165. 1996.

S. macrophylla Roxb., Fl. Ind. 3:793. 1832; FBI 6:310. 1892, *non* Willd. 1805.

S. zeylanica L., Sp. Pl. 1029. 1753; FBI 6:309. 1892; Adv. Front. Pl. Sci. 4:50. 1963; Ind. Forest. 93. 57. 1967; FEH 3:135. 1975; EFPN 1:79. 1978.

Local Name: Kukurdaine (Nep.); Rajdan-tini (Beng.).

Shrubby climbers with striated glabrous branchlets, sometime prickly. Internodes 7-9 cm long. Tendrils simple, sinistrorsely coiled, glabrous. Petioles upto 2.6 cm long. Leaves 12-18 x 9-12.5 cm, ovate-elliptic, acute, cuneate at base, margin entire, 7-nerved. Umbels many flowered, on branched peduncle. Bracteoles upto 0.15 cm long. Flowers pedicellate (pedicels upto 1.4 cm long); tepals short; filament 0.5-0.55 cm, linear; anthers upto 0.15 cm long. Berries 0.7-0.75 cm across, reddish on ripening.

Flr.: Mar. - Aug. *Fr.:* Sep. - Dec.

Specimen Cited: Near Suntalay, 655m, AP Das & PC Rai 1503, dated 04.6.1996.

Status: Sparse.

Local Distrib.: Suntalay, Gorubathan, Machuki. 500-1250 m.

General Distrib.: Tropical Himalaya, India, Bangladesh, Myanmar, Central provinces and Concan.

Smilax rigida Wall *ex* Kunth, Enum. Pl. 5:164. 1850; Monog. Phaner. 1:105. 1878; FBI 6:304. 1892; Adv. Front. Pl. Sci. 4:73. 1961; FEH 1:417. 1966; FB 3 (1):32. 1994.

Local Name: Kukurdaine (Nep.).

Spiny shrub upto 2.5m high. Stems spiny, strongly ridged, ridges decurrent from leaf bases. Spines upto 1cm, nearly straight. Leaves sessile; petioles very short and with ciliate and brownish free stipular, scales at base; lamina 1.5-2.9 x 0.95-2.3cm, ovate, sometimes orbicular also, mucronate, base rounded to shallow cordate, costae 3, coriaceous. Tendrils absent. Umbel 2-5 flowered; peduncle 0.45-0.89cm, arising from lower leaf axil of lateral shoots. Female flowers with 2 seriate tepals, outer tepals 0.39 x 0.17cm, inner tepals 0.15cm wide; ovary to 0.12cm; stigmas 3, erect; staminodes 3. Male

flowers campanulate, outer tepals 0.23-0.28 x 0.11-0.13cm, inner one 0.1cm wide; anthers upto 0.03 x 0.03 cm. Berries to 0.5cm, blackish.

Flr.: May - Jun. *Fr.:* Sept. - Oct.

Specimen Cited: Near Jorhpokhari, 3000m, AP Das & PC Rai 1765, dated 20.5.1997.

Status: Frequent.

Local Distrib.: Chitray, Left Hill peak of Lava, Jorhpokhari, Pankhasari. 2000-3050 m.

General Distrib.: E. Himalaya.

COMMELINACEAE R. Br.

Key to the Genera:

1. Plant scrambling/climbing; leaves ovate-cordate.....*Streptolirion*
1. Plant erect or decumbent; leaves never ovate-cordate.....2
2. Cymes sessile; flowers dark blue.....*Cyanotis*
2. Cymes pedunculate; flowers white or pale blue.....*Commelina*

COMMELINA L.

Key to the species:

1. Small diffuse herb, upto 33cm high; sheaths 1-1.8cm long; cymes paired; seeds blackish-brown, surface with reticulation.....*C. diffusa*
1. Plant straggling and upto 150cm high; sheaths 2-2.8cm long; cymes solitary; seeds gray and slightly granular.....*C. paludosa*

Commelina diffusa Myanmarn f., Fl. Ind. 18. 1768; Merrill in Journ. Arn. Arb. 18.64. 1937; NRBGE 25: 179. 1964; FEH 1: 400. 1966; Nam. Chang. Flr. Pl. 140. 1987; FB 3(1): 237. 1994; Fl. Sik. 1:168. 1996.

C. nudiflora L. *sensu* Clarke in DC., Monog. Phan. 3: 144. 1881, FBI 6: 369. 1892.

Small annual herbs with thickened roots, 16-33 cm. Stem branched, rooting from lower nodes. Leaves alternate, 4-6 x 1.5-2 cm, narrowly lanceolate, acuminate, base contracted into a short petiole, granular above, glabrous beneath. Sheaths 1-1.8 cm, cylindric, glabrous, often vertically nerved, mouth with jointed cilia. Spathes 1.5 - 2 cm, conduplicate, base rarely cordate. Cymes in unequal paired peduncles, longer peduncle 2-4 male flowered, persistent; shorter peduncle 5-6 bisexual flowered. Petals blade 0.3-0.42 cm, orbicular, bluish; claw 0.35 cm; filaments 0.65 cm long; anthers unequal, 0.1-0.12 cm (lateral) to 0.18 cm (medial); ovary 0.15 x 0.7 cm, ellipsoidal, triangular; styles 0.7 cm, filiform. Capsule 0.5-0.59 x 0.25-0.3 cm, oblong-ellipsoid, greenish-brown. Seeds blackish-brown, marked with surface reticulation.

Flr. & Fr.: Apr. - Oct.

Specimen Cited: Suntalay (Near Samsing) 655 m, AP Das & PC Rai 1642, dated 06.6.1996.

Status: Abundant in low altitude areas.

Local Distrib.: Phari, Sunatalay, Machuki, Sunatalay. Upto 1350m.

General Distrib.: Pantropic and warm temperate regions.

Commelina paludosa Bl., Enum. Pl. Java 1: 2 1827; JBNHS 59: 60 1962; NRBGE 25: 181. 1964; FEH 1: 400. 1966; Nam. Chang. Flr. Pl. 141. 1987; TBRI 50 (4):110. 1987; FB 3(1): 235. 1994; Fl. Sik. 1:169. 1996.

C. obliqua Buch-Ham. ex D. Don, Prodr. 45. 1825, *non* Vahl 1806; FBI 6: 372. 1892 p.p. FIEM 25. 1989.

Straggling and upto 150 cm long, highly branched. Upper leaves 10-19 x 2.4 cm, lanceolate, acuminate, base cuneate, coarse and granulated above, usually glabrous and smooth beneath; sheaths 2-2.8 cm, cylindric, mouth ciliated and brownish. Spathes lanceolate, clustered and shortly stalked, acuminate, base cuneate. Cyme solitary, 6-7 flowered. Flowers white or sometime pale blue; petals 3, 2 of which 0.42 x 0.32 cm long usually oblong with 0.4-0.45 cm long claw; 3rd petal 0.53 cm long, lanceolate, sometimes even absent; filaments folded; outer anthers shorter (0.12 x 0.6 cm), ellipsoidal, central anther 0.2-0.24 cm; ovary 0.65 x 0.45 cm, broadly ellipsoid; style upto 0.62 cm long, apically recurved. Capsule 0.5-0.53 x 0.48-0.58 cm, oblong, triangular and truncate, glossy, greenish brown. Seeds oblong, slightly granular and greyish.

Flr. & Frt.: May - Nov.

Specimen Cited: Neora Khola near Samsing, 700 m, AP Das & PC Rai 1708, dated 17.5.1997.

Status: Very Common.

Local Distrib.: Samsing, Gorubathan, Machuki, Sakam. 400-1600m.

General Distrib.: India, Sri Lanka, nepal, Myanmar, Malaysia, Indochin, China.

CYANOTIS *D. Don (nom. cons.)*

Cyanotis vaga (Lour.) J.A. and J.H. Schultes, Syst. Veg. 2: 1153. 1830; FBI 6: 387. 1892; NRBGE 25: 186. 1964; Nam. Chang. Flr. Pl. 168. 1987; TBRI 50(4): 110. 1987; FB 3(1) : 228. 1994; Fl. Sik. 1:169. 1996.

Tradescantia vaga Lour., Fl. Cochin 1: 193. 1790.

Small slender herb, 14-28 cm tall. Stem sparsely branched, rounded, softly hairy. Leaves alternate, sessile, lamina 2-5 x 0.2-0.4 cm, narrow-lanceolate, ciliate, acute; leaf-sheath woolly hairy. Cymes both terminal and axillary, sessile. Bracts long, straight or curved, hairy. Flowers upto 1 cm long, dark blue; filament long, white hairy. Capsule small, oblong; seeds with two clefts, reticulate.

Flr. & Frt.: Jul. - Nov.

Specimen Cited: Jaributti-Rechila, 2195-2280 m, AP Das & PC Rai 0391, dated 15.10.1994.

Status: Abundant.

Local Distrib.: Rechila Park, Jaributti, Chonkobhir, Reshete, Helipad region. 1900-2400m.

General Distrib.: Subtropical and temperate regions of Africa and Asia.

***STREPTOLIRION* Edgew.**

Streptolirion volubile Edgew. in Proc. Linn. Soc. 1: 254. 1845; Trans. Linn. Soc. 20: 90, t. 2. 1846; Commel. & Cyrt. Beng. t. 40. 1874; FBI 6: 389. 1892; KB 16: 212. 1962; FEH 1: 402. 1966; TBRI 50(4): 128. 1987; FIEM 31. 1989; FB 3(1): 229. 1994; Fl. Sik. 1:172. 1996.

Tradescantia cardifolia (non Swartz 1788) Griff., Priv. Journ. 208. 1847.

Streptolirion cordifolium (Griff.) O. Kuntze, Rev. Gen. Pl. 2: 722. 1891.

Twining herbs. Stem long upto 6 ft., flaccid, often rooting from nodes, glabrous or thinly hairy. Leaves long petioled (petiole 1.3-7 cm long), lamina 3-8.6 x 1.7-5.7 cm, ovate-cordata, entire, long acuminate, base inwardly deep-lobed, greenish, glabrous both surfaces, nerves upto 15 arising from base, concentric, leaf-sheaths 2 cm with ciliate mouth, brownish and membranous.

Flr. & Frt.: Aug. - Oct.

Specimen Cited: Ruka Hill, 2460 m, AP Das & PC Rai 0934, dated 24.10.1994.

Status: Common.

Local Distrib.: Abundantly growing in Ruka Hill. 2350-2460m.

General Distrib.: Subtropical and temperate Himalayas, Khasia Hills, Manipur, Myanmar, China and Japan.

JUNCACEAE Juss.

***JUNCUS* L.**

Key to the species:

1. Flowering stems leafy, branched from near base; flowers sessile.....*J. bufonius*
1. Flowering stem leafless, usually unbranched; flowers shortly pedicellate.....2
2. Stem slender, grooved; sheath auricled; capsule narrowly ovoid.....*J. ochraceus*
2. Stem densely tufted; sheath not auricled; capsule obovoid, trigonous.....*J. effusus*

Juncus bufonius L., Sp. Pl. ed. 1, 328. 1753; FBI 6:392. 1892; FEH 2:162. 1971; EFPN 1:85. 1978; TBRI 50 (4):167. 1987; FIEM 84. 1989; FB 3(1): 231. 1994.

Glabrous annual, densely tufted herbs to 30 cm tall. Stem usually branched near base. Stem Leaves upto 6 cm long, 0.1-0.1 cm wide, sub-based, solid, greenish yellow. Auricles 0. Bracteoles 2, ovate- acuminate. Flowers sessile, borne singly; tepal-outer 0.3-0.45cm, acuminate, greenish; inner 0.3-0.4 cm, membranous; stamens 6, not exceeding

tepals; filaments upto 0.1cm; anthers minute; ovary 0.15-0.17 cm, ellipsoid; stigma lobes deflexed. Capsules trigonous, ellipsoidal with truncate apex.

Flr. & Frt.: Apr. - Sep.

Specimen Cited: Jaributti, 2195 m, **AP Das & PC Rai** 0396, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Rechila Chowk, Jaributti, Sakam. 1600-2200m.

General Distrib.: N. W. to E. India, N. W. to C. Himalayas.

Juncu effusus L., Sp. Pl. ed. 1, 326. 1753; FBI 6:392. 1894; FEH 1: 402. 1966; FIEM 84. 1989; FB 3(1):253. 1994.

Perennial rhizometous herbs. Flowering stems densely tufted, bearing orange-brown scale Leaves, cylindric, shallowly grooved. Inflorescence compact with few Flowers tepals 6, unequal, lanceolate, acute; stamens 3: anthers 0.06 cm; ovary oblong-ellipsoid; style very short. Capsule 0.18-0.25 cm long, obovoid, trigonous with emarginate tip.

Flr. & Frt.: Jul. - Nov.

Specimen Cited: Near Dhamdhamay Dara, 2350m, **AP Das & PC Rai** 0986, dated 23.4.1995.

Status: Frequent.

Local Distrib.: Rechila Chowk, Tangta, Helipad region, Dhamdhamay Dara. 2200-2450m.

General Distrib.: Temperate regions of the Northern Hemisphere.

Juncus ochraceus Buchenau in Abh. Nat. Ver. Brem. 3:292. 1872; FBI 6:394. 1894; FEH 1:403. 1966; TBRI 50 (4):117. 1987; FB 3 (1):253. 1994; Fl. Sik. 1: 176. 1996.

Small robust herbs, 17-35 cm. Stem simple, slender, grooved. Leaves sheathed, as long as stem or shorter, filiform, glabrous, channeled above; sheaths upto 6 cm, auricled. Cyme compound in small head, loosely branched, partly or all reduced to sterile spikelets of golden yellow bracts and glumaceous tepals. Flowers small, shortly pedicellate, pale green; perfect flowers 1 or 2, usually developed at the second axil of head; sepals narrow, linear-lanceolate, membranous; anthers twisted at length; filament shorter than anthers; style slender, almost twice longer than sepals. Capsule narrow ovoid.

Flr. & Frt.: Aug. - Oct.

Specimen Cited: Rechila Chowk, 2480m, **AP Das & PC Rai** 093, dated 15.6.1994.

Status: Frequent.

Local Distrib.: Hill ridge above Lava, Middle Rechila Chowk, Reshete. 2100-2500m.

General Distrib.: Temperate E. Himalaya and Assam.

PALMAE (nom. alt.=ARECACEAE Schultz.)

CALAMUS L.

Calamus erectus Roxb., Fl. Ind. 3:774. 1832; FBI 6:438. 1892; FIEM 16. 1989; FB 3 (1): 419. 1994; Fl. Sik. 1:181. 1996.

Local Name: Phekre (Nep.); Rhom, Rong (Lep.).

Shrubs with stems upto 6.5m, tufted, scarcely branched. Sheaths 2.4-3.6 cm wide, spiny on the upper side, eflagellate; ocrea long (upto 25 cm), densely lamellate with black-brown bristles; auricles long upto 9.2 cm; rachis tomentose on upper portion with flattened spines. Petiole short upto 80 cm. Leaves upto 5 m long with 35 leaflets on each side; leaflets sub-opposite 38-70 cm x 2.5-4.3 cm, linear-lanceolate, midrib surfaces minutely setose on both sides, lateral veins numerous, acuminate apex with wide terminal pinnae. Inflorescence 40-98 cm, pendent, branched, covered with brown felt. Bracts on prophylls and inflorescence tubular and lacerate. Male rachillae upto 30 cm long, flexuous, bracts 0.35-0.45 x 0.6- 0.75 cm, funnel-like; flowers sessile, borne on cup-shaped bracteole; calyx 0.05-0.06 cm, lobed; corolla lobes 0.6-0.75 x 0.27-0.35 cm; anthers 0.5-0.7 cm; filaments upto 0.07 cm. Female inflorescence and male inflorescence alike; bracts upto 0.75 cm long and conspicuously tubular; calyx 0.05 cm, lobed; corolla lobes equal or slightly exceeding calyx. Fruit 3-3.6 x 2.5 cm, ellipsoid; fruit scales upto 0.9 cm wide, grooved and orange-yellowish brown.

Flr.: Nov. - Apr. *Frt.:* Apr. - Aug.

Specimen Cited: Near Machuki, 1200m, AP Das & PC Rai 1757, dated 18.5.1997.

Status: Sparse.

Local Distrib.: Machuki, Phari. 900-1300 m.

General Distrib.: Eastern Himalayas (Sikkim, Bhutan, Assam, Khasi Hills), Bangladesh.

Note: Fruits edible and chewed as stimulant

PANDANACEAE R. Br.

PANDANUS L.

Pandanus furcatus auct. non Roxb.: Hk. f., FBI 6. 484. 1983 p.p.; Nam. Chang. Flr. Pl. 410. 1987; FB 3(1). 432. 1994; Fl. Sik. 1:184. 1996.

P. nepalensis St. John in Bot. Mag. Tokyo 85: 254. 1972; EFPN 1:87. 1978.

Local Name: Tarika (Nep.); Bor-kung (Lep.).

Small sparingly branched trees to 3-8m high, with thick aerial roots in the lower part. Leaves drooping, 3-6m long, 6-7.2 cm wide, ensiform, apex acuminate to long caudate, base contracted, midrib spiny below, spines 0.15-0.2cm, often curved. Male spike

pendulous, 9-14.5 x 2.5-3 cm, compound; stamens 10; filaments fused on the lower part; anthers 0.45-0.5 cm, mucronate; spathes upto 1 m long, broadly lanceolate, shortly acuminate, yellowish. Female spikes dense, pendent, 1-8 syncarps; spathes 29-32 x 4-4.5 cm, oblong, acuminate; style upto 0.75 cm long, bifid, persistent; fruiting syncarps 18-32 x 11-12.5 cm, ellipsoid to oblong, red brown on ripening. Drupes 4-5.5 x 1-2.4cm, obovoid.

Flr. & Frt.: Jul. - May

Specimen Cited: Suntalay, 750m, AP Das & PC Rai 1510, dated 04.6.1996.

Status: Frequent at lower belt.

Local Distrib.: Sakam Forest, Machuki, Sunatalay. Upto 1500m.

General Distrib.: Subtropical E. Himalaya.

Note: Fruits edible; often eaten by children.

ARACEAE Juss.

Key to Genera:

1. Plants climbing.....2
1. Plants terrestrial or helophytic.....3
2. Leaves entire; petioles winged.....*Pothos*
2. Leaves pinnately segmented, rarely entire; petioles not winged*Rhaphidophora*
3. Marshy herbs.....4
3. Terrestrial herbs.....5
4. Plants not aromatic; petioles and peduncles prickly.....*Lasia*
4. Plants highly aromatic; petioles and peduncles not prickly.....*Acorus*
5. Leaves simple, peltate or deeply cordate; flowering with leaves.....6
5. Leaves dissected (pedate, radiate or trifoliate); flowering with leaves or before leaves.....7
6. Flowers before the emergence of leaves.....*Remusatia*
6. Flowers after the emergence of leaves.....*Colocasia*
7. Leaf single with 3 dissected lobes; flowers appearing before leaves; monoecious.....*Amorphophallus*
7. Leaf either single (then radiate or trifoliate) or 2 or more on pseudostem (then pedate); flowering with leaves; dioecious or monoecious.....*Arisaema*

ACORUS L.

Acorus calamus L., Sp. Pl. ed. 1, 1: 324. 1753; FBI 6: 555. 1893; FEH 1: 393. 1966; FIEM 5. 1989; FB 3(1): 158. 1994; Fl. Sik. 1: 185. 1996.

Local Name: Bojho (Nep.); Ruk-Lop (Lep.)

Marshy aromatic herb with creeping rootstock. Leaves 26-61 x 0.6-1.6 cm, linear, margins wavy, acute, base equitant dark green, thick, mid-rib thick, nerves parallel, aromatic. Peduncle leaf-like. Spathe 15-30 cm, ensiform. Spadix 3.5-4.5 x 0.8-1cm,

cylindric, dense flowered and slightly bent upward. Sepals 6, orbicular, tip curved inward; stamens equal to sepals; anthers reniform; ovary conical; stigma minute.

Flr. & Frt.: Apr. - Aug.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 0528, dated 22.10.1994.

Status: Sparse.

Local Distrib.: Tinsimana, Alubari. 2150-2900m.

General Distrib.: Europe, Siberia, India east to Japan, and C. and N. America.

Note: An important medicinal plant.

AMORPHOPHALLUS *Blume ex Decn. (nom. cons.)*

Amorphophallus bulbifer (Roxb.) Bl. in Rumphia 1:148. 1835; FBI 6: 515. 1893; Pfl.-reich iv-23 c, Ht. 48: 98. 1911; FEH 1:394. 1966; FB 3(1): 122. 1994; Fl. Sik. 1:186. 1996.

Arum bulbifer Roxb., Fl. Ind. ed. 2, 3:510. 1832.

Perennial herbs, growing from a corm-like tuber. Tuber 6-7 x 6.8-8cm, subglobose. Cataphylls membranous, brownish. Petiole 0.35-1m, smooth, green, often mottled; lamina divided into 3 segments; leaflets narrow-oblong, acuminate, cuneate; bulbils developed at primary or secondary divisions of leaf and leaflets. Peduncle 12-25 cm, stout and smooth. Spathe upto 17cm, ovate, subacute, margins overlapping basally, usually greenish outside, pinkish crimson inside towards base. Spadix equalling spathe, female section upto 3 x 1.2 cm; male section 4.1-4.9 x 1.6-1.9 cm; appendix 5-7.8 x 2.4-2.5 cm, swollen, subacute, pink, sometime whitish. Ovary to 0.2cm, 1-2 locular; style to 0.05 cm; stigma 0.18-0.24cm diam., capitate; anthers to 0.25cm, angled, prismatic.

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Near Machuki, 1040 m, AP Das & PC Rai 1768, dated 21.5.1997.

Status: Sparse.

Local Distrib.: Samsing, Phari, Machuki. Upto 1050m.

General Distrib.: Tropical E. Himalaya (Sikkim, Darjeeling), Khasia, other tropical parts of India.

ARISAEMA *Mart.*

Key to the species:

1. Leaves radiate; tip of appendix knoblike.....*A. concinnum*
1. Leaves trifoliolate or palmate.....2
2. Leaves palmate.....3
2. Leaves trifoliolate.....4
3. Blade of spathe auricled.....*A. nepenthoides*
3. Blade of spathe not auricled.....*A. jacquemontii*

4. Exerted portion of spadix appendix swollen.....*A. speciosum*
 4. Exerted portion of spadix appendix not swollen.....5
 5. Spathe greenish; outer leaflets oblong.....*A. intermedium*
 5. Spathe dark-purple; outer leaflets rhombic-elliptic.....6
 6. Appendix equal or slightly exceeding spathe blade; spathe blade upto 9cm long
*A. propinquum*
 6. Appendix flagellum drooping and exceeding the tip of spathe; spathe blade over 10cm
 long.....7
 7. Spathe blade reddish-brown; appendix thickened and over 6cm long, narrowing from
 base.....*A. utile*
 7. Spathe blade purplish-black; appendix basally swollen, thickened parts less than 4cm
*A. griffithii*

Arisaema concinnum Schott in Bonplanda 7: 27. 1859; Prodr. 50. 1860; Bot. Mag. t. 5914. 1871; FBI 6: 505. 1993; Pfl.- reich IV-23 F, Ht. 73: 177, f. 36 F. 1920; BBSB 8: 122, f.I. 1955; FEH 1: 394. 1966; FB 3(1): 148. 1994; Fl. Sik. 1:187. 1996.

A. affine Schott, Bonplanda 7: 27. 1859; Prodr. 51. 1860.

Herb, 16-40 cm tall. Tuber globose Leaf solitary; petiole 10-30 cm, stout, greenish; leaflets 8-12, subsessile, spreading, radiating; lamina 5-19 x 1.2-3.5 cm, oblanceolate or narrow-lanceolate, margin entire or rarely undulate type, acuminate, base narrowed, dark green and glabrous. Spathe 10 cm, ovate-lanceolate, green with longitudinal white stripes, tube 4-6.5 cm, limb shorter or equal to tube, appendage slender, curved, tail-like extending beyond the tube. Spadix slender, slightly longer than spathe-tube, green or purple; flowering stem shorter than petioles.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Near Lava, 2280 m, AP Das & PC Rai 0329, dated 18.6.1994; Ruka Hill, 2480 m, AP Das & PC Rai 0923, dated 24.10.1994.

Status : Common.

Local Distrib.: Reshete, Left Hilltop of Lava, Ruka Hill, Lava. 2100-2500m.

General Distrib.: Temperate Himalayas, Khasia Hills and Myanmar.

Arisaema griffithii Schott, Syn. Aroid 26. 1856; Prodr. 54. 1860; Bot. Mag. t. 6491. 1880; FBI 6: 499. 1839, Pfl. Reich IV-23 F, Ht. 73: 219, f. 53. 1920; BBSB 8: 126, f. Z. 1955; SFSH. f. 110-112. 1963; FEH 1: 395. 1966; TBRI 50(4): 106. 1987; FB 3(1): 151. 1994; Fl. Sik. 1:188. 1996.

A. hookerianum Schott in Oester. Bot. Wochenbl 7: 334 . 1857.

A. hookeri Schott, Gen. Aroid. t. 6, f. 11-19. 1858.

Small tuberous herbs to 36 cm, tuber depressed. Leaves usually solitary, trifoliate or 2; petiole 22 cm, stout; leaflets 3, sessile; lamina 10-19 x 9.5-12.5 cm, rhombic-ovate, margins faintly yellow, entire to obscurely crenate, rounded-acute, dark green, glabrous, nerves sunk, impressed above, lateral nerves upto 12 on either sides. Peduncle shorter than petiole. Basal bracts large. Spathe 14.5cm long, conspicuously striped, tube broad,

curved back, pale ribbed with white; limb incurved, rounded. Spadix stout, suddenly narrowed to tail-like appendage. (Plate VI: 61).

Flr. & Frt.: Mar. - May (-Jul.)

Specimen Cited: Middle Rechila, 2490m, AP Das & PC Rai 1183, dated 03.5.1995 ; Zero Point, 2285 m, AP Das & PC Rai 1393, dated 07.5.1995.

Status: Frequent.

Local Distrib.: Zero Point, Pankhasari, Rechila Midle, Helipad region. 1900-2500m.

General Distrib.: Endemic to E. Himalaya.

Note: Sherpa community of high terrains collect its tubers and keep them in running water (wrapped in clothes) for many days. Tuber is then crushed to powders and the bread is prepared during winter.

Arisaema intermedium Blume var. *biflagellatum* (Hara) Hara, FEH 2: 332. 1971; EFPN 1: 90. 1978; Nam.Chang. Flr. Pl. 45. 1987; FIEM 8. 1989; FB 3 (1): 150. 1994; Fl. Sik. 1:189. 1996.

A. biflagellatum Hara in Journ. Jap. Bot. 36: 77. 1961; FEH 1: 394. 1966.

26-40 cm tall with corm 1.8-2.6 cm across. Cataphylls pale yellow. Leaves usually single or sometimes 2; leaf stalk 10-27 cm, slender, pale green; leaflets 3, sessile, 6-15 x 3.5-7 cm, shapes variable from narrowly elliptic (central leaflet) to lanceolate (outer leaflets), finely acuminate, base cuneate to strongly asymmetric, finely net-veined beneath. Flowering stem much shorter than leaf-stalk. Spathe pale yellowish green, rarely darkly striped; tube 3-5 cm; blade 4-5.9 x 1.4-2.4 cm, lanceolate, narrowed to a short tail-like tip. Spadix appendix 1.5-3 x 0.4-0.5 cm, shortly stipitate, curved upwards, whitish and developed into long (23 cm) slender and hanging flagellum. Synandria creamy, shortly stalked, comprising 3-4 anthers.

Flr.: Jun. - Jul.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 0172, dated 14.6.1994.

Status: Less Frequent.

Local Distrib.: Thartharay, Reshete, Jaributti. 1900-2300m.

General Distrib.: Temperate Himalayas.

Arisaema jacquemontii Blume in Rumphia 1: 95. 1835; Voy. t. 168. 1844; Pfl.-reich IV-23 F, Ht. 73: 197, f. 45 A-C. 1920; BBSB 8: 127, f.B. 1955; SFSH f. 114. 1963; FEH 1: 395. 1966; EFPN 1: 90. 1978; Nam. Chang. Flr. Pl. 45. 1987; FB 3(1): 146. 1994; Fl. Sik. 1:189. 1996.

A. cornutum Schott in Bonplanda 7: 27. 1859; FBI 6: 506. 1893.

A. exile Schott in Bonplanda 7:26. 1859; FBI 6:506. 1893.

A small 15-45 cm tall plant. Corm 0.9-2 cm across. Pseudostem pale green. Petioles 3-15 cm, green; leaf single, digitate; leaflets 5, sessile, 4-9.5 x 1.5-2.5 cm, narrowly

oblanceolate to elliptic, abruptly short-acuminate to acuminate, base cuneate, surfaces pale green. Peduncles longer than leaves. Spathe pale green with bright white stripes or dark purplish; tube 2-5.2 cm long; blade 1.3-5 x 1-2.3 cm, oblong-triangular, tapered into a filiform tip (3cm). Appendix dark purple, upper part decurved, base sometimes truncate, swollen, stipe 0.12-0.45 cm long. Synandria nearly sessile, creamy or with dark purple tinges, composed of 2-4 anthers. Fruiting peduncle pale green, erect.

Flr.: Jun. - Aug.

Specimen Cited: Rechila Middle, 2490 m, **AP Das & PC Rai** 1297, dated 05.5. 1995.

Status: Less Common.

Local Distrib.: Chouda Feri, Rechila Middle, Ruka Hill. 1900-2500m.

General Distrib.: Afganistan (Kuram) and Himalayas (Kashmir to Darjeeling).

Ariaema nepenthoides (Wallich) Martius in Flora 2: 458. 1831; Bot. Mag. t. 6446. 1879; FBI 6: 504. 1893; Pfl.-reich IV-23 F, Ht. 73: 218 f, 49. 1920; BBSB 8: 137 f. D. 1955; SFSH f. 106. 1963; FEH 1: 395. 1966; FB 3(1): 145. 1994; Fl. Sik. 1:189. 1996.

Arum nepenthoides Wallich, Tent. Fl. Nepal 26, t. 18. 1824.

Arisaema ochraceum Schott *sensu* Lacaita in Journ. Lin. Soc. 43: 483. 1916.

Local Name: Gurba (Nep.).

Herbs with globose tuber, upto 55 cm tall. Stem clouded with dark streaks. Leaves 2, digitate; petioles 8-14.5 cm, green to red-brown spotted; leaflets 5-11, sessile to subsessile; lamina 3.5-12.1 x 0.9-2.5 cm, narrow elliptic or oblanceolate, entire, acute, glossy, green, glabrous, lateral nerves upto 23 on either sides. Peduncle shorter than petioles. Spathe 9-12.5 cm, triangular-ovate and curved forward, resembling cobra hood, greenish-brown to reddish brown, ornamented with white stripes on the back, tube elongate, limb-base dilated into two conspicuous rounded lobes. Spadix much shorter than spathe, fat thick, pale green or whitish, appendage short. (**Plate VI: 62**).

Flr. & Frt.: Feb. - Jun..

Specimen Cited: Rechila, 2490m, **AP Das & PC Rai** 1011, dated 23.4.1995; PHE Source, 2155 m, **AP Das & PC Rai** 1050, dated 25.4.1995.

Status: Frequent.

Local Distrib.: PHE Source, Rechila Middle, Left Hilltop of Hattidara. 1900-2600m.

General Distrib.: Himalayas (Nepal-Bhutan), Khasia, N. Myanmar and W. China.

Arisaema propinquum Schott in Oesterr. Bot. Wochenbl. 7: 333. 1857; FBI 6: 501. 1893; FEH 1: 397. 1966; EFPN 1: 90. 1978; Nam. Chang. Flr. Pl. 45. 1987; FB 3 (1): 153. 1994; Fl. Sik. 1: 190. 1996.

A. wallichianum Hk. f., FBI 6: 500. 1893.

A. sikkimense Chatterjee in BBSI 3: 18. 1949; RBSI 18(1): 2. 1959.

A. costatum auct. non Mart: Chatterjee in BBSB 8: 137. 1955.

A. wallichianum var. *sikkimense* (Chatterjee) Hara in Journ. Jap. Bot. 36: 76. 1961.

Herbs to 30-58 cm. Tuber depressed, globose. Leaves single; petiole 22 cm, stout, brown-spotted, leaflets 3, shortly stalked, lamina 24.5-21 x 5.5-9 cm, elliptic to ovate, entire, caudate-acuminate, base oblique, dark green, lateral nerves many, very close, parallel and strong beneath. Spathes upto 13.5 cm, dark purple with longitudinal white stripes, limb incurved and narrowed into a tail-like tip. Spadix appendage long, stipitate.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Middle Rechila, 2490m, **AP Das & PC Rai** 1193, dated. 03.5.1995.

Status: Frequent.

Local Distrib.: Thosum Peak, Thartharay, Pankhasari, Jaributti, Chouda Feri. 2000-2800m.

General Distrib.: Himalayas (Kashmir-Sikkim), S. Tibet.

Arisaema speciosum (Wallich) Mart. in Flora 14: 458 (183); Bot Mag. t. 5946. 1872; FBI 6: 500 1893; Pfl.-reich IV-23 F, Ht. 73: 193. 1920; BBSB 8: 135 f. M. 1955; SFSH f. 119. 1963; FEH 1: 396. 1966; TBRI 50(4): 106. 1987; FB 3 (1): 149. 1994; Fl. Sik. 1: 190. 1996.

Arun speciosum Wallich, Tent. Fl. Nepal. 29, t. 20. 1824.

Arisaema eminens Schott in Oesterr. Bot. Wochenbl. 7: 357. 1857, Prodr. 30. 1860, *e typo*.

Local Name: Mongjing (Lep.).

Tuberous herbs to 30 cm. Rootstock oblique, rooting. Leaf single; petiole 21 cm, stout, smooth and marbled with brown and purple spots; petiolules upto 0.9 cm long; leaflets 3, lamina 12-15 x 4.5-5.5 cm, median ovate, lateral dimidiate cordate, entire, long acuminate, base cuneate or rounded, thinly hairy above, veins reticulate. Spathe 18 cm conspicuously dark black-purple striped with purple linings towards base; limb broadly lanceolate, incurved, caudate-acuminate. Spadix appendage thick and curved, white at base, pink or yellowish; male and female flowers on different plants. (**Plate VII: 63**).

Flr. & Frt.: May - Jun. (- Aug.)

Specimen Cited: Chouda Feri, 2285 m, **AP Das & PC Rai** 1393, dated 07.5.1995.

Status: Less Common.

Local Distrib.: Rechila Durpinay, Chitray, Chouda Feri. 1900-2600m.

General Distrib.: Temperate E. Himalaya, Assam, China.

Note: Shoot used as fodder for pigs.

Arisaema utile Hk. f. ex Schott, Prodr. 30. 1860; Bot. Mag. t. 6474. 1880; FBI 6: 499. 1893; Pfl.-reich IV-23 F, Ht. 73: 218, f. 52. 1920; BBSB 8: 137, f. Q. 1955, SFSH f. 115. 1963; FEH 1: 396. 1966; FB 3(1): 153. 1994; Fl. Sik. 1:191. 1996.

Tuberous herb to 35 cm. Leaves solitary; leaf-stalk 22 cm, dark spotted; petiolules 1-1.5 cm long; leaflets 3, 11.5-15.5 x 6.5-10.5 cm, rhombic-ovate or obovate, margins undulate, rounded to acute, base oblique, pale green, reddish near margin, glabrous. Spathe 10-15 cm long, dark purple with white stripes, blade obovate and rounded or notched at apex with a short interposed tail-like tip, margin of blade netted with conspicuous transparent veins. Spadix appendage thread-like, as long as spathe.

Flr. & Frt.: Apr. - May (- Jul.)

Specimen Cited: Helipad region, 2500m, AP Das & PC Rai 1119, dated 27.4.1995.

Status: Less Frequent.

Local Distrib.: Helipad region, Thosum Hill, Tinsimana, Left Hill ridges of Hattidara. 2300-2950m.

General Distrib.: Endemic to E. Himalaya.

Note: Fermented tubers eaten.

COLOCASIA L.

Colocasia esculenta (L.) Schott in Schott and Endl., Melet. Bot. 18. 1832; EFPN 1:91. 1978; Nam. Chang. Flr. Pl. 139. 1987; FB 3(1): 136. 1994; Fl. Sik. 1:191. 1996.

Arum esculentum L., Sp. Pl. 965. 1753.

Colocasia antiquorum Schott in Schott and Endl., Melet. Bot. 18. 1832; FBI 6:523. 1893.

Local Name: Mane (Nep.).

Perennial. Rhizome upto 5.2 cm diam., tuberous, often vertical to horizontal. Petioles upto 82 cm, sheathing below for one-third to two-third length, greenish. Leaf blade 14-46 x 9.9-36 cm, oblong-ovate to suborbicular, broadly cuspidate, base shallow-cordate, glaucous. Peduncle upto 27 cm. Spathe tube 3.1-5.2 x 1.2- 1.55cm, greenish, blade 9-20 x 2.1-5.2 cm, narrowly lanceolate, acuminate, creamy yellow. Monoecious. Spadix: basal part female to 1.25-3.5 cm, separated by a zone of sterile male flowers to 1.3-2 cm; male part 4.5-6.6 cm; appendix 1.6-4.4 x 0.18-0.2 cm. Ovary 0.1-0.3 cm diam., unilocular; stigma to 0.06 cm diam., broadly peltate; ovules many, parietal. Synandria upto 0.1cm diam.; anthers subsessile.

Flr. & Frt.: Jun. - Dec.

Specimen Cited : Near Chouda Feri , 2080 m, AP Das & PC Rai 1769, dated 21.5.1997.

Status : Less Common.

Local Distrib.: Chonkobhir, Chouda Feri, Sakam Forest. 1500-2100m.

General Distrib.: Himalayas, India, Bangladesh, Sri Lanka.

Note: Rhizomes and petioles are cooked and consumed as vegetable. The plant is also an ideal fodder for pigs.

LASIA Lour.

Lasia spinosa (L.) Thwaites, Enum. 336. 1864; Pfreich. Heft 48.24. 1911; Nam. Chang. Flr. Pl. 316. 1987; FB 3 (1):129. 1994; Fl. Sik. 1:192. 1996.

Draconitum spinosum L., Sp. Pl. 967. 1753.

Lasia heterophylla (Roxb.) Schott, Melet. 1:21. 1832; FBI 6:550. 1893.

Prickly, rhizomatous marshy herbs forming thickets. Stem to 2.6 cm diam., decumbent, armed with prickles. Petioles spongy, prickly. Leaves simple or blades pinnatisect into segments, blades upto 35 cm long, broadly lanceolate, lobes cuspidate. Peduncles spiny. Spadix 2-5 cm long, sessile, spathe convolute, dark crimson outside. Flowers bisexual; tepals 6, to 0.25 cm, long; filaments to 1.4 x 0.75 cm, free, thickened at apex; anthers to 0.8 cm long and broad, basally attached; ovary to 0.15 cm, ovoid. Fruits to 1 x 0.55-1.2 cm, rugose-spiny and single seeded.

Flr.: Feb. - Mar. *Fr.:* Apr.

Specimen Cited: Samsing, 700m, AP Das & PC Rai 1948, dated 02.11.1997.

Status: Sparse.

Local Distrib.: Confined to some places of Samsing area. 500-800m.

General Distrib.: Tropical Himalaya, India, Myanmar, east to China, and Malaysia.

POTHOS L.

Pothos cathcartii Schott, Aroid. 1:22, t.44, 45. 1853; Prodr. Aroid 565.1860; FBI 6:552. 1894; Pfl.-reich IV-23.B, Ht. 21:27. 1905; FEH 1:397. 1966; FB 3(1):125. 1994; Fl. Sik. 1:192.1996.

Perennial epiphytic and lithophytic climbers. Stems to 17.5m, 0.35-0.45cm diam., branched, rooting from lower nodes. Leaves distichous; petioles with phyllodic wings, 2.2-9cm, triangular, apex truncate to shallowly emarginate; lamina 6-14.5 x 2.2-5.5cm, narrowly elliptic, acuminate, base cuneate to rounded, 2-3 longitudinal veins on each side of multiple midrib, secondary veins divergent from midrib and parallel, veinlets reticulate. Bracts usually sheathing lower peduncle part, elliptic, mucronate, coriaceous. Peduncle 1.45-2.5cm, stiffly erect. Spathe 0.75-1.35cm, suborbicular, spreading, mucronate, strongly concave and greenish. Spadix borne on short (upto 0.7cm) stripe, 0.75-1 x 0.55-0.68cm, subglobose to ellipsoid. Tepals square with triangular-hooded apex upto 0.15cm, keeled; filaments 0.14 x 0.9cm, elliptic; anthers to 0.07cm, creamy; ovary upto 0.15 x 0.18cm, cylindric-hexagonal, truncate. Berry 1.35-1.5 x 0.75-1cm, hexagonal-cylindric with truncate apex.

Flr.: Dec. - Apr. *Fr.:* Apr. - Jun.

Specimen Cited: Near Samsing, 700m, AP Das & PC Rai 1511, dated 04.6.1996.

Status: Common.

Local Distrib.: Asala Khola, Sunatalay, Samsing. 500-900m.

General Distrib.: Tropical and Subtropical Himalayas, Assam, Manipur, Myanmar and China.

REMUSATIA Schott

Remusatia pumila (D. Don) H. Li et A. Hary, Acta Bot. Yunn., Suppl. 5:28. 1929; FB 3(1):135. 1994; Fl. Sik. 1:193. 1996.

Gonatanthus pumilus (D. Don) Engler and Krause in Pfreich. Heft. 71:19.1920; FEH 1:397.1966; Nam. Chang. Flr. Pl. 264. 1987; TBRI 50(4): 115.1987; Fl. Sik. 1:193.1996.

Caladium pumilum D. Don, Prodr. 21. 1825.

Gonatanthus sarmentorus Klotzsch in Link, Klotz. and Otto, Ic. Pl. Rar. 1:33. 1841; FBI 6:522. 1893.

Small herbs, to 20cm. Rootstock tuberous with small bulbils. Leaves peltate, long stalked; lamina 8.6 x 4.6 cm, ovate, entire, acuminate, base cordate, dark green above. Peduncle upto 5 cm long. Spathe 13 cm long, tube 1.8 cm, ovoid, inflated, greenish, blade conical, golden-yellow; female inflorescence in the swollen limb base. Spadix included. Berries enclosed within persistent spathe-tube, yellow.

Flr. & Frt.: May - Jul.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 0250, dated 16.6.1994.

Status: Common.

Local Distrib.: Alubari, PHE Source, Jaributti. 1900-2250m.

General Distrib.: Himalayas (Simla-Sikkim), Khasia, Manipur, Thailand, W. China.

RHAPHIDOPHORA Schott

Key to the species:

1. Pinnae upto 5 on each side; pinna of mid-leaf upto 5.2cm wide, costae parallel, glaucous beneath; spadix 4-8.5cm long.....*R. glauca*

1. Pinnae 6-10 on each side; pinna of mid-leaf upto 6.5cm wide, lateral costae not parallel, not glaucous beneath; spadix 18-23cm long.....*R. grandis*

Rhaphidophora glauca (Wallich) Schott in Bonpl. 5:45. 1857; FBI 6:547. 1893; Pfl.-reich iv-23 B, Ht. 37: 47. 1908; FEH 1:398. 1966; FB 3 (1):127. 1994; Fl. Sik. 1:193. 1996.

Pothos glauca Wallich, Pl. As. Rar. 2: 45, t. 156. 1831.

Local Name: Kanchirna/ Chuna Champa (Nep.).

Liana, epiphytic or scrambling on rocks. Stems to 1.2 cm thick, rooting. Petioles 8.5- 32 cm, with indistinct pulvinus at junction with blade, margins sheathing and sheath reaching leaf blade base; leaf blade symmetric, 11-36 x 7-22.5 cm, ovate, acuminate, base truncate, oblique or shallow cordate, asymmetrically and pinnately dissected; pinnae upto

5 on each side, pinna at mid-leaf upto 5.2 cm wide, rounded at base, apex truncate, with 3 parallel costae, sometimes glaucous beneath. Peduncles 11-24 cm, spreading and apically curved. Inflorescence erect. Spathe 8.1-13.9 x 3.1-8.8cm, oblong-ovate, acuminate, waxy and yellowish. Spadix 4.4-8.2 x 0.9-1.25 cm, sessile, cylindric. Flowers bisexual; perianth 0; stamens 4; filaments 0.28-0.29 x 0.08-0.14 cm, flat; anthers 0.09-0.1 x 0.11-0.13 cm; ovary 0.32-0.55 cm, hexagonal-cylindric, apex truncate, smooth, unilocular; ovules many, parietal; stigma 0.07-0.1 cm, sessile, flat.

Flr. & Frt.: Aug. - Apr.

Specimen Cited: Above Phari, 1000 m, **AP Das & PC Rai** 1766, dated 20.5.1997.

Status: Fairly Common.

Local Distrib.: Phari, Machuki, Reshete, right hill ridge of Alubari, Pankhasari. 1000-2500m.

General Distrib.: E. Himalaya, Khasia and Naga Hills, Manipur, etc.

Note: Used as ornamental plant species.

Rhaphidophora grandis Schott in Oester. Bot. Wochenbl. 349.1858; FIEM 13. 1989; FB 3(1):128. 1994; Fl. Sik. 1:194. 1996.

Local Name : Thulo Kanchirna (Nep.).

Comparatively larger liana, parts massive and larger in every respect than other species. Stem upto 4cm thick. Leaf blades 38-96 x 37-62 cm, oblong, blunt, not glaucous beneath; pinnae broad, 6-10 per side, sometimes even upto 12 per side, more wider, pinna of mid-leaf 4.2-6.5 cm wide, truncate at apex, sinuses narrow, lateral costae not parallel. Peduncles stouter. Spadix 18.5-23.1 x 3.1-5.1 cm; ovaries upto 1.35 cm long in fruit, fibrous, domed; stigma raised.

Flr. & Frt.: May - Mar.

Specimen Cited: Near Alubari, 2180 m, **AP Das & PC Rai** 0679 dated 18.10.1994.

Status: Common.

Local Distrib.: Alubari, Ruka Hill, Pankhasari, Sakam Forest. 1800-2500m.

General Distrib.: Tropical and subtropical Himalayas; Kumaon, Sikkim, Darjeeling, Khasi Hills.

CYPERACEAE Juss.

Key to the Genera:

1. Leaves reduced to bladeless basal sheaths; inflorescence apparently lateral.....*Schoenoplectus*
1. Leaves with blades (not reduced); inflorescence terminal.....2

2. Bristles absent.....	3
2. Bristles numerous, longer than spikelet in fruits.....	<i>Erioscirpus</i>
3. Plants tufted, leafy only at base.....	<i>Fimbristylis</i>
3. Plants not tufted, leafy throughout.....	4
4. Stem 4 or more angled, compressed	5
4. Stems trigonous to rounded, not compressed.....	<i>Scirpus</i>
5. Spikelets never falling; glumes spiral (sometimes distichous).....	6
5. Spikelets falling; glumes distichous.....	7
6. Nuts with persistent style base, trigonous.....	<i>Bulbostylis</i>
6. Nuts without persistent style base, obovoid-trigonous.....	8
7. Stigmas 3; nut 3-angled.....	<i>Cyperus</i>
7. Stigmas 2; nut truncate.....	9
8. Prophylls in female spikelets completely fused forming utricle.....	<i>Carex</i>
8. Prophylls in female spikelets only partially closed.....	<i>Kobressia</i>
9. Glumes deciduous; spikelets more than 0.9-1.4cm long; inflorescence condensed.....	<i>Pycneus</i>
9. Glumes not deciduous; spikelets 0.25-0.35cm; inflorescence a dense head.....	<i>Kyllinga</i>

BULBOSTYLIS Kunth.

Bulbostylis densa (Wallich ex Roxb.) Karsten and Schenk, Vegetations 20 (7): 16. 1930; FEH 1:380. 1966; FB. 3 (1):298. 1994; Fl. Sik. 1:198. 1996.

Scirpus densus Wallich ex Roxb. , Fl. Ind. ed. Carey, 1: 231. 1820.

Bulbostylis capillaris C.B. Clarke var. *trifida* (Kunth) C.B. Clarke in FBI 6:652. 1893.

Slender and densely tufted annual. Stems 5-18 cm, filiform. Leaves erect, basal and sub-basal, half the stem length or often more. Sheaths membranous, hairy at apex, pale brown. Inflorescence umbellate, very rarely reduced to a single spikelet. Spikelet sessile, 0.28-0.55 x 0.13-0.25 cm, ovoid, acute; rays upto 3 cm. Lowermost bract shorter than inflorescence and with filiform tip. Glumes spiral, sometimes distichous, 0.15- 0.19 x 0.1-0.17 cm, ovate, acute, minutely fimbriate, 3-veined. Stamens 2; style upto 0.08 cm, glabrous; stigmas 3. Nut minute, strongly trigonous, crowned with persistent style base, surface finely papillose.

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Alubari, 2280m, **AP Das & PC Rai** 0287, dated 17.6.1994.

Status: Common.

Local Distrib.: Alubari, Lava, Sakam Forest, Tiffin Dara. 1700-2300m.

General Distrib.: E. Himalaya, China, Japan.

CAREX L.

Key to the species:

- | | |
|--|-------------------|
| 1. Midrib of female glumes excurrent; utricles over 0.3cm; spikes 2-5 per fascicle..... | 2 |
| 1. Midrib of female glumes not excurrent; utricles under 0.27cm; spikes 3-10 per fascicle..... | <i>C. pulchra</i> |

2. Margin of beaks setose.....	3
2. Beaks smooth.....	4
3. Female spikes linear, slender.....	<i>C. setosa</i>
3. Female spikes cylindric, over 2.3cm.....	<i>C. alopecuroides</i>
4. Spikes subsessile.....	5
4. Spikes on slender peduncles.....	6
5. Stems densely tufted; female glumes with orange-brown tinges.....	<i>C. inanis</i>
5. Stems not densely tufted; female glumes with pale-yellow strip.....	7
6. Leaf sheath bases golden-brown, glazy.....	<i>C. daltonii</i>
6. Leaf sheath bases chessnut-brown, shining.....	<i>C. crassipes</i>
7. Rhizomes creeping; leaf sheath base reddish-purple.....	<i>C. filicina</i>
7. Rhizomes not creeping; leaf sheath base pale brown.....	8
8. Utricles swollen, beaks straight.....	<i>C. cruciata</i>
8. Utricles not swollen; beaks curved.....	9
9. Stems usually with single basal leaf.....	<i>C. stramentita</i>
9. Stems with more than one leaf.....	10
10. Culms trigonous; leaf sheath light yellow; utricles lanceolate and glabrous.....	<i>C. nubigena</i>
10. Culms not trigonous; leaf sheath bases deciduous, dark purple; utricles rhomboid and hispid.....	11
11. Rhizomes woody; spikes 5-11, terminal males with a female flower in middle; utricle beaked.....	<i>C. teres</i>
11. Rhizomes not woody; spikes 4-7, usually females; utricle beakless.....	<i>C. obscura</i>

Carex alopecuroides D. Don ex Tilloch et Taylor var. *chlorostachys* (D. Don) Cl. in J. Linn. Soc. 36: 271. 1903; FM 9(1): 160. 1979; Nam. Chang. Flr. Pl. 102. 1987; FB 3(1): 394. 1994; Fl. Sik. 1:199. 1996.

C. chlorostachys D. Don in Trans. Linn. Soc. 14: 330. 1825, *non* Steven 1813.

C. japonica sensu Cl. in FBI 6: 736. 1894 p.p., *non* Thunb.

C. japonica. ssp. *chlorostachys* (Kuk.) Koyama, FEH 1: 382. 1966.

C. doniana Spr., Syst. Veg. 3: 825. 1823; Reinwardtia 1: 399. 1951.

Local Name: Mongsher (Lep.).

Rhizomes long creeping, spreading, ribbed-scaly. Stems tufted. Leaves subbasal, sheathing at the lower 1/3 part of culm, blades very wider, 0.55-1.1cm. Culm 25-45 cm, acute, trigonous. Inflorescence terminal. Male spike 1, erect, 2.2-5 cm long, erect. Peduncle short to upto 3 cm long. Female spikes 3-5, erect, 2.3-6.2 cm long, cylindrical, shortly peduncled; prophylls fused forming utricles 0.4-0.45 x 0.11 cm, narrowly ellipsoidal, trigonous, gradually tapering into longer beak (upto 0.15 cm long), apex herbaceous and glabrous; stigmas 3. Female glumes 0.2-0.28 x 0.8-0.1 cm, acuminate, midrib greenish. Male glumes 0.3-0.4 cm, narrow oblong or lanceolate, subacute to acuminate, tip being scabrid, midrib greenish.

Flr. & Frt.: Apr. - May.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 076, dated 14.6.1994; Near Rechila Peak, 2800 m, AP Das & PC Rai 0165, dated 15.6.1994.

Status: Frequent.

Local Distrib.: Zero Point, Jaributti, Lava, Sakam Forest. 1700-2000m.

General Distrib.: E. Himalaya, C. China, northeastward to Japan.

Carex crassipes Boeckeler in Linnacea, 11:329. 1876; FB 3 (1): 385. 1994.

Perennial smaller herb with slender and creeping rhizome, 17-24 cm. Leaf blades 0.35-0.45 cm long, narrower, sheaths with shining dark chessnut-brown bases. Fascicles with many slender peduncles, upto 12 cm, disposition of sexes similar, utricles hispid with bifid beak, gradually narrowed. Spikes and glumes comparatively less and smaller, straw-coloured to dark brown, awns very short (0.1 cm).

Flr. & Frt.: May - Jul.

Specimen Cited: Near Pankhasari, 2250 m, **AP Das & PC Rai** 1709, dated 19.5.1997.

Status: Less Common.

Local Distrib.: Kuwapaani, Pankhasari, Dhamdhamay Dara, Alubari. 2000-2500m.

General Distrib.: E. Himalaya (Darjeeling-Sikkim), Bhutan.

Carex cruciata Wahlenb. in Vet.-Akad, Nya Handl. Stokh 24: 149. 1803; Illust. *Carex* 3: t. 247-249. 1862; FBI 6: 715. 1894, FEH 1: 381. 1966; FM 9(1): 121. 1979; Nam. Chang. Flr. Pl. 102. 1987; Fl. Sik. 1: 201. 1996.

C. condensata Nees ex Wight, Contrib. Bot. Ind. 123. 1834; FBI 6: 716. 1894.

Perennial herbs. Rhizomes woody. Stems covered with remnants of leaves at apex. Culm 50-86 cm. Leaf sheaths pale brown, dark veined at base. Leaves sub-basal, blades 0.55-0.85 cm across. Inflorescence 15-25 cm long. Panicles pyramidal. Bracts leafy. Bracteoles filiform. Spikes predominantly female. Utricles glabrous, swollen, parallelly veined, abruptly tapered into straight beak. Female glumes 0.15 - 0.25 x 0.1 - 0.15 cm, ovate, minutely mucronate deep red with pale yellow stripe. Male glumes 0.2-0.3cm, lanceolate, obscurely mucronate. Utricles glabrous, swollen, parallelly veined, abruptly tapered into straight beak.

Flr.: Apr. - May *Frt.:* Aug. - Jan.

Specimen Cited: Neora PHE Source-Rechila, 2100-2280 m, **AP Das & PC Rai** 1055, dated 26.4.1995.

Status: Common.

Local Distrib.: PHE Source, Chitray, Helipadcregion, Hattidara. 1900-2600m.

General Distrib.: Madagascar, India, Indo-China, Formosa, S. Japan.

Carex daltonii Boott, Illust. 1: i. 5, t. 16. 1958; FBI 6: 726. 1894, FB 3(1): 384. 1994; Fl. Sik. 1: 202. 1996.

Plants with creeping rhizome. Leaves in basal rosettes, usually solitary on lower part of culm, blades 0.5-1.2 cm wide, shorter than culm, stiffy. Bases of leaf-sheaths golden brown, glazy. Culm 49-70 cm long, erect and stout. Fascicles many, pedunculate, desposition of male and female Flowers similar. Peduncles lenthening upto 15.5 cm, slender. Utricles 0.3-0.4 x 0.05-0.1 cm, hispid, tapering into a bifid beak being 0.12-0.16 cm long. Female glumes comparatively smaller, sizes being 0.22-0.28 x 0.15-0.2 cm, dark brown or straw yellow; awn extending upto 0.22-0.24 cm.

Flr.: Mar. - Apr. *Fr.*: May - Jul.

Specimen Cited: Rechila Middle, 2400 m, **AP Das & PC Rai** 0980, dated 23.4.1995.

Status: Less Frequent.

Local Distrib.: Tinsimana, Thosum Peak, Rechila Middle. 2300-2900m.

General Distrib.: E. Himalaya (Sikkim-Bhutan).

Carex filicina Nees *ex* Wight, *Contrib. Bot. Ind.* 123. 1834; *FBI* 6: 717, 1894, incl. var. *meiogyne* Kükenthal, *Pfl.-reich* IV-20, Ht. 38: 274. 1909, *FEH* 1: 381. 1966; *TBRI* 50(4): 108. 1987; *FB* 3(1): 337. 1994; *Fl. Sik.* 1: 202. 1996.

C. meiogyne Nees, *Contrib. Bot. Ind.* 123. 1834, p.p.

C. filicina Nees var. *meiogyne* (Nees) Strachey, *Cat. Pl. Kumaon* 73. 1854, *Pfl.-reich* IV-20, Ht. 38: 274. 1909.

Stout herbs with creeping and woody rhizomes. Leaves blades 0.25-1.2 cm wide, almost equal to culm; leaf sheath bases reddish-purple, persisting without turning into fibres; sometimes sheaths bladeless. Culm 25-93 cm long. Inflorescence 10.5-81 cm, nodes distinct, 2-6. Partial panicles open, triangular with hispid axis, bracteate, occurring in unequal pairs; bracts shorter than inflorescence; bracteoles tips filiform, upto 0.25 cm. Spikes variable in sizes, sharply becoming shorter upwards, usually female; utricles lax, 0.2-0.35 x 0.08-0.1cm, narrowly ellipsoidal, trigonous olive-green, glabrous; beak 0.06-0.17 cm, deflexed; stigmas 3. Female glumes 0.13-0.18 x 0.075-0.12 cm, ovate, acute, pale brown. Male glumes 0.15- 0.31 x 0.055-0.12 cm, narrow lanceolate.

Flr.: Apr. - Aug. *Fr.*: May - Feb.

Specimen Cited: Jaributti, 2195 m, **AP Das & PC Rai** 041, dated 14.6.1994, South Hill of Rechila, 2424 m, **AP Das & PC Rai** 0601, dated 16.10.1994; Thosum Hill, 2590 m **AP Das & PC Rai** 0883, dated 23.10.1994; Near Jorhpokhari, 2900 m, **AP Das & PC Rai** 0938, dated 24.10. 1994; Dhamdhamay Dara, 2480-2518 m, **AP Das & PC Rai** 1130, dated 28.4.1995.

Status: Very Common.

Local Distrib.: South Hill ridge of Rechila, Thosum Hill, Dhamdhamay Dara, Jorhpokhari, Alubari, Jaributti. 2100-3050m.

General Distrib.: India, Myanmar, Indo-Chin, Malaysia, China, etc.

Note: Highly variable species, taxonomic review essential.

Carex inanis Kunth, Enum. Pl. 2: 522. 1837; FBI 6: 743. 1894; Pfl. Reich. IV-20, Ht. 38: 419. 1909; EFPN 1: 103, 1978; TBRI 50(4):108. 1987; FIEM 37. 1989; FB 3(1): 404. 1994; Fl. Sik. 1: 204. 1996.

Woody with short rhizome. Stems densely tufted. Leaves longer than culms and inserted on lower half of culm, 0.1-0.2 cm wide, sheathing, basal leaf sheaths fibrilous with bases purplish-brown and persistent. Culm 6-38 cm, variable, rounded-trigonous. Spikes 4-7, subsessile, erect, apically crowded; male spike terminal in position, 0.8-2 cm long; lower 3-6 spikes female, 1.2-2.2 cm long, sometimes basally branched into 1 or 2. Bracts longer than inflorescence. Utricles 0.15-0.2 x 0.1-0.14 cm, broadly ellipsoid to obscurely obovoid with abrupt bidentate short beak, shortly whitish hairy, olive-brown; stigmas 3. Female glumes 0.17-0.26 x 0.9-0.16 cm, oblong to lanceolate, acute, rarely minutely emarginate, orange-brown with greenish midrib. Male glumes oblanceolate with strongly keeled midrib.

Flr.: Jun. - Jul. *Fr.*: Jul. - Nov.

Specimen Cited: Alubari, 2280 m, AP Das & PC Rai 094, dated 14.6.1994.

Status: Less Frequent.

Local Distrib.: Hattidara, Alubari, Left Hill ridge of Hattidara, Lava. 2000-2700m.

General Distrib.: Temperate Himalayas.

Carex nubigena D. Don ex Tilloch and Taylor, Trans. Lin. Soc. 14:326. 1825; Boott., Illustr. Carex 1: 5.2. 1858; FBI 6: 702. 1894; Pfl.-reich IV-20, Ht. 38: 145, f. 39 E-H. 1909; FEH 1: 383. 1966; TBRI 50 (4): 108. 1987; FB 3(1): 1994; Fl. Sik. 1:207. 1996.

Woody with short rhizome and densely tufted stems: Leaves inserted along the culm, blades either shorter or equal to culm, 0.13-0.17 cm wide; leaf sheath-bases persistent as dried fibres, light yellow. Culm 8.5-30 cm, shallowly trigonous. Inflorescence 1.8-3.8 cm long, greenish. Spikes androgynous, shortly cylindrical or ovoid, lateral one sessile, lowers distant, 0.6-1 cm long, upper congested at fruiting. Lower bract leafy, base clasping stem. Utricles lanceolate, plano-convex, beaked (0.1-0.15 cm long), glabrous; stigmas 2. Female glumes 0.2-0.3 x 0.14-0.18 cm, oblong-lanceolate to ovate, acuminate, hyaline, mid-rib greenish and extended.

Flr.: Apr. - Jul. *Fr.*: Apr. - Aug.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 0122, dated 14.6.1994.

Status: Common.

Local Distrib.: Jaributti, Thartharay, Durpinay, Ruka Hill, Todey-Tangta, Alubari. 1800-2700m.

General Distrib.: Temperate Himalayas and China.

Carex obscura Nees in Wight, Contrib. Bot. Ind. 126. 1834; FBI 6: 731. 1894; FIEM 40. 1989; FB 3(1): 390. 1994; Fl. Sik. 1:207. 1996.

Herbs with short rhizomes and densely tufted stems. Leaves equal to culm, 0.3-0.55 cm wide. Leaves sheaths bladeless, shining dark purple. Culms 18-86 x 0.15 -0.22 cm, erect. Spikes 4-7, crowded, erect, subsessile, lower one rarely long pdncld., usually females, terminal gynaeandrous. Bracts 0.23-0.42cm wide, lowermost sheathless. Utricles rhomboid, trigonous beakless, hispid; stigmas 3. Female glumes smaller, ovate or orbicular, dark purple, mid nerve greenish.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Jaributti, 2195, **AP Das & PC Rai** 0440, dated 15.10.1994.

Status: Common.

Local Distrib.: Alubari, Jaributti, Tinsimana, Chitray. 2100-2900m.

General Distrib.: Himalayas (Kashmir-Kumaon), Sikkim, Darjeeling.

Carex pulchra Boott., Illustr. 1:4, t. 13. 1858; FBI 6: 727. 1894; FIEM 41. 1989; FB 3(1): 385. 1994; Fl. Sik. 1:210. 1996.

Perennial herb with short rhizome and tufted stems. Leaves in rosettes, shorter to equalling the culm length, 0.15-0.3 cm wide, stiff and hispid above when young, leaf-sheaths bases dull, pale orange-brown, persistent. Culm 20-48 cm long. Inflorescence slender, nodding, arising from nodes. Peduncle single or in pairs at nodes forming fascicles of 3-11 slender scabrid peduncles; each peduncle usually bearing one spike, sometimes more. Most spikes female, long peduncled. Spike of the fascicle sometimes gynaeandrous, spikes in terminal fascicle rarely all male, female spikes 1.3-3 cm long, linear, utricles 0.2-0.25 x 0.6-0.8 cm, ellipsoidal trigonous, beaked, olive-brown, stigmas 3. Female glumes 0.15 - 0.25 x 0.12 cm, oblong-obovate, subacute, yellowish brown. Male glumes 0.35-0.4 x 0.11-0.12 cm, narrow-lanceolate, acute with keeled midrib.

Flr. & Frt.: Jul. - Oct.

Specimen Cited: Alubari Helipad, 2500m, **AP Das & PC Rai** 1106, dated 27.4.1995.

Status: Frequent.

Local Distrib.: Helipad region, Thartharay, Right Hill ridge of Alubari, Mulkharka, Todey-Tangta. 1800-2550m.

General Distrib.: E. to C. Himalayas.

Carex setosa Boott., Illus. 3:108, t. 327-329. 1862; FBI 6: 745. 1894; FIEM 42. 1989; FB 3(1): 398. 1994; Fl. Sik. 1:211. 1996.

Shortly rhizomatous, woody. Stems densely tufted. Leaves shorter than culm, blades 0.15-0.24 cm, wide, flat. Leaf-sheaths bases pale brown, persisting as stiffy fibres. Culm

18-68 cm long, slender. Inflorescence lax. Male spike 1.5-3 cm long, usually 1, terminal. Female spikes upto 2 ½ time longer than male spike, linear, very slender, lowest spike rarely basally brached. Peduncles upto 8.5 cm long, slender. Bracts blades stiff, sheathed, brownish hyaline. Utricles 0.3-0.35 x 0.075 -0.1 cm, linear-ellipsoidal, margins sparsely setose, beak notched, 0.07-0.12 cm with setose margins; stigmas 3. Female glumes 0.24-0.3 x 0.01-0.15 cm, oblong-ovate, blunt, red-brown, margin hyaline, midrib scabrid and greenish. Male glumes 0.58-0.7 x 0.15-0.2 cm, acute.

Flr.: Apr. - Jun *Fr.*: Jun. - Sep.

Specimen Cited: PHE Source at Jaributti, 2155 m, **AP Das & PC Rai** 1049, dated 26.4.1995; Rechila Helipad, 2300 m **AP Das & PC Rai**, 1097 dated 27.4.1995.

Status: Common.

Local Distrib.: Rechila Helipad, Jaributti, Reshete, Kuwapaani, Tiffin Dara, Alubari. 1600-2500m.

General Distrib.: Himalayas (Kashmir-Sikkim).

Carex stramentita Boott. ex Boeckeler in Linnacea 40:351. 1876; FBI 6: 717. 1894; Pfl.-reich IV-20, Ht. 38: 264. 1909; FEH 1: 384. 1966; Fl. Nong. Vic. 347. 1982; FB 3 (1): 376. 1994; Fl. Sik. 1: 212. 1996.

Stout herbs, 30-60 cm tall. Rhizomes woody, creeping and dark-brown scaly. Leaves basal, usually single on stem lower part, blades 0.75-1.4 cm wide, shorter than culm, pale-green. Inflorescence with distinct nodes, pale to straw coloured on maturity, nodes 2-3. Partial panicles (lower most) triangular, dense in immature stage becoming distant on ripening. Bracts longer than inflorescence. Bracteoles 0.26 cm long, scabrid. Spikes very dense, lanceolate, primarily male. Utricles 0.35-0.45 x 0.13-0.15 cm, sharply trigonous, veined, abruptly beaked, beak upto 0.15 cm with scabrid margins; stigmas usually 3. Female glumes 0.15-0.39 x 0.12 -0.15 cm, ovate, acute, ribbed. Male glumes longer than female ones, oblong-lanceolate, shortly mucronate and ribbed.

Flr.: Mar. - May *Fr.*: Jun. - Oct.

Specimen Cited: Thosum Beat, 2590m, **AP Das & PC Rai** 0883, dated 23.10.1994.

Status: Less Common.

Local Distrib.: Todey-Tangta, Rechila Durpinay, Thosum Beat, Tiffin Dara. 1600-2600m.

General Distrib.: N. India, N. Myanmar, Thailand, Tonkin.

Carex teres Boott., Illustr. 1: 62, t. 167. 1858; FBI 6: 707. 1994; FIEM 42. 1989; FB 3(1): 372. 1994.

Rhizomes woody and thick. Leaves equal or longer than culm, blades 0.4-0.9 cm wide, apex trigonous; leaf sheaths extending upwards, thin, red-brown, persistent. Culm 35-60 cm long, stout. Peduncles ascending, short, lowest being upto 2.5 cm long. Spikes 5-11,

terminal male, gynaeandrous or with female flowers in middle, usually shorter than female spikes; lower 4-10 spikes female, 4.5-9 cm long. Basal bract foliaceous with scarcely sheathing base, upper bracts filiform. Utricles 0.22-0.32 x 0.11-0.2 cm, narrow elliptic, biconvex, sharply 3-5 nerved, brownish-olive, purplish glandular, beak at full maturity upto 0.08 cm; stigmas 2. Female glumes with scabrid awn 0.25-0.32 x 0.08-0.13 cm, oblong to narrowly elliptic, apex truncate or emarginate, mid-rib with 3 veins. Male glumes longer than female ones, oblanceolate, subacute to shortly mucronate.

Flr. & Frt.: Apr. - Jul.

Specimen Cited: Near Tinsimana, 2900m, AP Das & PC Rai 0785, dated 20.10.1994.

Status: Frequent.

Local Distrib.: Ruka Hill, Tinsimana, Chitray, Thosum. 2300-2900m.

General Distrib.: Endemic to Darjeeling and Sikkim Himalayas.

CYPERUS L.

Key to the species:

1. Stems leafless; bracts foliaceous forming an involucre.....*C. involucratus*
1. Stems leafy; bracts not foliaceous.....2
2. Mucros nearly erect, stout; spikelets over 0.3cm wide.....*C. compressus*
2. Mucros recurved, slender; spikelets upto 0.2cm wide.....3
3. Glume margins curved; nut faces obovate.....*C. cuspidatus*
3. Glume margins usually straight; nut faces slightly curved.....4
4. Spikes long-rayed (1-9cm); spikelets to 0.08cm, very narrow; nuts upto 0.05cm wide.....*C. cyperoides*
4. Spikes sessile, very rarely short rayed; spikelets over 0.01cm wide; nuts 0.06-0.075cm wide.....5
5. Perennial plants; stems trigonous; leaves shorter or equalling stem; sheath base purplish-red.....*C. cyperinus*
5. Annual plants; stems slender; leaves longer than stem; sheaths pale brown.....6
6. Plants stoloniferous.....*C. rotundus*
6. Plants not stoloniferous.....7
7. Leaves longer than stem; glumes elliptic or oblong-obovate, acute or blunt
.....*C. hyalinus*
7. Leaves equalling stem; glumes suborbicular; minutely apiculate.....*C. iria*

Cyperus compressus L., Sp. Pl. ed. 1, 46. 1753; FBI 6: 605. 1893; Pfl.-reich IV-20, Ht. 101. 156, 16, f. 4, A-D. 1935; Bull. Bot. Gard. Lucknow no. 85: f. 3. 1963; FEH 1: 386. 1966; FIEM 44. 1989; FB 3(1): 310. 1994; Fl. Sik. 1:214. 1996.

C. pectiniformis R. and S., Mant. 2:128. 1824.

Annual plant with trigonous and tufted stems, 8-35 cm tall. Leaves usually sub-basal with blades almost half to as long as stems, 0.15-0.25 cm wide and with conspicuous transverse veinlets; sheath bases reddish. Inflorescence of sessile spikelets, 2.6-4 cm across, sometimes even compound bearing 1-4 stiffy hairs on it. Partial inflorescence spicate with spikes of a few spreading spikelets, rachis shorter (upto 0.3 cm). Spikelets

1.5-2.6 cm long and upto 0.3 cm wide, usually elliptic to oblong, with more than 4 nuts, strongly compressed, falling. Glumes 12-28, 0.35-0.4 x 0.25-0.29 cm including strong mucro, ovate and overlapping, midrib 0.1 cm wide, sharply keeled, veins 6-9, excurrent, rachilla persistent. Stamens 3; styles 3, upto 0.16 cm long, stigma upto 0.1 cm, slender. Nuts 0.12-0.15 x 0.1-0.14 cm, obovate, rarely elliptic, narrowed towards base, trigonous, glossy brownish.

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Near Samsing, 780 m, **AP Das & PC Rai** 1555, dated 06.6.1996.

Status: Fairly Common.

Local Distrib.: Tiffin Dara, Samsing, Phari, Rechila Durpinay, Reshete. 700-2200m.

General Distrib.: Cosmopolitan.

Cyperus cuspidatus Kunth in H.B.K., Nov. Gen. Sp. Pl. 1:204. 1815; FBI 6:598.1893; Kukenthal, Pfl.-Reich IV-20, Ht. 101: 262, f. 29 E. 1936; Bull. Bot. Gard. Lucknow no.110:t.14. 1965; FEH 1:386.1966; FB 3(1): 306. 1994; Fl. Sik. 1:214. 1996.

C. uncinatus sensu Clarke in Phillip J. Sci. Bot. 2:82. 1970, *non* Poir. 1806.

Densely tufted annual. Stems 3-8 cm, trigonous, slender. Leaves sub-basal, longer than stem, 0.75-2 cm wide. Sheaths reddish. Inflorescence a head consisting of numerous sessile spikelets, 1.4-3cm diam., sometimes compound with 1-4 rays. Spikelets 0.6-1.4 x 0.12-0.15cm, oblong fimbriate. Glumes many (15-32), spreading at a later stage, oblong-elliptic, sharply mucronate, margins curved, midrib greenish, 3 veined, keeled. Stamens 2-3; style minute. Nut 0.055-0.065 x 0.4 cm, apiculate, with obovate faces, dark brown.

Flr. & Frt.: Jul. - Nov.

Specimen Cited: Near Samsing, 550m, **AP Das & PC Rai** 1744, dated 17.5.1997.

Status: Common.

Local Distrib.: Sakam, Mchuki, Chouda Feri, Samsing. 500-2100m.

General Distrib.: Pantropic.

Cyperus cyperinus (Retz.) Suringar, Het Gest. Cyp. Mal. Arch. 154, t. 6, f. 10. 1898; FEH 1: 386. 1966; FM 7(3): 641. 1974; Nam. Chang. Flr. Pl. 164. 1987; FB 3(1): 308. 1994.

Kyllinga cyperina Retz., Obs. Bot. 6: 21.1791.

Mariscus cyperinus (Retz.) Vahl, Enum. 2: 377. 1806; FBI 6: 621. 1893; FIEM 6. 1989.

Perennial with short rhizome. Stem upto 72 cm x 0.35 cm, trigonous. Leaves shorter or equal to stem, 0.3-0.9 cm wide, sub-basal; sheaths base purplish-red. Spikes in dense heads, sessile 1.3-1.8 x 0.8-1.2 cm, coarse, sometimes bearing rays to 2.4 cm. Wider spikelets 0.55-0.7 x 0.1-0.11 cm, oblique; glumes 0.35-0.42 x 0.15-0.18 cm, wider, 3-veined, spraw-coloured, occasionally flushed brown; stamens 3; style 0.5-0.85 cm; stigmas 0.18-0.25 cm. Nut 0.2-0.22 x 0.65-0.75 cm, slightly curved, brownish.

Flr. & Frt.: May - Oct.

Specimen Cited: Sakam Forest, 1530m, **AP Das & PC Rai** 1526, dated. 04.6.1996.

Status: Less Frequent.

Local Distrib.: Kuwapaani, Sakam, Phaparkheti. 1300-1800m.

General Distrib.: Tropical regions of eastern Asia, India, China, eastwards to Japan, S. E. Malaysia and northern Australia.

Cyperus cyperoides (L.) Kuntze, Rev. Gen. Pl. 3(2): 333. 1898, FEH 1: 386. 1966, FM 7(3): 642. 1974; Nam. Chang. Flr. Pl. 164. 1987, FIEM 64. 1989; FB 3 (1): 307. 1994.

Scirpus cyperoides L., Mant. 2: 181. 1771.

Mariscus sieberianus Nees ex Cl. in FBI 6: 622. 1893.

Perennial. Stem 30-60 cm 1-0.35 cm, trigonous. Leaves shorter or equal to stem, 0.3-0.8 cm wide, sub-basal; sheaths purplish-red. Inflorescence 3-11 x 2-6.5 cm, partial inflorescence spicate. Spikes 1.3-3.9 x 0.65-1.2 cm, cylindric; spikelets many, spreading, 0.3-0.7 x 0.5-0.75 cm, linear, acute, glumes appressed lower ones sterile, fertile ones linear-lanceolate, 3-veined with greenish midrib; stamens 3; style very short; stigmas upto 0.3 cm long. Nut 0.18-0.2 x 0.45-0.6 cm, slightly curved, brownish, papillose.

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Samsing, 730 m, **AP Das & PC Rai** 1713, dated 17.5.1997.

Status: Common.

Local Distrib.: Gorubathan, Samsing, Phari, Machuki. 400-1700m.

General Distrib.: Subtropical and temperate regions of both the hemisphere.

Cyperus hyalinus Vahl, Enum. 2: 329. 1806; FM 7(3):655. 1974; Nam. Chang. Flr. Pl. 165. 1987.

Pycneus pumilus Cl. in FBI 6: 591.1893 quoad descr. excl. *basionym*; FB 3(1):319. 1994.

Cyperus pumilus L., Cent. Pl. 2:6.1776; Pfl.-reich 10-20 Ht. 101:375, f.44 A-C. 1936.

Annual. Stem 4-12 x 0.06-0.075 cm, slender, tufted. Leaves arranged on lower stem part, longer than stem, 0.16-0.18cm wide. Sheaths pale brown. Inflorescence head of sessile spikelets, sometimes 1 x compound with rays numbering 1-4; involucre bracts usually 2, sometimes 3. Partial inflorescence spicate consisting of 6-14 spikelets; rachis upto 0.32 cm. Spikelets 0.4-1.2 x 0.15-0.18 cm, narrow oblong. Glumes upto 0.15 x 0.1 cm, elliptic, oblong to obovate, acute or blunt, midrib greenish, 3-veined; mucro upto 0.02 cm, curved. Stamens 1 to 2; style upto 0.04 cm, red-brown, slightly granular.

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Near Samsing, 700m, **AP Das & PC Rai** 1750, dated 18.5.1997.

Status: Common.

Local Distrib.: Suntalay, Samsing, Sakam, Phaparkheti. 500-1750m.

General Distrib.: India, Indo-China and Malaysia

Cyperus involucratus Poir in Lamk., Encyc. 7:253. 1806; FBI 6:617. 1894; FB 3 (1):317. 1994; Fl. Sik. 1:215. 1996.

Perennial with short rhizomes. Stem tufted, devoid of Leaves, spongy. Sheaths upto 19.5 cm, papery. Inflorescence compd., umbellate with primary rays recurved and upto 9 cm long; secondary rays to 2.2 cm, not curved. Bracts exceeding primary rays, numerous, leaf-like with hispid margin. Spikelets umbellate, elliptic, compressed. Glumes 0.12-0.15 x 0.01cm, lanceolate, overlapping, acute, strongly keeled, straw-coloured. Stamens 3. Style upto 0.05 cm; stigmas 0.09- 0.13 cm. Nut 0.075 x 0.045 cm with oblong-elliptic faces, acute, pale-yellow, finely papillose.

Flr. & Frt.: Jul. - Oct.

Specimen Cited: Samsing, 650m, **AP Das & PC Rai** 1565, dated 06.6.1996.

Status: Frequent.

Local Distrib.: Gorubathan, Kuwapaani, Samsing. 500-1600m.

General Distrib.: E. Himalaya, Asia, Africa, America.

Cyperus iria L., Sp. Pl. ed. 1, 45, 1753; FBI 6: 666.1893, Pfl.-reich IV-20, Ht. 250. 1963; Bull. Bot. Gard. Luck. no. 85, t. 6. 1963; FEH 1: 387. 1966; FIEM 45. 1989; FB 3(1):312. 1994; Fl. Sik. 1:215. 1996.

Local Name: Mothey (Nep.).

Slender annual with tuft of 20-40 x 0.15-0.26 cm sized stem. Leaves usually borne on lower half of stem, almost equalling stem, upto 0.4 cm wide; sheath bases dark brownish. Inflorescence upto 6-9 cm long, 4-9 cm wide; primary rays 4-6, upto 5 cm long; secondary rays much shorter; partial inflorescence 4 x 5.2 cm. Spikes 3-5, sessile, narrowly oblong, lower ones spreading; spikelets 10-15, erect 0.45-0.75 x 0.15-0.17 cm, oblong, rachis upto 2.4 cm. Glumes 6-12, oblique, overlapping, 0.12-0.15 x 0.12-0.16 cm, suborbicular, emarginate, 3-veined, minutely apiculate. Stamens 3; stigmas to 0.02 cm, sessile. Nut 0.14 x 0.8 cm; elliptic-obovate, apiculate, blackish on maturity.

Flr. & Frt.: May - Oct.

Specimen Cited: Asala Khola, 530 m, **AP Das & PC Rai** 1714, dated 17.5.1997.

Status: Frequent.

Local Distrib.: Phari, Sakam, Asala Khola. Upto 1900m.

General Distrib.: Cosmopolitan.

Cyperus rotundus L., Sp. Pl. ed. 1, 45.1753; FBI 6:614. 1893; Pfl.-reich IV -20, Ht. 101: 107, f. 13. 1935; Bull. Bot. Gard. Lucknow no. 85: t. 10. 1963; FEH 1: 388. 1966; Nam. Chang. Flr. Pl. 166. 1987; FIEM 47. 1989; FB 3 (1):316. 1994; Fl. Sik. 1:217. 1996.

C. retzii Nees in Wt., Contrib. 82. 1834, *non* Poir. 1806.

C. tuberosus sensu Cl. in FBI 6: 616. 1893 p.p. *non* Rottb.

Local Name: Mothey (Nep.); Mutha (Beng.); Nut Sedge (Eng.).

Annual with slender stolons, spreading, tubers fibrous and blackish. Stems 16-35 x 0.09-0.14 cm. Leaves aggregated near stem base, blades half to length of stem, 0.17-0.36 cm wide, sheaths, membranous, pale. Inflorescence 2-9 x 2-6 cm, usually 1 x compound; primary rays 1-5 nos., erect, longest upto 6.5 cm; involueral bracts shorter or equal to inflorescence. Partial inflorescence with 4-7 spikelets forming cylindric spikes; rachis 0.25-0.65 cm. Spikelets 1-2 x 0.15-0.2 cm, linear, acute. Glumes upto 22 nos., 0.28-0.34 x 0.17-0.2 cm, narrowly ovate, overlapping, blunt, strongly 3 veined with greenish midrib. Stamens 3; style 0.01 cm. Nut 0.15-0.16 x 0.07-0.08 cm, oblong-elliptic with concave faces, pale brown and minutely papillose.

Flr. & Frt.: Apr. - Aug.

Specimen Cited: Chouda Feri, 2250m, AP Das & PC Rai 0958, dated 22.4.1995.

Status: Common.

Local Distrib.: Samsing, Gorubathan, Chouda Feri, Left Hill ridge of Reshete, Rechila Durpinay. Upto 2300m.

General Distrib.: Cosmopolitan weed.

***ERIOSCIRPUS* Palla**

Erioscirpus cosmosus (Wallich) Palla, Bot. Zeitung. Liv. I. 148, in obs. 151, in Clavi 1896; FB 3 (1):281. 1994

Tufted perennial. Stem 30-30 cm long, solid, obscurely trigonous. Leaves exceeding stems, basal 0.9-0.43 cm wide, with minutely serrate margin, blades narrow and channelled. Sheaths persistent. Inflorescence diffuse, terminal, compound panicle, 9-48 cm; inflorescence bracts leafy, exceeding inflorescence. Spikelets numerous, borne either singly or in pairs, 0.5-1 x 0.15-0.3cm, narrowly ellipsoid, paniced, sessile. Glumes spirally inserted on axis, 0.25-0.3 x 0.5-1 cm, ovate-oblong, acute or blunt, midrib greenish, mucro 0.35 mm. Stamens 1-2; stigmas 3, papillose, reddish-brown. Nut narrow, flattened, trigonous, oblong, dark-brown with numerous basal bristles, bristles longer than spikelets in fruiting.

Flr. & Frt.: May - Dec.

Specimen Cited: Reshete, 2150m, AP Das & PC Rai 0366, dated 14.10.1994.

Status: Common.

Local Distrib.: Sakam, Reshete, Chonkobhir, Todey-Tangta. 1200-2300m.

General Distrib.: Himalayas, Myanmar, Tonkin, China.

FIMBRISTYLIS Vahl (*nom. cons.*)

Key to the species:

1. Plants non-rhizomatous.....2
1. Plants with short rhizomes.....*F. complanata*
2. Stems densely tufted.....3
2. Stems filiform, not tufted.....*F. aestivalis*
3. Plants spreading with creeping stolons.....*F. stolonifera*
3. Plants without stolons.....4
4. Glumes 0.19-0.28cm; stamen 1; styles broadened and with fimbriate margins; stigmas 2, deflexed.....*F. dichotoma*
4. Glumes 0.14-0.15cm; stamens 1-2; styles fimbriate at base; stigmas 3, not deflexed.....*F. miliacea*

Fimbristylis aestivalis (Retz.) Vahl, Enum. Pl. 2: 288. 1806; FBI 6: 637. 1893; FEH 1: 390. 1966; FB 3 (1): 296. 1994; Fl. Sik. 1:219. 1996.

Scirpus aestivalis Retz., Obo. Bot. 4:12. 1786; Fl. Ind. ed. Carey 1.227. 1820.

Tufted, slender annual. Stems 2-9 x 0.025-0.04 cm, filiform, leafless at base. Leaves eligulate, basal and sub-basal, upto 4.5 cm long, 0.025 x 0.065 cm wide, acute, margin thickened; sheaths pilose, membranous. Inflorescence umbellate, 0.3-2.6 x 0.25-2 cm, compound, with longest ray upto 1.5 cm long. Lowermost bract 2.1 cm, hairy at base. Spikelets 0.35-0.55 x 0.09-0.16 cm, linear-lanceolate, acute and angled. Glumes 0.11-0.13 x 0.09-0.16 cm, oblong-elliptic, blunt or subacute, mucronate, keeled, mid-rib green. Stamen 1; style 0.04-0.06 cm, nearly glabrous or minutely hairy at base; stigmas 2, basally hairy. Nut 0.04-0.05 x 0.03-0.04 cm, obovate, biconvex, smooth and pale-yellow.

Flr. & Frt.: Apr. - Sep.

Specimen Cited: Above Phari Busty, 820m, AP Das & PC Rai 1544, dated 06.6.1996.

Status: Frequent.

Local Distrib.: Phaparkheti, Todey, Machuki, Phari, Alubari. 750-1800m.

General Distrib.: Temperate-Tropical regions of Asia, India, China, eastward to Japan, Malaysia and N. Australia.

Fimbristylis complanata (Retz.) Link, Hort. Berol. Descr. 1: 292. 1827; FBI 6:646. 1893; FEH 1:390. 1966; FB 3 (1): 291. 1994; Fl. Sik. 1:220. 1996.

Scirpus complanatus Retz., Obs. Bot. 5:14. 1789.

Perennial with short rhizome. Stems tufted, compressed above. Leaves basal and sub-basal, abruptly tapering at apex, 8-30 x 0.1-0.45 cm, margins thickened and minutely serrate, stiff; sheaths pale-brown, ligulate. Inflorescence compound with primary rays flattened and longest being upto 4.5-9 cm; lower bract upto 5.5 cm long, leaf-like. Spikelets sessile, 0.4-0.7 x 0.15-0.2cm, borne singly, linear-ellipsoid, acute. Glumes 0.2-

0.25 x 0.1-0.17cm, ovate, acute or apiculate, strongly keeled, brownish. Stamens 3; style basally swollen, glabrous; stigmas 3, erect. Nut 0.1 x 0.065 cm, trigonous.

Flr.: Apr. - May

Fr.: Jul. - Aug.

Specimen Cited: Below Machuki, 1200m, AP Das & PC Rai 1739, dated 17.5.1997.

Status: Less Frequent.

Local Distrib.: Machuki, Zero Point, Thartharay, Sakam Forest. 1100-2300m.

General Distrib.: India to Malaysia, S. China and Japan.

Fimbristylis dichotoma (L.) Vahl, ssp. *dichotoma* Enum. Pl. 2: 287. 1806; Kew Bull. 1935: 150. 1935; FEH 1: 391. 1966; Fl. Nong. Vic. 343. 1982; TBRI 50(4): 114. 1987; FB 3 (1): 294. 1994; Fl. Sik. 1: 220. 1996.

Scirpus dichotomus L., Sp. Pl. ed. 1, 50. 1753.

F. diphylla (Retz.) Vahl, Enum. Pl. 2: 289 1806; FBI 6: 636. 1893, incl. var. *annua* C. B. Clarke.

Small, usually non-rhizomatous tufted herb, very variable in size. Stems compressed, densely tufted, 12-many cm. Leaves basal and on lower stem part, nearly half in length of stem, ligulate, acute. Sheaths short hairy, brownish. Inflorescence 2-12.5cm, compound; primary rays unequal, longest being upto 8 cm. Lower bracts 5-11 cm long, leafy. Spikelets 0.27-1.2 cm, borne singly. Glumes 0.19-0.28 x 0.14-0.2 cm, usually ovate, acute, 3-veined with distinct greenish mid nerve. Stamen 1; style 0.15-0.18 cm, broadened basally deep brown with fimbriate margins; stigmas 2, deflexed.

Flr. & Fr.: Mar. - Oct.

Specimen Cited: Jaributti, 2100m, AP Das & PC Rai 096, dated 14.6.1994.

Status: Common.

Local Distrib.: Chouda Feri, Zero Point, Samsing, Jaributti, Machuki. Upto 2200m

General Distrib.: Tropical and subtropical regions of the world.

Fimbristylis miliacea (L.) Vahl, Enum. 2:287. 1806 quoad *basionym*, *non sensu* Cl. in FBI 6:644. 1893; JAA 35:216.1954; FEH 1:391.1966; FM 7(3): 552. 1974; Nam. Chang. Flr. Pl. 240. 1987; FIEM 53. 1989; FB 3(1):293. 1994; Fl. Sik. 1:221. 1996.

Scirpus miliaceus L., Syst. Veg. 10:868. 1759.

Fimbristylis quinqueangularis (Vahl) Kunth, Enum. 2:229. 1873; FBI 6:664. 1893; Blumea 8:118. 1955.

Annual without rhizome. Stem 25-50 cm long, compressed, 3-4 angled, densely tufted. Leaves equal to stem or often larger, stouter, stem-leaves reduced to elongated sheaths with minute blades, basal leaves with flat blades and minutely serrate margins. Spikelets 0.4-0.55 x 0.15-0.2 cm, acute and strongly angled; glumes 0.14-0.15 x 0.1 cm, acute with shortly excurved midnerve, strongly keeled. Stamens 1-2; style 0.04-0.05 cm, thickened and fimbriate at base; stigmas 3, upto 0.04 cm. Nut rounded-trigonous.

Flr. & Frt.: Jul. - Oct.

Specimen Cited: Near Machuki, 1200m, **AP Das & PC Rai** 1740, dated 17.5.1997.

Status: Common.

Local Distrib.: Samsing, Phari, Sakam Forest, Jaributti, Phaparkheti. Upto 2200m.

General Distrib.: Old World Tropicas (from Africa-India, eastward to Formosa, Malaysia and N. Australia).

Fimbristylis stolonifera Clarke in Hk f., FBI 6:637. 1893; FIEM 55. 1989; FB 3 (1): 295. 1994; Fl. Sik. 1:221. 1996.

Spreading plant with slender, creeping stolon. Stem tufted, grooved. Leaves margin mintely serrate. Inflorescence simple. Spikelets 0.45-0.75 x 0.25-0.45 cm. Glumes 0.26-0.31 x 0.17-0.23 cm, dark red-brown, midrib green. Stamens 3; style fimbriate in upper half portion. Nuts borne on conspicuous gynophore, wider and with 12 vertical rows of cell rows at each face, rarely tuberculate.

Flr. & Frt.: Jun. - Sep.

Specimen Cited: Near Zero Point, 2090m, **AP Das & PC Rai** 0233, dated 16.6.1994.

Status: Frequent.

Local Distrib.: Chouda Feri, Jaributti, Zero Point. 2000-2300m.

General Distrib.: E. Himalaya (Nepal-Bhutan).

***KOBRESSIA* Willd.**

Key to the species:

1. Culms curved; prophylls lanceolate, opening above, keels glabrous.....*K. fragilis*
1. Culms erect, sub-terete; prophylls oblong-elliptic, opening toward base, keels ciliate.....2
2. Leaf sheaths brown; female glumes 0.3-0.35cm long, ovate; racheola shorter than prophyll.....*K. pygmaea*
2. Leaf sheaths pale; female glumes 0.6-0.85cm long, lanceolate or oblong-lanceolate; racheola as long as prophylls.....*K. uncinoides*

Kobressia fragilis C.B. Clarke in J. Lin. Soc. 36:267. 1903; EFPN 1:113. 1978; FIEM 58. 1989; FB.3(1): 342. 1994

Densely tufted perennial. Culm 8-38 cm, usually curved. Leaves basal and sub-basal, shorter than culm, margin inrolled. Sheaths fibrous, pale brown. Inflorescence 1.5-4 x 0.05-0.065 cm, linear, often curved; lateral spikes upto 5 nos., overlapping, lower one branched. Lowest bract equal or even longer than inflorescence with filiform blade and clasping base. Lateral spikes androgynous; male spikelets 1-4, single-flowered; female spikelets 2-7, single-flowered. Female glumes 0.25-0.35 x 0.15-0.17 cm, ovate, rounded

to acute, mucronate, hyaline turning to yellowish-brown at later stage. Prophyll 0.25-0.35 x 0.1-0.13 cm, lanceolate, partially closed, opening above, curved, pale brown; keels 2, greenish and glabrous. Nut 0.16-0.18 x 0.1 cm, ellipsoidal, trigonous, shining brown. Racheola equal to prophyll, sometimes even longer, 2-nerved and ciliate.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Near Mulkharka at Sikkim-Neora Border, 2480 m, AP Das & PC Rai 1138, dated 29.4.1995.

Status: Less Common.

Local Distrib.: Machuki, Mulkharka, Left Hill crest of Ruka Hill, Rechila Durpinay. 1300-2500m.

General Distrib.: E. Himalaya (Nepal, Sikkim, Darjeeling, Bhutan).

Kobressia pygmaea (Clarke) Clarke in Hk.f., FBI 6:696. 1894; FB 3(1):349. 1994; Fl. Sik. 1:225. 1996.

Hemicares pygmaea Clarke in Jour. Lin. Soc. Bot. 20:383. 1883.

Densely tufted perennial. Leaf sheaths base striate, brownish, persisting as fibres later on. Culm 2-5 x 0.035-0.04 cm, sub-terete, erect. Leaves all basal, as long as culm, tubular, channelled above, not keeled. Inflorescence dense spike, 0.4-0.6 x 0.15-0.2 cm, androgynous. Spikelets single-flowered. Male glumes 0.35-0.4 x 0.15-0.18 cm, apparently deciduous. Female spikelets 3-6, lowermost bract aristate and glume-like. Female glumes 0.3-0.35 x 0.2-0.25 cm, ovate, acute; midrib broad and green. Prophyll 0.2-0.24 x 0.1-0.12 cm, oblong-elliptic, opening towards base, keels ciliate at apex. Nut 0.15-0.17 x 0.1 cm, obovoid-trigonous, apiculate, shining pale brown. Racheola very short.

Flr. & Frt.: May - Sept.

Specimen Cited: Rachila Middle, 2400m, AP Das & PC Rai 1044, dated 26.4.1995.

Status: Frequent.

Local Distrib.: Tinsimana, Rechila Middle, Thosum Hill, Rechila Peak. 2400-3100m.

General Distrib.: Himalayas, Tibet and China.

Kobressia uncinoides (Boott) Clarke in Hk. f., FBI 6:698. 1894; Pfl.-reich. iv-20, Ht. 38:46. 1909; FEH 3:129. 1975; FIEM 60. 1989; FB 3(1): 337. 1994; Fl. Sik. 1:226. 1996.
Carex uncinoides Boott, Illust. Carex 1:8. t. 23. 1858.

Rhizomes woody, not spreading, thick. Leaves basal and sub basal, shorter than culm, 0.3-0.4 cm wide, flat, acute. Sheath bases thin, pale. Culm subterete, (3)-11-48 x 0.14-0.22 cm. Inflorescence 3-8 x 0.9-1.8 cm, spike-like Panicle; lateral spikes 5-8, androgynous, appressed; basal spike peduncled. Lower bract glume-like with clasping base, tip aristate. Spikelets all single-flowered, lower ones female. Female glumes 0.6-0.85 x 0.25-0.35 cm, lanceolate to oblong-lanceolate, acute or obtuse, pale yellow, midrib

green, awn as long as 0.2 cm. Prophyll 0.55-0.82 x 0.14-0.15 cm, linear-lanceolate with ciliate keels. Nut stipitate, 0.3- 0.35 x 0.09- 0.12 cm, oblong, brownish. Racheola as long as prophyll and ciliate.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Below Jorhpokhari, 2920 m, **AP Das & PC Rai** 0850 dated 22.10.1994.

Status: Fairly Common.

Local Distrib.: Ruka Hill, Chitray Bunglow, Middle Rechila, Pankhasari, Alubari, Reshete. 1900-2750m.

General Distrib.: C. to E. Himalayas.

KYLLINGA Rottb.(*nom. cons.*)

Key to the species:

- 1. Rhizome extensively creeping; glumes 3; nut oblong-obovate or oblong-elliptic*K. brevifolia*
- 1. Rhizome short, not creeping; glumes 4; nut obovate.....*K. odorata*

Kyllinga brevifolia Rottb., Descr. and Ic. 13. t. 4, f. 3. 1773; FBI 6:588. 1893; Nam. Chang. Flr. Pl. 163. 1987; FB 3 (1):324. 1994; Fl. Sik. 1:227. 1996.

Perennial with extensively creeping rhizome. Stems 5-40 cm, triquetrous. Leaves sub-basal, shorter than stem, upto 0.38 cm wide. Sheaths reddish brown. Inflorescence 0.55-0.95 x 0.55-0.7 cm, sometimes hemispheric with 1-2 subsidiary heads. Involucral bracts 2-4, 2.5-17.5 cm. Spikelets sessile, 0.25-0.35 x 0.09-0.1 cm, lanceolate. Glumes 3, lowermost sterile, 0.07-0.13 x 0.07-0.1 cm, ovate; middle glume also sterile, conduplicate, oblong-ovate with recurved mucro, midrib greenish, keeled; upper glume fertile, 0.25-0.3 x 0.17-0.2 cm, oblong-ovate. Stamens 1-3; style upto 0.07 cm; stigma 0.01-0.015cm. Nut 0.14 x 0.09 cm, oblong-obovate or oblong-elliptic, truncate, pale yellow or red-brown, nearly smooth.

Flr. & Frt.: Apr. - Aug.

Specimen Cited: Near Machuki, 1300m, **AP Das & PC Rai** 1752, dated 18.5.1997.

Status: Common.

Local Distrib.: Sakam, Phari, Machuki, Tiffin Dara, Mulkharka. Upto 2400m.

General Distrib.: Cosmopolitan.

Kyllinga odorata Vahl, Enum. Pl. 2:382. 1806; J. S. Afr. Bot. 49:278. 1983; FIEM 61. 1989; FB 3(1): 326. 1994.

K. cylindrica Nees in Wight, Contrib. Bot. Ind. 91. 1834; FBI 6:588. 1893.

Perennial with short rhizomes. Stems tufted. Inflorescence 1-1.2 x 0.5-0.6cm, cylindrical, drying white, sometimes with small subsidiary heads at base. Spikelets 0.24-0.28 x 0.14-

0.16 cm, ovate. Glumes 4, uppermost only fertile, rest sterile; lowermost upto 0.12 x 0.02 cm, linear; sub-basal 0.12 x 0.075 cm, ovate; upper 2 ovate, acute, keeled, fertile one upto 0.25 x 0.2 cm, 3-veined. Stamens 2; style upto 0.02 cm long; stigmas 0.07-0.08 cm. Nut 0.14-0.15 x 0.12 cm, obovate, apiculate and yellowish.

Flr. & Frt.: May - Aug.

Specimen Cited: Near Phari, 930 m, AP Das & PC Rai 1571, dated 07.6.1996.

Status: Less Common.

Local Distrib.: Machuki, Phari, Gorubathan, Chel Khola. 400-1600m.

General Distrib.: Tropical Himalayas (Kumaon-Sikkim), Singapore, Africa, Australia.

***PYCREUS* Beauv.**

Pycreus polystachyos (Rottb.) Beauv., Pl. Oware and Benin. 2:48, t, 86, f. 2. 1807; FBI 6:592. 1893; Nam. Chang. Flr. Pl. 166. 1987; FB 3 (1): 321.1994; Fl. Sik. 1:232. 1996.

Annual to perennial. Stems upto 58 x 0.25 cm. Leaves inserted on lowermost part of stem, shorter than stem, 0.25-0.35 cm wide, blades flat. Sheaths red-brown. Inflorescence a dense compound head, 2.4-0.35 cm across, with short rays to 0.5 cm. Partial inflorescence spicate consisting of 16 spikelets. Spikelets 0.95-1.4 x 0.15 cm, linear, acute. Glumes 0.18-0.2 x 0.1-0.12 cm, lanceolate, deciduous, apiculate to acute, keeled, margins hyaline. Stamens 2; style 0.08-0.09 cm; stigmas 2, equal to style. Nut 0.1 x 0.05 cm, oblong-elliptic, truncate, brown-black.

Flr. & Frt.: Sep. - Dec.

Specimen Cited: Below PHE Source, 2050m, AP Das & PC Rai 0380, dated 15.10.1994.

Status: Less Common.

Local Distrib.: Kuwapaani, PHE Source, Jaributti, Pankhasari. 1400-2100m.

General Distrib.: India (E. and N.E. India, Andaman and Nicobar Islands), Nepal, Bangladesh, Myanmar.

***SCHOENOPLECTUS* (Reichenbach.)Palla (nom. cons.)**

Schoenoplectus mucronatus (L.) Palla in Verh. K.K. Zool. Bot. Ges. Wien 38: 657. 1893; FB 3(1):284. 1994; Fl. Sik. 1:235. 1996.

Scirpus mucronatus L., Sp. Pl. 50. 1753.

S. triangulatus Roxb, Fl. Ind. 1:219. 1820.

Schoenoplectus triangulatus (Roxb.) Sojak in Cas. Nar. Muz. (Prague) 141:62. 1972.

Perennial with short rhizome. Stems tufted, 75-130 x 0.4-0.65 cm, stout and triquetrous. Leaves reduced to basal bladeless sheaths upto 23 cm. Inflorescence consisting of 9-13 sessile spikelets, apparently lateral; bracts 2.5-8 cm, triquetrous. Spikelets 1.5 x 0.5 cm, narrowly ovoid. Glumes 0.3-0.5 x 0.25 cm, ovate, acute or subacute, margins dark golden-brown. Stamens 3; stigmas 3. Nut 0.2-0.22 x 0.14-0.16cm, obovate, obliquely biconvex, truncate, base attenuate, smooth; bristles 6 and exceeding nut.

Flr.: May - Jun. *Fr.*: Jun. - Sept.

Specimen Cited: Near Alubari, 2190m, **AP Das & PC Rai** 0174, dated 15.6.1994.

Status: Frequent.

Local Distrib.: Chouda Feri, Machuki, Sakam, Alubari. 1400-2300m.

General Distrib.: India, Malaysia, China and Japan.

SCIRPUS L.

Scirpus ternatanus Reinw. ex Miq., Fl. Ind. Bot. 3:307. 1859; JAA 35:203. 1954; FM 7(3):501. 1974; Nam. Chang. Flr. Pl. 512. 1987; FB 3 (1): 279. 1994; Fl. Sik. 1:235. 1996.

S. chinensis Munro in Seem., Bot. Voy. Herald 423.1857, non Osbeck 1753; FBI 6:662. 1893

Stout perennial herb with short rhizome. Stem leafy, trigonous, upto 75 cm. Leaves inserted on stem base and usually 4-7 on lower stem part, lamina 0.55-1.6 cm wide, blades often overtopping stem, coriaceous, base sheathing, midrib with keels, sheaths loose possessing transverse veinlets. Inflorescence 8-26 cm diam. with divaricate and rigid 6-8 primary rays, longest ray upto 11.2 cm; bracts leafy, longer than rays. Spikelet clusters 4-13, 0.25-0.45 x 0.14-0.15 cm, ovoid, brownish-red. Glumes 0.15 x 0.12 cm, ovate, tip blunt, hyaline with greenish midrib. Stamens 3. Nut elliptic-obovate, flattened and apiculate, greenish-white; stigmas 2.

Flr. & Fr.: Apr. - Jun.

Specimen Cited: Near Choudha Feri, 2220m, **AP Das & PC Rai** 1305, dated 05.5.1995

Status: Frequent.

Local Distrib.: Chonkobhir, PHE Source, Chouda Feri. 1800-2300m.

General Distrib.: E. Himalaya, Tibet, China.

GRAMINAE (nom. alt. = POACEAE Barnhart)

Key to the species:

1. Herbaceous plants.....2
1. Shrubby plants.....19
2. Plants 11-33cm tall; culms geniculate at base, sometimes rooting at nodes
.....*Alopecurus*
2. Plants 1-5m tall; culms not stout and leafy, not rooting at nodes.....3
3. Spikelets arranged in panicles of spike-like racemes.....4
3. Spikelets not in spike-like raceme.....6
4. Spikelets awnless; racemes in a spiciform panicle.....*Imperata*
4. Spikelets awned; racemes condensed and on elongated axis.....5
5. Spikelets paired; glumes thin; panicles silky villous.....*Erianthus*

5. Spikelets not paired; glumes thick; racemes elongated.....	<i>Miscanthus</i>
6. Spikelets arranged in digitate, scattered, scattered on solitary raceme.....	7
6. Spikelets arranged in spreading panicles.....	<i>Chrysopogon</i>
7. Spikelets 1-flowered.....	<i>Eulalia</i>
7. Spikelets with more than 1-flowers.....	8
8. Racemes not solitary.....	9
8. Racemes solitary.....	<i>Pogonatherum</i>
9. Lemmas awned.....	10
9. Lemmas awnless (if awned then spikelets on loose panicle).....	<i>Eragrostis</i>
10. Spikelets upright; glumes 1-5 nerved.....	<i>Helictotrichon</i>
10. Spikelets not upright; glumes nerves 5 or more.....	11
11. Florets all fertile.....	<i>Isachne</i>
11. Only the upper florets fertile.....	12
12. Spikelets not subtended by bristles.....	13
12. Spikelets subtended by 1-many bristles.....	<i>Setaria</i>
13. Lower glumes turned towards rachis; spikelets abaxial.....	14
13. Lower glume usually absent; spikelets overtopping and plano-convex.....	<i>Paspalum</i>
14. Lemma of upper floret cartilaginous.....	<i>Digitaria</i>
14. Lemma of upper floret not cartilaginous.....	15
15. Glumes long acuminate.....	<i>Calamogrostis</i>
15. Glumes not acuminate.....	16
16. Leaf blades not narrow and flat.....	17
16. Leaf blades narrow and flat.....	<i>Agrostis</i>
17. Spikelets in nodding or erect panicles, not alike.....	<i>Festuca</i>
17. Spikelets in expanded panicles, all alike.....	18
18. Perennials; leaves subamplexicaul; spikelets crowded on capillary branches in large pedicels, 2-flowered; palae truncate.....	<i>Thysanolaena</i>
18. Annuals; leaves not subamplexicaul; spikelets 3-many flowered; palae not truncate.....	<i>Poa</i>
19. Leaves usually tessellate.....	20
19. Leaves not tessellate.....	25
20. Ultimate inflorescence branches without bract at base.....	21
20. Ultimate inflorescence branches with bract at base.....	24
21. Style 1; longitudinal nerves of glumes not raised.....	22
21. Styles 2; longitudinal nerves of glumes raised.....	<i>Chimonobambusa</i>
22. Stigmas 3; culm sheath with appressed, erect brown hair and ring of upwardly pointing hairs near base.....	<i>Yushania</i>
22. Stigmas 2; culm sheaths glabrous and ciliate at the margins outside.....	23
23. Culm sheath densely scabrous inside below ligule.....	<i>Drepanostachyum</i>
23. Culm sheath not scabrous inside.....	<i>Arundinaria</i>
24. Spikelets with 2-3 central hermaphrodite or female florets.....	<i>Dendrocalamus</i>
24. Spikelets with 1 central hermaphrodite floret.....	<i>Cephalostachyum</i>
25. Culms upto 3.6cm high; spikelets upto 5cm long, 5-8 flowered.....	<i>Thamnocalamus</i>
25. Culms upto 6cm tall; spikelets upto 0.9cm long, usually uniflowered.....	<i>Himalayacalamus</i>

AGROSTIS L.

Key to the species:

1. Plants perennial, erect; leaf blades narrow; lemma without mucro.....*A. myriantha*
1. Plants annual, semi-erect-erect; leaf blades flat; lemma with mucro.....*A. triaristata*

Agrostis myriantha Hk. f. in FBI 7: 257. 1897; Fl. Am. 141. 1940; Fl. III. Pl. Prim. Sinic. 541. 1959; Grass. Ind. 388. 1960; Journ. Coll. Arts. Sci. Chiba 4(3): 316. 1965; FEH 1: 349. 1966; TBRI 50(4): 105. 1987; FIEM 180. 1989; Fl. Sik. 1: 278. 1996.
A. platyphylla Mez. in Fedde, Rep. Sp. Nov. 17: 302. 1920.

A perennial grass with stout and leafy culms to 1.5 m high. Leaves 10-30 x 0.3-1 cm, linear-lanceolate, acute, blades narrow, scabrid; ligules truncate, membranous. Panicles 12-28 cm long, densely flowered. Rachis branched into fascicles or whorled. Pedicels clavate, smooth. Glumes 0.25 cm long, one-nerved, keels usually scaberulous. Lemma upto 15 cm long, ovate, 5- nerved, awnless and glabrous. Palea minute; anthers upto 0.05cm..

Flr.: Jun. - Nov.

Specimen Cited: Reshete, 2200 m, **AP Das & PC Rai** 1334, dated 06.5.1995.

Status: Common.

Local Distrib.: Alubari, Reshete, Neora-Sikkim Border, Sakam, Helipad region. 1600-2350m.

General Distrib.: E. Himalaya, Assam, and China.

Agrostis triaristata (Hk. f.) Bor, Grass. Ind. 391. 1960; FIEM 181. 1989; Fl. Sik. 1: 279. 1996; FB 3 (2):604. 2000.

Deyeuxine triaristata Hk. f., FBI 7: 266. 1896.

Calamogrostis triplifera Hk. f., FBI 7:262. 1896.

28-40 cm tall annual herbs, semierect-erect. Leaves 8-17 cm long, broadly linear-lanceolate, flat, shortly ligulate. Panicles 10-18 cm long pyramidal, erect, with spreading branches. Spikelets many, 0.4cm, dense. Glumes subequal to equal, oblong-acute glabrous, greenish brown. Palea small, usually glabrous. Lemma with mucros; anthers 0.05 cm long.

Flr.: Aug. - Oct.

Specimen Cited: Jaributti - Rechila, 2195-2280 m **AP Das & PC Rai** 0402, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Chouda Feri, Rechila Chowk, Jaributti, Kuwa Paani. Upto 2350m.

General Distrib.: Tropical and temperate regions (Continental India, Western Tibet, Sri Lanka).

ALOPECURUS L.

Alopecurus aequalis Sobolewsky, Fl. Petrop. 16. 1799; Grass. Ind. 392. 1960; FIEM 181. 1989; FB 3 (2):620. 2000.

Alopecurus geniculatus L., Sp. Pl. 60. 1753; FBI 7:239. 1896; Fl. Asm 5: 151. 1940; Grass. Ind. 393. 1960; Fl. Sik. 1: 279. 1996.

Annual or subperennial small grass, 11-33 cm tall. Culms geniculate at base, sometime rooting from nodes. Leaves upto 5.2 cm long, 0.2-0.3 cm in width, lanceolate, acute, base rounded or abruptly contracted, usually glabrous and smooth. Sheaths striate, nearly inflated, glabrous. Ligule 0.25-0.35 cm long, membranous. Panicle 2-7 x 0.45- 0.7 cm, cylindric, greenish yellow. Spikelets 0.25 cm long, compressed. Glumes equal to spikelets, usually connate at base, ciliate; lemma 0.25 cm long, basally long awned (upto 0.4 cm), truncate. Stamens 2 or rarely 3, linear.

Flr.: Jun. - Aug.

Specimen Cited: Tinsimana, 2900 m, **AP Das & PC Rai** 1241, dated 04.5.1995.

Status : Sparse.

Local Distrib.: Chitray, Tinsimana. 2600-2900m.

General Distrib.: Temperate and Sub-tropical Himalayas (Kashmir-Sikkim, Assam, Bhutan).

ARUNDINARIA Michx.

Arundinaria griffithiana Munro in Trans. Lin. Soc. 26: 30. 1868; FBI 7: 379. 1896; TBRI 50 (4):106. 1987.

Chimonobambusa griffithiana Nakoi, JAA 6: 151. 1925; Trs. N. Beng. 139. 1929; Fl. Asm. 5: 45. 1934; Nam. Chang. Flr. Pl. 118. 1987.

Gregarious bamboo with culms 4-8m tall. Stem olive green; nodes prominent, spiny; internodes 17-23 cm long, furrowed. Culm-sheaths slightly longer than internodes, 10-13 cm broad. Ligule ciliate. Lamina 9.5-12.5 x 9.5-12 cm, linear-lanceolate, acuminate, base narrowed into a short petiole. Leaf-sheaths glabrous, ciliate on the edges. Panicle terminal with sheathing bracts. Spikelets upto 4 cm long with 2 empty glumes, 4-6 flowered. Pedicels wavy-scabrid, hairy. Rachis flattened, hairy; rachilla upto 0.75 cm long, hairy. Glumes 2, ovate-lanceolate, 5-7 nerved; lemmas 1.2 cm long, lanceolate, 7-nerved and hairy above; paleas equal to lemmas, 2-keeled and bi-mucronate. Lodicules 3, obovate. Stamens inserted; anthers emarginate; ovary linear-oblong; style 1, short; stigmas 2, plumose.

Flr.: Mar. - May.

Specimen Cited: Thosum Hill, 2780m, **AP Das & PC Rai** 1897, dated 27.10.1997.

Status: Less Frequent.

Local Distrib.: Pankhasari, Thosum Hill, Chitray. 2250-2800m.

General Distrib.: E. Himalaya (Sikkim-Bhutan), Khasi Hills.

CALAMOGROSTIS *Adans.*

Calamagrostis emodensis Griseb in Goett. Nachr. 80.1868; FBI 7: 261. 1896; Fl. Asm 5: 14 f. 1940; Fl. Ill. Pl. Prim. Sinic. 526. 1959; Grass. Ind. 395. 1960; FEH 1: 354. 1966; TBRI 50(4): 107. 1987; Fl. Sik. 1: 283. 1996; FB 3 (2):610. 2000.

Stout grass upto 1.5 cm tall. Culms erect, developing from geniculate base; culm base covered with persistent old sheaths-remains. Leaves 23-36 x 0.55-0.8 cm, apex tapered into a sharp point, flat, glabrous, many-nerved. Sheaths loose and striate. Ligule oblong. Panicle upto 19 cm, effuse, glazy, branched into whorls, branchelets capillary. Spikelets condensed. Lower glume lanceolate with scarious margins, uninveved; upper glume 0.6-0.65 cm long, similar like lower glume in other features. Lemmas 0.25 cm long, dorsally glabrous; awn 0.65 cm long, arising from below the lemma tip; palea shorter than lemma, lanceolate. Grain 0.1 cm long, spindle-shaped.

Flr. & Frt.: Apr. - Oct.

Specimen Cited: Helipad region, 2500m, AP Das & PC Rai 1096, dated 27.4.1995.

Status: Frequent.

Local Distrib.: Thosum Hill, Left Hill peak of Lava, Helipad region, Tinsimana. 2500-3000m.

General Distrib.: Himalayas (Kashmir-Bhutan), W. China.

CEPHALOSTACHYUM *Munro*

Cephalostachyum capitatum Munro, Trans. Lin. Soc. 26: 139. 1868; Trs. N. Beng. 141. 1929; Fl. Asm. 5: 16. 1934; FB 3 (2):496. 2000.

Local Name: Gopay Baans (Nep.).

Medium-sized, more or less scandent bamboo species, 4-10 m high. Stems densely branching, hard, yellowish. Internodes upto 100 cm long. Culm-sheaths 20-32 x 5-7.5 cm, thin, truncate at the top, pale brown and pubescent. Ligule toothed. Leaf-sheaths glabrous. Leaves ovate-lanceolate, tip setaceous, base obliquely rounded, glabrous. Inflorescence a terminal or axillary head of 2.5-4 cm diam., globular. Spikelets many, both fertile and sterile, fertile ones upto 2 cm long. Glumes 2, ovate. Lemma with minute awn; palea convolute, 2-keeled, mucronate. Lodicules 3, oblong-lanceolate, ciliate at the top. Stamens 6; anthers apically emarginate; ovary ovoid, glabrous; stigmas 2, hairy. Caryopsis depressed, smooth and with ramnants of style.

Flr. & Frt.: Apr. - Jun.

Specimen Cited: Below Rachila Park, 2100m, AP Das & PC Rai 0280, dated 17.6.1994.

Status: Common.

Local Distrib.: Lolay Gaon, Rechila Park, zero Point, Sakam, Reshete. 1700-2400m.

General Distrib.: E. Himalaya (Sikkim-Bhutan), Naga Hills.

Note: Leaves are good fodder. Hard culms are used to make bows and arrows by Lepcha tribe.

CHIMONOBAMBUSA *Makino*

Chimonobambusa hookeriana Nakoi in JAA 6: 151. 1925; FEH 1: 379. 1966; Fl. Sik. 1:237. 1996.

Arundinaria hookeriana Munro, Trans. Lin. Soc, 26: 29. 1868; Bamb. Brit. Ind. in Ann. Bot. Gard. Cal. 7: 17, t. 15. 1896; FBI 7: 382. 1896; Bambus. 39, t. 24 B. 1913.

Caespitose bamboo. Culms 4.5-5.5 m high, white scurfy at young stage, glaucous- green. Nodes bluish-ringed; internodes fistular, 18-22 cm apart. Culm-sheath 35-62 cm long, papery, attenuate to truncate. Ligule short. Leaves tessellate; lamina 13-29 cm long, linear or rarely oblong-lanceolate, glaucous green, margins scabrous, base attenuate, pale and grabrous beneath, leaf-sheaths glabrous with minutely ciliate margins. Panicles fascicled, falcate. Spikelets in 0.85 cm long. Flowers pedicellate; glumes 2, oblong, 5-12.5 cm long, membranous, lower 3-nerved and upper 5 nerved, nerves raised; lemma ovate, distinctly 3 nerved; palea 2-keeled, glabrous except hirsute tip. Lodicules 3, obovate, 3-5 norved, acute or rounded, base swollen; stamens exerted; ovary ellipsoid; styles 2; stigmas 2, plumose. Grain ellipsoid and with persistent style base.

Flr. & Frt.: Mar. - Jun.

Specimen Cited: Pankhasari, 2250m, AP Das & PC Rai 0696, dated. 19.10.1994.

Status: Common.

Local Distrib.: PHE Source, Lolay Gaon, Pankhasari, Thartharay, Rechila Durpinay. 1600-2350m.

General Distrib.: E. Himalaya and Khasia Hills.

CHRYSOPOGON *Trin.*

Chrysopogon aciculatus Trin., Fund. Agrost. 188. 1820; Act. Phytotax. Geobot. 11: 162. 1942; JAA 29: 359. 1948; Fl. Fl. Pl. Prim. Sinic. 820. 1959; Grass. Ind. 115. 1960; Dansk Bot. Arkiv. 20 (2):168. 1962; FEH 1: 355. 1966; Fl. Sik. 1:247. 1996; FB 3 (2):791. 2000.

Andropogon aciculatus Retz., Obs. Bot. 5: 22. 1789; FBI 7: 188. 1896.

A perennial herb with woody and creeping rhizome. Culms upto 55 cm. Lower nodes branching and rooting. Leaf sheaths rounded, shorter or longer than internodes, usually glabrous or slightly hairy at the throat; ligules membranous; blades closed below and upper spreading 3-13 x 0.3-0.52 cm, linear margins spinous wavy at the older leaves obtuse or acute, glaucescent. Panicle 3-9 cm long, erect, spreading; branches 1.2-1.6 cm long, filiform, hairy. Spikelets both sessile and pedicelled; sessille ones 0.25-0.4 cm, linear; callus equalling spikelets, decurrent on pedicel; lower glumes 0.22-0.4 cm long, linear and subulate, indistinctly 2-3 nerved, keels 2, upper glumes 0.22-0.42 cm, lanceolate, shortly aristate lower floret: lemma upto 0.3 cm long, linear, acute or obtuse, 2-nerved; upper floret. Lemma linear-acuminate, palea linear-obtuse, glabrous; lodicules cuneiform; stamens 3; anthers upto 0.1 cm long. Pedicelled spikelets longer than sessile ones, lanceolate, glabrous; lower glume upto 0.6 cm long, subulate; keels 3 nerved; upper glume upto 0.55 cm long, acuminate, membranous; lower floret: lemma hyaline with

retrorse cilia, palea cuspidate; upper floret: lemma broad; palea linear-oblong; anthers 0.16-0.2 cm. Caryopsis linear.

Flr. & Frt.: Mar. - Sep.

Specimen Cited: Samsing, 730 m, **AP Das & PC Rai** 1569, dated 06.6.1996.

Status: Very Common.

Local Distrib.: Phari, Samsing, Phaparkheti, Gorubathan, Machuki. 700-1700m.

General Distrib.: E. Himalaya (Nepal-Darjeeling), India, Myanmar, Indo-China, Malaysia, China, Formosa, N. Australia.

DENDROCALAMUS *Nees*

Dendrocalamus hamiltonii Nees et Arnt. ex Munro, Trans. Lin. Soc. 26:151. 1868; FBI 7: 405. 1896; Bambus. 154, t. 86. B. 1913; Trs. N. Beng. 140. 1929; Fl. Asm. 5:9. 1934; FEH 1:379. 1966; FB 3 (2):492. 2000.

Local Name: Choya Baans, Taama (Nep.).

Large straggling species of bamboo but sometimes also grows straight attaining a height of 20m, very thick reaching upto 5.8-8.2inches in diam. Culms caespitose, 10-19m tall, branched above, dull green. Nodes with root-scars; internodes 35-51cm long. Culm-sheaths long and stiff, 30-46 cm long, glabrous or with few patches of stiff hairs. Leaf-sheaths appressed hairy. Ligule truncate. Leaves tessellate, variable, small to 37 cm long and upto 3.75 cm broad, broadly lanceolate, base rounded into a short petiole, serrate on the margins, smooth above. Panicles comprising of heads of purple flowers. Flowers almost globular, with scarious bracts. Spikelets upto 1 cm long, with 2-3 central hermaphrodite or female florets, ovoid, glabrous. Glumes 2, rounded; lemmas orbicular, ciliate; paleas 2-keeled and apically bifid; stamens exerted; anthers purplish; ovary sub-orbicular; style hairy; stigmas 3, plumose.

Flr.: Apr. - May

Specimen Cited: Below Machuki, 1330m, **AP Das & PC Rai** 1582, dated 07.6.1996.

Status: Common in the lower hill tracts.

Local Distrib.: Phari, Machuki, Sakam, Suntalay, Samsing. 500-1800m.

General Distrib.: Subtropical E. Himalaya, Assam, Myanmar and Thailand.

Note: Old culms are used for building houses, and making fences, mats, water vessels, containers etc. Young shoots are eaten as vegetable and pickles through traditional preparation procedures, and also sold in the market.

DIGITARIA *Helst. ex Fabr.*

Key to the species:

1. Culms simple, rarely branched from lower nodes, glabrous; lower glume upto 0.4cm long.....*D. ciliaris*
1. Culms decumbent, branched and sometimes rooting from lower nodes; lower glume usually absent.....2
2. Lamina acuminate; ligule of a rim of stiffy hairs; upper glume ovate, 5-nerved; rachis convex.....*D. compacta*
2. Lamina acute; ligule truncate, membranous; upper glume oblong, 3-nerved; rachis flexuous.....*D. sanguinalis*

Digitaria ciliaris (Retz.) Koel., Descr. Gram. 27. 1802; Blumea 21: 32. 1973; Nam. Chang. Flr. Pl. 188. 1987; TBRI 50(4): 112. 1987; Fl. Sik. 1:251. 1996; FB 3 (2):728. 2000.

Panicum ciliare Retz., Obs. Bot. 4: 16. 1786.

Paspalum sanguinale Lamk. var. *ciliare* Hk. f., FBI 7: 15. 1896 p.p.

Digitaria sanguinalis Scop fa. *ciliaris* (Retz.) Haines, Bot. Bihar and Orissa 5: 1008. 1994.

D. adscendens (H.B.K.) Henr. in Blumea 1: 92. 1934; Grass Burm. Cey. Ind. and Pak. 298. 1960 (incl. var. *criniformis* (Henr.); Brittonia 14: 248. 1962.

Paspalum sanguinale Lamk. var. *commutatum* sensu Hk.f., FBI 7: 15. 1896 p.p.

Digitaria adscendens ssp. *marginata* var. *criniformis* Henr., Monog. Digitaria 999. 1950, Grass. Burm. Cey. Ind. and Pak. 299. 1960.

D. ciliaris ssp. *marginata* var. *fimbriata* (Link) Jain and Das, IF 99: 572. 1973.

D. ciliaris ssp. *ciliaris* var. *criniformis* (Henr.) Majumdar in BBSB 25:75. 1971.

An annual herb, 30-60 cm tall, tufted. Culms usually simple, rarely branched from lower nodes, glabrous. Leaves upto 11 cm long, 0.35-0.7 cm wide, linear-lanceolate, margins cartilaginous, apex narrowed into sharp point, base slightly contracted, glabrous or sparsely hairy. Sheaths loose, glabrous or hairy at base. Ligules membranous. Recemes 4-9, subdigitate, basally pubescent. Rachis straight with winged lateral angles. Pedicels binate, unequal, one being very short and another being 0.3-0.35 cm long. Spikelets 0.2-0.3 cm long, lanceolate to lanceolate-oblong, appressed mostly not or very slightly imbricate, pale green. Lower glume upto 0.4 cm long, ovate, obtuse to subacute, turned towards rachis; upper glume 3-nerved, ovate-lanceolate, acute. Lower floret sterile; lemma 7-nerved, membranous; palea and lodicules minute. Upper floret hermaphrodite; lemma oblong-lanceolate, cartilaginous; palea minute. Anthers 3.

Flr.: Jun. - Nov.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 0467, dated 15.10.1994.

Status: Very Common.

Local Distrib.: Tiffin Dara, Sakam Forest, Left Hill ridge of Lava, Jaributti, Zero Point. Upto 2250m.

General Distrib.: Pantropic.

Digitaria compacta (Roem. et Schult.) Veldkham. in Blumea 21:71. 1973; Nam. Chang. Fl. Pl. 188. 1987; Fl. Sik. 1.251. 1996; FB 3 (2):731. 2000.

Paspalum compactum Roem. et Schult., Syst. Veg. 2: 316. 1817.

P. sanguinale var. *commutatum* sensu Hk. f., FBI 7: 15. 1897 p.p.

Digitaria cruciata var. *esculenta* Bor in Webbia 11: 353. 1955; Grass. Burm. Cey. Ind. and Pak. 300. 1960.

An annual grass, 15-25 cm tall. Culms ascending from a decumbent base, branches and sometimes roots arise from lower nodes, densely hairy at nodal regions, often leafy to top. Leaves 2.2-8 x 0.2-0.8 cm, lanceolate, margins ciliate, acuminate, base rounded, nerves 6, hairy both surfaces. Leaf sheaths loose, striate and hairy, hairs white and shiny. Ligule of a rim of stiffy white hairs. Inflorescence a raceme of false spikes. Spikes shorter upwards. Rachis hardly 0.1 cm wide, convex, long. Spikelets arranged in 2 rows, ovate-lanceolate, seated upon short pedicels Lower glume nil; upper glume ovate, 5-nerved. Lower floret sterile; lemma flat with hyaline margins, upper floret hermaphrodite; lemma broadly elliptic, dull white or yellow; palea like lemma. Stamens 3.

Flr.: May - Aug.

Specimen Cited: Jaributti, 2196m, AP Das & PC Rai 0404, dated 15.10.1994.

Status: Frequent.

Local Distrib.: Alubari, Jaributti, Chonkobhir, Reshete. 1700-2200m.

General Distrib.: E. Himalaya (Nepal-Darjeeling), Assam, W. China.

Digitaria sanguinalis (L.) Scop., Fl. Carn. ed. 2, 1: 52. 1772; Grass Burm. Cey. Ind. and Pak. 304. 1960; FWP 134: 231. 1982; Nam. Chang. Flrs. Pl. 189. 1987; FB 3 (2):728. 2000.

Paspalum sanguinale L., Sp. Pl. 1: 57. 1753.

Digitaria sanguinalis ssp. *vulgaris* var. *rottleriana* Henr., Monogr. Digitaria 986. 1950.

D. sanguinalis ssp. *aegyptiaca* var. *frumentacea* Henr., Monogr. Digitaria 986. 1950;

An annual. Culms decumbent, branched; nodes slightly swollen. Ligules 0.2 cm long, truncate and membranous. Leaf sheaths loose, often hirsute; leaf lamina 3-13 x 0.45-0.6 cm, linear-lanceolate, margin white, acute. Panicle many spiked, erect; rachis very short, flexuous. Spikelets 0.3 cm long linear-lanceolate; lower glume sometimes absent; upper glume upto 0.13 cm long, oblong, 3-nerved. Lower floret: lemma upto 0.3 cm, linear-lanceolate, acute, nerves upto 78 slightly hairy, palea 0. Upper floret: lemma upto 0.29 cm, elliptic-lanceolate, acuminate; palea equal or slightly shorter than lemma, cartilaginous and coriaceous.

Flr.: Aug. - Nov.

Specimen Cited: Samsing, 750m, AP Das & PC Rai 1751, dated 18.5.1997.

Status: Fairly Common.

Local Distrib.: Machuki, Phari, Sakam, Left Hill ridge of Kuwapaani, Samsing. 700-1800m.

General Distrib.: E. Himalaya, Meghalaya, Assam, China.

***DREPANOSTACHYUM* Keng f.**

Drepanostachyum intermedium (Munro) Keng f., L. Bomb. Res. 2:28. 1983; Fl. Sik. 1:239. 1996; FB 3 (2):506. 2000.

Arundinaria intermedia Munro, Trans. Lin. Soc. 26: 28. 1868; FBI 7: 381. 1896; Bambus. 39, t. 23 C. 1913; FEH 1:379. 1966.

Chimonobambusa intermedia Nakoi, JAA 6: 151. 1925; Trs. N. Beng. 139. 1929; Fl. Asm. 5: 48. 1934.

Local Name: Titay Nigalo (Nep.).

Small caespitose bamboo species with thin and tufted annual stems. Culms 3-4m tall, smooth; nodes swollen with distinct ring; internodes 12-24cm long. Sheaths upto 25cm, thin, ciliate, papery. Leaves tessellate; ligule 0.5cm long, triangular; petiole swollen; lamina 7-18cm long, shapes variable, bright green, attenuate at base into a short petiole. Leaf-sheaths glabrous, sometimes stiffly hairy; callus minute. Panicles racemose, verticillate and subtended by membranous bracts; rachis smooth and with minute bracts below. Spikelets 1-2.25 cm long, upto 5-flowered, purple or yellow; rachilla clavate and compressed. Glumes 2, ovate, membranous, 3-8 nerved, ciliate at the apex; lemma mucronate, 6-9 nerved; palea longer than lemma, bi-mucronate, with 2 ciliate keels. Lodicules 3, fimbriate. Stamens exerted; anthers blunt or shortly apiculate; ovary linear-oblong, glabrous; stigmas 2, plumose. Caryopsis swollen in the middle, with persistent style base.

***Flr. & Frt.:* Apr. - May**

Specimen Cited: Hattidara, 2549m, AP Das & PC Rai 1894, dated 27.10.1997.

Status: Fairly Common.

Local Distrib.: Jaributti, Machuki, Hattidara, Reshete, Pankhasari, Sakam, Right Hill crest of Dhamdhamay Dara. 1500-2500m.

General Distrib.: E. Himalaya.

Note: Fibres obtained from the culm is used for making mats, baskets and also as ropes in house-tieing, loads-carrying, etc.

***ERAGROSTIS* P. Beauv.**

Eragrostis nigra Nees ex Steud. Nom. ed. 2. (1): 563. 1840; Syn. Pl. Glum. 1: 207. 1854; FBI 7: 324. 1896; Fl. Asm. 5: 101. 1940; Grass Burm. Cey Ind. and Pak 511. 1960; FEH 1: 362. 1966; TBRI 50(4): 113. 1987; Fl. Sik. 1:290. 1996; FB 3 (2): 662. 2000.

A variable perennial grass occurring in wasteland, 20-90 cm tall. Culms suberect to erect depending upon the less-robust and robust forms, usually simple, leafy at the base. Leaves basal, 0.2-0.5 cm in width, lanceolate, elongate, flat, margins smooth or with a

few hairs at the base, acute, surfaces smooth. Sheaths with smooth or ciliate margins, obscurely compressed. Ligule ciliate. Panicle upto 35 cm, much branched, spreading, branches being usually in whorls or fascicles. Rachis nodes glabrous. Pedicels longer than spikelets. Spikelets 0.3-0.4 cm long, linear-oblong, olive grey. Glumes 0.15-0.17 cm long, keeled, uninerved; lemmas slightly exceeding glumes, ovate-acute; palea denticulate, obtuse and persistent. Stamens 3 with short anthers. Caryopsis upto 0.7 cm long, obscurely grooved on dorsal face.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Near Lava, 2118 m, AP Das & PC Rai 0305, dated 18.6.1994.

Status: Fairly Common.

Local Distrib.: Lava, Rechila Durpinay, Zero Point, Mulkharka, Neora-Sikkim Border. Upto 2300m.

General Distrib.: India, Sri Lanka, nepal, Bhutan, Myanmar, Indochina, Malaysia, China.

***ERIANTHUS* Michx.**

Erianthus rufipilus (Steud.) Griseb in Nachr. Ges. Wiss. Gottingen 93. 1868; Grass Ind. 152. 1960; FB 3 (2):765. 2000.

Saccharum rufipilum Steud., Syn. Pl. Glum. 1: 409. 1855.

Erianthus fulvus Nees ex Steud., Syn.Pl. Glum. 1: 409. 1855.

Perennial shrubs upto 2.5m. Culms erect, robust. Stem stout, nodes pubescent. Leaves upto 90cm long, linear, flat or convolute, margins scaberulous, glaucous, scabrid beneath; leaf-sheaths margins hairy; ligule ciliate, rounded. Panicle upto 40 cm long, erect with villous rachis, silky villous; spikes condensed. Pedicels filiform, villous. Spikelets paired, brownish. Glumes very variable, thin, glabrous to ciliate, acute-acuminate, shortly awned, 1-3 nerved.

Flr.: Oct. - Nov. *Frt.:* Nov. - Dec.

Specimen Cited: Rechila Chowk, 2280m, AP Das & PC Rai 0614, dated 17.10.1994.

Status: Less Common.

Local Distrib.: Hattidara, Rechila Chowk, Todey, Lower Hill crest of Jaributti. 1500-2450m.

General Distrib.: India, Nepal, Bhutan, Myanmar, Malaysia, China.

***EULALIA* Kunth**

Eulalia mollis (Griseb.) O. Kuntze, Rev. Gen. Pl. 2: 775. 1891; Grass. Ind. 156. 1960; FEH 1: 364. 1966; Fl. Sik. 1: 255. 1996; FB 3 (2):774. 2000.

Erianthus mollis Griseb. in Nachr. Ges. Wiss. Gottingen 92. 1868.

Pollinia mollis (Griseb.) Hack in DC., Monogr. Phan. 6: 161. 1889; FBI 7: 111. 1896.

Small grass upto 40 cm tall. Stem slender. Leaf sheaths ciliate. Leaves mainly arising from the stem base, 9-15 x 0.4-1.3 cm, linear-narrow lanceolate, acute, dark green both

sides. Spikes 7.5-20 x 2.5-5 cm, flexuous. Pedicels slender, silky hairy, glistening. Spikelets 1-flowered, narrowly lanceolate; glume 1 villous with obscurely notched tip, often double mucronate; 2nd glume subacute, thinly hairy with ciliate margins; 3rd glume lanceolate, uninerved and hyaline; 4th glume with slender awn; palea minute, glabrous.

Flr.: Sep. - Oct.

Specimen Cited: Hattidara, 2549 m, AP Das & PC Rai 0620, dated 17.10.1994

Status: Frequent.

Local Distrib.: Alubari, Hattidara, Zero Point, Rechila Middle. 1800-2550m.

General Distrib.: Temperate Himalayas (Simla-Sikkim).

FESTUCA L.

Festuca leptopogon Stapf ex Hk. f., FBI 7: 354. 1897; Fl. Asm. 5: 82. 1940; Fl. Ill. Pl. Prim. Sinic. 122. 1959; Grass Ind. 538. 1960; FEH 1: 264. 1966; TBRI 50(4): 114. 1987; Fl. Sik. 1:293. 1996; FB 3 (2):535. 2000.

Small tufted perennial herbs, 30-60 cm high. Root-stock short with fibrous roots. Culms erect. Leaves 5-20 cm long, linear, margins scarcely scabrid, acuminate, base rounded, dark greenish, nerves many. Ligule upto 0.28 cm and truncate. Panicle 10-20 cm, either erect or nodding; branches scabrid with appressed branchlets. Pedicels short. Spikelets linear-lanceolate. Lower glume 0.1-0.15 cm, wedge-shaped, uninerved; upper glume upto 0.25 cm long, ovate-oblong, trinerved. Lemmas 0.65-0.75cm, apically 2-lobed and 5-nerved; awn upto 0.65 cm long, straight and scabrid; palea 2-keeled, glabrous. Lodicules 2-horned. Anthers 0.1 cm long; ovary hispid above the middle. Grain linear-oblong.

Flr. & Frt.: May - Oct.

Specimen Cited: Alubari, 2280m, AP Das & PC Rai 015, dated 13.6.1994.

Status: Frequent.

Local Distrib.: Thartharay, Zero Point, Kuwapaani, Machuki. 1400-2300m.

General Distrib.: Sikkim and Darjeeling Himalayas, Khasia Hills.

HELICTOTRICHON J.A. & J.H. Schult.

Helictotrichon virescens (Nees ex Steud.) Henr. in Blumea 3: 452. 1940; Grass. Ind. 439. 1960; Fl. Sik. 1:295. 1996; FB 3 (2):582. 2000.

Helictotrichon asperum (Munro) Bor in Ind. For. Rec. (Bot.) 1(3):68. 1938; Fl. Asm. 5: 132. 1940.

Avena aspera Munro ex Thwaites, Enum. Pl. Zeyl. 372. 1864.

Avenastrum asperum Fischer, Flora of Madras 10:1802. 1931.

Perennial grass upto 60 cm tall. Stem slender, stout, smooth. Leaf-blades 13.5-30 x 0.35-0.9cm, usually flat, very rarely convolute. Sheaths smooth, sometimes pubescent. Ligules membranous, truncate. Panicles often drooping, main axis scabrid. Spikelets 0.7-1.3 cm long, upright, ovate-oblong, glossy. Lower glume 0.45-0.6 cm, lanceolate, 1 or 3 nerved.

Upper glume 0.75-0.85 cm, ovate-lanceolate, 5-nerved. Lower most lemma 1 cm long, ovate-lanceolate; awn 1.8-4.2 cm long, recurved; upper lemmas smaller than lower ones; palea 0.77 cm long with obtuse, 2-keeled tip; anthers linear; ovary pyriform or ovoid with hirsute tip.

Flr. & Frt.: Apr. - Nov.

Specimen Cited: Jorpokhari, 3100m, AP Das & PC Rai 0695, dated 19.10.1994.

Status: Frequent.

Local Distrib.: Chitray, Jorpokhari, Dhamdhamay Dara, PHE Source, Rechila Chowk. 1800-3000m.

General Distrib.: Himalayas (Kashmir-Bhutan), Assam and W. China.

***HIMALAYACALAMUS* Keng f.**

Himalayacalamus falconeri (Hk. f. ex Munro) Keng f., J. Bomb. Res. 2:24. 1983; Fl. Sik. 1: 240. 1966; FB 3 (2):510. 2000.

Thamnocalamus falconeri Hk. f. ex Munro, Trans. Lin. Soc. 26:34. 1868; Fl. Asm. 5:53. 1934; EFPN 1:147. 1978; Nam. Chang. Flr. Pl. 563. 1987.

Arundinaria falconeri (Hk. f. ex Munro) Gamble, Ann. Roy. Bot. Gard. Calc. 7:20. 1896; FBI 7: 383. 1896.

Drepanostachyum falconeri (Hk. f. ex Munro) J. Camp., Gen. Himal. Bamb. 23. 1983.

Small-sized laxly caespitose bamboo, loosely tufted. Culms upto 6m tall, fistular, rarely striped, yellowish-green. Internodes upto 16 cm long. Branchlets fascicled at nodes. Culm-sheaths upto 32 cm long, straw-coloured and striate; ligule hairy. Leaves 7-10.5 x 0.8-1.4 cm, acuminate, base attenuate. Sheaths truncate above and glabrous. Panicle racemosely branched. Spikelets upto 7 in individual raceme, 0.7-0.9 cm long, usually unflowered or sometimes 2-flowered, glabrous. Glumes 2, oblong, membranous; lemma ovate or lanceolate, 5-7 nerved; palea 2-keeled, apically bifid. Lodicules fimbriate; stamens exerted, usually obtuse, rarely short apiculate; ovary ovate, glabrous; style short; stigma 3.

Flr.: Mar. - May

Specimen Cited: Rechila, 2280m, AP Das & PC Rai 0691, dated 19.10.1994.

Status: Rare.

Local Distrib.: Left foothill of Rechila Chowk, Reshete. 2000-2300m.

General Distrib.: Temperate Himalayas (Kumaon to Bhutan).

***IMPERATA* Cyr.**

Imperata cylindrica (L.) Raens., Nom. Bot. ed. 3: 10. 1797; Grass. Burm. Cey. Ind. and Pak. 169. 1960; FWP 143: 252. 1983; Nam. Chang. Flr. Pl. 293. 1987; Fl. Sik. 1:257. 1996; FB 3 (2):770. 2000. *Lagurus cylindricus* L., Syst. Nat. ed. 10, 2: 878. 1759.

Imperata cylindrica var. *major* (Nees) Hubbord in Hubbard and Vaughan, Grasses Maur. 96. 1940.

Perennial grass, highly variable in size, some hardly 10 cm, other forms often attaining a height of 2.5 m or so. Culms solid, basally fistular, glabrous. Ligules ciliate, membranous. Leaf-sheaths loose, exceeding internodes, glabrous or sparsely hairy. Leaves variable, as long as 1.5 m, margins scabrid and white hairy, narrowing towards the base and tapering to an acuminate tip. Panicle 5-30 cm, cylindric, dense; stalks thickened at tips and finely hairy. Spikelets upto 0.35 cm long, lanceolate; callus twice longer than spikelets, hairy. Lower glume lanceolate, membranous, 3-9 nerved, villous on upper surface; upper glume keeled. Lower floret empty; lemma epaleate, acute and hyaline. Lemma in upper floret ovate-lanceolate, either glabrous or ciliate, anthers 2, upto 0.3 cm long; stigmas 2, purplish.

Flr.: Apr. - May

Specimen Cited: Samsing, 720 m, **AP Das & PC Rai** 1576, dated 07.6.1996.

Status: Fairly Common.

Local Distrib.: Phari, Machuki, Sakam, Kuwapaani, Samsing, Zero Point. Upto 2200m.

General Distrib.: Tropical and temperate regions of Asia, Australia, Africa, etc.

***ISACHNE* R. Br.**

Isachne albens Trin., Sp. Gram. Ic. t. 25. 1828; FBI 7: 22. 1896; Fl. Asm 5: 196. 1940; Act. Phytotax. Geobot. 11: 54. 1942; JAA 29: 309. 1948; Reinwardtia 2 (2): 280. 1953; Fl. Ill. Pl. Prim. Sinic. 640. 1959; Grass Ind. 579. 1960; Dansk Bot. Arkiv 20 (2): 150. 1962; Bull. Not. Sci. Mus. 6: 121. 1962; FEH 1: 366. 1966; TBRI 50(4): 117. 1987; Fl. Sik. 1:296. 1996; FB 3 (2):743. 2000.

A perennial grass, 25-45 cm tall. Culms either erect or spreading, branched. Leaves 3-10 x 0.35-0.7 cm, linear to linear-lanceolate, margin ciliate, scabrid, surfaces rough. Sheaths smooth, striate. Ligule a rim of stiffy hairs. Panicle decomposed, 6.5-28 cm long, branches capillary. Pedicels erect, spreading later on. Spikelets 0.1-0.2 cm long, nearly globose. Lower glumes 0.1cm, orbicular, nerves many, glabrous. Upper glume equalling the lower one. Lemmas with infolded margins, pubescent above. Lower floret usually male, upper being hermaphrodite; palea equal or slightly shorter than lemmas. Anthers 2.

Flr.: Aug. - Nov. *Frt.*: Oct. - Dec.

Specimen Cited: Jaributti-Alubari, 2195-2280m, **AP Das & PC Rai** 0401, dated 15.10.1994.

Status: Common.

Local Distrib.: Rechila Chowk, Reshete, Pankhasari, Thartharay, Lower Hill ridge of Jaributti. Upto 2300m.

General Distrib.: Temperate regions of south-east Asia.

MISCANTHUS Anders.

Miscanthus nepalensis (Trin.) Hack. in DC., Monogr. Phan. 6: 104. 1889; FBI 7: 107. 1896; Fl. Ill. Pl. Prim. Sinic. 754. 1959; Grass. Ind. 196. 1960; FEH 1: 368. 1966; Fl. Sik. 1:259. 1996; FB 3 (2):769. 2000.

Eulalia nepalensis Trin. in Memb. Acad. Sci. Petersb. Ser. 6, 2: 333. 1832.

Perennial grass, 70-155 cm high. Culms terete. Ligule upto 0.2 cm long, truncate. Sheaths terete, usually glabrous. Leaf blades 28-48 x 0.65-0.95 cm, linear, base narrowed, erect or spreading, glabrous, midnerve prominent and thick. Panicles 11-15.5 cm, spreading. Racemes many, elongated and densely crowded. Pedicels sub-capillary, tips often swollen. Spikelets upto 0.25 cm long, ovate-lanceolate; glumes thick, lower glume obtuse, emarginate, lower half long hairy; upper glume upto 0.28 cm long uninerved; keel scabrid. Lower floret empty; lemma 0.28 cm long, lanceolate, denticulate, glabrous. Upper floret lemma 0.25-0.3 cm long, linear-lanceolate, uninerved and glabrous; awn upto 1 cm long, acute; stamens 2-3; stigmas exerted. Caryopsis 0.15-0.16 cm long, oblong.

Flr. & Frt.: Aug. - Oct.

Specimen Cited: Near Zero Point at Rechila Road, 2240m, AP Das & PC Rai 0963, dated 22.4.1995.

Status: Common.

Local Distrib.: Alubari, Zero Point, Thartharay, Helipad region, Mulkkharka. 1600-2400m.

General Distrib.: Subtropical to temperate Himalayas (Garhwal-Bhutan), Assam, Myanmar, Indochin, China, etc.

PASPALUM L.

Paspalum scrobiculatum L., Mant. 1: 29. 1767; FBI 7: 10. 1896; Grass Burm Cey. Ind. and Pak. 340. 1960; FEH 1: 372. 1966; EFPN 1: 139. 1978; FWP 143:213. 1982; Nam. Chang. Flr. Pl. 414. 1987; TBRI 50(4): 121. 1987; Fl. Sik. 1: 265. 1996; FB 3 (2):712. 2000.

P. orbiculare G. Forster, Fl. Insul. Austree Prodr. 7. 1786; Grass Burm. Cey. Ind. and Pak. 340. 1960.

P. commersonii Lamk., Tab. Eney. Math. Bot. 1:175. 1791; Grass. Burm. Cey. Ind. and Pak. 335. 1960.

P. cartilagineum Presepal Rel. Haenk. 1: 216. 1830; Grass. Burm. Cey. Ind. and Pak 335. 1960.

Tufted grass. Culms upto 58 cm tall, spongy at base, hairy on the collar at leaf juncture. Leaves upto 28 cm long, 0.5- 0.9 cm wide, sublanceolate-linear, tapered into a fine point, base obscurely contracted, smooth and glabrous both sides. Leaf sheaths loose, scarious, persistent. Inflorescence of false spikes, erect or often drooping. Rachis 0.1-0.2 cm wide, smooth and glabrous. Pedicels stout. Spikelets in 2 rows, overlapping. Lower glume 0, upper glume 5-nerved, glabrous. Lower floret sterile; lemma flat, 3-nerved membranous. Upper floret hermaphrodite; lemma 0.15 cm long, punctate, yellow or brownish, palea just like lemma; stamens 3.

Flr. & Frt.: Jun. - Oct.

Specimen Cited: Rechila, 2280m, **AP Das & PC Rai** 0403, dated 15.10.1994.

Status: Common.

Local Distrib.: Helipad region, Rechila, Reshete, Chonkobhir, Kuwapaani. Upto 2250m.

General Distrib.: Tropics of the Old World.

POA L.

Key to the species:

1. Plants upto 30cm high.....2
1. Plants over 30cm.....*P. gammieana*
2. Leaves upto 9cm long, margins rough; ligules truncate; lemmas ovate-oblong, obtuse; lower glume ovate.....*P. alpina*
2. Leaves 8-15cm, acuminate, margins scaberulous; ligules oblong to ovate; lemmas oblong, sub-acute or obtuse; lower glume lanceolate.....*P. annua*

Poa alpina L., Sp. Pl. 67. 1753; FBI 7:338. 1896; Fl. Asm 5:71. 1940; Grass. Ind. 555. 1960; FIEM 248. 1989.

A small densely tufted low grass. Culms upto 30 cm tall, smooth. Leaves short to 9 cm long, linear, acute, plicate with rough margins, glabrous; sheaths at stem base distichous, thick towards the base and enclosing stem; sheaths at upper stem region much longer, open or not; ligule very short and truncate at lower leaves, longer and ciliolate at upper leaves. Panicles upto 5 cm long, dense, sometimes lax, branched with binate lower branches. Spikelets 0.4-0.55cm long, ovate, crowded. Pedicels short on lower spikelets. Lower glume upto 0.35 cm long, ovate, acute; upper glume more broader. Lemmas 0.3-0.35 cm long, ovate-oblong, obtuse, sometimes emarginate; paleas with 2 serrulate and ciliolate (below) keels.

Flr.: Mar. - May

Specimen Cited: Rechila Chowk, 2280m, **AP Das & PC Rai** 0427, dated 15.10.1994, Jorphokhari, 3040m, **AP Das & PC Rai** 0692, dated 19.10.1994. Rechila Middle, 2490m, **AP Das & PC Rai** 1176, dated 03.5.1995; Jorphokhari, 3040 m, **AP Das & PC Rai** 1187, dated 03.5.1995.

Status: Very Common.

Local Distrib.: Jorphokhari, Rechila Middle, Alubari, Chitray. 2200-3100m.

General Distrib.: W. to E. Himalayas (Sikkim, Darjeeling), Assam.

Note: Present collection is a new record for West Bengal.

Poa annua L., Sp. Pl. ed. 1, 68. 1753; FBI 7: 345. 1896; Act. Phytotax. Geobot. 10: 120. 1941; Reinwardtia 2 (2): 322. 1953; Fl. Ill. Pl. Prim. Sinic. 224. 1959; Grass. Ind. 55.

1960; Journ. Coll. Arts. Sci. Chiba 4: 317. 1965; FEH 1: 372. 1966; Fl. Sik. 1:300. 1996; FB 3 (2):556. 2000.

Annual or subperennial, tufted herb. Culms upto 30 cm high, often rooting basally. Ligules 0.3 cm, oblong to ovate. Sheaths loose and slightly compressed. Leaf blades 2.2-3.5 cm x 0.27-0.35 cm, linear, margin scaberulous, acute, flaccid. Panicles upto 8.2 cm long, branched, stiff and often sub-secund. Spikelets 0.5-0.62 cm long, 3-8 flowered, ovate, lower ones usually lanceolate, green or purple; lower glume 0.27-0.31 cm, lanceolate, acute; upper glume longer, ovate and 3-nerved; lemmas upto 0.38 cm long, oblong, sub-acute or obtuse; palea nearly equal to lower glume; keels ciliate; anthers short (upto 0.1 cm). Caryopsis upto 0.25 cm long, oblong.

Flr. & Frt.: Mar. - Nov.

Specimen Cited: Rechila Road near Chouda Feri, 2230m, AP Das & PC Rai 0383, dated 15.10.1994.

Status: Common.

Local Distrib.: Chouda Feri, Phaparkheti, Chitray, Neora-Sikkim Border, Left Hilltop of Lava, Zero Point. 1500-2600m.

General Distrib.: Cosmopolitan in the subtropical and temperate regions of the world.

Poa gammieana Hk f., FBI 7: 345.1896; Grass. Ind. 557. 1960; FIEM 249. 1989; Fl. Sik. 1: 300. 1996; FB 3 (2):553. 2000.

Small annual herb, 25-45 cm tall. Stem leafy, terete. Leaves 8-15 x 0.7-1.1 cm, scattered upto panicle, linear, long acuminate, glabrous, sheaths lax, mostly smooth or asperulous; ligule acute, pubescent beneath. Panicle 9-18 cm long, flexuous. Spikelets 0.7cm long, pale green; 1st glume lanceolate, 3 nerved with entire margin; 2nd glume narrow oblong, trinerved, flowering glumes 0.4 cm long, acute, keel silky-hairy; palea shorter than flowering glumes, keels ciliate; anthers oblong. Lodicules nearly bilobed.

Flr.: Jun. - Jul.

Specimen Cited: Rechila Alubari, 2280m, AP Das & PC Rai 024, dated 13.6.1994.

Status: Common.

General Distrib.: Endemic to Eastern Himalaya (Sikkim, Darjeeling, Bhutan).

***POGONATHERUM* P. Beauv.**

Pogonatherum crinitum (Thunb.) Kunth, Enum. Pl. 1: 478. 1833; FBI 7: 141. 1896; Act. Phytotax. Geobot. 11:159. 1942; Fl. Ill. Pl. Prim. Sinic. 786. 1959; Grass. Ind. 200. 1960; Dansk Bot. Arkiv. 20 (2):175. 1962; FPK 129. 1981; Fl. Sik. 1:287. 1996; FB 3 (2):778. 2000.

Andropogon crinitus Thunb., Fl. Jap. 40, t. 7. 1784.

A caespitose slender perennial. Culms upto 50 cm tall, usually in tufts. Branchlets filiforma, glabrous. Ligules reduced. Sheaths slightly compressed with fimbriate throat.

Upper leaves usually shorter, 2.5-6.8 x 0.15-0.39 cm, blades linear to linear-lanceolate, spreading, acuminate, base rounded. Raceme solitary. Spikelets upto 0.2 cm long, truncate; callus hairy; upper glume slightly obtuse, glabrous or ciliate; lower floret absent; upper floret lemma toothed, awn being 1.9-2.1 cm long, palea 2/3 shorter than lemma.

Flr.: May - Aug.

Specimen Cited: Suntalay, 1530m, AP Das & PC Rai 1755, dated 18.5.1997.

Status: Frequent.

Local Distrib.: Thartharay, Sakam, Mulkharka Pokhari. 1500-2400m.

General Distrib.: E. Himalaya (Nepal-Sikkim), India, Thailand, Indo-China, China, Japan and Malaysia.

SETARIA *P. Beauv.*

Key to the species:

1. Annuals, upto 20cm tall; rachis minutely pubescent; spikelets not deciduous; palea granular-punctate.....*S. intermedia*
1. Perennials, 1-2m tall; rachis scabrid; spikelets deciduous; palea ovate.....*S. palmifolia*

Setaria intermedia Roem. et Schult., Syst. Veg. 2: 489. 1817; FBI 7: 79. 1896; FWP 143: 183. 1982; Nam. Chang. Flr. Pl. 520. 1987; Fl. Sik. 1: 273. 1996; FB 3 (2):722. 2000.

S. tomentosa (Roxb.) Kunth, Rev. Gram. 1: 47. 1829; Grass. Burm Cey. Ind. and Pak. 365. 1960.

S. pumila (Poir) Roem. et Schult., Syst. Veg. 2: 891. 1817; FWP 143: 181. 1982.

Panicum pumilum Poir in Lamk., Ency. Meth. Bot. Suppl. 4: 273. 1816.

Setaria pallidifusca (Schumach.) Stapf and Hubbard in KB 1930: 259. 1930; Grass Burm. Cey Ind. and Pak. 363. 1960; FEH 1: 376. 1966.

Annual tufted slender grass, 5-20 cm long, smooth. Leaves 3-10 x 0.25-0.7 cm, linear, finely tapered into acute tip, flat or infolded, glabrous except basal region. Leaf sheaths keeled, smooth. Ligule truncate. Inflorescence an erect false spike, 1-5 cm, rufous. Rachis slender, minutely pubescent, branched into sessile- subsessile involucre subtending a spikelet. Spikelets upto 0.25 cm long, subtended by single or more glabrous bristles. Pedicels reduced to small stumps. Lower glume subacute or obtuse, 3-nerved, membranous, upper one 5-nerved. Lower floret male or barren, anthers if present 0.25 cm long; upper lemma not keeled, finely rugose, dorsally curved, 5-nerved and membranous; palea elliptic-oblong to oblong. Upper florets hermaphrodite, boat-shaped; lemma transversely rugose; palea granular-punctate.

Flr.: Jun. - Sep.

Specimen Cited: Jaributti-Rechilla, 2195-2280m, AP Das & PC Rai 0468, dated 15.10.1994

Status: Common.

Local Distrib.: Lake below Tinsimana, Jaributti, Rechila Chowk, Chonkobhir. Upto 2500m.

General Distrib.: Tropics of the Old World.

Note: Excellent fodder for cattle.

Setaria palmifolia (Koen.) Stapf in Journ. Lin. Soc. Bot. 42: 186. 1914; Fl. Asm 5: 214. 1940; Grass. Burm. Cey. Ind. and Pak. 363. 1960; FEH 1: 376. 1966; Fl. Nong. Vic. 375. 1982; Fl. Sik. 1: 273. 1996; FB 3 (2):723. 2000.

Panicum palmaefolium Koen. in Naturf. 22: 208. 1788.

P. spicatum Wild.(non-Lamk.):Hk. f. in FBI 7:55. 1896.

A perennial grass, 1-2 m high, with stout woody root-stock. Culm 30 cm, nodes strigillose. Leaves broad, 15-45 cm x 1.3-5.2 cm, linear-lanceolate, acuminate, base narrow, glabrous or sparsely hairy, blades folded between primary nerves, leaf sheaths with ciliate or naked margins, smooth or hispid, ligulate. Panicles 30-60 cm, spreading, open, loosely-spiculate. Rachis branched, angular and scabrid. Spikelets 0.3 cm long, solitary, shortly pdlt. or even sessile, subtended by a single bristle, deciduous, glabrous. Lower glume half to spikelet in length, broadly ovate, obtuse 5-nerved and membranous; upper glume ovate, obtuse, 7-nerved and membranous Lower floret barren, lemma ovate, shortly apiculate; palea hyaline, ovate. Upper floret hermaphrodite; lemma ovate-oblong, pale yellow with involute margins; palea ovate, striate, margins incurved.

Flr.: Sep. - Oct.

Specimen Cited: Rechila Chowk, 2280m, AP Das & PC Rai 0695, dated 19.10.1994.

Status: Common.

Local Distrib.: Chitray, Rechila Chowk, Left Hill crest of Ruka Hill, Sakam, Machuki. Upto 2600m.

General Distrib.: Tropics of the Old World.

THAMNOCALAMUS Munro

Thamnocalamus aristatus E. G. Camus, Bambusees 54. t. 36 E. 1913; Trs. N. Beng. 139. 1929; EFPN 1:147. 1978; Nam. Chang. Flr. Pl. 536. 1987; Fl. Sik. 1:242. 1996.

Arundinaria aristata Gamble, Bamb. Brit. Ind. 18, t. 17: 1896; FBI 7: 382. 1896.

Local Name: Rato Nigalo (Nep.).

Small gregarious bamboo. Stems tufted. Culms robust, upto 3.6m high, hard, branched, glaucous green. Branches red with long and thin sheaths. Internodes 22-30 cm long. Culm-sheaths 16-20 x 7-7.5 cm, broad at the base; ligule pubescent. Leaves clustered at the branchlets tops; petioles upto 0.45 cm long, glandular; lamina oblong-lanceolate, base attenuate, lateral nerves 3-5 pairs. Leaf-sheaths 5-7 cm long; ligule acute. Panicles of grouped racemes borne on the top of culms; bracts 3.5-5 x 1.3-1.5 cm, spathe-like. Spikelets upto 5 cm long, 5-8 flowered; rachilla articulate, whitish. Glumes oblong-lanceolate, membranous, keeled. Lemma ovate, long acuminate, 9-nerved; palea 2-

cuspidate, 2-keeled. Lodicules lanceolate, ciliate. Stamens purple, obtuse at the top; ovary ovate; stigmas 3, hairy.

Flr.: Apr. - May

Specimen Cited: Ruka Hill, 2480 m, **AP Das & PC Rai** 1902, dated 27.10.1997.

Status: Rare.

Local Distrib.: Lower Hill range of Ruka and Thosum Hill. 2200-2500m.

General Distrib.: E. Himalaya (Nepal-NEFA).

THYSANOLAENA *Nees*

Thysanolaena latifolia (Roxb. ex Horneman) Honda, J. Fac. Sc. Tokyo Sect. Ill. Bot. 3:312. 1930; Taxon 33 (3):437. 1984; Fl. Sik. 1:305. 1996; FB 3 (2):648. 2000.

Thysanolaena maxima (Roxb.) O. Ktze., Rev. Gen. Pl. 794. 1891; Act. Phytotax. Geobot. 10: 272. 1940; Ill. Pl. Prim. Sinic. 340.1959; Grass. Ind. 650. 1960; Dansk Bot. Arkiv 20(2); 153. 1962; FEH 1: 378. 1966.

T. agrostin Nees, Edinb. New Phil. Jour. 18: 180. 1835; FBI 7:61. 1896.

Local Name: Amliso, Kuccho (Nep.).

Perennial. Culms 1.5-3 m tall, solid, rounded and glabrous. Ligules truncate and cartilagenous. Sheaths tight, hard. Leaves numerous, sub-amplexicul, 25-55 x 5-10 cm, broadly lanceolate, margin scabrid, acuminate, glaucous below. Panicle upto 60 cm long, branches filiform, further redivided into numerous branchlets. Spikelets 0.13-0.16 cm, 2-flowered, ovoid-lanceolate, acuminate; glumes ca. 0.75 cm long, lanceolate, glabrous, 1-nerved. Upper floret ovate, acute; palae truncate; stamens 2-3; anthers very short; styles free.

Flr.: Aug. - Apr.

Specimen Cited: Phari, 1100m, **AP Das & PC Rai** 1756, dated 18.5.1997.

Status: Less Common.

Local Distrib.: Phari, Machuki, Samsing, Phaparkheti. 700-1400m.

General Distrib.: Subtropical and temperate regions of India, Nepal, Bhutan, Myanmar, Indochin, China, etc.

Note: Brooms are made from its panicles. Roots are medicinal.

YUSHANIA *P.C. Keng*

Yushania maling (Gamble) R. Majumdar, FIEM 283. 1989; Fl. Sik. 1:242. 1996; FB 3 (2):503. 2000.

Arundinaria maling Gamble in KB 1912: 139. 1912; Trs. N. Beng. 139. 1929; FEH 1: 379. 1966; EFPN 1: 122. 1978; Nam. Chang. Flr. Pl. 49. 1987, TBRI 50(4): 106. 1987.

A. racemosa Munro in Trans. Lin. Soc. Lond. 26: 17. 1868 p.p., FBI 7: 379. 1896 p.p.

Local Name: Malingo (Nep.).

Shrubby erect bamboo, 2.5-4.5 m tall. Culms slender, fistular, nodes in between 30-40 cm gaps; internodes 25-38cm long, 2-3 cm in diam., scabrid. Culm-sheaths upto 28 cm long, 10 cm in width, blade subulate, erect or reflexed, coriaceous, apex attenuate, broadly auricled, scarcely yellowish-hispid; ligule 1 cm, fimbriate. Leaves 5-12 x 0.45-1 cm, linear-lanceolate, acuminate, base attenuate into a short stalk, glabrous, veinlets conspicuous. Sheaths striate, sparsely ciliate at the mouth and back; ligule truncate, pubescent. Panicle upto 10 cm long, decompound. Bract spathaceous. Rachis glabrous, branched. Pedicels filiform. Spikelets 3 cm long, distichous. Glumes 2 in no., ovate; lemma 1-1.2 cm long, ovate; palea with 2 ciliate keels. Anthers apically bifid; ovary ovoid; stigmas 3, long-plumose.

Flr.: Apr. - May.

Specimen Cited: Jaributti, 2195 m, AP Das & PC Rai 086, dated 14.6.1995.

Status: Very Common.

Local Distrib.: Pankhasari, Zero Point, PHE Source, Jaributti, Chouda Feri. 1600-2300m.

General Distrib.: E. Himalaya.

Note: Leaves are good fodders for cattle and ponies. Roofing mats, sleeping mats and other domestic utensils are also made from its culms.

3.3. LIST OF RECORDED PTERIDOPHYTES

The study was mainly concentrated at studying the angiospermic species of the Neora Valley National Park in this floristic work. However, species of ferns encountered on the trails of valley have been collected and herbarium is prepared. The same has been identified, and a small list of fern species has been appended below. This includes 26 genera under 42 species belonging to 18 fern families. However, the list as placed here does not incorporate all the fern species of the Neora Valley, and which, obviously, requires a separate and comprehensive study so as to enumerate the total list of the fern species of the entire Neora Valley. The following is the list of pteridophytes recorded from the Neora Valley, which has been prepared using our collection and also the records in earlier publication (Majumdar *et al*, 1984).

ASPIDIACEAE

Ctenitis apiciflora
Diacalpe aspidioides
Dryopteris extensa
Dryopteris nuda
Dryopteris palescea
Dryopteris sinofibrillosa

Dryopteris splendens
Paranema cyatheoides
Polystichum aculeatum
Polystichum lentum
Polystichum nepalense
Polystichum setosum

ASPLENIACEAE

Asplenium ensiforme
Asplenium fenulifolium
Asplenium laciniatum

ATHYRIACEAE

Diplazium polypodioides

CYATHEACEAE

Alsophila glabra

DENNSTAEDTIACEAE

Dennstaeditia scabra
Microlepia strigosa
Monachosorum subdigitatum

EQUISETACEAE

Equisetum diffusum

GLEICHENIACEAE

Gleichenia glauca
Gleichenia linearis

HAMIONTIDIACEAE

Pityrogramma calomelanos

HYMENOPHYLLACEAE

Hymenophyllum denticulatum
Hymenophyllum polyanthos

HYPOLEPIDACEAE

Pteridium aquillinum

LINDSAEACEAE

Stenoloma chusanum

LYCOPODIACEAE

Lycopodium clavatum
Lycopodium plegmeria
Lycopodium selago
Lycopodium serratum

NEPHROLEPIDACEAE

Nephrolepis exaltata

PTERIDACEAE

Pteris cretica
Pteris wallichiana

POLYPODIACEAE

Crypsinus griffithianus
Polypodium hastatum
Polypodium himalayense
Polypodium leiorhizum
Polypodium lineata
Pyrossia mollis
Pyrossia stigmosa

SELAGINELLACEAE

Selaginella monosperma

THELYPTERIDACEAE

Cyclosorus parasiticus

VITTARIACEAE

Vittaria elongata

Chapter-IV

4. DISCUSSION

4.1. ANALYSIS OF THE FLORA

The Neora Valley is perhaps a virgin or least interfered area in a whole of the vast stretch of Eastern Himalayas. The present floristic survey of the valley revealed a very rich flora, and a total of 812 species and varieties, 468 genera belonging to 138 families of angiosperms, 4 genera and 4 species of gymnosperms under 3 families and a total of 45 fern species under 26 genera belonging to 18 families are recorded in this work. The diverse variation of the climatic, edaphic, altitudinal and biotic conditions along with their complex inter-relationships and species composition have enabled the Neora Valley to support and sustain the different kinds of vegetation cover.

This part of Eastern Himalayas is very rich in floristic diversity forming an integral part of *Biodiversity Hot-spot*, and attracts a large number of tourists, Botanists and naturalists from the worldover. The dicotyledonous angiosperms have fairly over dominated the vegetation of the valley, the monocot-dicot ratio of the flora being 1:5. A sharp variation in the distribution and dominance of different taxa belonging to different families is observed. It is found that *Compositae* (52 species) is the largest and dominant family of angiosperms in the valley. Other dominant families as observed during the present survey include *Rosaceae* (36 species), *Rubiaceae* (35 species), *Cyperaceae* (35 species), *Gramineae* (32 species), *Urticaceae* (27 species), *Leguminosae* (25 species), *Scrophulariaceae* (23 species), *Ericaceae* (18 species), *Polygonaceae* (15 species), *Lauraceae* (15 species), *Ranunculaceae* (13 species), etc.

The valley equally represents all the habit groups of plants such as herbs, shrubs, trees and climbers due to its varied and favourable environmental conditions as well as the contagious topography with other floristically rich areas of Eastern Himalayas, in one hand, and to the tropical regions of northern Bengal through the river valley in its lower part on the other hand. A good number of lianas are growing in different altitudinal zones of the valley. The dense forests of the valley houses a large number of economically important tree species. However, the zones with dense canopy of trees have very poor herbaceous vegetation in the forest floor. The largest and dominant family *Compositae* is represented by mostly herbaceous species and few shrubby species whereas the families like *Lauraceae* and *Fagaceae* exhibit only the tree forms. The most primitive family *Ranunculaceae* is represented by 7 herbs, 4 climbers and 2 undershrubs. The population of the species of temperate or subtemperate families such as *Compositae*, *Rubiaceae*, *Ranunculaceae*, *Rosaceae*, *Libiatae*, *Ericaceae*, *Scrophulariaceae*, *Lauraceae*, *Urticaceae*, *Caryophyllaceae* etc. are dominating the vegetation of the Neora Valley National Park.

Many wild species have been found to be of great economic significance for the local people including food value, ornamental potentiality, therapeutic values, religions and social values, etc. On the other hand, a large number of trees belonging to diverse family groups are found to be timber trees which are very costly, durable and are in much demand in the market. Some noteworthy timber yielding species of the Neora Valley include *Tsuga dumosa*, *Michelia doltsopa*, *Taxus baccata*, *Castanopsis tribuloides*, *Betula alnoides*, *Toona ciliata*, *Terminalia myriocarpa*, *Alnus nepalensis* etc.

The forests of Neora Valley are also the ideal home to a large number of epiphytes, saprophytes, parasites and helophytes. While many plants species in the valley were assessed to be threatened and endangered, on the other hand, a remarkable intraspecies biodiversity was also observed in some species including *Panax pseudo-ginseng* with its 3 varieties, and 2 *forma*.

The flora of the valley is also housing a good proportion of plants unique for Himalaya. Bulk of the dicot species recorded in the survey is of Himalayan origin. Beside, major representative taxa of flora of the valley are Sino-Himalayan followed by South-East Asian and of Malaysian origin. While there are quite a few cosmopolital species of plants in the Park, at the same time, there are some pantropic and pantemperate species too. Apart from this, a few taxa were found to be exotics, migrated or introduced and adapted to this part of Indian Himalayas from the countries like North America, China, Japan, Australia, Africa, Mexico, W. Indies, South America etc.

4.1.1. NUMERICAL DISTRIBUTION OF TAXA

The present floristic work on Neora Valley National Park deals with an account of 138 angiospermic families, out of which 120 are dicotyledonous and the remaining 18 are monocotyledonous. 678 species under 392 genera are recorded from 120 dicot families and 134 species belonging to 76 genera in 18 monocot families. Only 4 species of gymnosperm belonging to 3 families and a total of 45 species of ferns under 26 genera belonging to 18 families are recorded from the Neora (Table 4.1).

Table 4.1: Numerical presentation of the taxa of the Neora Valley National Park

<i>Taxa</i>	<i>Families</i>	<i>Genera</i>	<i>Species</i>
Dicotyledons	120	392	678
Monocotyledons	18	76	134
Gymnosperms	3	4	4
Pteridophytes	18	26	45
Total	159	498	861

The following tables [4.2-(a, b); 4.3 & 4.4] gives an account of family-wise numerical distribution of Taxa of the Neora Valley.

Table 4.2: Numerical presentation of family-wise angiospermic taxa for the flora of Neora Valley National Park

(a). DICOTYLEDONS:

Sl. No.	FAMILY	GENERA	SPECIES
1	ACANTHACEAE	8	10
2	ACERACEAE	1	8
3	ACTINIDIACEAE	1	1
4	ALANGIACEAE	2	2
5	AMARANTHACEAE	4	4
6	ANACARDIACEAE	5	6
7	ANNONACEAE	2	3
8	APOCYNACEAE	2	2

9	AQUIFOLIACEAE	1	6
10	ARALIACEAE	9	11
11	ARISTOLOCHIACEAE	1	3
12	ASCLEPIADACEAE	7	10
13	BALANOPHORACEAE	1	2
14	BALSAMINACEAE	1	3
15	BEGONIACEAE	1	7
16	BERBERIDACEAE	1	4
17	BETULACEAE	3	4
18	BORAGINACEAE	2	3
19	BUDDLEJACEAE	1	3
20	BURSERACEAE	1	1
21	BUXACEAE	1	1
22	CALLITRICHACEAE	1	1
23	CAMPANULACEAE	3	3
24	CANNABACEAE	1	1
25	CAPRIFOLIACEAE	2	5
26	SAMBUCACEAE	2	5
27	CARYOPHYLLACEAE	5	12
28	CELASTRACEAE	3	6
29	COMBRETACEAE	2	4
30	COMPOSITAE	35	52
31	CONVOLVULACEAE	2	5
32	CORNACEAE	1	1
33	CRUCIFERAE	3	9
34	CUCURBITACEAE	6	6
35	DAPHNIPHYLLACEAE	1	1
36	DATISCAEAE	1	1
37	ELAEGNACEAE	1	2
38	ELAEOCARPACEAE	2	4
39	ERICACEAE	6	18
40	EUPHORBIACEAE	10	11
41	FAGACEAE	4	9
42	FLACOURTIACEAE	2	2
43	FUMARIACEAE	2	5
44	GENTIANACEAE	5	14
45	GERANIACEAE	1	1
46	GESNERIACEAE	6	10
47	GROSSULARIACEAE	1	1
48	HAMMAMELIDACEAE	1	1
49	HELWINGIACEAE	1	1
50	HYDRANGEACEAE	2	4
51	HYPERICACEAE	1	7
52	ICACINACEAE	1	1
53	JUGLANDACEAE	1	1
54	LABIATAE	9	13
55	LARDIZABALACEAE	1	1
56	LAURACEAE	7	15

57	LEEACEAE	1	1
58	LENTIBULARIACEAE	1	1
59	LINACEAE	1	1
60	CAESALPINIACEAE	3	5
61	MIMOSACEAE	3	4
62	PAPILIONACEAE	13	16
63	LOBELIACEAE	2	4
64	LORANTHACEAE	3	3
65	MAGNOLIACEAE	4	5
66	MALVACEAE	5	6
67	MELASTOMACEAE	5	7
68	MELIACEAE	1	1
69	MENISPERMACEAE	2	3
70	MONOTROPACEAE	1	1
71	MORACEAE	3	10
72	MYRSINACEAE	4	6
73	MYRTACEAE	1	2
74	NYSSACEAE	1	1
75	OLEACEAE	3	3
76	ONAGRACEAE	3	7
77	OROBANCHACEAE	2	2
78	OXALIDACEAE	1	4
79	PAPAVERACEAE	1	1
80	PASSIFLORACEAE	1	1
81	PHYTOLACCACEAE	1	1
82	PIPERACEAE	2	6
83	PLANTAGINACEAE	1	1
84	PODOSTEMACEAE	1	1
85	POLYGALACEAE	2	3
86	POLYGONACEAE	7	15
87	PORTULACCACEAE	1	1
88	PRIMULACEAE	2	8
89	RANUNCULACEAE	6	12
90	RHAMNACEAE	4	5
91	ROSACEAE	16	36
92	RUBIACEAE	19	35
93	RUTACEAE	7	11
94	SABIACEAE	2	3
95	SALICACEAE	1	2
96	SANTALACEAE	2	2
97	SAPINDACEAE	1	1
98	SAURURACEAE	1	1
99	SAURAUJACEAE	1	1
100	SAXIFRAGACEAE	3	4
101	SCHISANDRACEAE	2	3
102	SCHROPHULARIACEAE	16	24
103	SOLANACEAE	3	6
104	SONNERATIACEAE	1	1
105	STACHYURACEAE	1	1

106	STAPHYLEACEAE	1	2
107	STERCULIACEAE	3	3
108	STYRACACEAE	1	2
109	SYMPLOCCACEAE	1	6
110	THEACEAE	2	3
111	THYMELIACEAE	2	4
112	TILIACEAE	2	3
113	ULMACEAE	2	3
114	UMBELLIFERAE	8	12
115	URTICACEAE	13	27
116	VACCINIACEAE	2	6
117	VALERIANACEAE	1	1
118	VERBENACEAE	6	9
119	VIOLACEAE	1	7
120	VITACEAE	4	5

Table (b): MONOCOTYLEDONS

Sl.No	FAMILY	GENERA	SPECIES
1	ALLIACEAE	1	1
2	ARACEAE	8	16
3	ARECACEAE	1	1
4	COMMELINACEAE	3	4
5	CONVALLARIACEAE	3	5
6	COSTACEAE	1	1
7	CYPERACEAE	10	35
8	DIOSCOREACEAE	1	3
9	HYPOXIDACEAE	3	3
10	JUNCACEAE	1	3
11	LILIACEAE	1	1
12	ORCHIDACEAE	12	14
13	PANDANACEAE	1	1
14	POACEAE	24	32
15	SMILACACEAE	1	7
16	TRILLIACEAE	1	1
17	UVULARIACEAE	1	2
18	ZINGIBERACEAE	3	4

Table 4.3: Numerical presentation of family-wise Gymnospermic taxa for the flora of Neora Valley National Park

Sl.No	FAMILY	GENERA	SPECIES
1	PINACEAE	2	2
2	TAXACEAE	1	1
3	TAXODIACEAE	1	1

Table 4.4: Family-wise numerical presentation of Pteridophytes of Neora Valley National Park

Sl.No	FAMILY	GENERA	SPECIES
1	ASPIDIACEAE	5	12
2	ASPLENIACEAE	1	3
3	ATHYRIACEAE	1	1
4	CYTHEACEAE	1	1
5	DENNSTAEDTIACEAE	3	3
6	EQUISETACEAE	1	1
7	GLEICHENIACEAE	1	2
8	HAMIONTIDACEAE	1	1
9	HYMENOPHYLLACEAE	1	2
10	HYPOLEPIDACEAE	1	1
11	LINDSAEACEAE	1	1
12	LYCOPODIACEAE	1	1
13	NEPHROLEPIDACEAE	1	1
14	PTERIDACEAE	1	2
15	POLYPODIACEAE	3	7
16	SELAGINELLACEAE	1	1
17	THELYPTERIDACEAE	1	1
18	VITTARIACEAE	1	1

However, a comparison of 10 dominant families in Flora of British India (Hooker 1872-97), Flora of Eastern Himalaya (Hara 1966, 1971; Ohasi 1975) and Bengal Plants (Prain 1903) with that of the present work (Table 4.5) shows the families such as *Compositae*, *Rosaceae*, *Gramineae*, *Cyperaceae*, *Leguminosae* (sub-families treated together) etc. are the most dominant ones in generalised term, substantiating the earlier stand (Hooker 1906, 1907; Chatterjee 1940; Hara 1966, 1971) of the dominance of these families in the flora of the Eastern Himalayan region.

In *Flora of British India*, dominant families are Orchidaceae, Composite, Gramineae, Rosaceae, Cyperaceae etc, whereas in *Bengal Plants*, the families like Leguminosae, Gramineae, Cyperaceae, Compositae etc are the dominant ones. Moreover, the families having dominance over the flora in the present work are *Compositae*, *Rosaceae*, *Rubiaceae*, *Cyperaceae*, *Gramineae*, *Urticaceae*, *Leguminosae* (sub-families treated together), *Scrophulariaceae*, amongst few other families. This means there is a change of position in the list of dominance in the present work as compared to that of Hooker's Flora of British India, and The Flora of Eastern Himalaya (Hara, Ohashi ed.). *Orchidaceae* occupies the first position followed by *Compositae*, *Gramineae*, *Rosaceae* and *Cyperaceae* in Hooker's table whereas *Compositae* ranks first in the present work followed by *Rosaceae*, *Rubiaceae*, *Cyperaceae* and *Gramineae*. This clearly shows the change in the ranking of the dominant families in the present work (1993-2000) and that of Hooker (1872-97), Hara (1966, 1971)) and Ohashi (1975).

Table 4.5: List of 10 dominant families in Flora of British India, Flora of Eastern Himalaya, Bengal Plants and the present work

Sl. No	<i>Flora of British-India</i>	<i>Flora of Eastern Himalaya</i>	<i>Bengal Plants</i>	<i>Present Work</i>
1	Orchidaceae	Orchidaceae	Leguminosae	Composite
2	Compositae	Leguminosae	Gramineae	Rosaceae
3	Gramineae	Gramineae	Cyperaceae	Rubiaceae
4	Rosaceae	Compositae	Composite	Cyperaceae
5	Cyperaceae	Cyperaceae	Orchidaceae	Gramineae
6	Geraniaceae	Rosaceae	Euphorbiaceae	Urticaceae
7	Ericaceae	Scrophulariaceae	Rubiaceae	Leguminosae
8	Liliaceae	Labiatae	Urticaceae	Scrophulariaceae
9	Labiatae	Ranunculaceae	Acanthaceae	Ericaceae
10	Umbelliferae	Urticaceae	Scrophulariaceae	Polygonaceae

4.1.2. COMPARISON OF FLORA OF NEORA VALLEY NATIONAL PARK WITH OTHER FLORAS OF ADJOINING REGIONS

The immediate three floras pertaining to Darjeeling District and the adjoining regions include (1) The Flora of Eastern Himalaya, Part I-III by Hara (1966, 1971) and Ohashi (1975), (2) *Enumeration of Flowering Plants of Nepal*, Vol. I-III by Hara *et al* (1978, 1979 and 1982) and (3) The Flowering Plants of Kurseong by Mathew (1981). The first flora, i.e. The Flora of Eastern Himalaya has engrossed the plant collection from North Bengal, Sikkim, Eastern Nepal and Bhutan regions in the Eastern Himalayas, covering an altitudinal range of 2000-4300m. The second treatise, i.e. Enumeration of Flowering Plants of Nepal is the outcome of compilation of the collections of Nepal plants at the Herbaria of British Museum [Natural History (*BM*)], Kew Herbarium (*K*) and Tokyo University Herbarium (*TI*) covering the altitudinal range between 60-4900m. The third treatise deals with the survey of flora of Kurseong subdivision of Darjeeling District in the altitude of 300m to 2120m. Moreover, the treatise also deals with numerous plants of the places outside Kurseong subdivision that include Darjeeling (in an altitudinal range of 2050-2200m), Gangtok (Sikkim) at 1800m, Gairibas (1640m), Kalijhora (340m), Lodhoma (1100m), Pokhriabong (1680m), Tung-Sandakphu (3022-3600m), Ghoom-TigerHill and Senchel (2300-2630m).

A numerical comparison of the different angiospermic taxa as enumerated in the three subsequent floras on Eastern Himalayas published in the recent past, and that of the present work has been highlighted in the following table 4.6.

Table 4.6. Comparative numerical representation of different angiospermic taxa in the three recently published flora on Eastern Himalayas and in the present work

[Abbreviations: FEH-Flora of Eastern Himalaya; EFPN-Enumeration of the Flowering Plants of Nepal; FPK-Flowering Plants of Kurseong]

FAMILIES	REPRESENTATION IN RECENT FLORAS							
	FEH		EFPN		FPK		Present Work	
	1966, '71, '75		1978, '79, '82		1981			
	Gen.	Sp.	Gen.	Sp.	Gen.	Sp.	Gen.	Sp.
Acanthaceae	19	46	31	69	13	21	8	10
Aceraceae	1	11	1	13	1	4	1	8
Actinidiaceae	1	2	1	2	-	-	1	1
Aizoaceae	1	1	2	2	-	-	-	-
Alangiaceae	1	2	1	3	1	1	2	2
Amaranthaceae	9	16	11	19	5	7	4	4
Anacardiaceae	6	9	12	20	3	5	5	6
Annonaceae	3	3	5	8	-	-	2	6
Apocynaceae	15	20	16	19	7	8	2	2
Aquifoliaceae	1	7	1	9	1	1	1	6
Araliaceae	10	15	12	24	7	8	9	11
Aristolochiaceae	2	5	2	6	1	1	1	3
Asclepiadaceae	19	32	26	49	8	14	7	10
Balanophoraceae	2	4	2	4	-	-	1	2
Balsaminaceae	1	29	1	39	1	7	1	3
Baseliaceae	1	1	2	2	-	-	-	-
Begoniaceae	1	16	1	18	1	8	1	7
Berberidaceae	2	11	3	34	2	2	1	4
Betulaceae	4	5	4	8	2	2	3	4
Bignoniaceae	2	2	9	13	-	-	-	-
Bombacaceae	1	1	1	1	-	-	-	-
Boraginaceae	11	19	21	50	1	1	2	3
Buddlajaceae	1	5	1	5	1	1	1	3
Burseraceae	1	1	1	1	-	-	1	1
Buxaceae	1	3	2	6	-	-	1	1
Cactaceae	-	-	2	2	-	-	-	-
Callitrichaceae	1	1	1	2	1	1	1	1
Campanulaceae	7	20	8	38	2	2	3	3
Cannabaceae	1	1	1	1	-	-	1	1
Capparidaceae	3	8	4	9	-	-	-	-
Caprifoliaceae	2	23	4	27	3	6	2	5
Caricaceae	-	-	1	1	1	2	-	-
Carlemannaceae	-	-	1	1	1	2	-	-
Caryophyllaceae	12	36	16	77	5	11	5	12
Celastraceae	5	16	7	20	2	3	3	6
Chenopodiaceae	1	3	8	16	-	-	-	-
Chloranthaceae	1	1	1	1	-	-	-	-
Circaeasteraceae	-	-	1	1	-	-	-	-
Cobacaceae	-	-	-	-	-	-	-	-
Combretaceae	3	7	4	12	1	1	2	4
Composite	70	166	110	382	38	55	35	52

Convolvulaceae	6	21	11	41	5	9	2	5
Cordiaceae	1	1	2	6	-	-	-	-
Coriariaceae	2	2	1	2	-	-	-	-
Cornaceae	4	6	2	3	-	-	1	1
Crassulaceae	1	17	7	42	1	1	-	-
Cruciferae	21	41	37	83	2	2	3	9
Cucurbitaceae	16	22	21	31	6	7	6	6
Daphniphyllaceae	1	1	1	1	-	-	1	1
Datisceae	1	1	1	1	-	-	1	1
Dilleniaceae	1	2	1	4	-	-	-	-
Dipsacaceae	3	7	4	7	-	-	-	-
Dipterocarpaceae	1	1	1	1	-	-	-	-
Droseraceae	1	1	1	2	-	-	-	-
Ebenaceae	-	-	1	5	-	-	-	-
Elaeagnaceae	2	6	2	7	1	1	1	2
Elaeocarpaceae	2	4	2	8	1	2	2	4
Elatinaceae	-	-	2	2	-	-	-	-
Ericaceae (with Vacciniaceae)	9	54	9	56	5	14	8	24
Euphorbiaceae	27	54	28	83	12	14	10	11
Fagaceae	3	14	3	16	3	9	4	9
Diapensiaceae	1	1	1	1	1	1	-	-
Flacourtiaceae	3	3	6	12	1	1	2	2
Fumariaceae (with Papaveraceae)	6	17	8	59	2	2	3	6
Gentianeae	8	28	14	106	2	6	5	14
Geraniaceae	1	9	2	14	1	1	1	1
Gesneriaceae	10	30	11	32	7	12	6	10
Grossulariaceae	2	8	1	9	1	1	1	1
Guttiferae	-	-	2	2	1	1	-	-
Haloragaceae	-	-	1	1	-	-	-	-
Hammamelidaceae	2	2	1	1	1	1	1	1
Hippocastanaceae	1	2	1	1	-	-	-	-
Hippuridaceae	-	-	1	1	-	-	-	-
Hydrangeaceae	1	4	4	10	1	1	2	4
Hydrophyllaceae	-	-	1	1	-	-	-	-
Hypericaceae	1	8	1	15	3	5	1	7
Icacinaceae	1	1	1	1	1	1	1	1
Illiaciaceae	1	1	-	-	-	-	-	-
Juglandaceae	2	2	2	2	1	1	1	1
Labiatae	39	88	48	149	20	24	10	14
Lardizabalaceae	2	2	2	2	1	1	1	1
Lauraceae	10	42	12	52	8	17	7	15
Lecythiadaeae	-	-	1	2	-	-	-	-
Leeaceae	1	7	1	7	1	1	1	1
Leguminosae	71	184	88	281	21	31	19	25
Lentibulariaceae	2	5	2	12	1	1	1	1
Linaceae	1	2	3	4	2	2	1	1
Lobeliaceae	2	9	2	9	2	4	2	4
Loganiaceae	2	2	3	4	-	-	-	-
Loranthaceae	5	10	8	15	2	3	3	3
Lythraceae	4	11	6	15	-	-	-	-
Magnoliaceae	4	11	6	15	2	3	3	3
Malphiaceae	1	1	2	3	-	-	-	-

Malvaceae	8	18	12	31	3	4	5	6
Martyniaceae	1	1	-	-	-	-	-	-
Melastomaceae	6	13	6	16	3	5	5	7
Meliaceae	4	4	9	14	2	2	1	1
Menispermaceae	7	13	7	13	4	4	2	3
Monotropaceae	1	1	2	3	-	-	1	1
Moraceae	5	15	5	43	2	12	3	10
Moringaceae	-	-	1	1	-	-	-	-
Myricaceae	1	1	1	1	-	-	-	-
Myristicaceae	2	2	-	-	-	-	-	-
Myrsinaceae	4	11	4	14	5	8	4	6
Myrtaceae	3	4	6	12	2	3	1	2
Nandinaceae	-	-	-	-	-	-	-	-
Nyctaginaceae	1	1	3	5	-	-	-	-
Nymphaeaceae	1	1	2	2	-	-	-	-
Nyssaceae	-	-	-	-	1	1	1	1
Ochnaceae	1	1	1	1	-	-	-	-
Olacaceae	1	2	3	3	-	-	-	-
Oleaceae	6	13	8	27	1	2	3	3
Onagraceae	4	14	4	27	2	2	3	7
Opiliaceae	-	-	2	2	-	-	-	-
Orobanchaceae	2	2	3	8	1	1	2	2
Oxalidaceae	2	5	2	6	1	1	1	4
Paeoniaceae	-	-	1	1	-	-	-	-
Paranassiaceae	1	6	1	6	-	-	-	-
Passifloraceae	1	1	1	3	1	1	1	1
Pedaliaceae	-	-	2	2	-	-	-	-
Phrymaceae	1	1	1	1	-	-	-	-
Phytolaccaceae	1	1	1	3	-	-	1	1
Piperaceae	2	9	2	10	2	5	2	6
Pittosporaceae	1	1	1	1	-	-	-	-
Plantaginaceae	1	2	1	5	1	1	1	1
Plantanaceae	-	-	-	-	-	-	-	-
Plumbaginaceae	1	1	2	3	-	-	-	-
Podophyllaceae	1	1	-	-	-	-	-	-
Podostemaceae	1	1	1	1	1	1	1	1
Polemoniaceae	-	-	1	1	-	-	-	-
Polygalaceae	2	5	3	12	1	1	2	3
Polygonaceae	11	41	11	72	4	12	7	15
Portulacaceae	1	1	2	2	-	-	1	1
Primulaceae	5	58	6	93	2	5	2	7
Proteaceae	1	1	2	2	1	1	-	-
Punicaceae	-	-	1	1	-	-	-	-
Pyrolaceae	1	3	1	1	-	-	-	-
Ranunculaceae	17	72	19	143	2	6	6	12
Rhamnaceae	6	14	10	28	-	-	4	5
Rhizophoraceae	-	-	1	1	-	-	-	-
Rosaceae	26	112	29	72	10	24	16	36
Rubiaceae	31	66	35	100	16	35	19	35
Rutaceae	11	19	12	31	7	7	7	11
Sabiaceae	2	7	2	7	1	2	2	3
Salicaceae	2	13	2	32	-	-	1	2

Sambucaceae	2	12	2	11	1	2	2	5
Santalaceae	4	5	4	7	2	2	2	2
Sapindaceae	4	4	5	5	-	-	1	1
Sapotaceae	1	1	2	2	1	1	-	-
Saurauiceae	1	2	1	3	1	1	1	1
Saururaceae	1	1	1	1	-	-	1	1
Saxifragaceae	8	40	6	93	3	3	3	4
Schisandraceae	1	3	1	3	1	1	2	3
Scrophulariaceae	32	95	36	165	11	18	15	23
Simaroubaceae	2	2	2	3	1	1	1	1
Solanaceae	10	30	16	44	5	14	3	6
Sonneratiaceae	1	1	1	1	1	1	1	1
Sphenocleaceae	1	1	1	1	-	-	-	-
Stachyuraceae	1	1	1	1	-	-	1	1
Staphyleaceae	1	1	3	4	-	-	1	2
Sterculiaceae	2	2	9	14	-	-	3	3
Styracaceae	1	2	2	3	1	2	1	2
Symplocaceae	1	8	1	10	1	5	1	6
Tamaricaceae	2	3	2	5	-	-	-	-
Tetracentraceae	1	1	1	1	-	-	-	-
Tetramelaceae		-	1	1	-	-	-	-
Theaceae	4	7	5	10	4	6	2	3
Thymeliaceae	4	7	4	7	2	2	2	4
Tiliaceae	3	9	3	18	2	2	2	4
Trapaceae	-	-	1	1	-	-	-	-
Ulmaceae	4	6	4	11	-	-	2	3
Umbelliferae	13	28	32	73	6	8	8	12
Urticaceae	15	54	17	59	12	30	13	27
Valerianaceae	2	3	3	5	1	1	1	1
Verbenaceae	12	30	12	36	8	11	6	9
Violaceae	1	16	1	14	1	2	1	7
Vitaceae	7	23	7	27	3	4	4	5
Zygophyllaceae	-	-	1	1	-	-	-	-
MONOCOTYLEDONS								
Agavaceae	-	-	1	4	-	-	-	-
Alismataceae	1	1	3	4	-	-	-	-
Amaryllidaceae	-	-	5	12	-	-	-	-
Araceae	14	37	17	37	7	12	9	17
Bromeliaceae	-	-	1	1	-	-	-	-
Burmanniaceae	1	1	1	3	-	-	-	-
Butomaceae	1	1	1	1	-	-	-	-
Cannaceae	1	1	1	4	-	-	-	-
Commelinaceae	9	16	9	21	8	13	3	4
Cyperaceae	10	114	19	171	6	17	10	35
Dioscoreaceae	1	8	1	13	1	3	1	3
Eriocaulaceae	1	6	1	13	-	-	-	-
Gramineae	78	183	112	346	38	49	24	32
Haemodoraceae	1	1	-	-	1	1	-	-
Hydrocharitaceae	1	1	5	7	-	-	-	-
Hypoxidaceae	2	3	2	5	2	2	3	3
Iridaceae	2	4	2	7	-	-	-	-
Juncaceae	2	26	2	34	2	3	1	3
Juncaginaceae	1	1	1	2	-	-	-	-

Lemnaceae	2	2	3	4	-	-	-	-
Liliaceae	24	50	35	65	9	13	7	10
Marantaceae	1	1	1	1	1	1	-	-
Musaceae	-	-	2	2	-	-	-	-
Najadaceae	1	1	1	2	-	-	-	-
Orchidaceae	61	188	87	113	29	72	12	14
Palmae(Arecaceae)	-	-	6	11	1	1	1	1
Pandanaceae	1	2	1	1	1	1	1	1
Pogostemonaceae	-	-	1	8	-	-	-	-
Pontederiaceae	2	2	2	3	-	-	-	-
Smilacaceae	1	15	1	15	1	8	1	7
Typhaceae	1	1	1	2	-	-	-	-
Xyridaceae	-	-	1	2	-	-	-	-
Zannichelliaceae	-	-	1	1	-	-	-	-
Zingiberaceae	8	17	11	35	7	9	4	5
Total genera and species	1064	2926	1474	4590	486	820	470	812
Total families	179		204		116		138	

[Note: Some of the smaller families treated separately in the present flora have been presented merging with their parent families in the above table to make it feasible for comparison with other floras under discussion].

The above table highlights the comparative figures of numerical representation of different taxa (including families, genera and species) as recorded in three treatises and the present work. The figures reveal that the elements of the flora of Neora Valley National Park represent alarmingly, a 18.96 % increase in *families* than that of the *Flowering Plants of Kurseong*, while the *genera* and the *species* of the Park represent 96.71% and 99.02% respectively, of the *genera* and the *species* as reported in *Flowering Plants of Kurseong* by Mathew (1981). That means the elements of the flora of Neora Valley have 3.29 % and 0.98 % of *genera* and *species* respectively, less than that of the flowering plants of Kurseong. Whereas 77.09% families of *Flora of Eastern Himalaya* have been found in the Neora Valley National Park in the present work, only 67.64% families of *Enumeration of Flowering Plants of Nepal* have been recorded in the present work. The comparison of the representations of genera and species in the present work with that of *The Flora of Eastern Himalaya* further reveals that the flora of Neora Valley engrosses only 44.17% genera and 27.75% species of *The Flora of Eastern Himalaya*. Interestingly, the present work when compared to the *Enumeration of Flowering Plants of Nepal* (by Hara *et al*, 1978, 1979, and 1982) revealed that the floristic elements of Neora Valley represent 55.05% and 17.69% of its genera and specie, respectively.

The above fact shows that the elements of Eastern Himalayan flora have nicely concentrated in the virgin habitats of Neora valley National Park. It is therefore, interesting to note that a small landmass of Neora Valley governs a major chunk of the floristic elements of the vast Eastern Himalayas reflecting its rich biodiversity.

4.1.3. HABIT GROUPS

The flora of Neora Valley exhibits a great diversity of all the habit groups of plants. The richness of floristic composition of these forests is naturally preserved and the habitat of

these different forms of life is intact in overall, except at some places where the gradual colonisation and encroachment of people have degraded or modified the forest biodiversity. The species richness and the occurrence of wide range of floristic habitats representing diverse habit groups of the flora add uniqueness to the nature-bestowed pristine Neora Valley. There is comparatively a higher representation of epiphytes within flora while the parasites and hydrophytes exhibiting lower representation is also very interesting. On the other hand, saprophytes are represented by only 2 species. The table below (4.7) exhibits the distribution of habit groups in the flora of Neora Valley National Park.

Table 4.7: *Different habit groups of Plants*

Forms of Plant	No. of species		Total species	% of the total species
	DICOT	MONOCOT		
HA	192	28	220	27.0935
HP	70	37	107	13.1773
S	113	09	122	15.0246
US	25	00	25	3.0788
T	157	03	160	19.7044
C	86	11	97	11.9458
E	18	09	27	3.3251
P	07	00	07	0.8620
SP	01	03	04	0.4926
H	03	00	03	0.3694
G	06	34	40	4.92610
Total	678	134	812	100

Abbreviations:

HA: Annual herb; HP: Perennial herb; S: Shrubs; US: Undershrub; T: Trees; C: Climber; E: Epiphytes; P: Parasites; SP: Saprophytes; H: Hydrophytes; G: Geophytes

4.1.3.1. HERBS

The floristic analysis of the Neora Valley National Park shows that the herbaceous species are in much higher proportion in comparison to any other habit groups. The number of herbaceous species (HA+HP+SP+H+G: 368) is almost equalling the number of shrubs, trees and climbers (i.e. 379) in the flora of the valley. A good proportion of climbers, epiphytes and parasites are also herbaceous. The herbaceous flora are dominant mostly in open forest patches and form the ground cover in the dense forests as well, mostly growing as heliophytes. Sciophytes are also of common occurrence in the midst of shady forest.

The most commonly occurring herbs of the valley include *Elshlotzia strobilifera*, *Galium asperifolium*, *Ageratum conyzoides*, *Ophiorrhiza spp*, *Rumex nepalensis*, *Ainslea latifolia*, *Impatiens spp*, *Stellaria media*, *Stellaria sikkimensis*, *Stellaria patens*, *Viola biflora*, *Viola diffusa*, *Oxalis corniculata*, *Persicaria spp*, *Begonia picta*, *Begonia gemmipara*, *Pilea spp*, *Elatostema spp*, *Mazus surculosus*, *Didymocarpus aromaticus*, *Plantago erosa*, *Erigeron karvinskianus*, *Spilanthes calva*, *Peracarpa carnosa*, *Ajuga lobata*, *Prunella vulgaris*, *Clinopodium umbrosum* and so on.

The hydrophytes noted in some places of the region are *Callitriche stagnalis*, *Nasturtium officinale*, etc. Amongst the sciophytes, *Drymaria villosa*, *Boeninghausenia albiflora*, *Begonia spp*, *Notochaete hamosa*, *Pilea spp*, *Ranunculus diffusus*, *Viola spp*, *Corydalis chaerophylla*, *Hydroctyle nepalensis*, *Loxostigma griffithii*, *Swertia chirayita* etc. are the most common ones growing in the region.

4.1.3.2. SHRUBS

Shrubs are observed growing as heliophytes, dominantly in the areas of subalpine zone and the forest fringes. However, shrubs are also occurring in other parts of the valley like in deep forest, hill furs and crests, degraded and open forest land etc. The most common shrubby species of the valley include *Rosa sericea*, *Rubus ellipticus*, *Rubus splendissimus*, *Berberis aristata*, *Berberis hookeri*, *Boehmeria macrophylla*, *Lycesteria glaucophylla*, *Lycesteria formosa*, *Lycesteria stipulata*, *Gaultheria fragrantissima*, *Gaultheria griffithiana*, *Mahonia napaulensis*, *Viburnum erubescens*, *Daphne bholua*, *Maesa chisia*, *Maesa rugosa*, *Zanthoxylum acanthopodium*, *Neillia rubiflora*, *Ribes glaciale*, *Astilbe rivularis*, *Euonymus frigidus*, *Hydrangea robusta*, *Dichroa febrifuga*, *Hypericum choisianum*, *Hypericum urala*, *Helwingia himalaica*, *Skimmia laureola* etc. Shrubs are the most important constituent of vegetations in semi-open places along the cliffs and around the bamboo breaks. One interesting observation regarding the distribution of shrub species is the altitude factor. Many species of *Rubus* and *Viburnum* are found to be dominant in the middle zone, while the diversity of shrubs is reduced with the increasing elevation of the places. On the other hand, low altitude places are rich of varied shrub species.

4.1.3.3. CLIMBERS

The diversity of climbers in Neora Valley with its wide habit structure and unique habitat adaptation form a fascinating group of flora and has a broad prospect for the separate and comprehensive study. The entire angiospermic climbers of the valley as a whole, can be classified as herbaceous, shrubby and lianas depending upon their habit forms and mode of the climbing. Based on it, the climbers can further be categorised as twinner, root climber, tendril climber, scandent and epiphytic climbers. The climbers are abundant in all types of vegetation and are extremely sensitive to the modification of habitat structure.

a. Herbaceous climbers

Herbaceous climbers of the valley are mostly perennial and geophytes. Yet annual climbers are also well represented. Most commonly seen herbaceous climbers in the valley include *Hedyotis scandens*, *Tripterospermum volubile*, *Gentiana speciosa*, *Dicentra scandens*, *Clematis acuminata*, *Codonopsis affinis*, *Stephania elegans*, etc.

b. Shrubby climbers

The forest patches of temperate region of the Neora is densely covered with different shrubby climbers. Most commonly occurring shrubby climbers of the valley include *Lonicera formosa*, *Elaegnus pyriformis*, *Aconogonum molle*, *Rubus acuminatus*, *Rubus paniculatus*, *Hydrangea anomala*, *Celastrus paniculatus*, *Kadsura heteroclita*, *Schizandra grandiflora* and *Senecio scandens*.

c. Lianas

Occurrence of lianas in Neora Valley is a common feature, and is roughly estimated to constitute almost half of the total climbers in the valley. Some examples worth to

mention include *Entada rheedi*, *Mucuna macrocarpa*, *Bauhinia vahlii*, *Trichosanthes cordata*, *Parthenocissus semicordata*, *Porana grandiflora*, *Thunbergia fragrans* etc.

4.1.3.4 . TREES

The thick canopy of the forests of Neora Valley National Park represents many tree species that has produced the final structure of the landscape of the valley. The trees have formed the climax vegetation forming dense inaccessible canopy right from the foothills to higher hilly ridges of the valley. Some of the common tree species of the Neora forests include *Erythrina stricta*, *Prunus cerasoides*, *Prunus napaulensis*, *Acer campbellii*, *Acer sikkimensis*, *Acer hookeri*, *Terminalia chebula*, *Nyssa javanica*, *Schima wallichii*, *Chaerospondias axillaris*, *Toona ciliata*, *Elaeocarpus lanceifolius*, *Megnolia campbellii*, *Alcimandra cathcartii*, *Michelia cahmpaca*, *Rhododendron spp.*, *Sorbus foliolosa*, *Daphniphyllum himalense*, *Engelhardtia spicata*, *Betula utilis*, *Betula alnoides*, *Quercus glauca*, *Quercus lamellosa*, *Lithocarpus elegans*, *Castanopsis tribuloides*, *Castanopsis indica*, *Castanopsis hystrix*, *Premna bengalensis*, *Macaranga indica*, *Mallotus philippensis*, *Artocarpus lacucha*, *Gynocardia odorata*, *Duabanga grandiflora*, *Aesandra butyracea*, *Lyonia ovalifolia*, *Tetrameles nudiflora*, *Alangium chinense*, *Junglans regia*, etc. Forests above 2800m elevation belong to the zone of *Rhododendron*, which mainly includes species like *Rhododendron barbatum*, *Rhododendron arboreum*, *Rhododendron dalhousiae*, *Rhododendron grande*, *Rhododendron falconeri*, *Rhododendron glaucophyllum*, *Rhododendron griffithianum*, *Rhododendron triflorum* etc. At some places, it is further mixed with *Viburnum nervosum*, *Acer campbellii*, *Betula alnoides* and *Betula utilis*. It is also observed that variation in altitude changes the composition of the tree species.

4.1.4. DISTRIBUTION OF FLORISTIC ELEMENTS

The high and low-lying areas of Neora Valley exhibit different floristic compositions. Different sets of elements of flora have dominance over different altitudinal areas of the park. Tropical hill forests upto 1000m of the Valley is dominated by trees like *Terminalia myriocarpa*, *Albizia spp.*, *Bombax ceiba*, *Schima wallichii*, *Toona ciliata*, *Phyllanthus emblica*, *Bauhinia purpurea*, *Lagerstroemia parviflora*. Among the shrubs, *Desmos chinensis*, *Desmos dumosus*, *Leucocephtrum canum*, *Oxyspora paniculata*, *Osbeckia nepalensis*, *Ficus hirta*, *Ficus neriifolia*, *Maesa montana*, *Ardisia crispa*, *Aconogonum molle* etc. are dominant ones. The ground cover in this altitudinal range of the valley is very rich in herbaceous species composition.

The sub-tropical (1000-1600m) hill forests of the park comprise of dense broad-leaved semi-evergreen to evergreen forest forming dense canopy. The tree species in this zone have attained gigantic form, the taller being upto 35 m high. The sub-tropical dominant trees include *Quercus glauca*, *Exbucklandia populnea*, *Litsea polyantha*, *Phoebe attenuata*, *Castanopsis indica*, *Castanopsis tribuloides*, *Castanopsis hystrix*, *Michelia champaca*, *Juglans regia*, *Engelhardtia spicata*, *Mecaranga postulata*, *Betula alnoides*. Large epiphytic climbers are also common in this zone. While thin patches of bamboo species occur in the lower region of this zone, the aroids, epiphytic orchids and several herbaceous climbers are also abundantly represented.

The temperate forest (1600-2400m) is extremely thick and is covered with mostly medium-sized evergreen species of trees. Deciduous trees can also be seen forming a very small proportion of this forest belt. A large number of mosses, lichens and other

epiphytes are growing on the barks and branches of the gigantic trees, and the herb, shrub and fern species on forest floor. The prevalence of woody climbers is also a common feature. The commonly seen taxa in this zone are *Acer campbellii*, *Machilus edulis*, *Symplocos glomerata*, *Symplocos theaefolia*, *Prunus nepalensis*, *Prunus cerasioides*, *Michelia cathcartii*, *Michelia doltsopa*, *Michelia excelsa*, *Quercus pachyphylla*, *Quercus lamellosa*, *Quercus lineata*, *Castanopsis hystrix*, *Castanopsis tribuloides*, *Machilus edulis*, *Betula alnoides*, *Phoebe attenuata*, *Eurya japonica*, *Evodia fraxinifolium*, *Pieris formosa*, *Taxus baccata*, *Litsea kingii*, *Litsea sericea*, *Cinnamomum obtusifolium* etc.

The shrubs in this temperate forests are mainly the *Viburnum erubescens*, *Viburnum cordifolium*, *Aucuba himalaica*, *Elsholtzia fructifera*, *Neillia thyrsoflora*, *Gaultheria griffithiana*, *Agapetes saligna*, *Maese chisia*, *Leycesteria formosa*, *Leycesteria stipulata*, *Daphne bholua* and so on.

At higher elevations towards sub-alpine range, species of *Rhododendrons* are the dominant forest taxa. Stunted *Quercus pachyphylla*, *Quercus lineata*, *Betula ulilis*, *Acer sikkimensis*, *Acer campbellii* and *Magnolia campbellii* constitute the forest at the lower sub-alpine zone. As we move upward, this is gradually replaced by different species of *Rhododendron* at the higher elevation of the sub-alpine belt. The high value timber tree *Tsuga dumosa* is interspersed with the species of *Rhododendron*, but its population is very thin. The bamboo species (*Arundinaria* sp.) have formed the thick undergrowth coverage in rhododendron and silver-fir mixed forests. Rhododendrons of this sub-alpine valley include *Rhododendron barbatum*, *Rhododendron arboreum*, *Rhododendron falconeri*, *Rhododendron dalhousiae*, *Rhododendron edgeworthii*, *Rhododendron grande*, *Rhododendron glaucophyllum*, *Rhododendron griffithianum*, *Rhododendron triflorum*, etc.

Above this elevation at the uppermost tier of the valley, i.e., 3000m and above, vegetations have developed in the form of scrubs. The mosaic of *Rhododendron setosum*, *Rhododendron anthopogon*, *Rhododendron thomsonii*, *Rhododendron campanulatum* along with the species of *Aconitum*, *Viola*, *Primula*, *Geranium*, *Arisaema*, *Fragaria*, *Ranunculus*, *Pedicularis*, *Meconopsis*, *Potentilla* etc. constitute the vegetation at the highest parts of the Park.

4.1.5. ELEMENTS OF THE FLORA

Like the major floras of the world, the flora of Darjeeling hills is also mixed with numerous plants of common distribution of many other parts of the world. Man has migrated to these hills quite a few centuries back. British entered there in the early part of nineteenth century and established their colonial characters in their establishments. This has led to the introduction of numerous foreign plants into the flora of this region, many of which have escaped and naturalised in due course of time.

An analysis of the recorded flora of Neora Valley National Park shows the following categories of plants.

I. Cosmopolitan

A total of 19 species out of 812 species of this flora are found to be pantropic or pantemperate in distribution. This means cosmopolitan species represents 2.34 % of the total flora of the valley. Some of these include *Sagina saginoides*, *Sagina procumbens*, *Sonchus oleraceus*, *Capsella bursa-pastoris*, *Prunella vulgaris*, *Monotropa uniflora*,

Callitriche stagnalis, *Drymaria diandra*, *Oxalis corniculata*, *Cerastium glomeratum*, *Amaranthus viridis*, *Trifolium repens*, *Eupatorium adenophorum*, etc.

II. Central Asiatic

There are common elements of flora even from Iran, Afganistan, Pakistan along with some from distant parts of Western India, Russia, and China. A total of 09 species representing 1.18% of the flora of park fall in this category. Most common plants include *Primula denticulata*, *Buddleja paniculata*, *Anaphalis contorta*, *Ranunculus laetus*, *Gynura cusimbua*, *Hemidesmus indicus*, *Quercus incana*, *Cannabis sativa*, *Tabernaemontana divaricata*, etc.

III. Afro-Asiatic

Some plants common for Africa and Arabian region are also found which represents a 1.6 % of the park flora. Some of these include *Toddalia asiatica*, *Crassocephalum crepidioides*, *Conyza stricta* var. *stricta*, *Achyranthes bidentata*, *Nasturtium officinale*, *Triumfetta pilosa*, *Sanicula elata*, *Parochetus communis*, *Trema orientalis*, *Lindernia parviflora* etc.

IV. American

The American plants included seven species in the park, constituting 0.86% of the flora. To mention a few of these are *Oxalis corymbosa*, *Borreria alata*, *Hedyotis corymbosa*, *Tithonia diversifolia*, *Eupatorium adenophorum*, *Drymaria villosa*, *Cestrum aurantiacum* etc.

V. Australian

Quite a few Australian species, either introduced or migrated are also found growing in the park, and forms 1.36% of the flora. They are *Erigeron karvinskianus*, *Curculigo capitulata*, *Melastoma malabathricum*, *Knoxia corymbosa*, *Siegesbeckia orientalis*, *Stellaria uliginosa*, *Toona ciliata*, *Celastrus paniculatus*, *Callitriche stagnalis*, *Murraya paniculata*, etc.

VI. Eurasian

Very few elements of Eurasian origin are also present in the park and constitute an insignificant proportion, i.e. 0.36% of the total flora. *Urtica dioica*, *Persicaria hydropiper*, *Cardamine hirsuta*, etc. of the flora are some plants common with Europe and the parts of the then USSR.

VII. Indian and Indian Subcontinental

The presence of some very common plant species of Indo-Gangetic and Deccan also enhances the uniqueness of the flora although it constitutes 0.86% of the total floristic composition of the flora of Park. Some of these recorded plants include *Chamabiana cuspidata*, *Murraya koenigii*, *Hemidesmus indicus*, *Erythrina stricta*, *Coffea bengalensis*, *Piper millesua*, *Pilea wightii*, etc.

VIII. Eastern Himalayan

This engrosses two categories of floristic elements, one exclusively growing in the Western part of the Eastern Himalaya i.e. from eastern Nepal to Bhutan, and the other category is covering plant species growing throughout the Eastern Himalayan belt, i.e. from eastern Nepal to Arunachal Pradesh. These two groups together form a 18% proportion of the park flora. Some examples pertaining to the first category of plant groups are *Acer hookerii*, *Stellaria sikkimensis*, *Pilea terniifolia*, *Gymnema thomsonii*,

Rhododendron dalhousiae, *Rhododendron grande*, *Quercus oxydon*, *Dichocarpum adiantifolium*, *Daphne sureil*, etc.

The second category of Eastern Himalayan elements includes *Gaultheria fragrantissima*, *Mucuna macrocarpa*, *Smilax ferox*, *Coelogyne corymbosa*, *Oxalis acetosella*, *Loxostigma griffithii*, *Juncus ochraceus*, *Ceropegia longifolia*, *Diffugia divaricata*, *Lonicera glabrata*, *Hoya lanceolata*, *Euonymus frigidus*, *Blumea procera*, *Microchites elliptica*, etc.

IX. S.E. Asian and Malaysian

The floristic elements in this category cover the common plants with Myanmar and Malaysian region. A total of 40 species of this category has been counted from the park flora, which accounts for 4.93%. Important ones amongst these elements are *Gentiana speciosa*, *Hoya linearis*, *Lysimachia debilis*, *Maesa chisia*, *Arisaema concinnum*, *Michelia cathcartii*, *Aconogonum molle*, *Dicentra paucinervia*, *Cinnamomum impressinervium*, *Bauhinia puepurea*, *Ficus hederacea*, *Castanopsis hystrix*, *Hydrobryum griffithii*, *Mallotus philippensis*, *Michelia champaca*, *Duabanga grandiflora*, *Engelhardia spicata*, *Pratia montana*, *Rubus lineatus*, etc.

X. Himalayan

This includes the species of plants growing along the Himalayan ranges and often extends further towards east and/or west. Such species are accounted to be 4.06% of the park flora. Some of the examples are *Mazus surculosus*, *Stellaria patens*, *Ainslea aptera*, *Euonymus echinatus*, *Rubus paniculatus*, *Maytenus rufa*, *Sabia campanulata*, *Populus ciliata*, *Pedicularis mollis*, etc.

XI. Sino-Himalayan

The Chinese plants also contribute to the flora of park. It resulted from the extension of the Chinese elements to the Himalayan belts, and accounts to 5.54% in the flora of park. This includes *Carpesium trachelifolium*, *Aconogonum campanulatum*, *Cicerbita cyanea*, *Thunbergia coccinea*, *Schefflera impressa*, *Polygonatum cirrhifolium*, *Schrophularia urticaefolia*, *Pteracanthus alatus*, *Periploca calophylla*, etc.

Thus, the flora of Neora Valley National Park is unique and has its own interesting characters, a phenomenon not common to other regions of the country except Himalayas. It is worthy of mention that quite a some number of representatives from other global regions have made their prompt presence in the virgin ecological niche of Neora Valley enriching its floristic composition. Yet, the congenial ecological conditions persisting in the range of Eastern Himalayas are the main force and factors towards proliferating ground for the evolution of a large number of local species rendering the endemism and originality of the flora (Das, 1995).

4.1.6. ENDEMIC FLORA IN THE VALLEY

D. Chatterjee (1940, 1960) has contended that India is very rich in endemic flora which contradicts J.D. Hooker's (1849) contention that Indian flora is the representation of migratory species. The latter study undertaken by many workers confirms the contention of D. Chatterjee in which he had estimated that about 60% of the Indian flora are of Indian origin, and out of which 14% being exclusively endemic to India.

The latest study reveals that about 405 dicotyledonous species alone are endemic occurring along Eastern Himalaya and North-East including North Myanmar, and many of which are being represented in Darjeeling district as well (Bhujel 1996). Neora Valley National Park, as one of the four important natural conservatories of the district of Darjeeling substantially contributes to the endemic flora of the country in this regard. A little over 14 % of the recorded taxa are ascertained to be endemic which keeps a great meaning as regards the biodiversity richness of a small geographic area (88 sqkm.) of the park and the essence of the endemic species in terms of species composition.

Dealing with the endemic flora of Neora Valley alone is not logical in this particular reference because Neora Valley National Park does not represent a distinct physico-climate zone from its surrounding areas. Therefore, in order to find the logical ground for assessing the endemics and to find out their status, the endemic taxa can be categorised broadly into following three phytogeographical divisions.

- I. Endemic to Darjeeling and Sikkim (Central part of E. Himalaya)
- II. Endemic to Eastern Nepal to Bhutan (Western half of E. Himalaya)
- III. Endemic to Eastern Himalaya (E. Nepal to Arunachal Pradesh)

This categorisation into various zones is within the logical framework and is precarious as the district of Darjeeling has a long stretch of common boundaries with Sikkim, Nepal, Bhutan etc., and also owes similar set of climatic and physical factors forming a distinct unit of physiography and ecology. In the given situation, the endemic species may have their distribution in both Sikkim and Darjeeling and may be extended to Eastern Nepal, Bhutan and far-eastern part of Eastern Himalaya.

I. Endemic to Darjeeling and Sikkim (Central part of E. Himalaya)

A few species are identified being exclusively endemic to Darjeeling and Sikkim hills. Mention may be made in this regard of the species as follows (Table 4.8).

Table 4.8: Endemic to Darjeeling and Sikkim Himalayas (Central part of E. Himalaya)

Names of Plants	Family
<i>Codonopsis affinis</i>	Campanulaceae
<i>Panax pseudoginseng</i> var. <i>angustifolium</i> f. <i>serratus</i>	Araliaceae
<i>Panax pseudoginseng</i> var. <i>biopinnatifidus</i> f. <i>neoraensis</i>	Araliaceae
<i>Primula kingii</i>	Primulaceae.
<i>Gongronema thomsonii</i>	Asclepiadaceae
<i>Begonia flaviflora</i>	Polygonaceae
<i>Sonerilla kurzii</i>	Melastomaceae
<i>Epilobium clarkeanum</i>	Onagraceae
<i>Carex teres</i>	Cyperaceae
<i>Poa gammieana</i>	Gramineae

II. Endemic to Eastern Nepal to Bhutan (Western half of E. Himalaya)

The valley also houses quite a few endemic species with their distribution from eastern Nepal to Bhutan. Following species of plants (Table 4.9) from the Neora Valley are being recorded to be endemic to this region (Eastern Nepal–Bhutan).

Table 4.9: Taxa of Neora Valley endemic to Eastern Nepal-Bhutan (Western half of E. Himalayas)

Names of Plants	Family
<i>Actinidia strigosa</i>	Actinidiaceae
<i>Symplocos dryophila</i>	Symplococaceae
<i>Kobressia fragilis</i>	Cyperaceae
<i>Carex crassipes</i>	Cyperaceae
<i>Carex daltonii</i>	Cyperaceae
<i>Rubia chaerifolia</i>	Rubiaceae
<i>Heracleum wallichii</i>	Umbelliferae
<i>Rhododendron glaucophyllum</i>	Ericaceae
<i>Piper khasianum</i>	Piperaceae
<i>Goldfussia echinata</i>	Acanthaceae
<i>Didymocarpus albicalyx</i>	Gesneriaceae
<i>Didymocarpus podocarpus</i>	Gesneriaceae
<i>Ilex sikkimensis</i>	Aquifoliaceae
<i>Porana grandiflora</i>	Convolvulaceae
<i>Hoya serpens</i>	Asclepiadaceae

III. Endemic to Eastern Himalaya (Eastern Nepal-Arunachal Pradesh)

A large number of endemic taxa are distributed from Eastern Himalaya to North East India and many of which are also represented in the flora of Neora Valley. Following enumeration (Table 5) depicts the representation of some of those endemics in the flora of Neora Valley.

Table 4.10: Taxa of Neora Valley endemic to Eastern Himalayas (Eastern Nepal-Arunachal Pradesh)

Names of species	Families
<i>Aristolochia griffithii</i>	Aristolochiaceae
<i>Begonia sikkimensis</i>	Begoniaceae
<i>Begonia gemmipara</i>	Begoniaceae
<i>Acer pectinatum</i>	Aceraceae
<i>Acer hookeri</i>	Aceraceae
<i>Berberis hookeri</i>	Berberidaceae
<i>Boehmeria glomerulifera</i>	Urticaceae
<i>Maesa macrophylla</i>	Myrsinaceae
<i>Mahonia nepaulensis</i>	Berberidaceae
<i>Myriactis wallichii</i>	Compositae
<i>Agapetes smithiana</i>	Vacciniaceae
<i>Agapetes saligna</i>	Vacciniaceae

<i>Agapetes hookeri</i>	Vacciniaceae
<i>Ajuga macrosperma</i>	Labiatae
<i>Callicarpa vestita</i>	Verbenaceae
<i>Clematis acuminata</i>	Ranunculaceae
<i>Cirsium wallichii</i>	Composite
<i>Cardamine yunnanensis</i>	Cruciferae
<i>Didymocarpus villosus</i>	Gesneriaceae
<i>Enkianthus deflexus</i>	Ericaceae
<i>Gentiana bryoides</i>	Gentianaceae
<i>Impatiens drepanophora</i>	Balsaminaceae
<i>Impatiens spirifer</i>	Balsaminaceae
<i>Lysionotus atropurpureus</i>	Gesneriaceae
<i>Fimbristylis stolonifera</i>	Cyperaceae
<i>Brassaiopsis mitis</i>	Araliaceae
<i>Neanotis gracilis</i>	Rubiaceae
<i>Ophiorrhiza succirubra</i>	Rubiaceae
<i>Ophiorrhiza thomsonii</i>	Rubiaceae
<i>Swertia speciosa</i>	Gentianaceae
<i>Persea clarkeana</i>	Lauraceae
<i>Persea gamblei</i>	Lauraceae
<i>Phoebe attenuata</i>	Lauraceae
<i>Populus glauca</i>	Salicaceae
<i>Potentilla peduncularis</i>	Rosaceae
<i>Pouzolzia sanguinea</i>	Urticaceae
<i>Primula denticulata</i>	Urticaceae
<i>Psychortia erratica</i>	Rubiaceae
<i>Pyrularia edulis</i>	Santalaceae
<i>Combretum wallichii</i>	Combretaceae
<i>Corydalis geraniifolia</i>	Fumariaceae
<i>Daphne bholua var glacialis</i>	Thymeliaceae
<i>Rhododendron barbatum</i>	Ericaceae
<i>Rhododendron dalhousiae</i>	Ericaceae
<i>Rhododendron falconeri</i>	Ericaceae
<i>Elatostema sikkimense</i>	Urticaceae
<i>Eriobotrya dubia</i>	Rosaceae
<i>Fragaria daltoniana</i>	Rosaceae
<i>Gynocardia odorata</i>	Flacourtiaceae
<i>Hypericum petiolulatum</i>	Hypericaceae
<i>Rubus paniculatus</i>	Rosaceae
<i>Rubus splendidissimus</i>	Rosaceae
<i>Scrophularia urticifolia</i>	Sarophulariaceae
<i>Sloanea dasycarpa</i>	Elaeocarpaceae
<i>Sorbus foliolosa</i>	Rosaceae
<i>Stellaria sikkimensis</i>	Caryophyllaceae
<i>Thubergia lutea</i>	Acanthaceae
<i>Carex teres</i>	Cyperaceae
<i>Celastrus paniculatus</i>	Celastraceae
<i>Ceropegia longifolia</i>	Asclepiadaceae
<i>Hoelboellia latifolia var. angustifolia</i>	Lardizabalaceae

<i>Persicaria microcephala</i>	Polygonaceae
<i>Vaccinium retusum</i>	Vacciniaceae
<i>Wendlandia wallichii</i>	Rubiaceae
<i>Zanthoxylum oxyphyllum</i>	Rutaceae

4.1.7. EXOTICS

Migration of plants species from one part to other distant parts is a continuous process and is facilitated by various geological and climatic factors. Various connecting links like land, bridge and the vast marine carriages may be attributed to for one of the probable routes for migration between Sri Lanka, Malaysia, Andamans and the parts of South India. Migration appears to be a long process for many of the plants. Exotics once migrated need to acclimatise itself, establish, propagate and naturalise. Exotic species are one important component of Eastern Himalaya floristic elements, many of them being already naturalised and some being in the process of naturalisation. Some of these exotics species are desirably introduced for food, fibre, fruits, flowers and drug values. It is believed that the natural migration of many plant species is affected through three lines, viz., migration of South East Asiatic plants from the low altitude hill ranges of North East India, entry of the European floristic elements through different parallel mountain systems and the migration of tropical and subtropical elements of Deccan and Peninsular India through the vast plains of central India.

Other important reason of migration can also be attributed to the transfer or migration of human civilization itself. The settlement of British colonies, establishments of tea garden in other parts of the globe etc. are simple examples that contributed towards the species migration. Some weed species entered with the food grains while the people carried them to distant parts. Many exotic edible and ornamental species were intentionally introduced to meet the human need and desire. Thus, these plants can be categorized as migratory and introduced exotic species, which formed one of the integral components of the flora and vegetation of Eastern Himalayas. In recent times, apart from the notes made by Biswas (1940), Hara (1966-71), Ohashi (1975), Mathew (1981) on exotic plant species of Eastern Himalayas, Das (1984-86), Bhujel & Yonzone (1985), Bhujel and Das (1995) have worked on the exotic species, specially of Darjeeling Himalaya and have further added some to the list of Eastern Himalayan exotic plant species. Neora Valley with its varied topography and contiguous geographical situation is rich in exotic species, many of them being of American origin, followed by Australian, Chinese, European and Siberian plant elements. Some examples are *Lantana camara*, *Tridax procumbens*, *Physalis peruviana* etc. (tropical and south American species); *Crassocephalum crepidioides*, *Duranta repens* *Cestrum aurantiacum* etc. (north and central American species); *Tithonia diversifolia*, *Erigeron karvinskianus*, *Calceolaria gracilis* etc. (Mexican species); *Ligustrum lucidum*, *Primula melacoides* (Chinese species); *Cardamine hirsuta*, *Cardamine flexuosa* (European and temperate Eurasian species); *Hydrocotyle sibthorpioides*, *Tabernaemontana divaricata* (Tropical Asiatic-Australian species); *Solanum torvum* (West Indies), etc.

It is noteworthy that the naturalisation process of exotic species in these patches of Himalayan region has gradual ecological implications. The rapid propagation and growth of abnoxious exotic weeds like *Lantana camara*, *Eupatorium adenophorum* etc. has played havoc upsetting the local ecological balance as well as creating environmentally unhygienic microclimate in some places. Thus, the alarming proliferation of exotics in

the Himalayan areas has been perceived as a threat at large to the local conducive environmental factors of the local floristic elements.

4.1.8. ECONOMIC ASSESSMENT

The floristic resources of the Neora Valley are high value assets from the economic point of view. A large number of floristic elements of the valley have been found to be economically very important while many of them are precious medicinal plant resources. Beside, many others have high economic value being ornamentals, aromatic, edible, and many being used in various domestic purposes and human cultural heritage. A large number of herb and shrub species are recorded to be edible that may often serve the purpose of need during food calamity and famine. Valley is also found to be the storehouse of the resources for traditional system of medicines (TSM) practiced by the local practitioners, village doctors, faith-healers etc.

The valley also represents the large number of diverse and high-valued timber tree species. The economic value of a timber tree much in demand today is very high. *Taxus baccata*, *Tsuga dumosa*, *Alnus nepalensis*, *Alcimandra cthcartii*, *Mangnolia campbellii* and *Michelia champaca* are few examples of timber species growing gigantically in the valley which are in much demand today.

The virgin Neora Valley serves as a storehouse of germplasm of several wild plant species having immense horticultural significance. There are a number of trees, shrubs, herbs and climbers of ornamental importance which are quite worthy of introduction into the gardens and parks on account of their beautiful and attractive flowers, fruits, foliage or for their characteristic shape of crown. The valley is particularly important for the availability of medicinal, wild edible and ornamental species of plants along with numerous other floristic elements that at present may not have an obvious economic importance but these may prove worthy of economic value in future. With the changing pattern of the human needs and with the upcoming vistas of new directions in plant biodiversity research, all the floristic elements of the Neora Valley Forests may prove to be of paramount significance.

The Neora Valley besides serving as *gene bank* for a number of food plants, forest trees, aromatic, medicinal and ornamental plants, it also acts as an intact repository of rich and remarkable biodiversity adding prestine beauty to the nature lovers' much revered valley. These natural habitats of Neora also represent an integral part and pocket of Hot Spots of floristic diversity in the entire eastern Himalayas and provide beautiful environmental background for the continuation of the process of evolution in this part of the great Himalayas.

These economically important plant resources of the Neora Valley can be dealt with separately under the following different heads.

4.1.8.1. MEDICINAL RESOURCES

Neora Valley appears to be a storehouse of a large variety of plants of therapeutic values as well as an ideal habitat of many animal species. These plant resources having therapeutic properties are variously used for the treatment of many of the commonly occurring human ailments. A host of diseases is categorically and traditionally dealt and treated with these medicinal species of flora and fauna, for the effective Traditional

System of Medicine (TSM) management of common human and animal diseases. To name some of the above medicinal plant resources of this kind following are spectacular and worthy of mention.

Aconitum ferox, *Astilbe rivularis*, *Swertia chirayita*, *Bergenia ciliata*, *Artemisia vulgaris*, *Eupatorium adenophorum*, *Ageratum conyzoides*, *Panax pseudo-ginseng*, *Taxus baccata*, *Lycopodium clavatum*, *Dryopteris sp*, *Dichroa febrifuga*, *Digitalis purpurea*, *Houttuynia cordata*, *Rubia manjith*, *Hemiphragma heterophyllum*, *Elaeocarpus lanceifolium*, *Costus speciosus*, *Terminalia chebula*, *Gentiana sp*, *Rhododendron arboreum*, *Laportea terminalis*, *Viscum nepalense*, *Acorus calamus*, *Achyranthes bidentata*, *Allium wallichii*, *Clematis acuminata*, *Cymbopogon flexuosus*, *Drymaria cordata*, *Entada rheedii*, *Fagopyrum debotrys*, *Heracleum wallichii*, *Mahonia napaulensis*, *Nephrolepis tuberosa*, *Polygala arillata*, *Solanum myriacanthum*, *Tetradium fraxinifolium*, *Thysanolaena maxima*, *Zanthoxylum nitidum*, *Usnea lucea*, *Dioscorea deltoidea*, etc.

4.1.8.2. SPECIES OF POTENTIAL ORNAMENTAL VALUE

Due to varied topography and diverse climatic factors, a large number of plant species of Neora Valley are of great horticultural significance. Some of them have already found places into the gardens of plant lovers and commercial gardeners. There is a bright prospect for the economic utility of these plant resources in future. To name a few species of potential ornamental plants, following is a small list.

Aeschynanthes bracteatus, *Paris polyphylla*, *Pleione praecox*, *Rhododendron anthopogon*, *Rhododendron arboreum*, *Acer campbellii*, *Arisaema griffithii*, *Rosa sericea*, *Primula denticulata*, *Primula melacoides*, *Corydalis geraniifolia*, *Ribes glaciale*, *Begonia picta*, *Begonia sikkimensis*, *Asparagus racemosus*, *Berberis hookeri*, *Daphniphyllum himalayense*, *Hedychium glaucum*, *Meconopsis paniculata*, *Polygonatum oppositifolium*, *Pratia montana*, *Pratia nummularia*, *Agapetes serpens*, *Bulbophyllum odoratissimum*, *Satyrrium nepalense*, *Herpysma longicaulis*, *Calanthe tricarinata*, *Zeuxine goodyeroides*, *Cymbidium sp*, *Daphne bholua*, *Hoya linearis*, *Michelia doltsopa*, *Impatiens pulchra*, *Peracarpa carnosa*, *Euonymus echinatus*, *Cardamine macrophylla*, *Anaphalis busua*, *Elaeagnus latifolia*, *Vaccinium vacciniaceum*, *Geranium nepalense*, *Holboellia latifolia*, *Potentilla fulgens*, *Schisandra grandiflora*, *Pimpinella diversifolia*, *Viola sikkimensis*, *Gonatanthus pumilus*, *Tsuga dumosa* etc.

4.1.8.3. EDIBLE SPECIES

Many species of plants found wild at varied elevations of the valley are edible and can serve the purpose of emergency food-need in case of any food calamity in future. These edible resources can also be scientifically processed and developed and can be brought to market for revenue generation. A few of them with their edible parts are *Dioscorea spp.* (tubers), *Elaeagnus conferta* (fruits), *Aconogonum molle* (young shoot), *Tupistra natans* (flowers), *Machilus edulis* (fruits), *Rhododendron arboreum* (flowers), *Bauhinia purpurea* (flower buds), *Viburnum erubescens* (fruits), *Fragaria vesca* (fruits), *Laportea terminalis* (leaves and inflorescence), *Urtica dioca* (leaves and inflorescence), *Nasturtium officinale* (young shoot), *Chearospondias axillaris* (fruits), *Cinnamomum bejolghota* (bark), *Fagopyrum debotrys* (young shoot), *Pentapanax leschenaultii* (young shoot), *Dendrocalamus hamiltonii* (young shoot), etc.

4.1.8.4. NOTABLE TIMBER SPECIES OF NEORA VALLEY

A large number of the species of plants growing in the park are of great timber value, some of them being exclusively in great demand in the market. Amongst large number of such notable timber species of the valley, following are some most valuable and significant timber plant species (Table: 4.11).

Table 4.11: Most valuable timber species of Neora Valley

Local Name (Nep.)	Scientific Name
Dhengre Salla	<i>Taxus baccata</i>
Katus	<i>Castanopsis tribuloides</i>
Rani Champ	<i>Michelia doltsopa</i>
Titey Champ	<i>Alcimandra cathcartii</i>
Saur	<i>Betula alnoides</i>
Dhuppi (<i>planted at some places</i>)	<i>Cryptomeria japonica</i>
Tooni	<i>Toona ciliata</i>
Utis	<i>Alnus nepalensis</i>
Paani Sahaj	<i>Terminalia myriocarpa</i>
Lapsee	<i>Melia dubia</i>
Dhuppi	<i>Pinus roxburghii</i>
Arupatey	<i>Prunus nepalensis</i>
Thengre Salla	<i>Tsuga dumosa</i>

4.1.9. ETHNOBOTANICAL INFORMATIONS

The district of Darjeeling is geographically extended not only sharing the geographical boundaries with the Kingdom of Nepal, Bhutan, and the State of Sikkim on the other hand, but it also shares the cultural and socio-anthropological relationships with these places. The ways of living of the people are directly linked with the diverse floristic resources of these places providing a great scope of separate ethnobotanical studies. The diverse methods of traditional usage of local floristic components for food, medicine, daily domestic activities, religious-rituals, marriage ceremonies, ethnic cultures and art etc. form the basis of ethnobotany. Thus, by ways of this study, the direct and indirect linkages or relationship between these plant elements and the socio-culture of the native people can be interpreted. This will also help to understand the life-style, economy and the vast traditional knowledge-store of the native people.

Very insignificant work has been done on the ethonobtany of Darjeeling hills (Bhujel 1984 a & b 1984, 1992 Yonzone & Mondal 1982; Yonzone *et al* 1984; 1985, Rai *et al* 1998). The different ethnic communities, viz, Lepcha, Bhutia, Sherpa, Rai, Limboo, Manger, Gurung etc. inhabiting the far-flung and fringe areas of the Neora Valley are still leading an almost primitive tribal life. The inherited vast knowledge-store about the traditional plant science is today confined with the older generations of these communities, and is gradually deminishing due to the inflow of products of the modern civilization. In the process, it is feared that many such knowledge base or information may have lost in the long run of time. Whatever ethonobotanical knowledge we witness today is almost based on folklore and cultural heritage in coded form or myths.

Therefore, what is most important today is to record this vast knowledge-store in scientific temperament. The immediate felt-need is to bring the potential ethnomedicines and wild edible plants under the purview of scientific study, thereby ensuring their multiplication and sustainable exploitation, which may serve to meet the complex and increasing needs of human being.

Realising the essence and gravity of this, the present study has also emphasized to partially encompass the ethnobotanical studies. Based on repeated surveys, field visit, available information, interactions with the local people and the resource examination, the recorded ethnobotanical information have been presented under different parameters such as ethnomedicines, ornamentals, edibles and other assorted uses.

4.1.9.1. ETHNOMEDICINAL PLANTS

The ailments treated by the plant species not only include the common ones like cough and cold or fever or wounds but also some of the serious diseases. Many of these are also found on sale in some hill markets of Kalimpong sub-division, and certainly a source of their collection is the Neora Valley. However, a few usage of some of these species appear to be examples of *doctrine of signature*, eg., the consumption of corolla of *Rhododendron arboreum* against bacillary dysentery (Rai *et al* 1998). Following table (Table 4.12) highlights some important ethnomedicinal plants of the park and their usage.

Table 4.12: Ethnomedicinal Plants

Name of Plants	Family	Local Name	Ailments	Parts in use and preparation
<i>Achyranthes bidentata</i>	Amaranthaceae	Ankhlay Jhar	Rheumatism, gout	Root & stem decoction
<i>Acorus calamus</i>	Araceae	Bojho	Skin diseases	Rhizome paste
<i>Ageratum conyzoides</i>	Compositae	Ilamay	Cut-injury	Extract of terminal tender leaves
<i>Artemisia indica</i>	Compositae	Titepati	Injury, bleeding	Extract of leaf & inflorescence
<i>Artemisia dubia</i>	Compositae	Titepati	Headache, nose-bleeding	Extract of leaf
<i>Astilbe rivularis</i>	Saxifragaceae	Buro-okhati	Tonic for post-natal women	Root
<i>Artocarpus lacucha</i>	Moraceae	—	Dysentery	Stem latex
<i>Bauhinia vahlii</i>	Caesalpiniaceae	—	Dysentery, laxative	Seeds & leaves
<i>Bergenia ciliata</i>	Saxifragaceae	Pakhan-bet	Diarrhoea, fever, pulmonary infections	Root decoction
<i>Betula alnoides</i>	Betulaceae	Saur	Snake-bite	Bark paste
<i>Boenninghausenia albiflora</i>	Rutaceae	—	Lice & other ectoparasite infections	Young shoot extract

<i>Boehmeria rugulosa</i>	Urticaceae	Daar	Snake-bite	Stem bark paste
<i>Callicarpa arborea</i>	Verbenaceae	-	Fevers, colic & skin disease	Extract of bark & leaves
<i>Callicarpa vestita</i>	Verbenaceae	-	-do-	-do-
<i>Cannabis sativa</i>	Cannabaceae	Ganja	Indigestion	Leaves & inflorescence
<i>Cardamine hirsuta</i>	Cruciferae	Simrayo	Low blood pressure & cardiac problem	Shoot extract
<i>Centella asiatica</i>	Umbelliferae	-	Pneumonia, fever	Shoot
<i>Clematis acuminata</i>	Ranunculaceae	Pinasay lahara	Sinus pain	Roots
<i>Clematis smilacifolia</i>	-do-	-do-	-do-	-do-
<i>Corydalis chaerophylla</i>	Fumariaceae	-	Stomach-ache	Fruits
<i>Corydalis geraniifolia</i>	-do-	-	-do-	-do-
<i>Cotoneaster microphyllus</i>	Rosaceae	-	Used as stringent	Stolons
<i>Cyperus rotundus</i>	Cyperaceae	-	Used as stringent	Rhizome
<i>Drymaria diandra</i>	Caryophyllaceae	Abijalo	Pneumonia, throat-pain, sinusitis	Shoots
<i>Drymaria villosa</i>	-do-	-do-	-do-	-do-
<i>Dicentra paucinervia</i>	Fumariaceae	-	Cardiac troubles	Shoots
<i>D. scandens</i>	-do-	-	-do-	-do-
<i>Duchesnea indica</i>	Rosaceae	-	Oral sores	Fruits
<i>Elsholtzia blanda</i>	Labiatae	-	Gastritis	Extract of shoot
<i>Eupatorium adenophorum</i>	Compositae	Kalijhar	External injuries	Leaf extract
<i>Fagopyrum debotrys</i>	Polygonaceae	Ban Fapar	Abdominal pain, choleric diarrhoea	Grains & young shoots
<i>Fraxinus floribunda</i>	Oleaceae	-	Bone fracture	Bark
<i>Girardinia diversifolia</i>	Urticaceae	-	Blood pressure	Inflorescence
<i>Gynocardia odorata</i>	Flacourtiaceae	Gantay	Skin disease & Leprosy	Seeds oil

<i>Hedera nepalensis</i>	Araliaceae	—	Sores	Latex
<i>Heracleum nepalensis</i>	Umbelliferae	Chimphing	Influenze, bodyache	Inflorescence & fruits
<i>Houttuynia cordata</i>	Saururaceae	—	Stomach disorder	Shoots
<i>Hydrocotyle himalaica</i>	Umbelliferae	Golpata	Pneumonia, throat infection	Shoots
<i>Hydrocotyle nepalensis</i>	-do-	-do-	-do-	-do-
<i>Hypericum uralum</i>	Hypericaceae	—	Wounds & bruises	Bark-juice
<i>Laportea terminalis</i>	Urticaceae	—	Blood pressure	Inflorescence & tender leaves
<i>Leucocephalum canum</i>	Labiatae	Ghoorpis	Epilepsy, wounds	Roots, leaves
<i>Listea cubeba</i>	Lauraceae	—	Stomach disorders	Flowers
<i>Mahonia napaulensis</i>	Berberidaceae	Keshari	Dysentery	Fruits & stem bark
<i>Mimosa pudica</i>	Mimosaceae	Buarijhar	Tooth-ache	Roots
<i>Mussaenda macrophylla</i>	Rubiaceae	—	Jaundice	Root extracts
<i>M. treutleri</i>	-do-	—	-do-	-do-
<i>Nephrolepis tuberosa</i>	Polypodiaceae	Paani Amala	Kidney troubles	Root tubers
<i>Paederia foetida</i>	Rubiaceae	—	Tooth-ache	Leaves, stem
<i>Panax pseudoginseng var. angustifolius</i>	Araliaceae	Paanch Pattay	Used as potent vitaliser	Rhizome
<i>Panax pseudoginseng var. bipinnatifidus</i>	-do-	-do-	-do-	-do-
<i>Persicaria capitata</i>	Polygonaceae	—	Insect bites & stings	Shoots
<i>Polygala arillata</i>	Polygalaceae	Marcha	Boils	Root
<i>Phyllanthus emblica</i>	Euphorbiaceae	Amala	Indigestion	Fruits
<i>Phytolacca acinosa</i>	Phytolaccaceae	—	High blood pressure	Leaves
<i>Plantago erosa</i>	Plantaginaceae	—	Tooth-ache	Leaves
<i>Prunus cerasoides</i>	Rosaceae	Arupatay	Bone-fracture & tooth-ache	Bark, stem
<i>Rhamnus</i>	Rhamnaceae	—	Used as astrigent	Fruits

<i>nepalensis</i>	ceae			
<i>Rhamnus purpureus</i>	-do-	-	Used as purgative	-do-
<i>Rhododendron arboreum</i>	Ericaceae	Lali Gurans	Blood dysentery, throat infection	Corolla
<i>Rubia manjith</i>	Rubiaceae	Majito	Menstrual disorder, chest troubles, boils & skin diseases	Roots & fruits
<i>Rubia wallichiana</i>	Rubiaceae	-do-	Jaundice, paralysis	Shoots
<i>Rubus ellipticus</i>	Rosaceae	Ainselu	Fever	Roots
<i>Rubus lineatus</i>	-do-	-do-	Food poisoning	Roots
<i>Rumex nepalensis</i>	Polygonaceae	Halhalay	Skin diseases	Shoots
<i>Scoparia dulcis</i>	Scrophulariaceae	-	Diabetes	Young leaves
<i>Skimmia laureola</i>	Rutaceae	Jainberiphul	Aromatic	
<i>Schima wallichii</i>	Theaceae	Chilaune	Anthetmintic	Barks
<i>Sida acuta</i>	Malvaceae	-	Bone fracture, boils	Shoots.
<i>Stephania glandulifera</i>	Menispermaceae	Tamarke	Liver trouble & jaundice	Root tuber
<i>Swertia chirayita</i>	Gentianaceae	Chireto	Dyspepsia, fever, headache	Shoots
<i>Taxus baccata</i>	Taxaceae	Dhengre salla	Stomach-ache, cough	Aril
<i>Terminalia chebula</i>	Combretaceae	Harra	Cough, indigestion, heart disease	Fruits
<i>Euodia fraxinifolium</i>	Rutaceae	Khanakpa	Typhoid, indigestion	Fruits
<i>Thalictrum foliolosum</i>	Ranunculaceae	-	Used as tonic and purgative	Roots
<i>Thalictrum javanicum</i>	-do-	-	-do-	-do-
<i>Tiarella polyphylla</i>	Saxifragaceae	-	Tuberculosis	Flowers
<i>Urtica ardens</i>	Urticaceae	Sisnu	Cardiac troubles & blood pressure	Flowers & Roots
<i>Valeriana hardwickii</i>	Valerianaceae	-	Epilepsy neurosis, colic	Roots
<i>Viola biflora</i>	Violaceae	-	Used as emetic,	Roots & Flowers

			antiseptic	
<i>Viola diffusa</i>	-do-	-	Chest pain	Flowers
<i>Viola pilosa</i>	-do-	-	Used as febrifuge & ematic	Shoot
<i>Viscum nepalense</i>	Loranthaceae	Harchur	Body-pain, fracture, fever	Stem decoction

Many of these medicinal plants or their products are available in the local markets of Darjeeling, Kurseong, Kalimpong, Sikkim, and also in the markets of Terai and Doars. As reflected from the study, the doses and the mode of administration etc. were also varying from place to place and community wise. Some plants were found to have multifarious usage being medicinal, edible as well as in many other domestic works. On the contrary, some species being medicinal were also equally poisonous or fatal if not administered properly and in appropriate dose.

It is agreeable that despite the vast scientific progress and achievements in the field of medicines, these therapeutic plants, still now, are to be recognized as valuable source of health care which are providing incredible health services to the rural people in the remotest and far-flung areas, where the modern health facilities are completely out of reach. The local *vaidyas*, *faith healers* and the practitioners in many other *traditional systems of medicines* (TSM) practicing their knowledge based on the plant elements were the once unquestioned doctors and/or authorities in the field of medicine. Even today, in most of the remote places of the globe, people have their own ethno-systems for the management of common ailments, and thereby maintain a unique science of ethno-medicine, which needs thorough documentation and scientific analysis.

4.1.9.2. ETHNO-ORNAMENTAL PLANTS

A large number of plant resources of Neora Valley are of tremendous ornamental value. These are the important resources for ornamentals in houses, and especially for their festive occasions. Many of them have already found the important places in the nursery and gardens of the people today fetching a good money for the gardeners and nurserymen, while some potential species have been domesticated for their beautiful foliage and flowers. The expedition of the Neora Forest revealed that it was the vast store-house of hundreds of ornamental species. Some of the prominent species of ethno-ornamental plants have been enumerated in the table below (table 4.13).

Table 4.13. Ethno-ornamental species of plants in Neora Valley

Name of the Plants	Families	Local Name	Flowering Period	Habit Types
<i>Acer thomsonii</i>	Aceraceae	Melo-kapasi	Otc.- Nov.	Ornamental tree
<i>Aeschynanthes bracteatus</i>	Gesneriaceae	-	Jul. - Sep	Epiphytic shrub
<i>Arisaema griffithii</i>	Araceae	Sanp ko Makai	Mar.- Apr.	Flowering herb
<i>A. speciosum</i>	-do-	-do-	May - Jun.	-do-
<i>Begonia picta</i>	Begoniaceae	Mager-kanjay	Aug.- Sep.	Foliage plant
<i>B. sikkimensis</i>	-do-	-do-	Jan. - Apr.	-do-

<i>Berberis hookerii</i>	Berberidaceae	Chutro	Apr.- Jun.	Flowering shrub
<i>Buddleja asiatica</i>	Buddlejaceae	Bhairung-pati	Jan. - Apr.	Flowering shrub
<i>Daphniphyllum himalayense</i>	Asclepiadaceae	Lal Chandan	May - Aug.	Ornamental tree
<i>Duranta repens</i>	Verbenaceae	-	Apr.- Jun.	Flowering shrub
<i>Hoya linearis</i>	Asclepiadaceae	-	Sep.-Oct.	Pendulous flowering herb
<i>Melastoma malabathricum</i>	Melastomaceae	Chulesi	May - Jul.	Flowering herb
<i>Michelia doltsopa</i>	Magnoliaceae	Rani chanp	Apr. - May	Ornamental tree
<i>Primula denticulata</i>	Primulaceae	-	May-Jun.	Flowering herb
<i>Prunus napanlensis</i>	Rosaceae	Arupatay	Apr. - May	Ornamental tree
<i>Rhaphidophora glauca</i>	Araceae	Kanchirna	May - Nov.	Climber
<i>Rhododendron arboreum</i>	Ericaceae	Lali Gurans	May - Jun.	Ornamental tree
<i>R. grande</i>	-do-	Chimal	May-Apr.	-do-

Apart from above prominent ethno-ornamental species of plant, there are a large number of plant species in the park of the Neora forest having ornamental values, which have tremendous future scope. These include the species of *Clematis*, *Tripterospermum*, *Thunbergia*, *Treutlera*, *Helwingia*, *Hydrangea*, *Euonymus*, *Jasminum*, *Gentiana*, *Corydalis*, *Dicentra*, *Thalictrum*, *Agapetes*, *Gaultheria*, *Fragaria*, *Rosa*, *Viola*, *Peracarpa*, *Aristolochia* and so on.

4.1.9.3. ETHNO-EDIBLE PLANTS

The floristic survey also revealed that Neora Forest is also rich in wild ethno-edible species of plant resources. It is equally observed that the people settled in the fringe areas of National Park survive on these wild edible resources of the Neora Forest, specially during the time of food-shortage. Collections from the wild and sale in the local market have also been observed. In true sense, many of these wild edible species have the potentiality for the cultivation and marketing for their nutrition value. Some prominent wild edible species of Neora Forest have been enumerated as below (table 4.14).

Table 4.14. Some important ethno-edible plant species of Neora Valley

Name of the Plant	Family	Local Name	Part eaten
<i>Aconogonum molle</i>	Polygonaceae	Thotney	Young stem
<i>Actinidia strigosa</i>	Actinidiaceae	Thekiphal	Fruits
<i>Atrocarpus lacucha</i>	Moraceae	-	Fruits
<i>Astilbe rivularis</i>	Saxifragaceae	Buro okhati	Roots
<i>Bauhinia purpurea</i>	Caesalpinaceae	Tanki	Flowers
<i>Bauhinia vahlii</i>	Caesalpinaceae	Bharla	Seeds
<i>Cardamine hirsuta</i>	Cruciferae	Shimrayo	Young shoot
<i>Cartanopsis hystrix</i>	Fagaceae	Katus	Seeds

<i>Castanopsis tribuloides</i>	Fagaceae	-do-	Fruits
<i>Choerospondias axillaris</i>	Anacardiaceae	Lapsee	Fruits
<i>Corylus ferox</i>	Betulacea	-	Fruits
<i>Dendrocalamus hamiltonii</i>	Poaceae	Choya Baans/Taama	Fruits
<i>Dioscorea spp</i>	Dioscoreaceae	Gittha-vyagur	Tubers
<i>Elaeagnus conferta</i>	Elaeagnaceae	Mallero	Fruits
<i>Elaeocarpus lanceifolius</i>	Elaeocarpaceae	Bhadrasay	Fruits
<i>Elaeocarpus sikkimensis</i>	Elaeocarpaceae	Bhadrasay	Fruits
<i>Fagopyrum debotrys</i>	Polygonaceae	Ban Bharay	Young shoot
<i>Ficus benamina</i>	Moracee	Kabra	Unopened leaf-buds
<i>Ficus auriculata</i>	Moraceae	Nebhara	Fruits
<i>Gaultheria hookerii</i>	Ericaceae	Kaligeri	Fruits
<i>Girardinia diversifolia</i>	Urticaceae	Bhangray sisnu	Young shoot
<i>Gynocardia odorata</i>	Flacourtiaceae	Gantay	Seeds
<i>Holboellia latifolia</i>	Lardizabalaceae	Gofla	Fruits
<i>Fragaria daltoniana</i>	Rosaceae	-	Fruits
<i>Fragaria nubicola</i>	Rosaceae	-	Fruits
<i>Laportea terminalis</i>	Urticaceae	Patley sisnu	Young shoot
<i>Litsea cubeba</i>	Lauraceae	Siltimbur	Fruits
<i>Machilus edulis</i>	Lauraceae	-	Fruits
<i>Morus australis</i>	Moraceae	Sano kimbu	Fruits
<i>Mangifera sylvatica</i>	Anacardiaceae	Chuchay Aanp	Fruits
<i>Murraya koenigii</i>	Rutaceae	-	Leaves
<i>Myrsine semiserrata</i>	Myrsinaceae	-	Fruits
<i>Nasturtium officinale</i>	Cruciferae	Simrayo	Shoots
<i>Oxalis corniculata</i>	Oxalidaceae	Chariamailo	Leaves
<i>Pentapanax leschnaultii</i>	Araliaceae	Chinday	Young shoot
<i>Prunus napaulensis</i>	Rosaceae	Arupatay	Fruits
<i>Prunus cerasoides</i>	Rosaceae	-	Fruits
<i>Rumex nepalensis</i>	Polygonaceae	Halhalay	Young shoot
<i>Smilax ovalifolia</i>	Smilacaceae	Kukurdainay	Fruits
<i>Phyllanthus emblica</i>	Euphorbiaceae	Amala	Fruits
<i>Phytolacca acinosa</i>	Phytolacceaceae	-	Shoot
<i>Piper mullesua</i>	Piperaceae	-	Fruits
<i>Rhamnus nepalensis</i>	Rhamnaceae	-	Fruits
<i>Rhus chinensis</i>	Anacardiaceae	Bhakimlo	Fruits
<i>Rosa sericea</i>	Rosaceae	-	Fruits
<i>Rubus calycinus</i>	Rosaceae	-	Fruits
<i>Rubus ellipticus</i>	Rosaceae	Ainselu	Fruits
<i>Rubus nivens</i>	Rosaceae	Ainselu	Fruits
<i>Rubus indotibetanus</i>	Rosaceae	Ainselu	Fruits
<i>Schisandra grandiflora</i>	Schisandraceae	Thekiphal	Fruits
<i>Schisandra neglecta</i>	Schisandraceae	Thekiphal	Fruits
<i>Sorbus vestita</i>	Rosaceae	-	Fruits
<i>Syzygium cumini</i>	Myrtaceae	-	Fruits
<i>Syzygium tetragonum</i>	Myrtaceae	-	Fruits

<i>Terminalia chebula</i>	Combretaceae	Harra	Fruits
<i>Terminalia bellerica</i>	Combretaceae	Barra	Fruits
<i>Euodia fraxinifloium</i>	Rutaceae	Khanakpa	Fruits
<i>Urtica dioica</i>	Urticaceae	Gharo sisnu	Young shoot
<i>Viburnum erubescens</i>	Caprifoliaceae	Asaray	Fruits

4.1.9.4. POISONOUS PLANT SPECIES OF NEORA VALLEY NATIONAL PARK

The forests of Neora Valley are also found to be the habitats for a number of poisonous species of plants. These plants exhibit a wide spectrum of poisonous effects depending upon the climatic seasons, use patterns and the plant parts used. Some are deadly poisonous for animals like cattles, fishes etc. while many are fatal to human being. The different parts of an individual species may be having different usage or poisonous effect. For example, the fruits of *Cucumis sativus* are edible whereas its roots are poisonous. Various factors like this offer a great scope for comprehensive study of the poisonous plant resource, which is beyond the scope of this work. Following table (Table 4.15) depicts some of the poisonous plants found in Neora Valley categorised as *irritants* and *lethal* poisons.

Table 4.15: Poisonous plants of Neora Valley National Park

IRRITANTS		
Name of the Plants	Families	Poisonous Parts
<i>Girardinia diversifolia</i>	Urticaceae	Stinging hairs
<i>Clematis gouriana</i>	Ranunculaceae	Stem & leaves juice
<i>Ranunculus diffusus</i>	Ranunculaceae	Leaf juice
<i>Laportea terminalis</i>	Urticaceae	Stinging hairs
<i>Dendrocnide sinuata</i>	Urticaceae	Stinging hairs
<i>Rhus succedanea</i>	Anacardiaceae	Stem & leaf juice
<i>Mucuna macrocarpa</i>	Papilionaceae	Fruit bristles
<i>Urtica ardens</i>	Urticaceae	Stinging hairs
LETHAL POISONS		
<i>Berberis insignis</i>	Berberidaceae	Stem juice(poisonous for fish)
<i>Cannabis sativa</i>	Cannabaceae	Shoots & flowers
<i>Cestrum aurantiacum</i>	Solanaceae	Shoots (poisonous for goat)
<i>Codonopsis affinis</i>	Campanulaceae	Shoots
<i>Gnaphalium affine</i>	Compositae	Shoots (poisonous for cattle)
<i>Lyonia ovalifolia</i>	Ericaceae	Shoots (poisonous for cattle)
<i>Rhododendron falconeri</i>	Ericaceae	Bark & leaves (poisonous for fish)
<i>Semecarpus anacardium</i>	Anacardiaceae	Bark & leaf juice
<i>Schima wallichii</i>	Theaceae	Bark
<i>Solanum nigrum</i>	Solanaceae	Fruit
<i>Pieris formosa</i>	Ericaceae	Young shoot
<i>Phytolacca acinosa</i>	Phytolaccaceae	Root
<i>Trichosanthes lepiniana</i>	Cucurbitaceae	Seeds

4.1.9.5. PLANTS OF OTHER ASSORTED ETHNIC USE

A large number of plant species of Neora Valley National Park have been recorded to be of assorted ethnic importance under frequent use. Many household commodities, utensils and cultural instruments etc. are made from these wild species. The rich culture and tradition of the hill people are related to the natural resources, especially the plant resources, and there are good numbers of such plant species in Neora Valley. Many of these species are used in religious rituals, some in marriage ceremony, prayers and puja offerings, worshipping etc. and quite a few number are traditionally used in festive occasions. Thus, the forest patches of Neora Valley also harbour many plant species related to the life processes of the hill people. The twigs and sticks of some such plants are used in pujas, marriages whereas the roots-bulbs or tubers of others are used to make pots or containers for various domestic purposes. Durable traditional wooden containers, milk-curd pots, flower-vase etc. are prepared by various ethnic communities from the trunk of some species of trees. Therefore, Neora Valley National Park embodies several species of plant having great ethnic importance, which form the indispensable parts of the regular activities of the different ethnic hill communities. Some examples are as follows:

(i) *Abrus precatorius*

Local Name: Lalgeri (Nep.)

Use: Jewellers use seeds as units of weight (reti); also used in necklaces as ornament.

(ii) *Stephania glandulifera*

Local Name: Tamarkay (Nep.)

Use: Root-bulb chopped to make a bowl, used as drinking pot for poultry; believed to keep the fowls free from diseases.

(iii) *Rubia manjith*

Local Name: Majito (Nep.)

Use: Fruits produce yellowish-red dye which is commonly used as cosmetics, specially as nail-polish and mehendi by teen-agers; also used as colouring ink.

(iv) *Rhus chinensis*

Local Name: Bhakimlo (Nep.)

Use: Twigs used as sticks in popular Nepali cultural festival *Deosi-song*.

(v) *Rhus hookerii*

Local Name: Kaag Bhalayo (Nep.)

Use: Stem exudate produce irritating blisters on skin; to immune against blisters its seeds and stems are burnt to produce smoke and allowed new-borns to inhale during naming ceremony.

(vi) *Pterospermum acerifolium*

Local Name: Hatti Pahenle (Nep.)

Use: Leaves used as dinner plates (*Tapara*).

(vii) *Prunus cerasoides*

Local Name: Painyoon (Nep.)

Use: Sticks and twigs are used invariably in Hindu worships and marriages in Nepali society.

(viii) *Polygala arillata*

Local Name: Guliyo Jara (Nep.)

Use: Roots are used to prepare starter culture *Marcha* which is used in fermentation of local millet beer.

(ix) *Mahonia napaulensis*

Local Name: Keshari (Nep.)

Use: Stems are used to make handles of sickle, khukuri etc.

(x) *Dioscorea hamiltonii*

Local Name: Ban Tarul (Nep.)

Use: Tuberous root traditionally used during *maghay sankranti* festival when people take bath in early morning and fix a small piece of tuber on the forehead as *Tika*.

(xi) *Cucurbita pepo*

Local Name: Kubindo (Nep.)

Use: Hard dried rind of fruits used for making a musical instrument called *Sarangi*.

4.2. IMPORTANCE OF THE FLORA

The natural resources of the country are our heritage, rich property and the biggest assets. The natural resources in various forms determine the economy of a nation. Flora or plant resource as a whole is a wealth, which is the most highly valued asset from the various points of usage and application in our lives.

Neora Valley has a very diverse flora, which also includes a large number of economically important plants such as medicinal herbs, timber trees, edible plants, relatives of cultivated plants, etc. Also there are plants of high horticultural value, particularly the members of *Orchidaceae*, *Ericaceae*, *Gentianaceae*, *Primulaceae* and *Rosaceae*. The rich vegetation of Neora Forest is an asset of the country representing an intact mass of vast resources. From these vast natural resources, only a small fraction or insignificant proportion is presently in the usage of a handful of people in the crude form. However, the bulk of these plant resources have the tremendous economic utility for a wider and scientifically productive use. Apart from the economic importance, the vegetation and its genera and species composition are equally very important for the scientific and environmental values to the scientists, botanists and environmentalists around the world. The excellent state of their preservation, virginity and pristine beauty have immense natural value which add additional charm to this himalayan belt of the country. The Neora Forest has a great significance as it represents a vast repository of diverse gene bank.

The importance of the Neora Forest is also from the point of tourism. The scenic beauty of the Neora Valley on the attractive background of the himalayan mountain, along with its rich biodiversity have become one of the forces toward drawing a lot of domestic and foreign tourists in this hilly region.

The other prominent importance of the flora of Neora Valley is that many of the plant species rated as endangered, threatened, highly rare or nearing extinction (eg. *Balanophora polyandra*, *Monotropa uniflora*, *Aristolochia griffithii*, *Panax pseudoginseng* etc.) in other parts of the Indian subcontinent are nicely surviving here and enjoy the protection. On the

other hand, the importance of Neora flora is its representation of considerable number of endemic plants. The representation of the large number of economically important plants of both the indigenous and exotic origin in the flora of Neora Valley is a crucial factor as a significance of the Neora flora. The outcome of this prolonged floristic study is the flora of Neora Valley, which serve as a checklist of the angiospermic plants of the virgin forests of Neora. However, the flora doesn't represent the complete checklist of fern species as this group was only partially studied. The economic value of the nutritious wild edible plants of the Neora Forest is high, and many such resources are yet to be analysed, exploited from different prospects. The checklist and the detailed taxonomic description on the other hand, will also help policy makers, administrators, leaders and planners to strategise their future actions of Neora Valley National Park for its protection and the development as well. The enumeration of various economically important plant species will further simplify the process for Park management. One very important possibility lies in the extensive research of these floristic resources from which a number of drugs and medicines may be formulated to combat the most dreaded human diseases like AIDS, Cancer, Hepatitis etc. which do not have the medicine for cure as of today. Thus, the importance of the flora of Neora Valley National Park can be summarised in respect of the following facts.

- (i) *In situ* conservation of large number of floristic and faunistic entities.
- (ii) Plenty of scope for propagation of economically valued species and endangered species as well
- (iii) Wide intra-specific diversity (eg. *Panax pseudo-ginseng*)
- (iv) Presence of numerous economically important species of plants
- (v) Presence of numerous wild relatives of cultivated plants
- (vi) Presence of a good proportion of endemics in the flora, etc.

Apart from these, the flora of Park also provides an excellent example of *Cradle for Evolution* through the following important characteristic features:

- (a) Almost uninterrupted vegetation
- (b) Remained undisturbed for million of years
- (c) Presence of distinct climatic bands for migration
- (d) Nicely hospitable climatic conditions
- (e) Diversity in habitat conditions, etc.

4.2.1. NEW RECORDS

Some records of new taxa and new distribution have been made from the flora of Darjeeling district in the recent years by some botanists (Das *et al* 1985; Das and Chanda 1986, 1988; Das and Lama 1992; Das and Bhujel 1996). Many such new taxa are expected to be documented in the days ahead as well. In the present work on the flora of Neora Valley National Park too, new records of taxa and new records of distribution have been established.

4.2.1.1. NEW TAXA

The present work has led to the discovery of 2 new *forma novo*. These are:

(1). *Panax pseudo-ginseng* Wall. var. *angustifolius* (Burkill) Li *forma serratus* PC Rai, RB Bhujel *et* AP Das (Araliaceae) *forma novo* (Plate IV: 33).

(2). *Panax pseudo-ginseng* Wall. var. *bipinnatifidus* (Seem.) Li *forma neoraensis* PC Rai, RB Bhujel *et* AP Das *forma novo* (Plate XVII).

4.2.1.2. NEW DISTRIBUTION RECORDS

Quite a few species of plants have been reported to be the new record of distribution for this region in the present work. These include the following plant species.

1. *Didymocarpus hookeri*. The species was earlier recorded from Khasia, Moflong and Bogapani region of Meghalaya (Hooker, 1885). The present collection records the species for the first time in West Bengal and, in other words, first time outside North-East India.
2. *Cardamine trichocarpa*. The species was known to grow in concan and Malabar region of southern India and from Sri Lanka. So, the present discovery of the species from Neora Valley National Park is its first record for East and North-East India.
3. *Canthium rheedi*. The said species was previously known to occur from concan and southwards, and in the South and Central parts of Sri Lanka (Hooker, 1882). The present discovery of this species from Neora Valley National Park is the first record of its occurrence in the entire East and North-East regions of India.
4. *Primula kingii*. Earlier, it was reported only from Gnathang (Natong), Sikkim (Hooker, 1882). So, the present distribution of this species in Neora Valley National Park is a new record from Darjeeling Himalaya. The present collection of this species is more than 100 years after its previous collection, which is equivalent to its rediscovery.
5. *Heracleum candicans*. This species was earlier known to grow in the Kashmir-Kumaon parts of the great Himalaya (Hooker, 1879). So the present distribution of this species is a new record for West Bengal.
6. *Potentilla lineata*. Previously, this species was known to occur in Jammu and Kashmir, Uttar Pradesh, Sikkim, Meghalaya, Arunachal Pradesh, Manipur and Nagaland (Dikshit and Panigrahi, 1999). The record of its presence in the Neora Valley National Park (Darjeeling Hill) therefore, is not only a new record of its occurrence in West Bengal but also it is showing the continuity of the distribution of the species in the Himalayan belt, starting from Jammu and Kashmir to Arunachal Pradesh and Nagaland.
7. *Goldfussia echinata*. Haridasan (1985) reported the occurrence of the species from Eastern Himalaya and Subhimalayas and, is common in Meghalaya. On the other hand, Hooker (1884) reported its occurrence from Sikkim, Bhutan, Khasia and Jayantha Mountain. But, so far, there is no any record of its occurrence in Darjeeling. Therefore, the present collection of the species from Neora Valley National Park is its first record of occurrence from West Bengal.

4.3. THREATS TO THE FLORA

Although the Reserve forests of Neora Valley appear to be intact and least disturbed, there are some challenges emerging out in and around the valley. These threats can be perceived only after making routine visit to the valley from various porous entry points. Nevertheless, there seem to be no threat to the valley as such. The biotic interference is not alarming enough to be labeled as threats. Yet, slow and gradual threats are constantly emerging as possible threats as described under:

1. Rapid expansion of surrounding village households around the Park, for eg. Kuwapani and Labha on the western side; Todey-Tangta and villages of Bhutan on the northeast sides, and Lingsay Busty etc. on the northwest sides. Inhabitants of these settlements will certainly depend on the forests of Neora Valley for many of their needs.
2. Construction of piggery sheds and unauthorised huts/houses inside or on the periphery of the Neora Valley.

3. **Grazing:** Cattle grazing is damaging forest ecology in some parts of the valley. Erections of cowsheds in the forest areas or near the human habitations at the fringes of the valley are the prime concern for protecting the forest environment. The permanent cowsheds made up of *Rhododendron* poles and bamboo-culm's roof at some important hilltops of the valley such as Jorepokhari (twin-lakes) and near the Tinsimana (international trijunction) give the forest and nature-lovers a shock and surprise.
4. **Alubari Khasmahal area:** It is extremely not logical to have a patch of agricultural land in the interior heart of the Neora Valley for the cultivation of potato. This area measures 274 acres and bulk of this land is inhabited by temporary settlers coming from distant villages like Kolbong, Lingsay, Labha etc, for the cultivation of potato, exercising almost a day-long walk from their native village to this place. Because of their temporary houses and cowsheds, the khasmahal area is almost naked reflecting a strange scene inside the dense green vegetation zone of Neora Valley, and literally is ridiculous, as this practice of cultivation doesn't make any profit to the cultivators.
5. **Defence Activities:** The first ever track of the difficult valley was established by the military personnel during their training and map-location exercises, upto trijunction belt. Now the herdsmen, tourists, hunters, poachers, naturalists and forest department personnel follow the same track for their activities inside the park, and has become almost a permanent trail route for the seasonal visitors. Digging of forest land for the construction of bunkers and littering with glass and plastic containers etc. is one serious aspect of military exercises inside the valley that give adverse impact to the valley's peaceful and most intact environment. However, there is a hope of restoration of damaged ecosystem and healing of the forest injury, as military activities are not a permanent feature in the forest.
6. **Soil Erosion:** It is also seen that the top humus soil layer is followed by the loose sandy soil beneath, which can hardly withstand the undue pressure resulting into substantial soil erosion in the high elevation areas. Strong winds, high rainfall and cattle grazing are the main causes of erosion.
7. **Slipping of trek route:** The unmatched soil erosion and the increasing human movement has caused a considerable amount of trodding and trampling down of trekking route/path in the valley which has formed tunnels as deep as 3-7.5m below the ground level at many places of the valley.
8. **Rapid invasion and proliferation by bamboo species**
9. **Hunters:** The valley is also the ideal place for shooters and hunters to move around without any obstacle and fear of the forest personnel. Such forest pockets in the valley are out of reach of the forest security prsonnel or forest officials. Hunters in a group of 3-5 people erect camps in the distant and inaccessible area, and exercise their hunting activities for a week to even three weeks. Many species of animals might have been driven on the brink of extinction as a result of hunting activities.
10. **Activities of Forest Corporation:** The Forest Development Corporation has cleared some areas of the park by felling the trees and planting tree species of high economic value, unsuitable for maintaining forest diversity. However, these activities have been stopped at present. Yet, a substantial area once hitherto untouched has been devastated and denuded. These denuded areas are now invaded by *Arundinaria maling* not suiting the forest environment.
11. **Construction of two roads by Forest Corporation** from Labha leading to Pankhasari and one towards Lailakha-Dolay forest areas of the Neora Valley has facilitated the easy access to the unauthorised visitors, poachers, cowboys, timber thieves from other places or areas. This has also resulted into the appearance of about 110 huts on

the road-sides belonging to migrant labourers, herdsman etc, and in fact, a few of them have turned into permanent village as seen in Lailakha, Dolay, Anikalay etc.

12. Neora drinking-water project: The Neora drinking-water project was initiated with a view to provide surplus drinking water to the people of Kalimpong town. The project work caused the construction of concrete track, bridges, walls, cutting of rocks, and laying of huge pipelines in the steep hills. These activities introduced various landslips and landslide zones in the once slipless and slideless forests.
13. The catchment source of this water project has not been given more importance for its proper treatment. The time may come when the mother forest itself may become devoid of water, ultimately causing a great damage to the nature-bestowed environment of the Neora Valley.
14. The use of the Neora Forest trail by people as transboundary route to visit the adjacent transboundary areas of the Neora Valley is a potential threat to the health and ecology of the Neora Forests as because this travel or journey via the interiors of forest is of minimum 2-3 days travel schedule. The orchid collectors, hunters, travelers, authorized or unauthorized local or other domestic tourists trekking to various spots of Neora Forests often camp at Lake sites and their non-ecofriendly activities have been identified as one of the serious threats.
15. One major threat perceived during the field reconnaissance is the activities of medicinal and ornamental plant collectors. Their activities may lead to the depletion of many valued and endangered plant species driving them on the verge of extinction.

These are some of the current and prominent threats perceived in routine survey of the vast valley apart from more such threats that are rather disguised at present.

4.4. CONSERVATION STATUS

Although the Neora Valley National Park occupies a prominent position from the floristic and geographical point of view, there are still some points that need immediate attention for ensuring the conservation status of the valley. It is true that there is probably no such corresponding vegetation zone in the State of West Bengal so rich in biodiversity. However, the damage to some extent inflicted on the vegetation due to various factors was also observed during the survey. The following factors were identified to be the hidden barriers for the conservation efforts.

- Fishing: It was found that fishing practices by various methods by unauthorised people were one of such factors. This practice directly or indirectly, inflicted damage on the faunistic and floristic composition of the Neora Valley. It was seen the people were using fish poison and also exploding the gelatin candles for killing fishes in the Neora River. This has got adverse impact on the ecological features of the Neora Valley.
- Tree-felling: It was also seen during the survey that some people were indulged in tree-felling activities for timber and planks. The population of high priced timber trees like *Tsuga dumosa*, *Alcimandra cathartii*, *Magnolia campbellii*, *Taxus baccata* was found to be decreasing steadily. These species alongwith other timber species were very scattered in their distribution. While trekking deep in the forest of Neora, some people were found to be carrying the planks of valuable tree species on their head for their sale destination.

- Hunting: The valley has become almost very safe and ideal place for hunters coming from Sikkim, Bhutan, Kalimpong and Terai region of Doars. This is due to rapid denudation of the nearby forest-cover owing to various reasons. The porosity of Neora valley along the vast stretch of its borders with the adjoining State of Sikkim and the Royal Kingdom of Bhutan is one of the factors facilitating the transboundary hunting practices.
- Medicinal plant collection: Although no such collectors were found to be collecting the medicinal plants from the Neora Valley during the entire period of survey, we are being reported of the illegal medicinal plant collection activity. Some people from distant places of Doars and adjoining places of Bhutan come to this Park and make the indiscriminate collection of medicinal plants like *Swertia chirayita*, *Rubia manjith*, *Panax pseudoginseng*, *Heracleum nepalense* etc. As reported, these people then sell these medicinal plants in huge quantity to the outsiders who usually conceal their identity. This act has already reduced the population of medicinal plant species of the Neora Forest to a great extent. There is a place called *Jaributti*, literally meaning *Medicines* in local language, which once used to be a storehouse of medicinal plants for the rich traditional system of medicine of the local people (hence the name of this particular place as *Jaributti* was derived). But unfortunately, the situation today in that particular pocket of the Neora Valley is quite different from what once used to be talked about.
- Orchid collection: An interesting phenomenon observed during the field reconnaissance trip of the Neora Forest was the collection of orchid species from the wild habitats of the Neora Forests. During the field trip, we found some people engaged in the collection of orchid species from the dense forests of Neora. It appeared that the purpose of collection of the orchid species was for sale to local nurserymen and not for self use to plant in the house garden.
- Collection of *Rhododendron* flowering twigs: Many people in organized groups from various places visit the park areas for trekking, picnic and as a whole, for the entertainment, without any formal permission. During this exercise, people cut *Rhododendron* twigs, sometimes often the tree itself for its magnificent flowers, and takes the flowering twigs to their houses. Beyond their excitement, such activities lead to a large-scale denudation of the majestic *Rhododendron* trees.
- Soil erosion: Soil erosion on the upper elevation regions of Neora Valley was one point of focus in the conservation status prospect of the Valley. The sandy soil with the humus layer above was found to be eroding constantly causing slipping and sliding of the trek routes. The unmatched soil erosion as perceived may emerge as a great threat in the long run.
- Drying-up of Jorpokhari: The Jorpokhari lakes are gradually drying up and the water volume of the lakes greatly diminishes during dry seasons. As Jorpokhari lie in such a forest patch of the Neora Valley *en route* to entry points to places of Bhutan, Sikkim and Kalimpong, human augmentation and tramping was observed to be more frequent than other areas of Neora causing certain adversity to the existence of the lakes. The transboundary travelers, herdsmen, hunters etc travelling through this forest route usually camp at this point at cowsheds or temporarily erected huts and use the water of the lake. It is also observed that the local people as well as people

from distant places (with permission as well as without permission) come to this point for trekking, and exercises activities which are not ecofriendly.

Apart from this, military exercise in the Neora forest, practices of monoculture plantation by the Forest Department in some border areas of the valley, rapid invasion of bamboo species, drinking-water project activity and various other human interferences as a whole, should be effectively brought together under the purview of conservation and management strategy of Neora Valley National Park.

4.5. PROPOSED METHODS OF CONSERVATION

Human beings have realised the degree of loss of biodiversity as a result of extinction of numerous species from the mother earth every year. *Rio de Genero Convention* (1992) was a major breakthrough towards jointly working at the global level for the conservation of biodiversity. International Union of Conservation of Nature and Natural Resources (IUCN) has demarketed only thirteen regions in the world of having biodiversity rich habitats designated as *Biodiversity Hot Spots*. Eastern Himalaya is one among them in our country. However, these Biodiversity Hotspots are equally under adverse environmental implications due to human activities. Government in its step to conserve the biodiversity has declared many areas as Reserve Areas for the *in situ* conservation. However, declaring certain areas as National Park is not the complete job to achieve the goal. The proper management of these Reserve Areas with effective monitoring and strong enforcement of laws whatsoever the harsh action or decision that may be, should be the strong component of this strategy. Whereas the proposals or the declaration of many areas as National Parks and/or Wildlife Sanctuaries have been the strength today for the conservation milieu, the mismanagement of the reserve areas and unaccountability at the end of people concerned have been the weak points which are acting as hurdles towards achieving the intended goal of conservation. On the other hand, we do not have the proper information or documents based on which the conservation recommendation and action-plans can be developed as noted in the resolution adopted in the *Systematic Botany, Plant utilization and Biosphere Conservation Symposium in Uppsala (1977)*.

With this background, following few proposals or recommendations have been placed for developing conservation strategies for the park, which might be considered actively by the Development-Planners and the Managers of Neora Valley National Park.

1. The Neora Valley National Park authority should promptly and strictly enforce the existing National Park laws and regulations despite the resistance from the people with vested interest.
2. A Code of Conduct for all the visitors, researcher, trekkers including the National Park management personnel should be developed and be persued for prompt exercise by all.
3. Encroachment and settlement of people in the periphery and fringe areas of the National Park should not be allowed, and the existing settlements are to be shifted.
4. Activities pertaining to Neora drinking water project should be made ecofriendly. Clearing of many plant species from their natural habitats and rampant felling of trees for the construction purpose under different projects should be immediately reviewed and further, such activities should be disallowed.

5. Other forestry operations of the Forest Development Corporation like building jeepable approach-roads for the carriage of logs and the monoculture type of replantation should be stopped
6. Repeated and large-scale military operations or training should not be permitted within the National Park area. If they are given the permission to exercise their activities in view of security reason, the Code of Conduct by security personnel should be ensured very strictly. Already a large quantity of empty bottles, non-degradable tin containers and polythene bags are accumulated in the areas of the park due to army operation.
7. In order to assess the diversity of bioresources as a whole of the Neora Valley National Park, other areas of study like survey of faunal species, preparation of checklists of bryophytes, fungi, etc. should also be immediately initiated.
8. Apart from the preparation of the checklists of these elements, their distribution patterns, population size, physiological tolerance, breeding system, reproduction, food-web, ecological needs, pollination and/or dispersal systems, germination, phenology, competitiveness and the impact of the ecological degradation should also be studied in details. The data bank of this detailed study will be helpful in drawing or formulating conservation strategies.
9. The strict vigil need to be maintained to prohibit the entry of unauthorized people into the National Park
10. The cattle grazing in the territory of the National Park should be banned.
11. Illegal felling of trees and timber theft should not be allowed at any cost.
12. The poachers, hunters and plant collectors should be nabbed.
13. The collection of rare ornamental plants like orchids, primulas etc. from their natural habitat, collection of wild edibles and medicinal plants should be stopped. It is being reported that some people in organized groups operate in the dense and virgin Neora Forest for the collection of precious medicinal and ornamental plants species.
14. A garden or nursery of the high valued medicinal plant species of the Neora Valley should be raised or established in parallel line so as to ensure their propagation, further sustainable exploitation and reintroduction, if necessary. Some of the plant species, valued for their medicinal properties which need immediate conservational intervention include *Swertia chirayita*, *Panax pseudo-ginseng*, *Rubia manjith*, *Clematis gouriana*, *Acorus calamus*, *Viscum nepalense*, *Haracleum wallichii*, *Dicentra paucinervia*, *Phytolacca acinosa*, *Valeriana hardwickii* etc.
15. Tourism activities should be either minimized or efficiently managed. Eco-friendly procedures or initiatives should be built up in each and every tourism activity. Trekking and mountaineering/expedition activities should also be made environment friendly through a controlled system or mechanism with a strict and definite guideline, and with no exception.
16. Some entry points of Neora Valley should be manned with the Department personnel so that the entry of unauthorized persons as well as the various untoward activities in the park can be checked.
17. Any sort of cultivation inside the park area should not be allowed.
18. Rapid invasion and proliferation of bamboo species is not good for the biodiversity and the health/ecology of Neora Valley. This phenomenon should be separately studied by the experts, and further suggestions and recommendations be invited for tackling the situation.

19. The use of Neora Forest trail by people as transboundary route should be closely monitored as this involves the 2-3 days journey of transboundary travelers through the interiors of the calm forest.
20. An appropriate strategy need to be developed to check the large-scale soil erosion in the regions between middle Rechilla and Jorpokhari. The opinion of soil experts is felt extremely necessary in this regard.
21. For complete knowledge and understanding of the floristic elements and the various factors associated with these, it is imperative to recommend the comprehensive study of the microhabitats for different species identified in the valley, and then all the information so obtained should be pooled together and reviewed for developing the better conservation strategies.

In the light of present study and the recommendations suggested above, the Neora Valley National Park authority/management and planners should give due consideration to the facts as found in this work. It is our observation from this extensive study that many precious orchids and other economically potential plant species, once very common in the hills of Darjeeling district as noted by Sir J.D. Hooker (1906) and other workers, are gradually losing their population which invites a great attention and concern of all those related with the conservation of Biodiversity of this Himalayan belt.

4.6. CONCLUSION

Flora of British India by J. D. Hooker published during 1875 and 1897 is the only botanical work that governs the floristic activities in the Indian Subcontinent, and remains one of the most important references on Indian botany even today for every floristic work. Bhutan was also partly covered by William Griffith in this flora. However, the difficult terrains of the hills remained inaccessible to most of the botanists for many reasons. Comprehensive floristic work of many such inaccessible areas, some of them now being declared as reserved areas, is still due. Neora Valley being one of the most inaccessible and difficult terrains, its comprehensive survey of floristic components was long due, and this text is the presentation of the floristic survey of the said valley carried out over the past eight years. This floristic work also adds advantage in enumerating some of the components of flora of adjoining parts of Bhutan as the areas of Neora Valley are extended sharing their common international boundaries. This work of botanical explorations of Neora Valley National Park has enabled to amass over 2000 herbarium specimens, now stored in the Herbarium of Botany Department, North Bengal University.

The flora of Neora Valley National Park spread over an area of 88 sqkm is very rich representing almost all the habit forms of plants. The valley is also found to be providing some pockets as habitats of many endangered species of plants viz., *Monotropa uniflora*, *Balanophora polyandra*, *Aristolochia griffithii*, *Clematis montana*, *Panax pseudo-ginseng* and so on. As is now understood from this floristic expedition of Neora Valley, it represents a vast repository of rich genepool but the valley remained hitherto botanically unexplored for long despite the visits of several botanists to the Eastern Himalayan regions. However, on the other hand, many species are recorded to be very rare, their frequency of occurrence being very sparse, and their population is rapidly dwindling. The phenomenon of plant migration into the valley is observed to be a crucial feature as many migratory species have been noted in the valley, and it is believed a number of species is still in the process of migration.

However, the great concern today is the interference from outside the park and the human activities in the fringe areas of the valley. These factors were perceived to be the great threats to the existence of the park, its ecology and its bioresources as a whole.

The flora of Darjeeling district is largely subjected to ecological and climatic variations (Bhujel 1996). The varied climatic, physiographic and the edaphic factors have enabled the Neora Valley National Park to evolve the rich diversity of its own in a small stretch of land mass. The different conditions of slopes, hill ridges, crests, furs, valleys formations, the diversity of habitat conditions, sharp altitudinal ranges of 300-3100m and the nature of diverse type of vegetation formations have altogether contributed to Neora Valley to acquire its unique and diverse flora and vegetation.

The present field study of hitherto unexplored Neora Valley forests recorded a total of 812 species of angiosperms belonging to 138 families which is remarkably a high figure in a small geographical land mass of only 88 sqkm. Out of these, 678 are dicotyledonous species belonging to 120 families whereas 134 species are monocots spread over 18 families. Ferns of the valley are represented by 42 species belonging to 18 families, and only 4 species of gymnosperm were recorded from the Neora. The present study was mainly concentrated on the angiospermic flora rather than the pteridodophytes. Thus, the list of fern species as depicted in this work may not be taken as the complete list of ferns existing in the park. This truth leaves a scope for a separate and comprehensive study of the fern flora of the Neora Valley.

Out of four natural reserves (2 wildlife Sanctuaries and 2 National Parks) in Darjeeling district, Neora Valley National Park is the one with rich genepool of floristic elements. The valley is not only rich in the Himalayan floristic elements, but also represents the rich Sino-Himalayan, Japanese, South-East Asian and Malaysian elements. Apart from this, other floristic elements of the valley also include Indian subcontinent, Australian, Eurasian, Central Asiatic and American elements as well. Some species in the valley are found to be naturalized exotic elements, alongwith many pantropic and cosmopolitan species. Migration of alien flora, their mixing, mutation, selection against different sets of climatic conditions further add to the richness of Neora Valley.

The most significant observation was that from a small land mass of 88 sqkm area in the domain of Neora Valley, a large number of plant species were found to be of direct medicinal values, and many other having future potentialities. The study also revealed that the floristic resources of the valley are also of great economic values as numerous species are wild edibles, potential ornamentals, fodder and high priced timber trees.

The species richness of Neora Valley gives a tremendous scope and avenues for the taxonomic rank delimitation of the *species*, *varieties* and also for the determination of *ecotypes* and *species novo* at the microlevel. Thus, it is obvious that more *taxa*, *varieties*, *ecotypes* and the *species novo* are expected to be evolved in the future through the course of long drawn-out process of migration of alien flora, mutation and selection in the given physiogeographic conditions. Beside, the flora of Neora Valley has very high endemic value as well. Many endemic species of Eastern Himalayas are well represented in the flora of Neora Valley.

The pristine beauty of the nicely rolling Neora Valley with its rich floristic genepool should be preserved at any cost. However, simply labeling the Neora Valley as National Park through legislation and gazette notification doesn't serve the purpose. The pristine

natural scenario and aestheticity of this Himalayan valley is itself a great asset besides being a part of the *Biodiversity Hot Spot*. Therefore, before concluding, I would like to advocate on the ecological safeguarding of the Neora Valley to be ensured through the proper and effective enforcement of the laws so that each and every entity of the elements of Neora Valley can be conserved and promoted at any cost. For this, a greater part of responsibility lies with the Department of Forest, and its personnel may ensure this through the exercise of their powers and duties with greater accountability and the credibility.

4.7. SUMMARY

The Neora Valley National Park is located on the flanks of Eastern Himalaya occupying a strategic position of one of the important *Biodiversity Hot Spots* of the world. The area under study is situated between 26° 52' 3"- 27° 7' 3" North latitude and 88° 45' - 88° 50' East longitude, covering an altitudinal range of 300-3100m above mean sea level, and with a total surface area of 88 sqkm. The place falls in the district of Darjeeling in West Bengal lying in the vast Eastern Himalayan tract and share common boundary with State of Sikkim, Doars area of Jalpaiguri district and the Kingdom of Bhutan. The park has its own identity and recognition from the biodiversity point of view, being scientifically or more precisely, botanically unexplored owing to its inaccessibility and many other difficulties. Its flora keeps a large meaning, particularly in terms of scientific, environmental, cultural and utilization aspects. The great significance of the park lies in its wide range of habitats representing all the habit forms of plant resources thereby producing a conducive environment for ecological diversity. Phytogeographically also, the park is one of the important and unique natural conservatories in the country and occupies a key position in this respect.

The park remaining undisturbed and unpenetrated for hundreds of years offers a scope for understanding the complex web of ecological processes. Its magnificent scenic beauty is a prime concern of eco-tourism industry today. Its virgin habitats and bioresources are of tremendous environmental values to the scientists, botanists and environmentalists around the world. The geographical orientation, sharp altitudinal variations with diverse climatic conditions and the rich diversity of flora and fauna have given a rare distinction to the park. The present study has shown that the park exhibits a higher percentage of flora representing major groups of plants including endemics. The flora of the Park is also of paramount significance in terms of the rich ethnobotany of the hill people which has helped the people of the adjoining areas to maintain their own science and economy. There is a pertinent scope of mobilising the abundant non-timber forest products (NTFPs) of the park for the economic activities, multifaceted scientific utilities and the park management as well. The prolonged botanical explorations through a well slated action plan and strategy could amass a large number of pertinent informations and data regarding the floristic richness of the virgin Neora Valley whose primeval forest cover and difficult terrains, as far as is known, had kept anyone away from traversing it.

It was amazing to compare the flora embodied in a small landmass of Neora Valley National Park (i.e. 88 sqkm.) with the floras of adjoining areas published in the recent past (*Flora of Eastern Himalaya*, 1966, 71, 75; *Enumeration of Flowering Plants of Nepal*, 1978, 79, 82; *Flowering Plants of Kurseong*, 1981). The flora of the park represents 77.09 % families, 44.17 % genera and 27.75 % species of the total families, genera and species, respectively of that of the entire Flora of Eastern Himalaya. Other interesting remark is that when the present floristic work is compared with the *Enumeration of Flowering Plants of Nepal* (by Hara *et al*), the park flora alone comprises of 67.64 % families, 31.88 % genera and 17.69 % species of the entire flowering plants of

Nepal. On the other hand, one very crucial and amazing point is that the flora of the park sustains 118.96 % families, 96.71 % genera and 99.02 % species of the *Flowering Plants of Kurseong* enumerated by Mathew (1981). The above findings are amazing and very crucial which depict and determine the floristic richness of Neora Valley National Park.

The park exhibits the different floristic compositions, and different sets of elements of the flora have dominance over different altitudinal areas of the park. The sub-tropical (100-1600m) hill forests of the park comprise of broad-leaved semi-evergreen forests forming dense canopy where the tree species are gigantic being upto 35m high or more. Almost all the forms of plant groups are nicely represented in the flora. The park is also found to be an ideal home to many endemic taxa in line with the contention that India is rich in endemic flora (D. Chatterjee, 1940, 1960), and substantially contribute to the endemic flora of the country. The constant presence of the pioneer habitats has resulted in a high number of endemic taxa in the park flora. There are 812 species of angiosperms out of which a little over 14 % are endemic. The flora is amazing in terms of endemism when its taxa are categorised into different phytogeographical divisions. Some of the species are exclusively endemic to Darjeeling and Sikkim Hills (eg., *Codonopsis affinis*, *Panax pseudoginseng* var. *angustifolius* f. *serratus*, *Panax pseudoginseng* var. *bipinnatifidus* f. *neoraensis*, *Primula kingii*, etc.) which is quite interesting.

The park also sustains a number of species of plants rated as threatened and/or endangered species in recent years. The habitat and the geobiochemical processes of the park are favouring their growth and multiplications. The presence of *Monotropa uniflora*, *Balanophora polyandra*, *Aristolochia griffithii*, *Aristolochia saccata*, *Dicentra paucinervia*, *Panax pseudoginseng* and many other threatened plants in the domain of park is an indicator of the significance of the flora of Neora Valley National Park. The park contains a diverse range of vegetation types and several phytogeographical pockets, each of which varying with altitudes. Apart from rich species of plants, the valley also supports a rich fauna, mainly avifauna. The primeval forests are also the important regulators of both climate and the hydrological cycle and provide the sources of catchment to Neora river, which is one of the very important and major drinking water sources for the people of substantially populated hill town of Kalimpong. So, the forest cover of Neora Valley governs an important role in watershed protection. The park is exceptionally bestowed with the vast number of species of horticulturally important plants, wild food plants and therapeutic plants along with a wide range of species often exploited for religious and/or traditional purposes and also for personal adornment at festivals.

The Valley possesses abundant plant materials having immense economic prospects, which can cater to the increasing needs of human in future. It is a source of precious and diverse medicinal plants apart from edible, ornamental and numerous other species of plants of varied ethnic utility. With the upcoming vistas of new directions in plant diversity research, the bioresources of Neora Valley may be scientifically utilised with new dimensions in order to serve the increasing human needs. The rich gene bank of the park may have potentiality to curb many of the modern human diseases from the world, and can be exploited accordingly as per the need assessment of the modern world and the situation of health hazard related complications. The park exhibits an excellent example of *in situ* conservation of both the flora and fauna. On the other hand, the faunal species of the park are also being reported to be invariably very rich. It is being estimated that the upper hill patch of the park (approximately 25 % of the total park area) alone represents 41 % of the total bird families of the vast State of West Bengal (Mukhopadhyay *et al*,

1999), whereas it represents 7.8 % and 17 % of the total mammalian species of the entire country (India) and the State of West Bengal, respectively (Biswas *et al*, 1999). The park is also, very recently reported to be supporting the highest density of tiger (*Panthera tigris*) population in West Bengal at present (Forest Department Bulletin). Other most important feature of the park is that it is an ideal home to many species of mammals which are reported to be in *Schedule I of Indian Wildlife (Protection) Act, 1972*. The forests of the park are also one of the very few rapidly vanishing habitats (perhaps one of the last habitats) for the most cute but highly endangered animal of the world i.e., Red Panda (*Ailurus fulgens*) in this Himalayan range.

Many foreign plant elements have also established themselves in the domain of Neora Valley through a long drawn out process of migration and naturalization. The park harbors various elements of the flora from Iran, Afghanistan; Pakistan, Russia and China. Plants of Afro-Asiatic, American, Australian, Eurasian, S.E Asia, Malaysian and Sino-Himalayan origins, etc. are also seen in the park. Some records of new taxa (*Panax pseudoginseng* var. *angustifolius* forma *serratus*, *Panax pseudoginseng* var. *bipinnatifidus* forma *neoraensis*) have also been made from the valley. Similarly, records of new distribution of some species of plants have also been established for this region (e.g. *Primula kingii*, *Didymocarpus hookeri*, *Cardamine trichocarpa*, *Canthium rheedi*, etc.). The park being one of the very rare and undisturbed pockets of forests in the entire Eastern Himalayan regions for almost hundreds of years also offers an excellent example of *cradle for evolution* of species. At the species level, sharp and remarkable intraspecies variations have been observed enough for the delimitations of the taxa, and are the future scope of fascinating research. The safe ecological niches for many threatened species of plants in the park are also crucially notable. The flora and vegetation of the park represent an invaluable scientific resource to the researchers due to evolutionary process of the biota in the park, long biological isolation and the relatively undisturbed state of ecosystem in major parts of the park.

Keeping in mind the value of rich genepool, bioresources of the Neora Valley is a boon to a densely populated country like India where there are many possibilities of sustainable and scientific exploitation of this nature-bestowed genebank with the fast advancement of technology. The region appreciably displays a wide range of economically important plant species of both the indigenous and exotic origins. The grave concern, however, today is the documentation and conservation of these genetic assets. The movement of grazing animals, herdsmen, plant collectors, transboundary businessmen, personnel of the Forest department as well as the activities of the defence personnel have resulted into trampling and eventual loss of vegetation cover in some places thereby leaving areas vulnerable to soil erosion and other ecological degradation. The wanton assault on forest due to increasing needs of the exponentially increasing human population has depleted many of the green covers of the nearby places, and now the people have been moving towards Neora Forests. Consequently, some green areas are already exposed facilitating the process of soil erosion, leaching, isolation and radiation, thereby affecting the normal geo-biochemical cycle. What is suggested is an effective and strong conservation programme with a vision of development, before it becomes late for ever so as to check the drastic reduction in the pace and process of natural regeneration. In all the future initiatives, the areas of Neora Valley National Park need to be highlighted as areas of prime biodiversity importance so as to draw attention and pull adequate resources to ensure the conservation of the park.

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2. Abstract of Papers

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PLATE I

1. *Ranunculus diffusus*
2. An etario of *Magnolia campbellii*
3. *Michelia cathcartii*
4. *Schisandra grandiflora*
5. *Holboellia latifolia* var *latifolia*
6. *Mahonia napaulensis*
7. *Meconopsis paniculata*
8. *Corydalis chaerophylla*
9. *Zanthoxylum oxyphyllum*
10. *Mucuna macrocarpa*
11. *Parochetus communis*



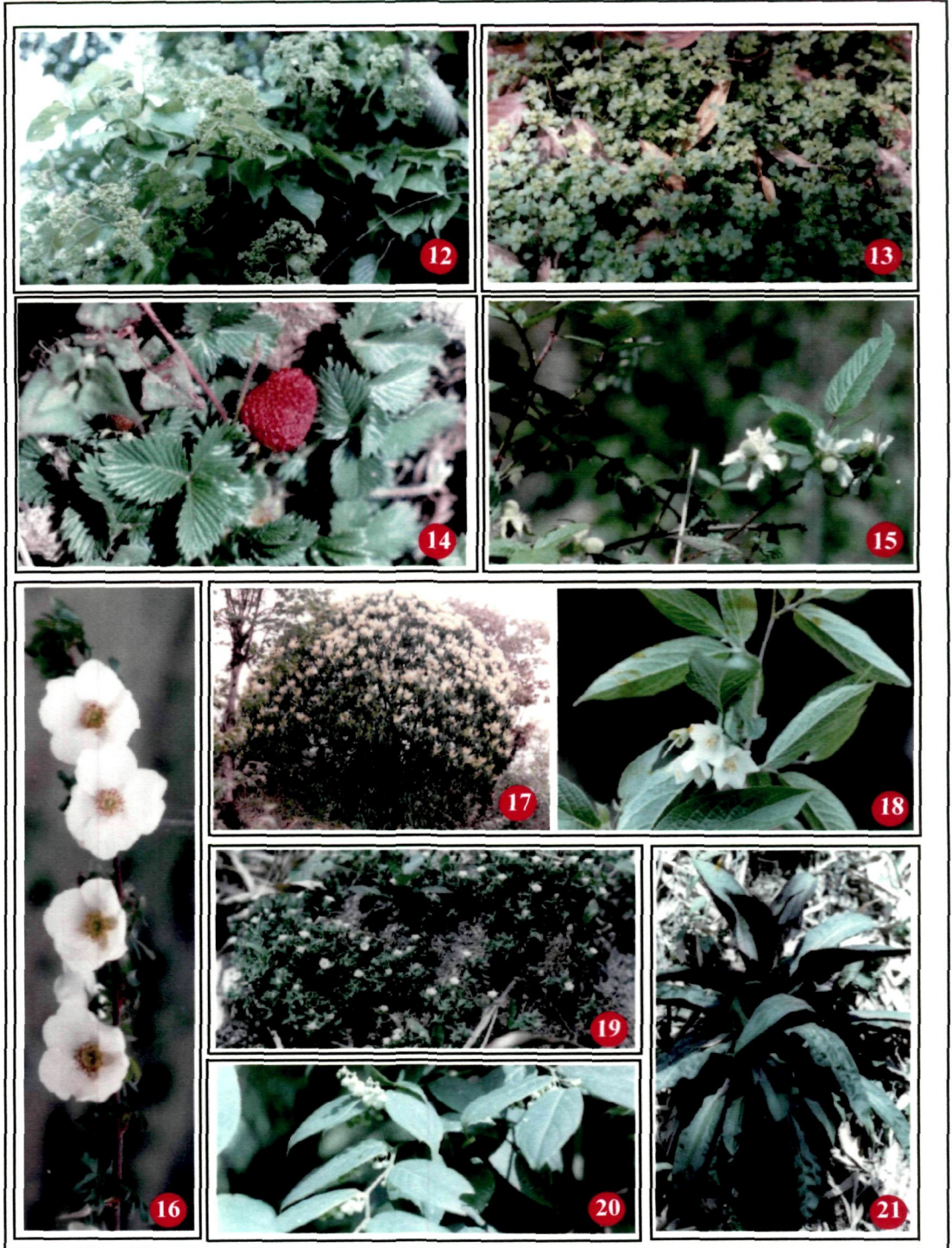


PLATE II

12. *Hydrangea anomala*
 13. *Chrysosplenium nepalense*
 14. *Fragaria nubicola*
 15. *Rubus indotibetanus*
 16. *Rosa sericea*

17. *Symplocos dryophila*
 18. *Styrax hookeri*
 19. *Gentiana bryoides*
 20. *Gaultheria griffithiana*
 21. *Swertia chirayita* (juvenile)

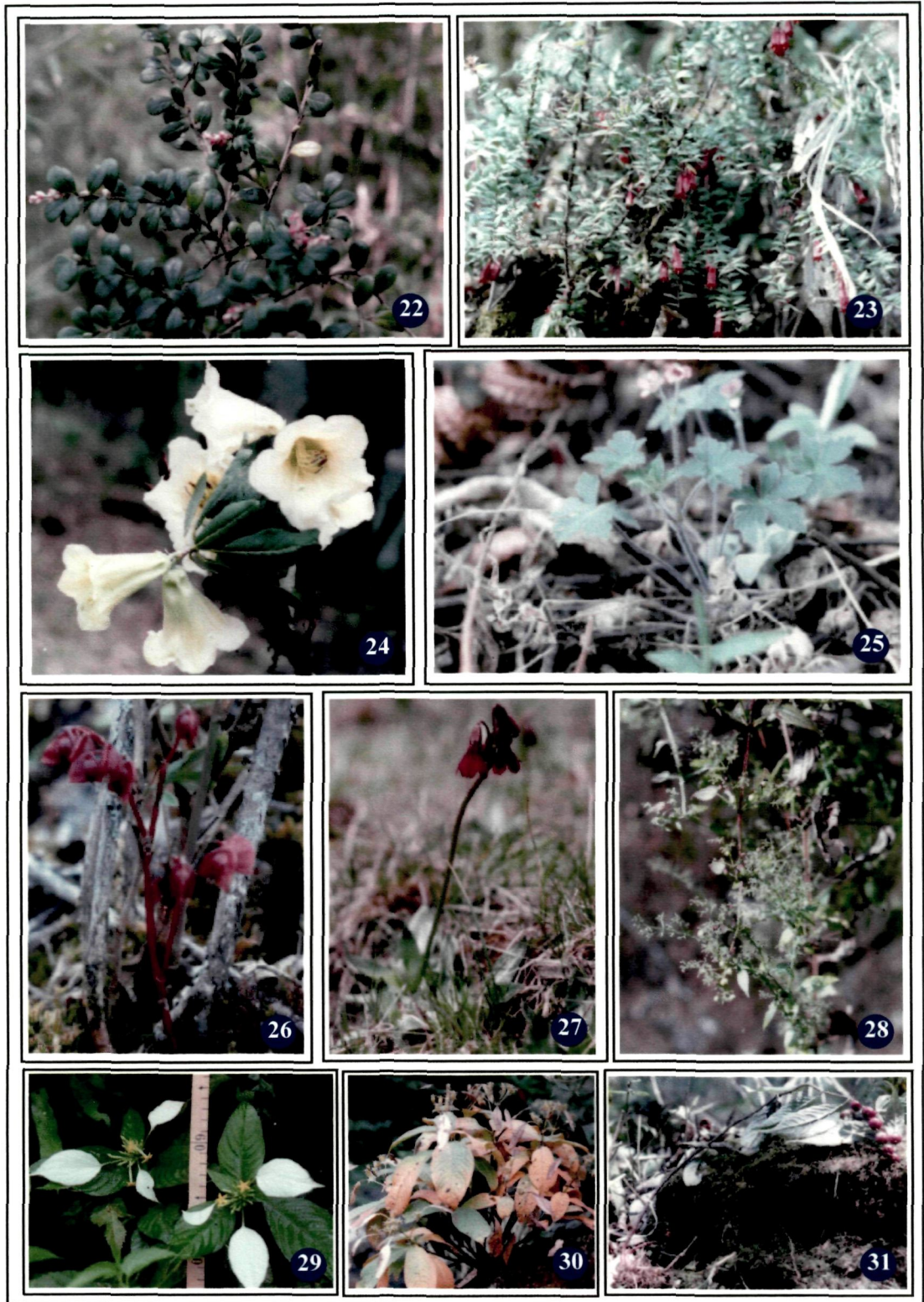


PLATE III

22. *Vaccinium retusum*
 23. *Agapetes serpens*
 24. *Rhododendron dalhousie*
 25. *Geranium nepalense*
 26. *Begonia flaviflora* in fruit

27. *Primula kingii*
 28. *Rubia wallichiana*
 29. *Mussaenda treutleri*
 30. *Neohymenopogon parasiticus*
 31. *Pratia montana*

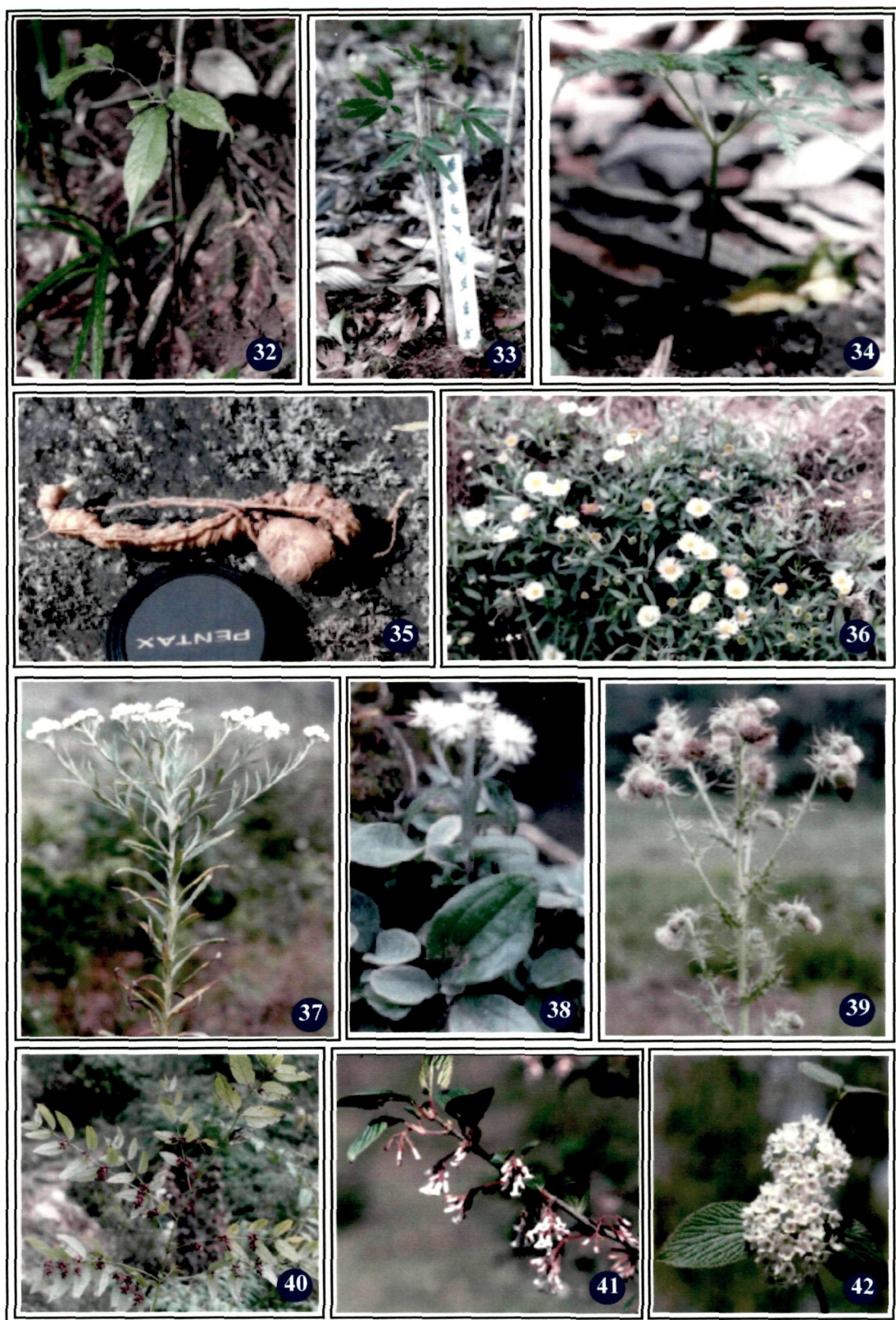


PLATE IV

32. *Panax pseudoginseng* Wall. var. *angustifolius* f. *angustifolius*
 33. *Panax pseudoginseng* Wall. var. *angustifolius* f. *serratus*
 34. *Panax pseudoginseng* Wall. var. *bipinnatifidus* f. *bipinnatifidus*
 35. Rhizome of *Panax pseudoginseng* Wall. var. *angustifolius*
 36. *Erigeron karvinskianus*
 37. *Anaphalis busua*

38. *Anaphalis triplinervis*
 39. *Cirsium wallichii*
 40. *Leycesteria formosa*
 41. *Viburnum erubescens*
 42. *Viburnum nervosum*

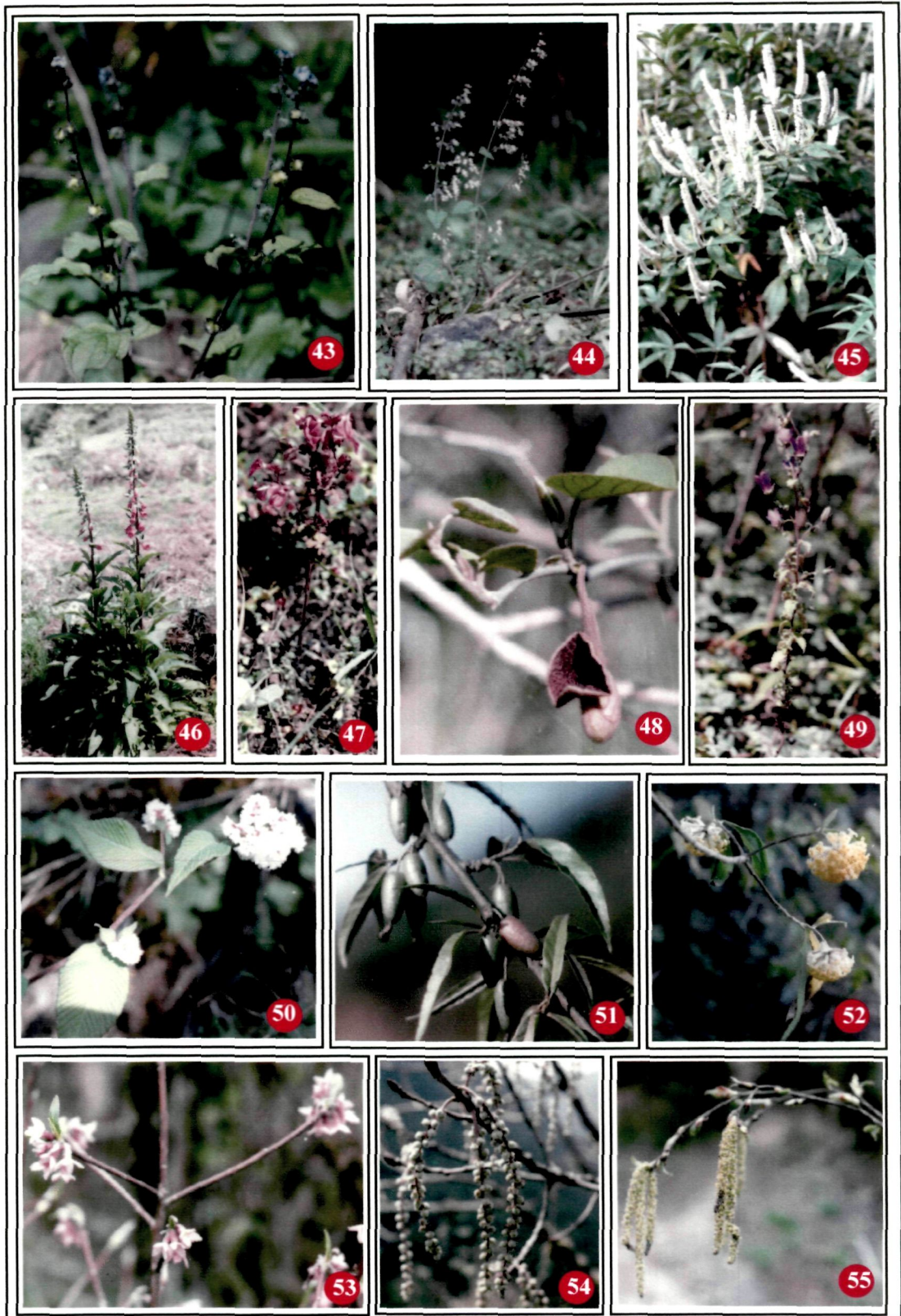


PLATE V

43. *Hackelia uncinata*
 44. *Radosia coetsa*
 45. *Elsholtzia fruticosa*
 46. *Digitalis purpurea*
 47. *Pedicularis mollis*

48. *Aristolochia griffithii*
 49. *Campanula pallida*
 50. *Aconogonum campanulatum*
 51. *Elaeagnus conferta*
 52. *Edgeworthia gardneri*

53. *Daphne bholua* var. *glacialis*
 54. *Populus glauca*
 55. *Betula alnoides*

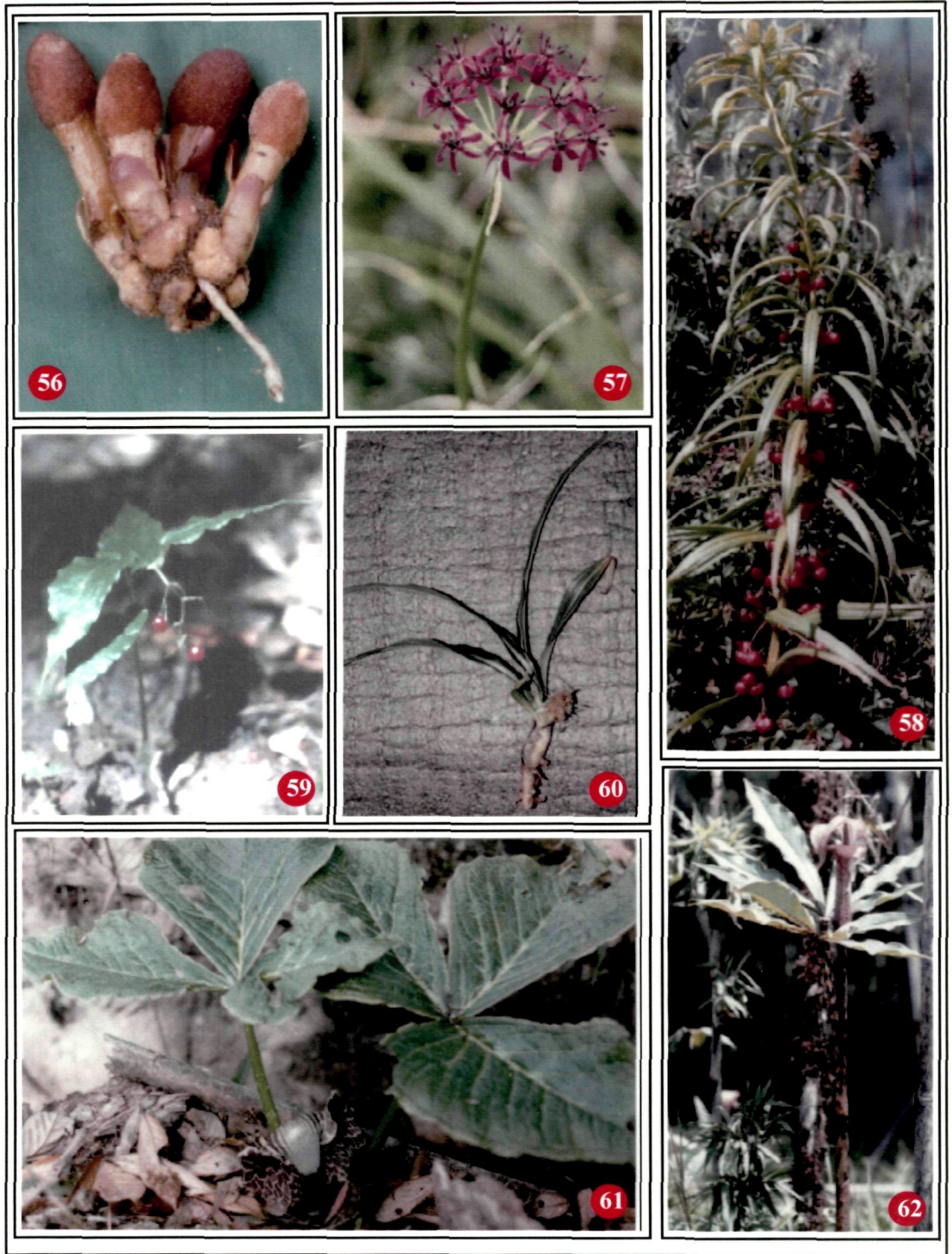


PLATE VI

56. *Balanophora polyandra*
 59. *Maianthemum fuscum*
 62. *Arisaema nepenthoides*

57. *Allium wallichii*
 60. *Tupistra nutans*

58. *Polygonatum cirrhifolium*
 61. *Arisaema griffithii*

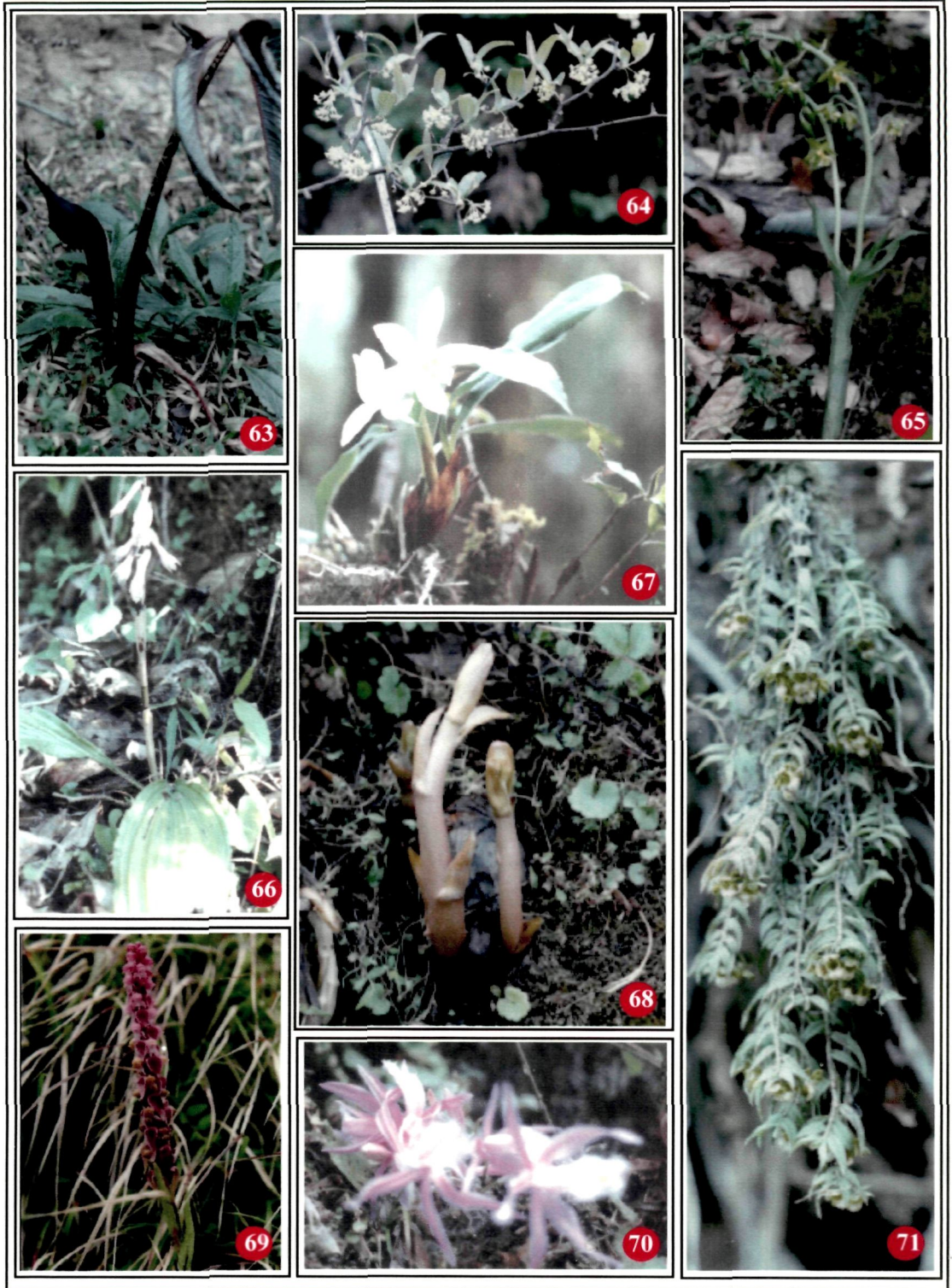


PLATE VII

63. *Arisaema speciosum*
 66. *Cremastra appendiculata*
 69. *Satyrium nepalense*

64. *Smilax ferox*
 67. *Coelogyne corymbosa*
 70. *Pleione praecox*

65. *Calanthe tricarinata*
 68. *Galeola lindleyana*
 (young inflorescence)
 71. *Gastrochilus distichus*

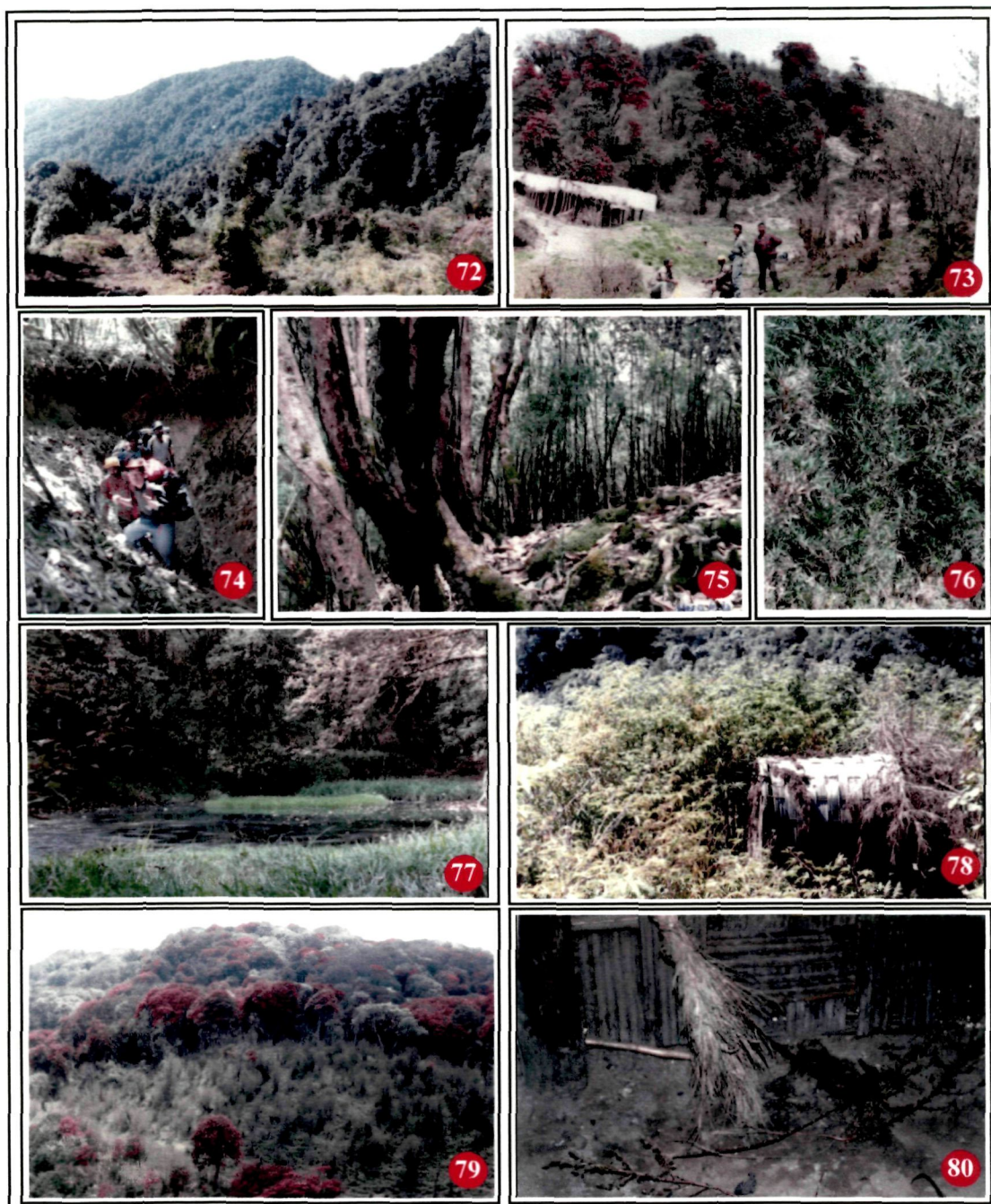
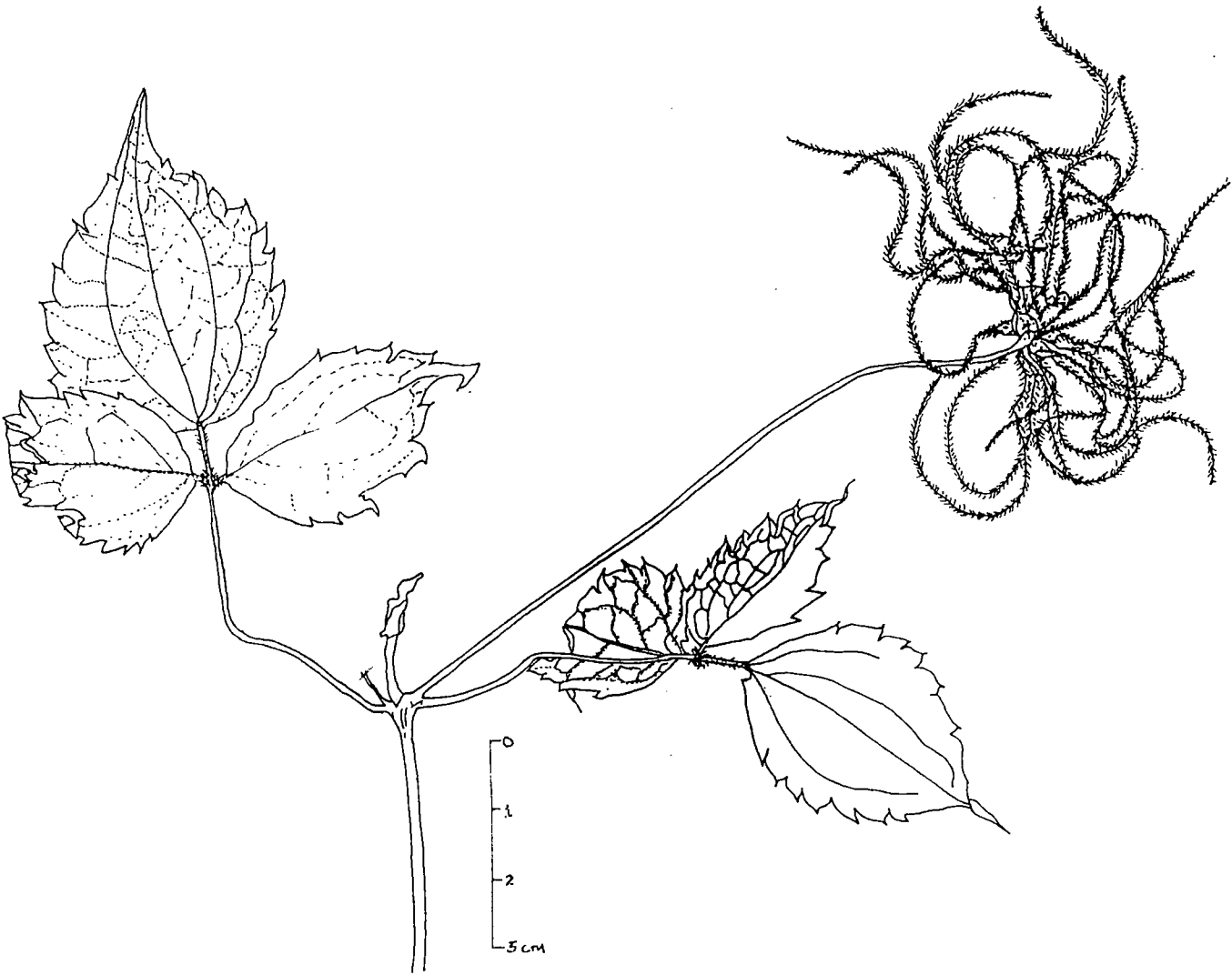


PLATE VIII

72. Dense canopy of forest of Neora Valley National Park
73. A Cowshed beside Jorpokhari, a place connecting many important locations in West Bengal, Sikkim and Bhutan
74. Crossing the trenches at depth of 7.5 m below ground level formed by yearly soil erosion
75. Bamboos invading the *Rhododendron* forest.
76. Almost impenetrable bamboo-thickets
77. A lake (unnamed) on the way to Todey-Tangta
78. A poacher's hut hidden in the thickets of *Rubus lineatus*
79. *Rhododendron* forest in full blossom.
80. The remains of plants used by Cowman left behind in a deserted Cowshed.
81. The Jorpokhari (paired lakes) at Upper Rechila

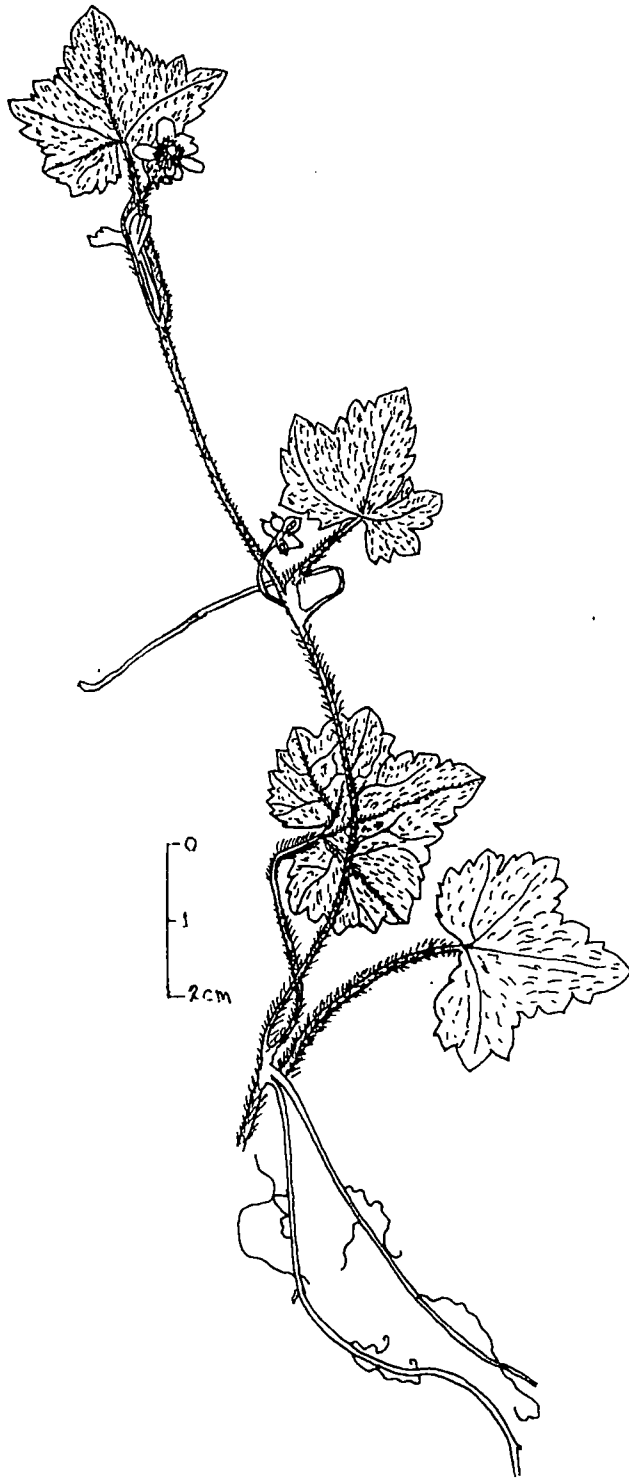


PLATE IX



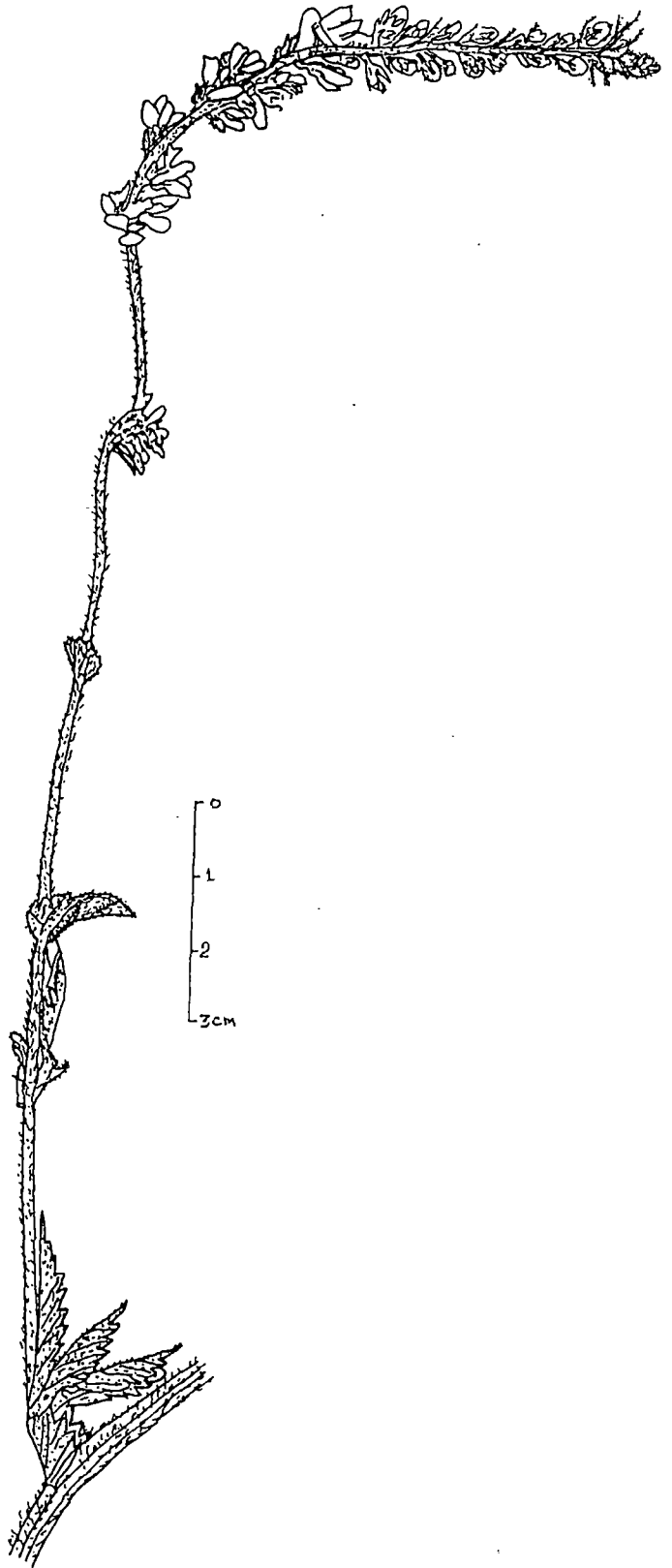
Clematis montana: a fruiting branch

PLATE X



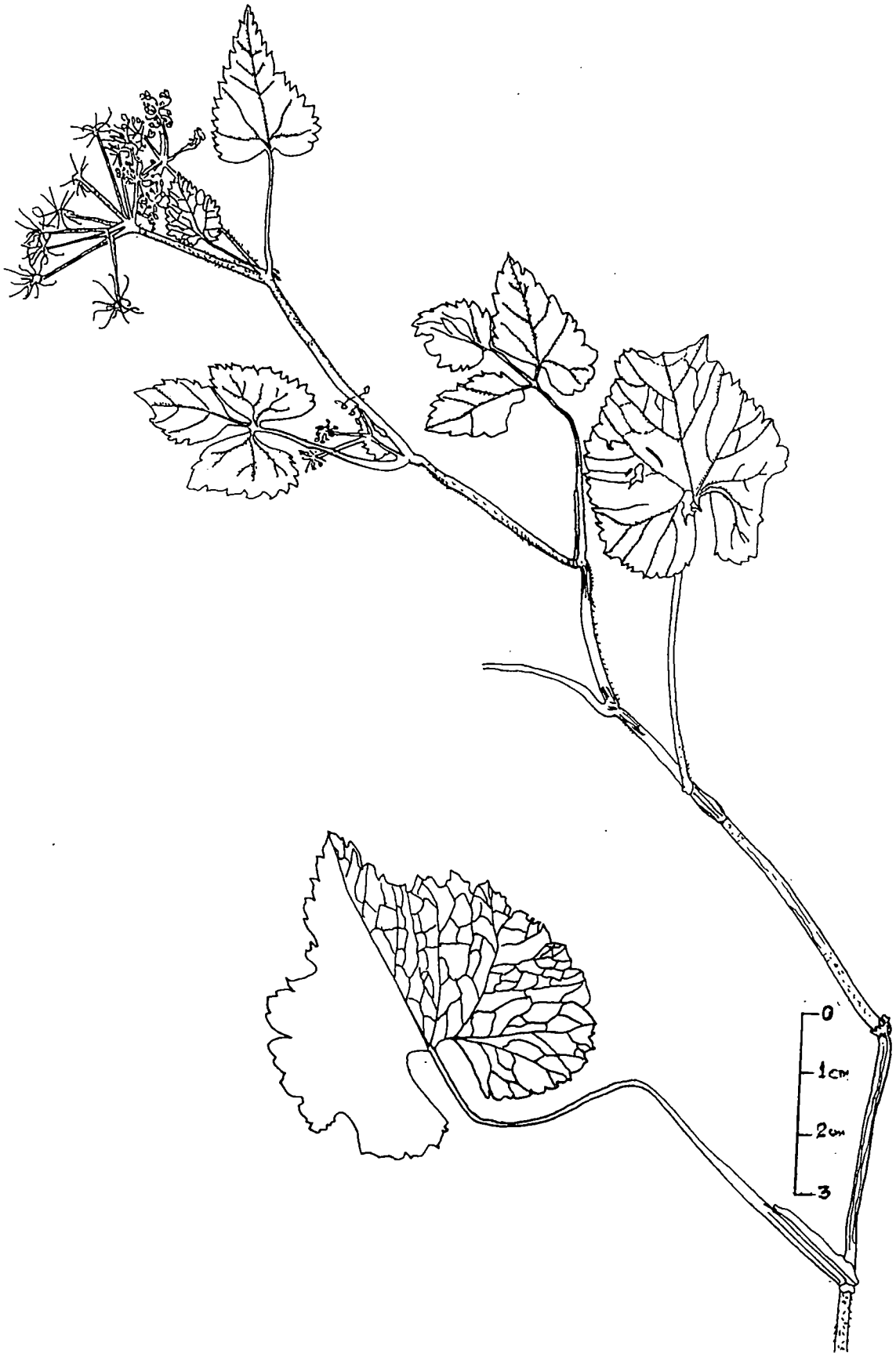
Ranunculus diffusus

PLATE XI



A flowering twig of *Agrimonia pilosa*

PLATE XII



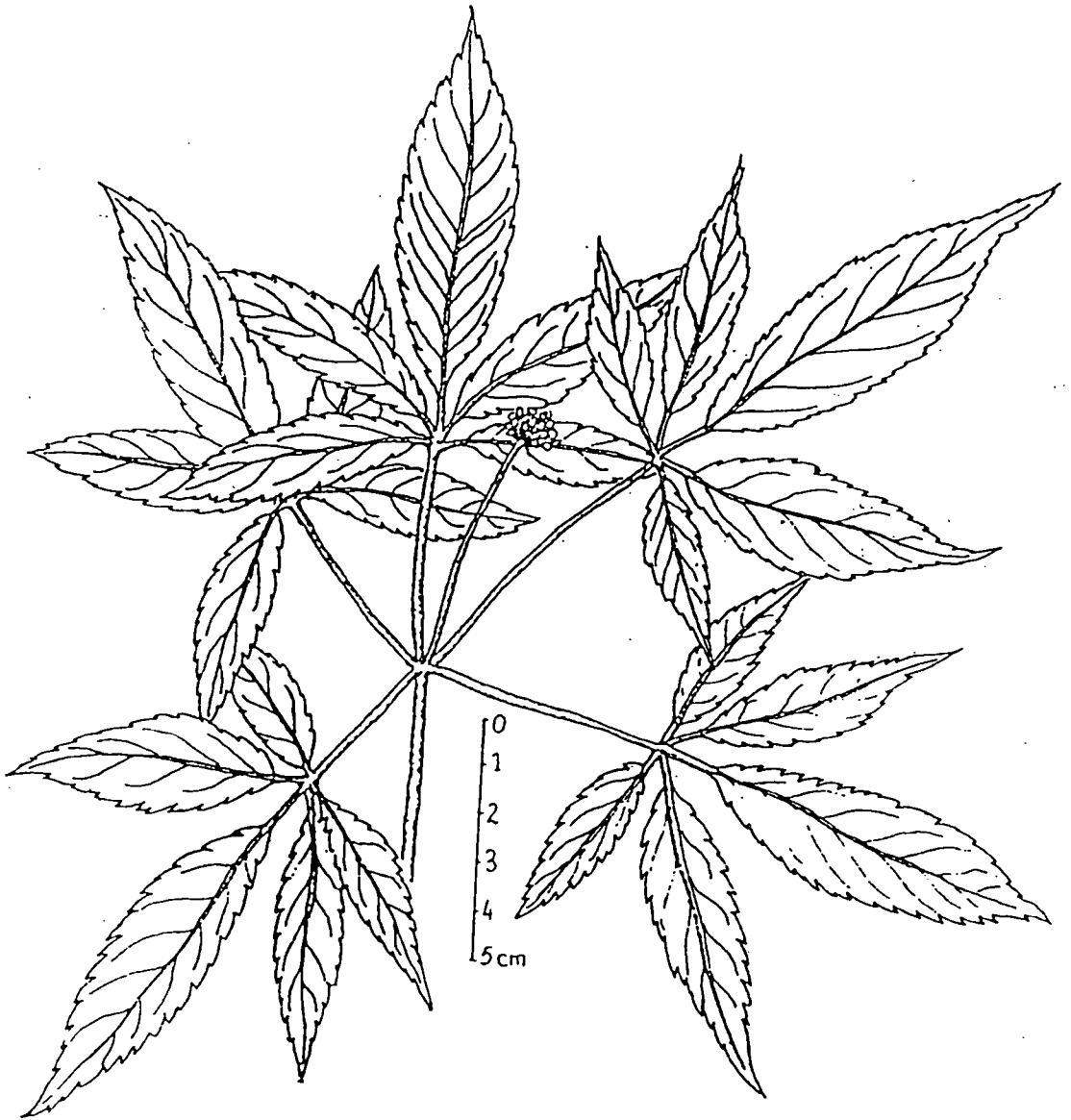
Pimpinella diversifolia

PLATE XIII



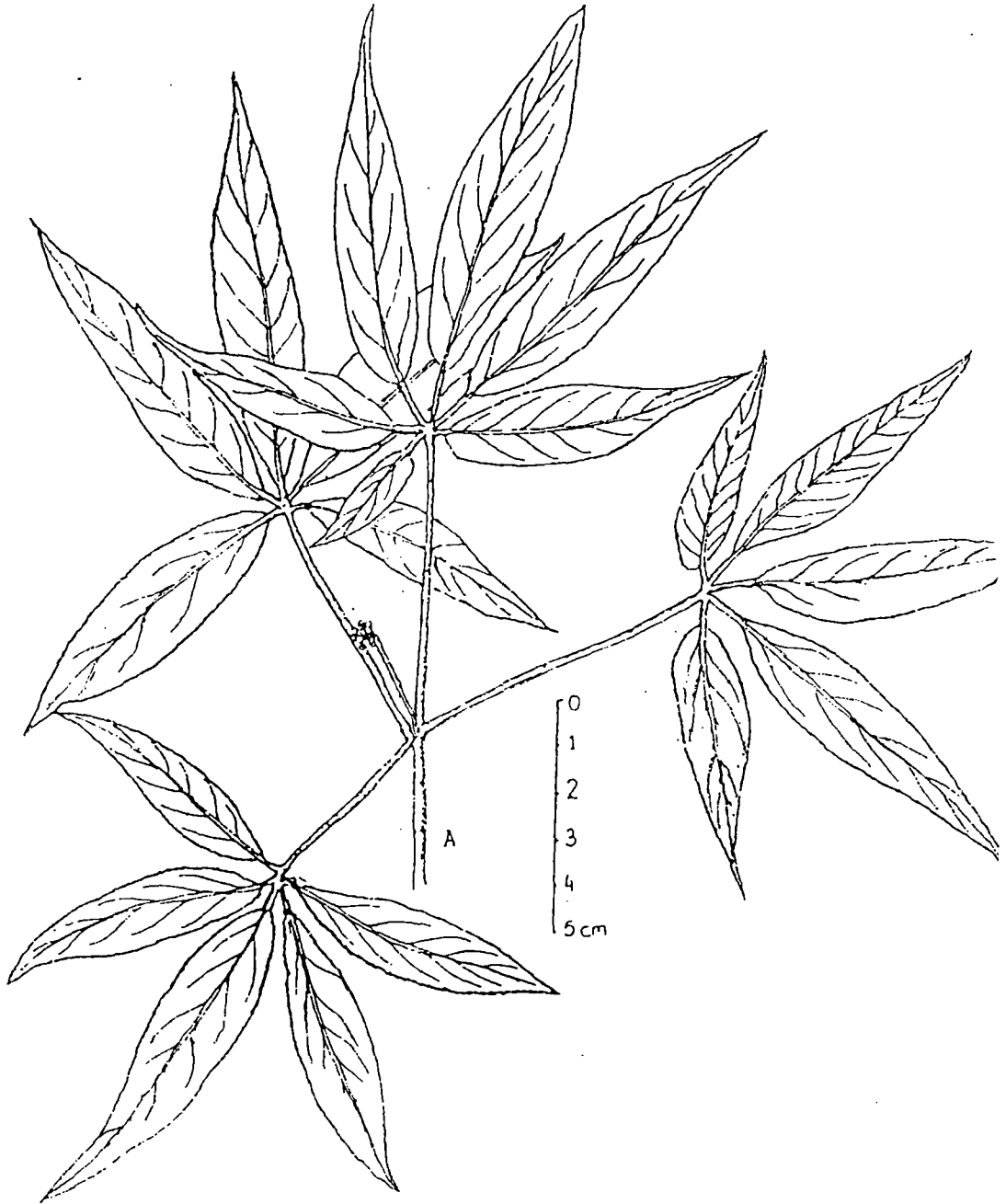
Pentapanax fragans: a flowering twig

PLATE XIV



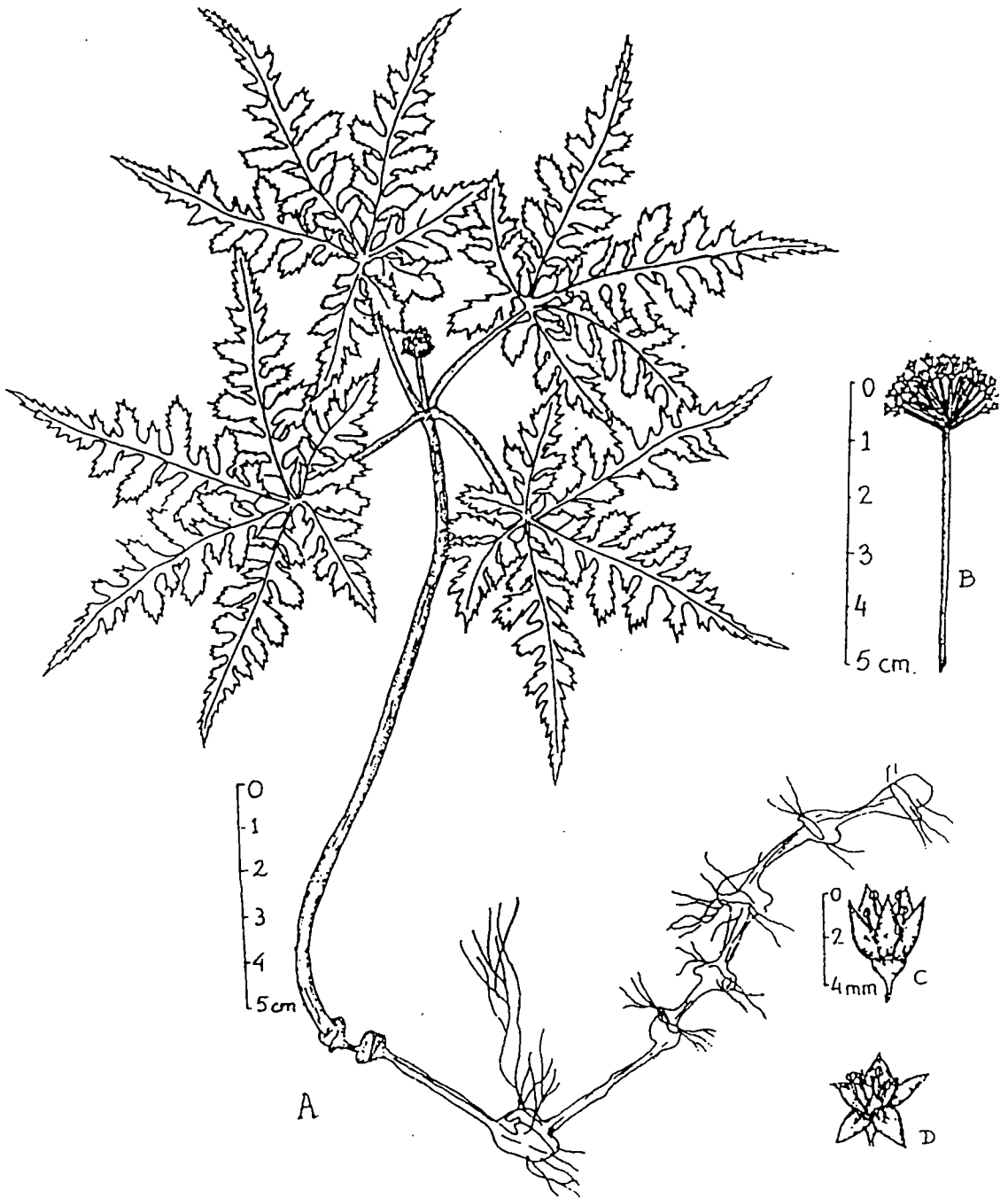
Panax pseudoginseng Wall. var. *angustifolius* f. *angustifolius*

PLATE XV



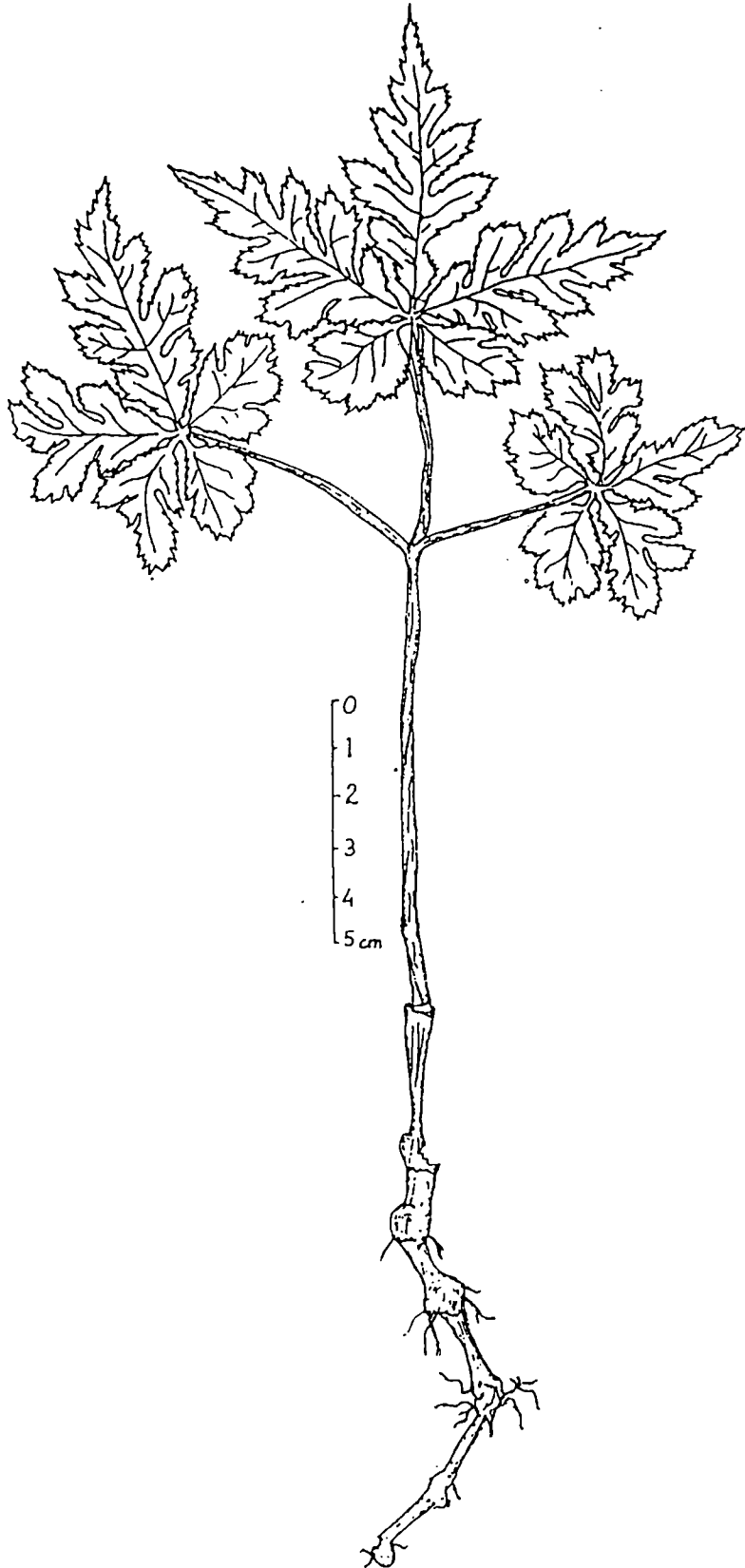
Panax pseudoginseng Wall. var. *angustifolius* f. *serratus*

PLATE XVI



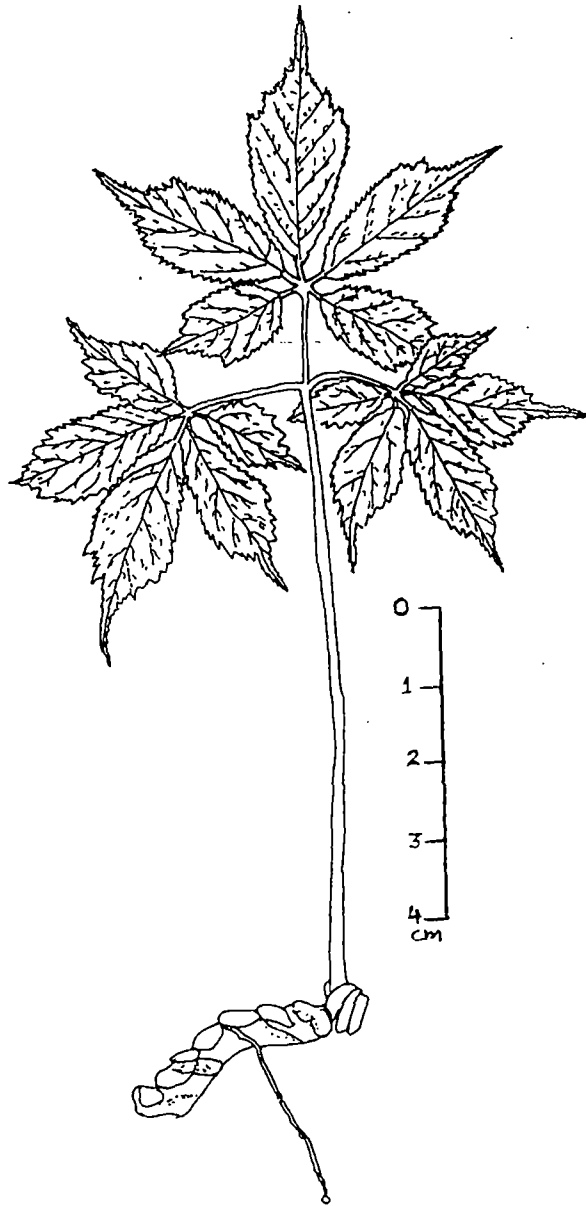
A. *Panax pseudoginseng* Wall. Var. *bipinnatifidus* f. *bipinnatifidus*: Habit
B. Inflorescence C. Young Flower D. Mature Flower

PLATE XVII



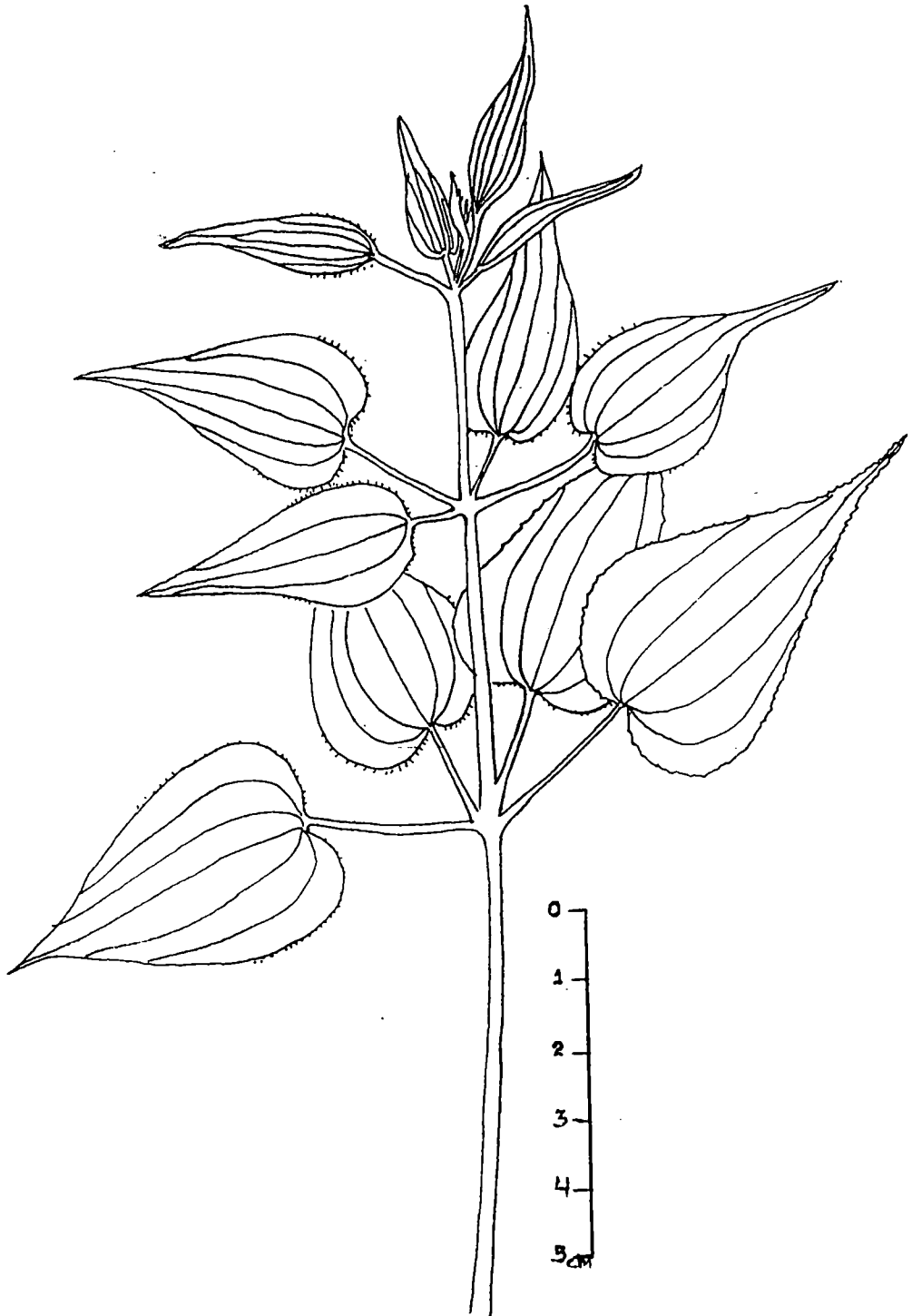
Panax pseudoginseng Wall. var. *bipinnatifidus* f. *neoraensis*

PLATE XVIII



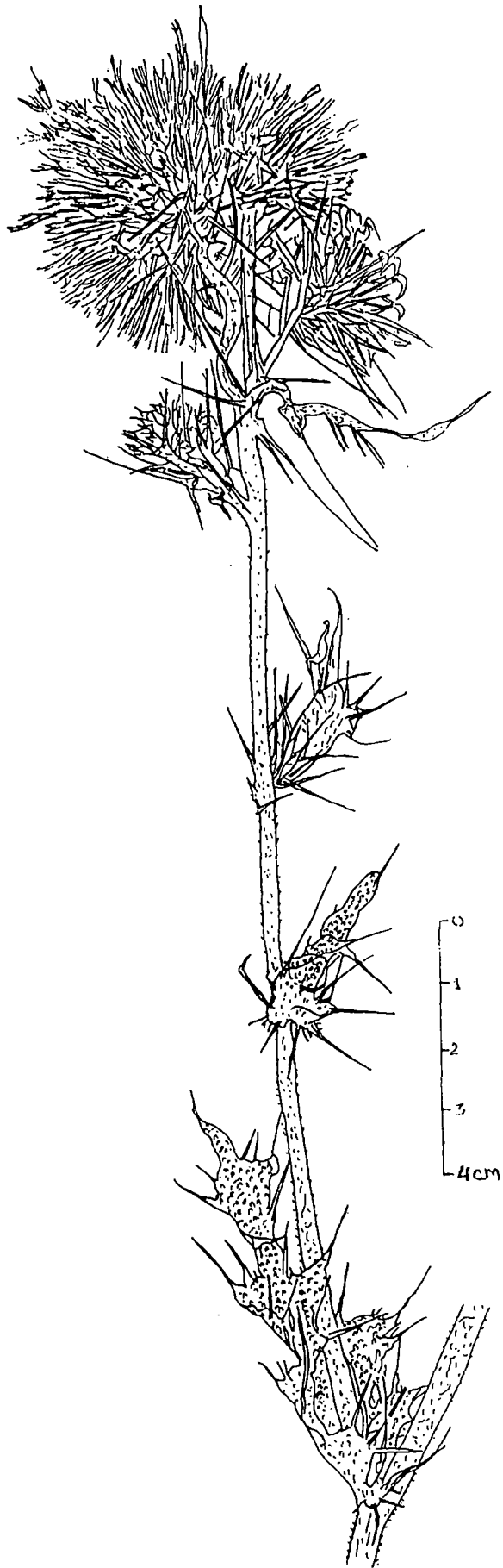
Panax pseudoginseng var. *angustifolius*: a young plant

PLATE XIX



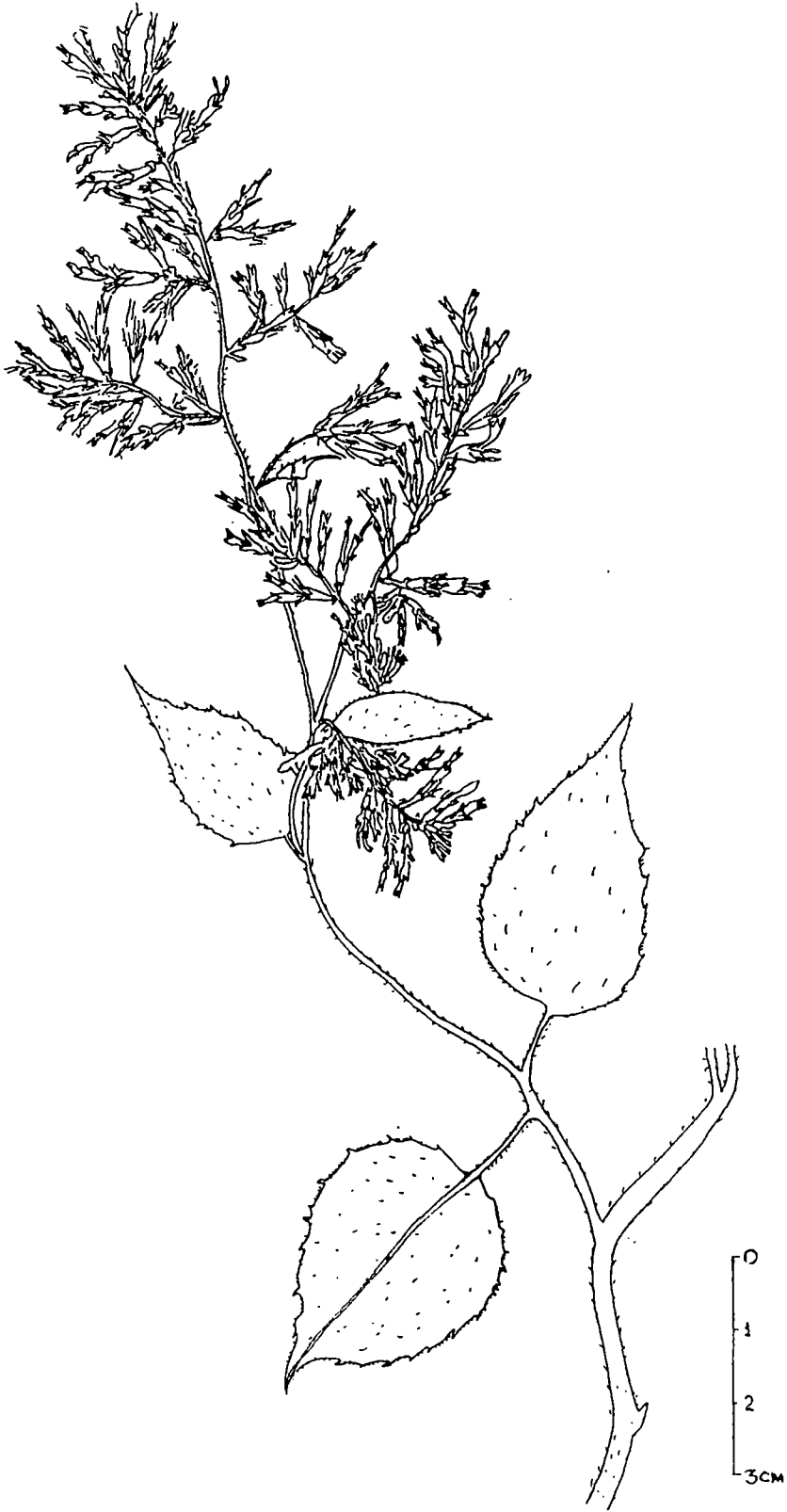
Rubia wallichiana

PLATE XX



Cirsium wallichii: a flowering twig

PLATE XXI



Cissampelopsis volubilis: a flowering twig

PLATE XXII



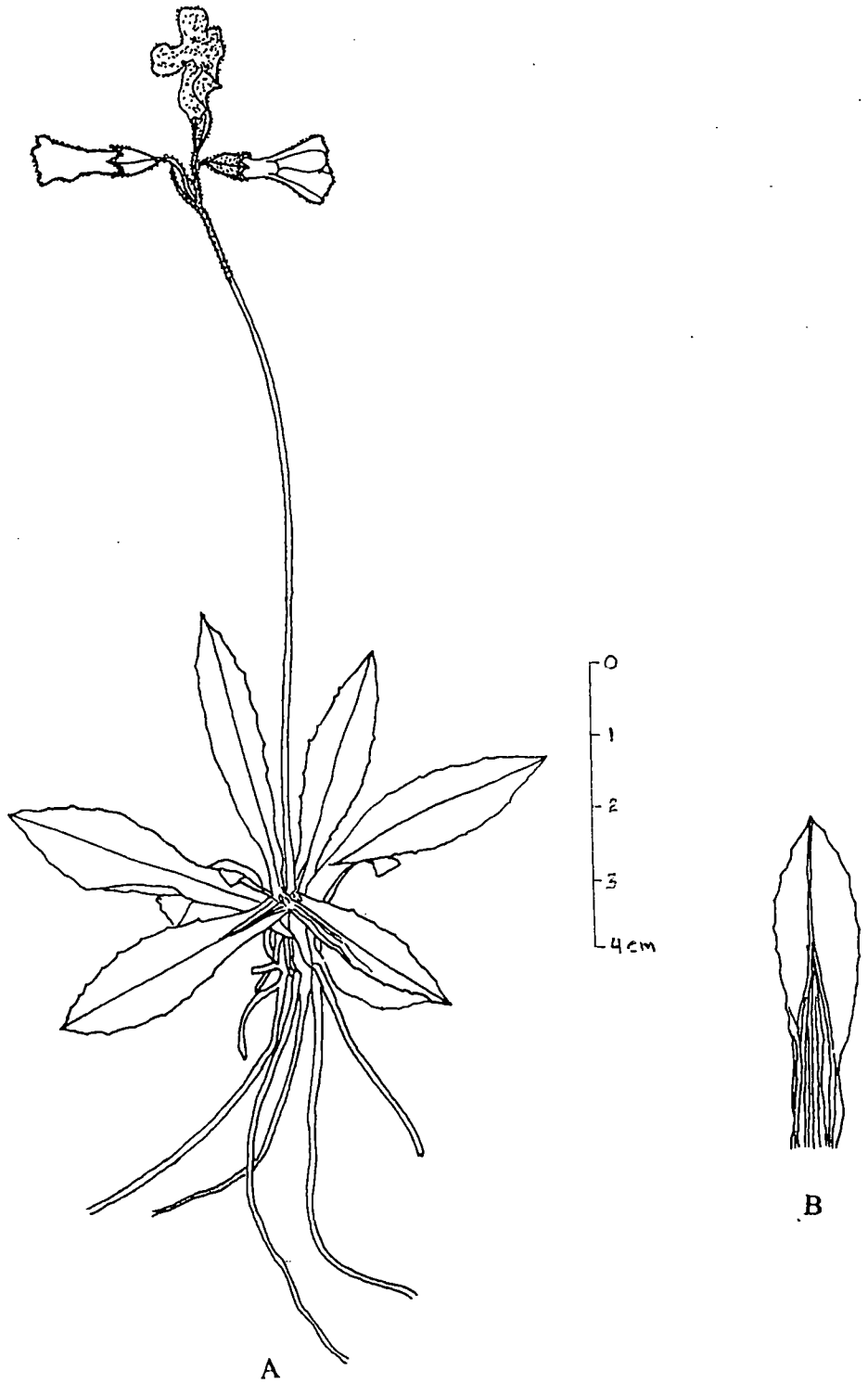
Myriactis nepalensis : A. Flowering twig B. Leaf

PLATE XXIII



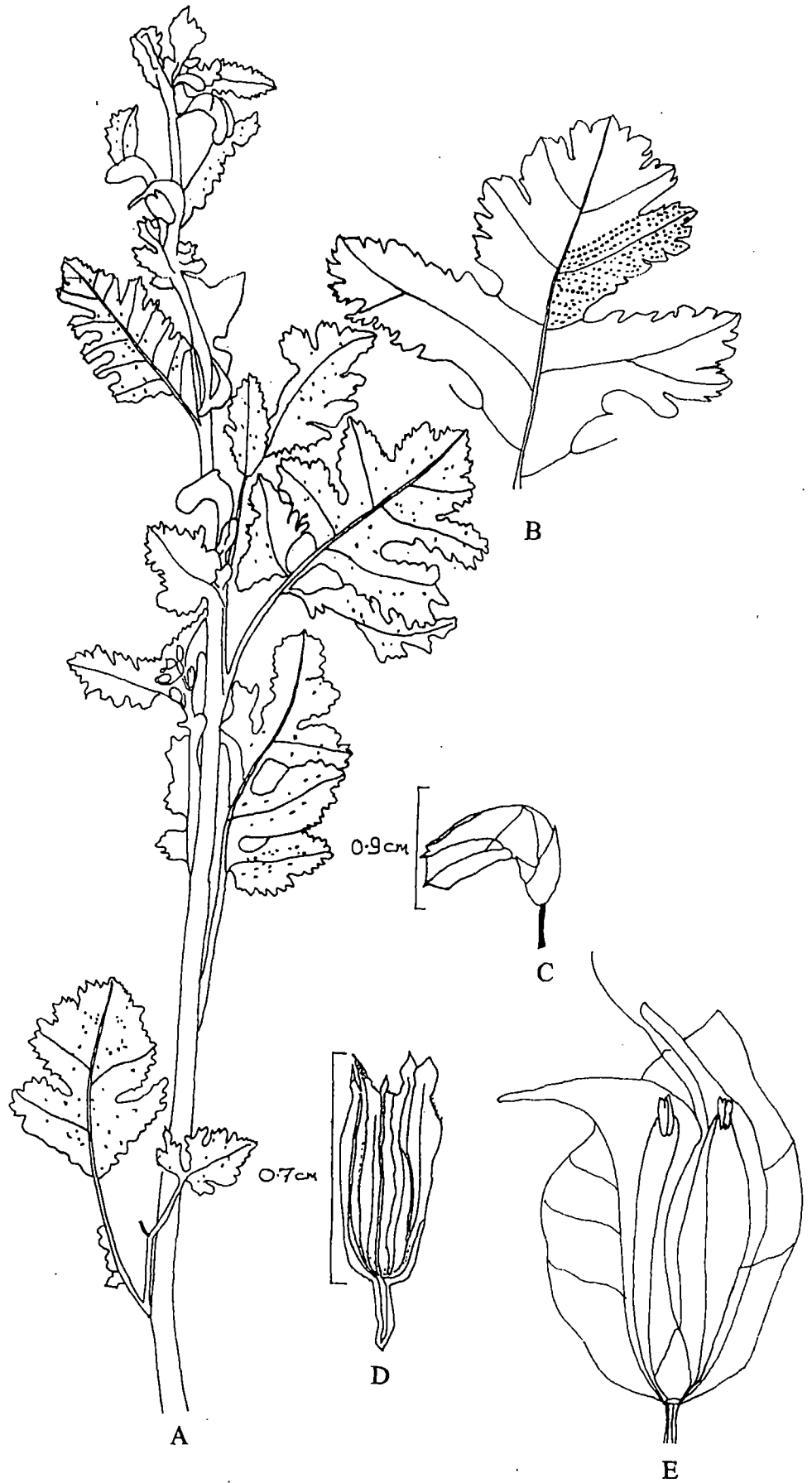
Synotis tetrantha: a flowering twig

PLATE XXIV



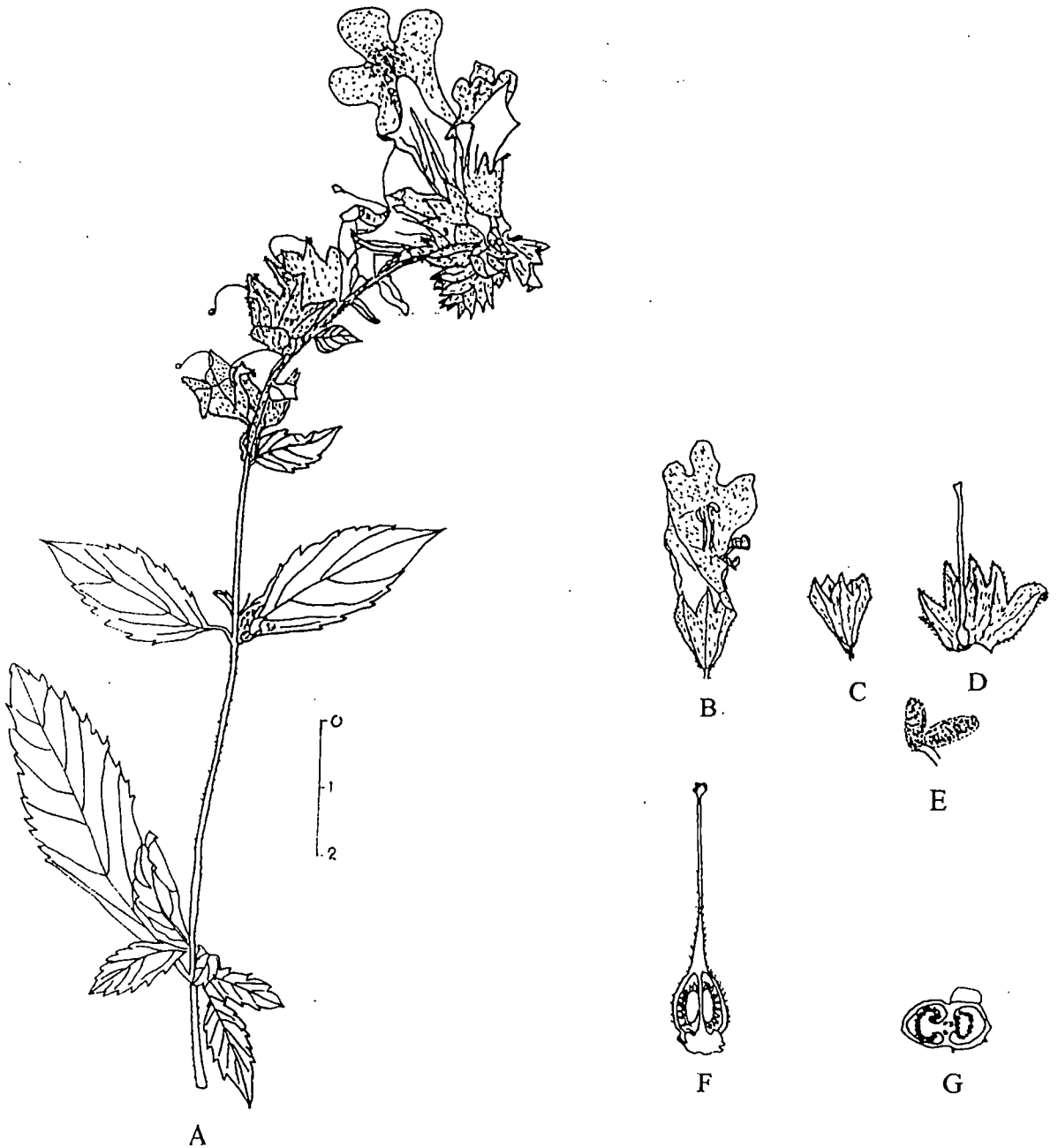
Primula kingii
A. Habit B. Leaf

PLATE XXV



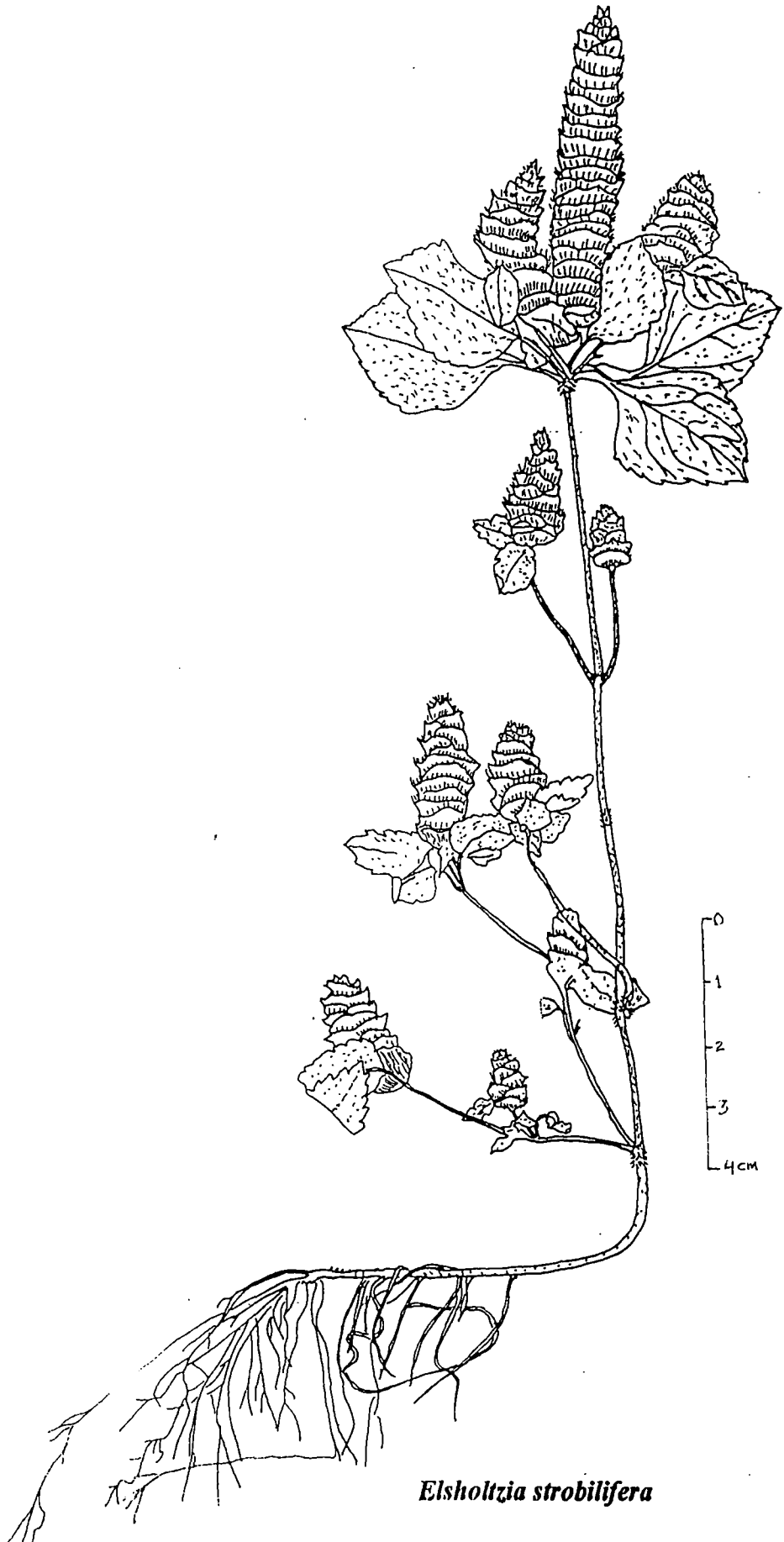
Pedicularis mollis: A. Habit B. Part of leaf C. Flower D. Calyx E. Flower split open showing androecium and pistil

PLATE XXVI



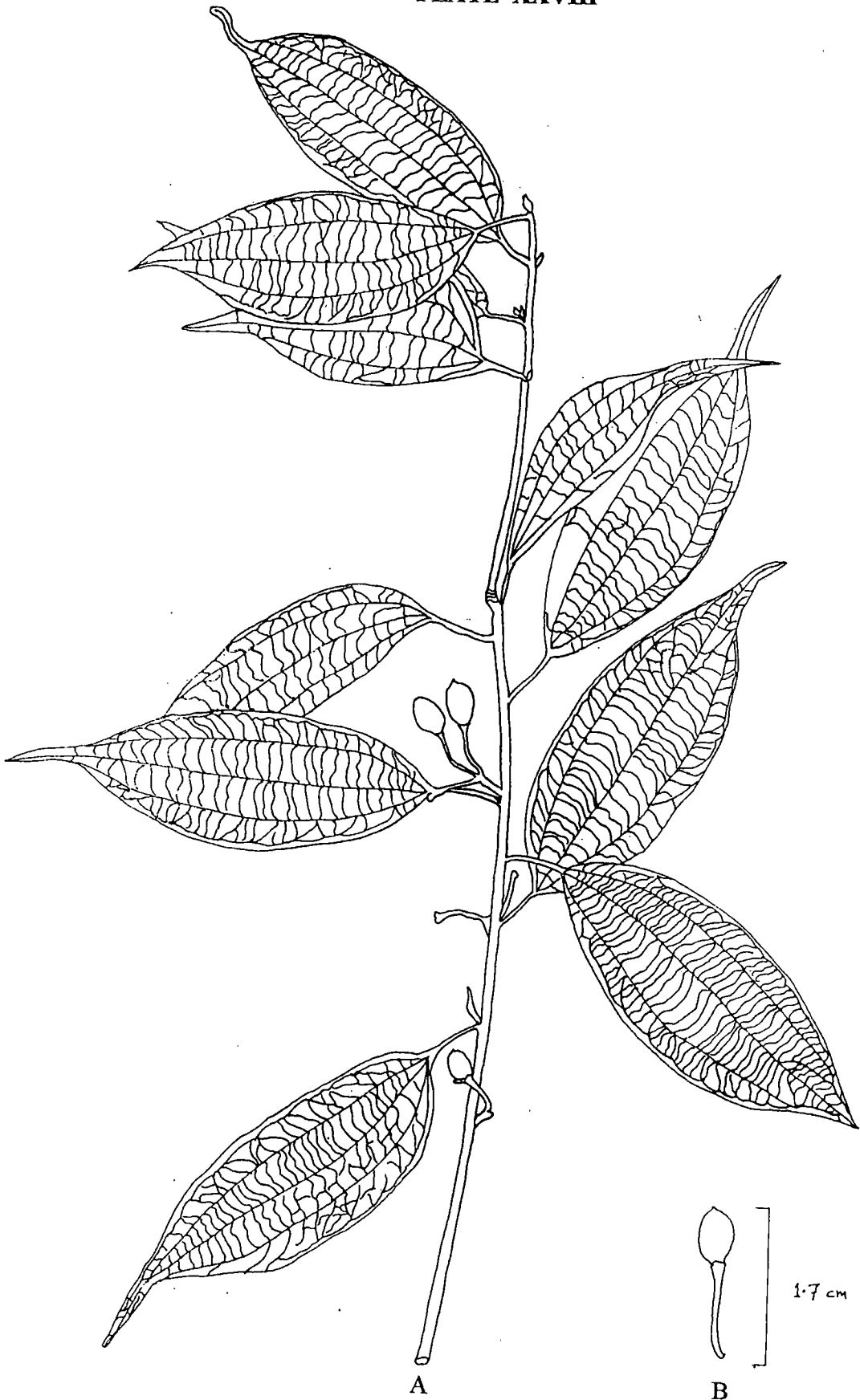
Lindenbergia grandiflora: A. Flowering twig B. Flower C. Calyx D. Opened calyx cup showing pistil E. Anthers attachment on filament F. L.s. of ovary G. T.s. of ovary

PLATE XXVII



Elsholtzia strobilifera

PLATE XXVIII



A *Cinnamomum impressinervium*: a fruiting twig
B. Fruit