

Publications

Acampe papillosa (Lindley) Lindley var. *flava* Das et al (var. nov.) from the Duars of West Bengal, India

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Abstract

Acampe papillosa (Lindley) Lindley var. *flava* AP. Das, T.K. Katham et S. Nirola, a new variety, is described from the Duars area of the Jalpaiguri District of West Bengal, India. The new variety differs from the type-variety mainly by the absence of stripes and blotches on distinctly yellow sepals and petals.

Key words: *Acampe papillosa* var. *flava* Das et al, New variety, West Bengal, India

INTRODUCTION

Acampe papillosa (Lindley) Lindley of Orchidaceae is a common epiphyte in Darjiling foot-hills, Terai and Duars region of West Bengal (Pears & Cribb 2002). In June 2009, some detached and fallen clumps of this orchid were rescued from the road-side near Nagrakata in Duars of Jalpaiguri district and were placed on nearby trees for future observation. These plants started flowering in the following November (2009). Interestingly, one of these clumps, though looking exactly similar in all vegetative characters but produced flowers those are having some easily recognizable differences from *Acampe papillosa*. In this plant the flowers are yellow and completely devoid of any blotch on any part of the flower and which are characteristic for *A. papillosa*.

This variant plant is now treated as a new variety of *Acampe papillosa* as follows:

Acampe papillosa (Lindley) Lindley, Fol. Orchid. *Acampe* 4:2, no.5.1853. var. *flava* var. nov.

A varietate typica floribus minoribus (c. 1.3 cm diam.), sepalis petalisque angustioribus aequae luteis, sepalis lateralibus asymmetricis, dorsalo oblanceolato, labello latiore pallide cremeo, omnibus partibus floralibus sine maculis purpuree brunneis propriis differt.

TYPUS: Nagrakata, Duars, Jalpaiguri, AP. Das & T.K. Katham 4193, dated 17.11.2009 (NBU).

The new variety differs from the type variety (*A. papillosa* var. *papillosa*) with a number of flower characters as presented in Table 1.

Table 1. Differences of *Acampe papillosa* var. *flava* Das et al from the Type variety.

Characters	<i>A. papillosa</i> var. <i>papillosa</i> (Fig. 1A)	<i>A. papillosa</i> var. <i>flava</i> (Fig. 1B)
Flowers	Larger \pm 1.8 cm across, floral parts less fleshy	Smaller \pm 1.3 cm across, floral parts much fleshy and shining
Sepals	Sepals 6-9 x 2-3 mm, similar, oblong-elliptic, obtuse, pale background transversely marked with linear purplish-brown blotches	Lateral sepals 6.6 x 2.5 mm, asymmetrically oblong-obtuse, evenly yellow throughout, markings or blotches absent

Characters	<i>A. papillosa</i> var. <i>papillosa</i>	<i>A. papillosa</i> var. <i>flava</i>
		Dorsal sepal 6.5 x 2 mm, oblanceolate, obtuse, evenly yellow throughout
Petals	Linear-elliptic, obtuse, 6-9 x 2-3 mm, transversely marked with linear	Linear-elliptic, obtuse, 6.3 x 1.5 mm, evenly yellow throughout
Lip	White, blotched with pink-purple, warty and papillose, 4-6 x - 25 mm	Uniformly pale-creamy, warty and papillose, blotches absent, 6 x 5 mm

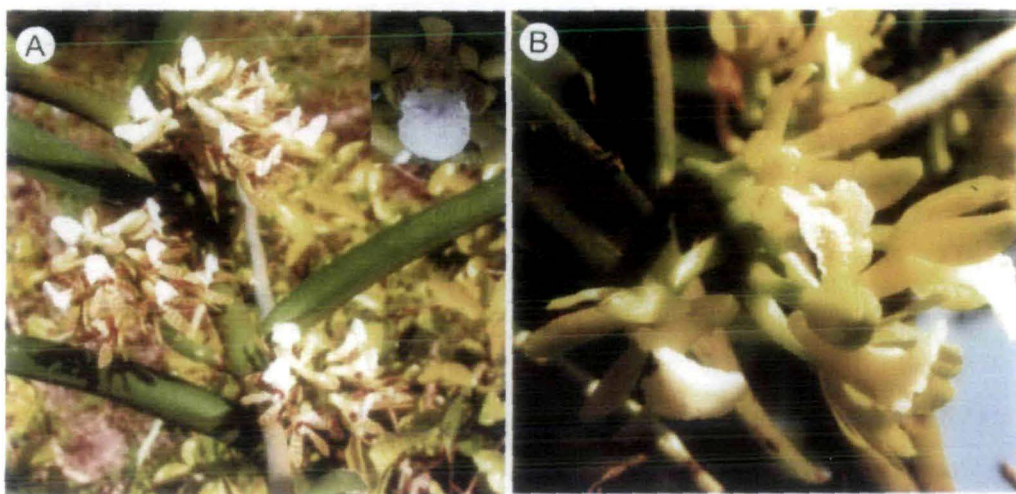


Fig. 1: A. *Acampe papillosa* var. *papillosa*; B. *Acampe papillosa* var. *flava*

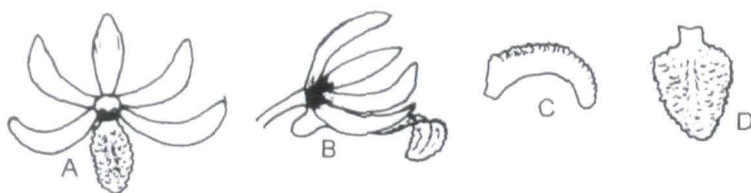


Fig. 2: *Acampe papillosa* var. *flava*. A. Flower in front view; B. Flower in lateral view; C. Labellum in lateral view; D. Labellum in front view.

The new variety can be easily recognised with its bright yellow and immaculate sepals and petals; lip white, inconspicuously stained with opaque yellow on disc or mesochile which is clearly visible on reflexion; the flowers are odoriferous.

Distribution: Extensive search for further specimens were conducted in numerous probable areas in tarai, Duars and hills of Darjiling, but no other plant with similar flowers were located. So, from the present knowledge regarding the distribution of this newly described variety it is now regarded as an endemic for the Duars region of West Bengal.

Acknowledgements

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An account of Cyperaceae A. L. Jussieu of Darjeeling District of Paschimbanga, India

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Abstract

The floristic diversity of Darjeeling region of Paschimbanga (formerly West Bengal) is well known. The hills of Darjeeling are forming a part of Eastern Himalaya. Vast differences in altitudinal ranges, extreme variation in temperature, climate soil character, etc. have created a wide range of variation in habitat structure. The Cyperaceae A. L. Jussieu has emerged to be the third dominant family amongst monocots in the district of Darjeeling after Poaceae and Orchidaceae. Out of about 72 genera and 4000 species world wide and about 38 genera and 485 species in India, a sizeable number of 134 species from 19 genera have been recorded from the study area. The members of the Cyperaceae are widely distributed and are present almost in all types of vegetation starting from hot tropical to chilling sub-alpine zones. Species of *Schoenoplectus*, *Eleocharis*, *Scirpus*, *Cyperus* etc. are most dominant in lower elevations while *Carex*, *Kobresia* etc. are mostly present in sub-alpine zone. Habitat wise they may be aquatic, marshy, mesophytic, lithophytic and some times even epiphytic.

The present article emphasizes upon the distribution pattern, dominance, RET species, endemism etc. of this important plant family in Darjeeling district.

Key words: Cyperaceae, Darjeeling flora, 19 genera, 134 species

INTRODUCTION

Geographically the Darjeeling district of the Indian state of Paschimbanga (formerly West Bengal) is located between 26° 31' 053" to 27° 13' 10" N latitudes and 87° 59' 30" to 88° 5' 31" E longitudes. It comprises an area of 3351.9 km² of which about 1st (2417.3 km²) lies in the hills and rest (934.6 km²) in plains. The forest cover of the district is 1,455 km² [46.20%] (Bhujel 1996). The altitude ranges from about 120 m amsl at Bidhan Nagar of Siliguri Terai to 3,660 m amsl at Sandakphu. As the area is expanded from the Himalayas to the Terai of Gangetic Plains, it possesses a vast variation in topographical, altitudinal, geographical and climatic features which gave rise to extremely rich vegetation and plant diversity in the area. The area is located within the IUCN recognized Himalaya Biodiversity Hotspot.

While working on the flora of different parts of the country and adjoining countries, many renowned botanists have explored this area at least since early 19th century (Das 1995, 2004). Among the well known explorers Clarke (1877, 1886), Hooker (1872 – 1897), Hara (1966, 1971), Hara *et al* (1978, 1979, 1982), Ohashi (1975), Koyama (1978), Mukherjee (1988), Noltie (1994), Das (1986, 1995, 2004), Hajra & Verma (1996), Rai (2001) and Ghosh (2006) has contributed considerably towards the floristic exploration of the area.

Cyperaceae A.L. Jussieu, commonly know as the sedge family is the third dominant family amongst the monocotyledonous flora in the region after Poaceae and Orchidaceae. Worldwide 72 genera with about 4000 species of the family were reported (Mabberley 2005), of which 38 genera with about 485 species are known to grow in India (Karthikeyan *et al* 1989).

Most of the members of Cyperaceae love to grow in wet and marshy places, though the number of mesophytic species are not less. Species of *Eleocharis*, *Fuirena*, *Hypolytrum*, *Lipocarpha*, *Rhynchospora*, *Schoenoplectus*, *Scirpus* etc. grow in wet and marshy lands, low lands, ditches, along streams, rice fields etc. whereas *Actinoscirpus*, *Carex*, *Erioscirpus*, *Kobresia*, *Pycreus*, *Scleria* etc. prefer dry land habitat and members of *Bulbostylis*, *Cyperus*, *Fimbristylis*, *Kyllinga*, *Isolepis* etc. like the both. Some species of *Cyperus*, *Carex* etc. are often found growing lithophytic and some times even epiphytically. In the Terai, the sedge flora covers most of the ground vegetation. It seems to be natural phenomenon that many open waste and unused lands the ground flora is fully dominated by the members of Cyperaceae. Most species of *Carex*, *Kobresia* etc grow in the temperate regions. It is by virtue the nature of the area has provided almost all the favourable conditions for the occurrence of these plants, therefore the Cyperaceae has emerged as the 3rd dominant family amongst monocots in the district of Darjeeling (Hara 1966, 1971; Ohashi 1975; Noltie 2000).

MATERIAL AND METHODS

Random collections were made while exploring the monocotyledonous flora of the Darjeeling district visiting the different places in different seasons during 2002 to 2009. The collected specimens were processed following the herbarium techniques of Jain & Rao (1977) and identified using different literature including Hooker (1893, 1894), Hara (1966, 1971), Ohashi (1975), Hara *et al* (1978), Rao & Verma (1982) and Noltie (2000). Specimens were matched at CAL and NBU-Herbarium. The identified sedges were studied properly mainly in relation to their distribution pattern mainly with help of literature and herbarium study. After completion of the work specimens will be deposited in the NBU-Herbarium.

RESULTS AND DISCUSSIONS

The present survey recorded the occurrence of 134 species and varieties of sedges covering 19 genera [Appendix -I]. Of these *Carex* is best represented with 40 species and is followed by *Cyperus* (29 sp.), *Fimbristylis* (15 sp.), *Pycreus* (8 sp.), *Scleria* (5 sp.), *Kyllinga* (5 sp.) and *Kobresia* (4 sp.). In addition, *Eleocharis* and *Schoenoplectus* are represented by 3 species each. Five genera [*Bulbostylis*, *Fuirena*, *Lipocarpha*, *Rhynchospora* & *Scirpus*] are with 2 species each and the remaining four genera [*Actinoscirpus*, *Erioscirpus*, *Hypolytrum* & *Isolepis*] are represented by solitary species only (Fig. 1).

Like the floristic elements in any vegetation, sedges in Darjeeling district are also locally not equally distributed. This may be generally analyzed from two angles, overall observation of the frequency of occurrence or availability and with the change of altitude in the habitat. From the availability point one species may be:

Abundant: Some members of the family grow abundantly as ground flora which covers different land forms dominating and intermixing with other flora. These include *Cyperus compressus*, *Fimbristylis acuminata*, *F. aestivalis*, *F. dichotoma*, *Kyllinga bervifolia*, *K. nemoralis*, *Pycreus pumilus*, *P. Sanguinolentus* etc.

Very common: *Bulbostylis barbata*, *Carex cruciata*, *C. filicina*, *C. cuspidata*, *Cyperus cyperinus*, *C. cyperoides*, *C. distans*, *C. haspan*, *C. iria*, *C. laxus*, *C. pilosus*, *Fimbristylis littoralis*, *Pycreus stramineus* etc.

Common: The common Cyperian species include *Bulbostylis densa*, *Carex baccans*, *C. condensata*, *C. decora*, *Cyperus compactus*, *C. difformis*, *C. digitatus*, *C. pangorie*, *C. paniceus*, *Eleocharis retroflexa*, *E. tetraquetra*, *Erioscirpus comosus*, *Fimbristylis complanata*, *F. miliacea*, *Fuirena ciliaris*, *Lipocarpha chinensis*, *Pycreus pumilus*, *Schoenoplectus juncoides* etc.

Rare: The occurrence of some species of sedges appears to be rare in the study area, like *Carex odorhampha*, *Scleria biflora*, *S. caricina* etc. and some species which sparsely found in few places only like *Scleria lithosperma*, *Actinoscirpus grossus*, different species of *Carex* like *C. duthiei*, *C. fucata*, *C. fusiformis*, *C. munda*, *C. obscura*, *C. rara*, *C. vesiculosa*, *Cyperus involucratus*, *C. niveus*, *C. nutans*, *C. silletensis*, *F. thomsonii*, *Hypolytrum nemorum*, *Kobresia curticeps*, *K. fragilis*, *K. pygmaea*, *K. uncinoides*, *Kyllinga squamulata*, *K. tenuifolia*, *Lipocarpha squarrosa*, *Pycreus diaphanus*, *Rhynchospora rugosa* var. *griffithii*, *R. rubra*, *Scirpus ternatanus* etc.

Endangered: Due to the abundance and less usefulness for the plant hunters, no such great threat has been arisen for the members of this taxon.

Altitudinal Distribution

Altitude is one important factor for the distribution of different species especially in the Himalayas as here the change of altitude is inversely proportional with the temperature (Fig. 6). The tropical environment of Terai can not support the same species as those can grow in high altitude areas in this district like Sandakphu, Phalut, etc. However, there are some species with quite broad ecological amplitude. Majority of the species do respond closely with the change of altitude. So, following type of altitude related distribution can be observed:

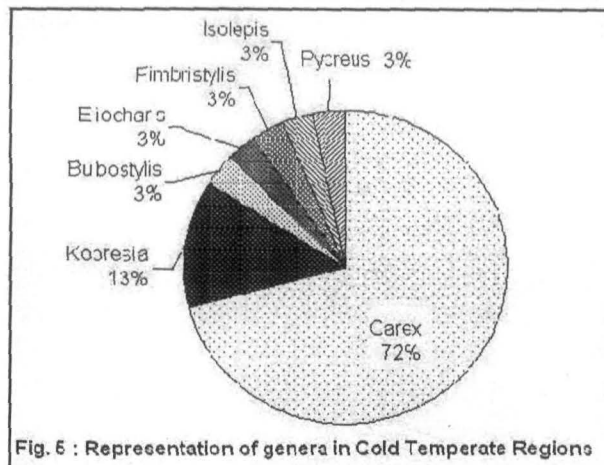
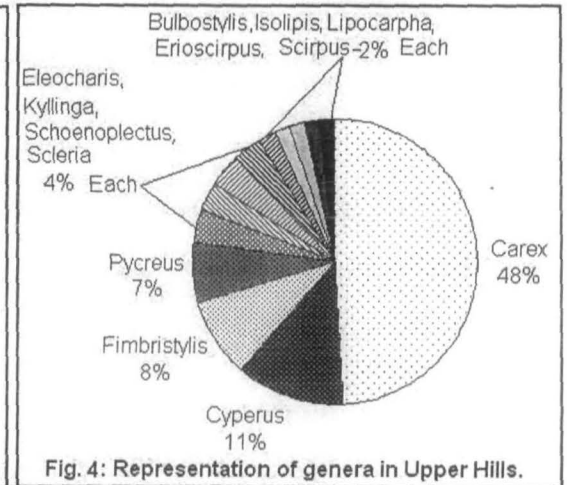
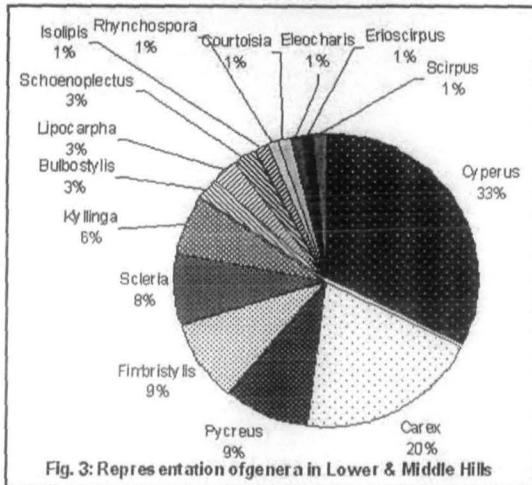
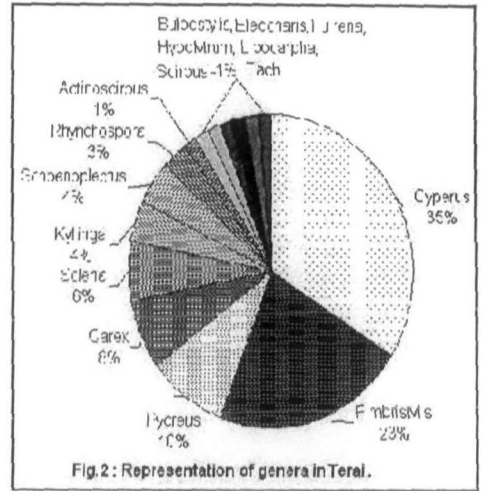
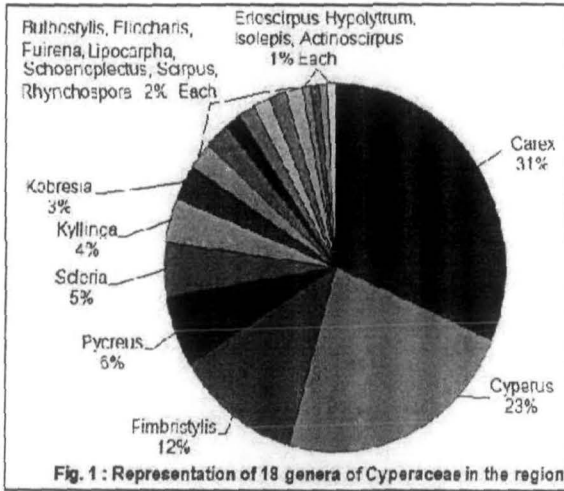
Plains of Terai (upto 200 m): The hot tropical conditions favour the occurrence of large number of species. *Cyperus* is with highest 35 % dominance succeeded by *Fimbristylis* (23 %) and *Pycreus* (10 %) of the total sedge flora of Darjeeling (Fig: 2). Some such important species includes *Actinoscirpus grossus*; *Bulbostylis barbata*; *Carex stramentita*; *Cyperus castaneus*, *C. compactus*, *C. compressus*, *C. cuspidatus*, *C. cyperinus*, *C. difformis*, *C. digitatus*, *C. distans*, *C. halpan*, *C. haspan*, *C. laxus*, *C. niveus*, *C. pangorie*, *C. paniceus*, *C. pilosus*, *C. pseudokyllingoides*, *C. rotundus*, *C. squarrosus*, *C. tenuiculmis*, *C. tenuispica*, *C. thomsonii*; *Eleocharis retroflexa*; *Fimbristylis acuminata*, *F. aestivalis*, *F. complanata*, *F. dichotoma*, *F. filifolia*, *F. littoralis*, *F. miliacea*, *F. schoenoides*, *F. tetragona*; *Fuirena umbellata*; *Hypolytrum nemorum*; *Kyllinga bervifolia*, *K. nemoralis*, *K. odorata* subsp. *cylindrica*; *Lipocarpha chinensis*; *Pycreus polystachyos*, *P. pumilus*, *P. stramineus*, *P. sanguinolentus*; *Rhynchospora rugosa*, *R. rubra*; *Schoenoplectus atriculatus*, *S. juncooides*, *S. mucronatus*; *Scirpus michelianus*; *Scleria biflora*, *S. caricina*, *S. terrestris*, *S. levis*.

Lower to Middle hills (200 – 1500 m): The characterist species of this region are *Carex cruciata*, *C. speciosa*, *C. thomsonii*, *Cyperus cyperoides*, *C. involucratus*, *C. nutans*, *C. sikkimensis*, *Kyllinga tenuifolia*, *Lipocarpha squarrosa*, *Scleria lithosperma* etc. (Fig. 3)

Upper hills to Sub-alpine (1500 m and above): With gradual decrease in temperature and increase in altitude the dominance of *Carex* species also increases. In the upper hills, upto 2700m, the scenario totally changes regarding that of Terai and the lower hills with 48 % representation of *Carex* and only of 11 % *Cyperus* and 8 % of *Fimbristylis* (Fig: 4). Finally in the cold temperate region, i.e. above 2700 m altitude, no more *Cyperus* is found but different species of *Kobresia* are seemed to be growing frequently. Here, both the genera *Carex* (72%) and *Kobresia* (13%) together dominate all other cyperian genera (15%). Most frequent species of the cold temperate region are *Carex decora*, *C. duthiei*, *C. fucata*, *C. fusiformis*, *C. fusiformis* subsp. *finitima*, *C. inanis*, *C. inclinis*, *C. munda*, *C. muricata*, *C. nubigena*, *C. obscura*, *C. odorhampha*, *C. polycephala*, *C. pulchra*, *C. rara*, *C. remota*, *C. setigera*, *C. setosa*, *C. speciosa*, *C. teres*, *C. vesiculosa*; *Kobresia fragilis*, *K. pygmaea*, *K. uncinoides*; *Pycreus diaphanus* etc (Fig: 5).

Wide vertical distribution: There is only one species, *Fimbristylis dichotoma* that is found from Terai to cold temperate region (100 – 3100 m). However, species like *Cyperus compressus*, *C. cuspidatus*, *C. difformis*, *C. rotundus*, *C. squarrosus*, *C. tenuiculmis*, *Fimbristylis*

aestivalis, *F. miliacea*, *Kyllinga complanata*, *K. bervifolia*, *Lipocarpha chinensis*, *Pycreus flavidus*, *P. sanguinolentus*, *Schoenoplectus juncooides*, *S. mucronatus* etc grow in areas with altitude ranging from 120 to 2700m; and some other species like *Carex filicina*, *Eleocharis tetraquetra* etc. are found growing between 200 and 2700 m.



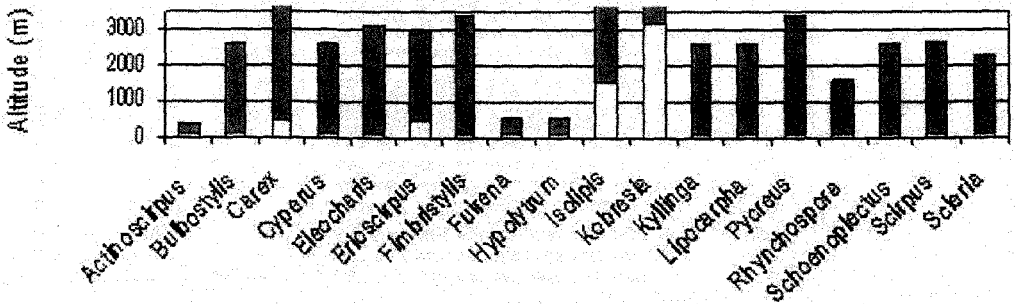


Fig. 6. Altitudinal distribution pattern of different genera of Cyperaceae

Endemism

Cyperaceae being a cosmopolitan family very few species show endemism to Himalayan region. However, the endemism in sedges in this locality may be studied as (i) Endemic to Darjeeling-Sikkim Himalayas: two species [*Carex teres*, *Cyperus sikkimensis*]; (ii) Endemic to Eastern Himalaya (Nepal to Bhutan): such as *Carex daltonii*, *C. decora*, *C. fucata*, *C. fusiformis* ssp. *fusiformis*, *C. insignis*, *C. munda*, *C. olivacea*, *C. polycephala*, *C. pulchra*, *Fimbristylis filifolia* & *F. stolonifera*. (iii) Endemic to Eastern Himalaya but extending to NE India: *Fimbristylis filifolia*, *F. fusciniux* and *Carex polycephala*; (iv) Endemic to the Himalayas (Kashmir to Arunachal Pradesh): like *Carex inanis*, *C. inclinis*, *C. setigera*, *Fimbristylis fusciniux* etc.

The data shows that most of the species of *Carex* found in the region are endemic to Himalayas. Most of the plants grow within the Asian boundaries from W to SE Asia and up to Australia and many are pantropical and cosmopolitan in their distribution.

Table 1. Comparison of Cyperaceae of Darjeeling District with other floras of adjoining regions [Abbreviations used: FEH = Flora of Eastern Himalaya (Hara 1966, 1971 & Ohasi 1975); FS = Flora of Sikkim (Hajra & Verma 1996); FB = Flora of Bhutan (Noltie 1994); PW = Present Work]

GENERA	FEH	FS	FB	PW
<i>Actinoscirpus</i>	0	0	1	1
<i>Bulbostylis</i>	2	2	2	2
<i>Blismus</i>	0	1	1	0
<i>Carex</i>	54	67	73	41
<i>Courtoisia</i>	1	0	0	1
<i>Cyperus</i>	25	19	25	29
<i>Eleocharis</i>	2	4	6	3
<i>Erioscirpus/ Eriophorum</i>	3	2	2	1
<i>Fimbristylis</i>	9	9	17	18
<i>Fuirena</i>	0	0	2	2
<i>Hypolytrum</i>	0	0	1	1
<i>Isolepis</i>	0	1	4	1
<i>Kobresia</i>	14	22	22	4
<i>Kyllinga</i>	0	3	5	5
<i>Lipocarpa</i>	0	1	2	2
<i>Mariscus</i>	0	12	0	0
<i>Pycreus</i>	0	11	8	8
<i>Rhynchospora</i>	0	5	2	2
<i>Schoenoplectus</i>	0	5	4	4
<i>Scirpus</i>	5	1	2	2
<i>Scleria</i>	0	4	6	7
Total:	9 # 115	17 # 169	19 # 185	19 # 134

Richness of Sedge Flora

Richness of the sedge flora recorded from the district of Darjeeling can be realized if it is compared with the other published floras covering this region. According sedge flora of Darjeeling has been compared with the floras of *Eastern Himalaya* (Hara 1966, 1971; Ohashi 1975); *Flora of Sikkim* (Hajra & Verma 1996) and *Flora of Bhutan* (Noltie 2000) in Table 1. Eastern Himalayan flora recorded 115 species of nine genera, Sikkim flora recorded 169 species of 17 genera and the Bhutan flora has recorded 185 species covering 19 genera of Cyperaceae. One needs to remember that all these three floras under discussion are covering much larger areas. Floras of Bhutan and Eastern Himalaya are also covering the Darjeeling region. The present survey in Darjeeling district has recorded as much as 134 species covering 19 genera of Cyperaceae. This is a clear indication that the sedge flora of Darjeeling is extremely rich. This is probably due the presence of wide diversity of habitat structure in the study area.

Importance

The members of Cyperaceae occupy the most important position in the vegetation along with the grasses of the area. Sedges cover most of the open lands, grasslands, forest floors, river banks and marshlands and are import fodder for the grazing animals.

CONCLUSION

The study revealed that the species of Cyperaceae are mostly dispersed towards lower elevations hence the number of species decrease along increase in altitude. *Carex* is the genus which has most endemic species, most of its members are confined within the Himalayas and very few have spread elsewhere. *Cyperus*, *Pycneus*, *Eleocharis*, *Kyllinga*, *Fimbristylis* etc. are the most important genera in the Terai & lower hills and *Carex*, *Kobresia*, *Isolepis* in the upper hills. *Carex* is the largest genus of the family, following *Cyperus* and *Fimbristylis* having maximum no. of species. The members of the family are one of the important floras in the grasslands so they provide most import fodder for the grazing animals. Maximum species grow in the marshes so the family is called as sedge family. They grow as weed crop fields.

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APPENDIX – I.

Members of Cyperaceae recorded from the Darjeeling district of Paschimbanga along with their distribution and status in the vegetation

[Abbreviations used: **General distribution:** Afg = Afghanistan, Afr = Africa, As = Assam, Ast = Australia, BD = Bangladesh, Bt = Bhutan, C = Central, Ch = China, Dj = Darjeeling, Eur = Europe, Him = Himalaya, In = India, In-Ch = Indo-China, In Sbcont = Indian Subcontinent, Indsia = Indonesia, Intr = Introduced, Jap = Japan, Jv = Java, Kh Hl = Khasia Hills, Ksm = Kashmir, Kum = Kumaon, Mad = Madagascar, Maur = Mauritius, Mly = Malaysia, Myn = Myanmar, N = North, NGun = New Guinea, Nilg = Nilgiri, Np = Nepal, NZ = New Zealand, O = Old, Pak = Pakistan, Phil = Philippines, S = South, Singpr = Singpr, Sk = Sikkim, SL = Sri Lanka, Slmn Ild = Solomon Island, Tbt = Tibet, Temp = Temperate, Thl = Thailand, Tr & STR = Tropical & Subtropical, Vit = Vietnam, W = West, WInd = W Indies. **Altitudinal distribution:** T = Terai (up to 200m); L = Lower Hills (200-700m); M = Middle Hills (700-1500m); U = Upper Hills (1500-2700m); C = Cold Temperate Region (2700-3636m). **Status:** A = Abundant, VC = Very Common, C = Common, LC = Less common, S = Sparse, R = Rare. **Exsiccatae:** PC = Collected by P. C. Rai (Rai P.C. 2001); FB = Recorded in *Flora of Bhutan* for Darjeeling region (Noltie 1994)]

Species, variety & sub-species	Exsiccatae	General distribution	Altitudinal distribution					Sta tus
			T	L	M	U	C	
<i>Actinoscirpus grossus</i> var. <i>kysoor</i> (Roxburgh) Noltie	1307	Tr.S & SE Asia; Ast.	+					S
<i>Bulbostylis barbata</i> (Rottboel) Clarke	796,911	Pnatic	+	+				VC
<i>B. densa</i> (Wallich) Handel-Mazzetti ex Karsten & Shenck	42,797	E Him, Jap & Ch.			+	+	+	C
<i>Carex alopecuroides</i> D. Don ex Tilloch & Taylor var. <i>alopecuroides</i>	PC 076, 0165,	Tr-Str Asia			+	+		MC
<i>C. alopecuroides</i> var. <i>chlorostachya</i> Clarke	FB	E. Him, C Ch. to Jap.				+	+	MC
<i>C. baccans</i> Nees	1156	In, Np, SL, In-ch, Jv, Ch.			+	+		C
<i>C. condensata</i> Nees	856	Mad, In, Ch, In-Ch, Jap.			+	+	+	C
<i>C. continua</i> Clarke	FB	In, Ch, Mly.	+	+				C

Species, variety & sub-species	Exsiccatae	General distribution	Altitudinal distribution				Sta tus
			T	L	M	U	
<i>C. crassipes</i> Boeckeler	1079	Endemic to Dj-Sk to Bt				+	S
<i>C. cruciata</i> var. <i>agrocarpa</i> Clarke	63	Mad, In, In-Ch, Tw, Indsia, Jap.		+	+	+	VC
<i>C. daltonii</i> Boott	PC980	E Him (Sk. to Bt)				+	+
<i>C. decora</i> Boott	442,563,755	C to E Him (Nepto Sk.-Bt)				+	+
<i>C. duthiei</i> Clarke	FB	Pak, W Him to Sk; C Ch.					+
<i>C. filicina</i> Nees	222,761	E Him, Kh Hl, As; SE Asia.		+	+	+	+
<i>C. foliosa</i> D. Don	FB	Pak to As; Nilg; Intr. to Eur, W Asia					+
<i>C. fucata</i> Boott ex Clarke	FB	E Him (E Nep to Sk-Dj)					+
<i>C. fusiformis</i> Nees ex Wight ssp. <i>fusiformis</i>	FB	E Him (E Nep to Sk-Dj)					+
<i>C. fusiformis</i> ssp. <i>finitima</i> (Boott) Noltie	FB	Him, S Ch, Mly.					+
<i>C. inanis</i> Kunth	226,432	Temp. Him (Ksm-Sk)					+
<i>C. inclinis</i> Boott ex Clarke	754	Temp. Him (Ksm-Sk).					+
<i>C. indica</i> Linnaeus	FB	In, S Afr.	+				
<i>C. insignis</i> Boott	66	E Him (Nep-Bt), As.			+	+	LC
<i>C. longipes</i> D. Don ex Tilloch & Taylor	601	Tr-Str Him & S. Ch.				+	+
<i>C. munda</i> Boott	FB	E Him (Nep-Bt)					+
<i>C. muricata</i> Linnaeus	FB	W Asia, Intr. to Eur.					+
<i>C. moysurus</i> Nees	696, 779	Him, S In to Indsia		+	+	+	C
<i>C. nubigena</i> D. Don	462	Pak & NW Him; Mly & C Ch.					+
<i>C. obscura</i> Nees	440	NW to E Him; S Ch					+
<i>C. odorhampha</i> Nelmes	FB	Him, S Ch, Mly.					+
<i>C. oligostachya</i> Nees ex Hooker	FB	Dj-Sk Him, As to Slmn Ild.	+	+			LC
<i>C. olivacea</i> Boott	FB	Dj-Sk to Bt				+	+
<i>C. phacota</i> Sprengel	FB	Np, In, SL, Mly, In-Ch, Jap.	+	+			C
<i>C. polycephala</i> Boott	FB	Him (Nep-Bt), As.					+
<i>C. pulchra</i> Boott	1106	C to E Him					+
<i>C. rara</i> Boott	FB	Him to Jap, SL.					+
<i>C. remota</i> Linnaeus	569	Eur, SW Asia to Pak, Him, (Ksm-NE In)					+
<i>C. setigera</i> D. Don	FB	Tr. Him (Ksm-Bt)					+
<i>C. setosa</i> Boott	1049, 1097	Him (Pak to Sk); Ch					+
<i>C. speciosa</i> Kunth ssp. <i>speciosa</i>	1157	Him, N In, N Myn, S & C Ch to W Mly		+	+	+	C
<i>C. speciosa</i> ssp. <i>dilatata</i> Noltie	FB	NE In to Ch					+
<i>C. stramentita</i> Boott	544	In Sbcont, SC Ch, In -Ch, Jv.	+	+	+		C
<i>C. teres</i> Boott	785	Endemic to Dj & Sk Him					+
<i>C. thomsonii</i> Boott	FB	S Afr to NZ		+	+		LC
<i>C. vesiculosa</i> Boott	FB	Nep to SE Asia to Jv					+
<i>Courtoisia cyperoides</i> (Roxburgh) Nees	1077	Nep, Bt, In, Myn, Vit, Laos, Thl; Afr, Mad.		+	+		LC
<i>Cyperus castaneus</i> Willdenow	792	S Afr, Tr Asia, Ast.	+	+			LC
<i>C. compactus</i> Retzius	176	Pak, In, Ch, Tw, Mly & Maur.	+				C
<i>C. compressus</i> Linnaeus	181,986	Cosmopolitan	+	+	+	+	A
<i>C. cuspidatus</i> Kunth	09	Pantropic	+	+	+	+	VC
<i>C. cyperinus</i> (Retzius) J.V. Suringar	183	Tr,E Asia, In, Ch, Mly, Jap & Ast.	+	+	+		VC
<i>C. cyperoides</i> (Linnaeus) Kuntze	199	STR- temp. of World		+	+		VC
<i>C. difformis</i> Linnaeus	111	STR- temp. of World	+	+	+	+	C
<i>C. digitatus</i> Roxburgh	294	Pantropic	+	+	+		C
<i>C. distans</i> Linnaeus f.	793	Pantropic	+	+	+		VC
<i>C. haspan</i> Linnaeus ssp. <i>haspan</i>	10081,125	Trop. of O & N World.	+	+	+		VC
<i>C. haspan</i> ssp. <i>juncoides</i> (Lamarck) Kukenthal	FB		+				VC
<i>C. involucratus</i> Rottboel	292	E Him, Asia, Afr, Amer.		+	+		S
<i>C. iria</i> Linnaeus	07,780	Tr-Str of World				+	+
<i>C. laxus</i> Lamarck	128	S & SE Asia, Afr, Mad.	+	+	+		VC
<i>C. laxus</i> var. <i>macrostachya</i> (Boeckeler) Karthals	188,198		+	+			
<i>C. lucidulus</i> Klein	310	NGun to Ast.	+	+			

Species, variety & sub-species	Exsiccatae	General distribution	Altitudinal distribution					Status
			T	L	M	U	C	
<i>C. niveus</i> Retzius	FB	Iran to Myn; E Afr.	+	+	+			S
<i>C. mutans</i> Vahl	180	Tr. Afr, In, SL, S Ch to Mly; Ast.	+	+	+			S
<i>C. pangorie</i> Rottboel	1029	Pak, Np, In to Myn, SL.	+	+	+			C
<i>C. paniceus</i> (Rottboel) Boeckeler	FB	N In to Vit, Jv.		+				C
<i>C. pilosus</i> Vahl	267,1007	S, E & SE Asia, Intr. else where	+	+	+			VC
<i>C. pseudokyllingoides</i> Kukenthal	FB	Mad, Afr, Asia.	+	+	+			C
<i>C. rotundus</i> Linnaeus	144	Cosmopolitan	+	+	+	+		A
<i>C. sikkimensis</i> Kukenthal	182	Endemic to Dj & Sk Him.		+	+			LC
<i>C. silletensis</i> Nees ex Wight	FB	Tr. Asia	+					S
<i>C. squarrosus</i> Linnaeus	1005	Pantropic	+	+	+	+		LC
<i>C. tenuiculmis</i> Boeckeler	310	Tr. Afr, In subcont to SE Asia, Ast.	+	+	+	+		C
<i>C. tenuispica</i> Steudel	1019	Tr-Str of O World	+	+				C
<i>C. thomsonii</i> Boeckeler	1153	NE In to Vit	+					C
<i>Eleocharis acutangula</i> (Roxburgh) Schultes	177	S Asia (Nep to Phil); trop. Afr, Amer, Aust; Mad.	+					LC
<i>E. retroflexa retroflexa</i> (Poiret) Urban	113	Pantropic	+					C
<i>E. tetraquetra</i> Nees ex Wight	FB	Afg, Pak, In, SL, Ch, Jap, N Gun & Ast.		+	+	+	+	C
<i>Erioscirpus comosus</i> (Wallich) Palla	1315	Him, N Myn, S Ch.		+	+	+		C
<i>Fimbristylis acuminata</i> Vahl	794	S & SE Asia, Ast.	+					A
<i>F. aestivalis</i> (Retzius) Vahl	179,784	Temp-Trop Asia; Ast.	+	+	+	+		A
<i>F. bisumbellata</i> (Forsskal) Bubani	1108	Tr Afr-S Eur, Pak, In, Mly, tr Ast - NZ	+	+				C
<i>F. complanata</i> (Retzius) Link	1118	Pantropic.	+	+	+	+		C
<i>F. dichotoma</i> (Linnaeus) Vahl	327,782	Tr-Str of world.	+	+	+	+	+	A
<i>F. filifolia</i> Boeck	FB	Dj-Sk Him to As	+					LC
<i>F. fuscinox</i> Clarke	FB	Dj to N In	+	+				LC
<i>F. littoralis</i> Gaudichaud	45,797	Tr-Str world.	+	+	+			VC
<i>F. miliacea</i> (Linnaeus) Vahl	FB	Pantropic.	+	+	+			C
<i>F. rigidula</i> Nees ex Wight	FB	Pak, N In to S. Ch, N Thl, Phil.	+					LC
<i>F. schoenoides</i> (Retzius) Vahl	774	Pak, N In to S. Ch, Mly, Taiw & N Ast.	+					LC
<i>F. tetragona</i> R. Brown	FB	Tr & STR Asia to Ast.	+					C
<i>F. tomentosa</i> Vahl	FB	Pantropic	+					LC
<i>F. squarrosa</i> Vahl	542	Pantropic	+					S
<i>F. stolonifera</i> Clarke	233	E. Him (Nep to Bt)					+	C
<i>F. tetragona</i> R. Brown	790	Tr & Str of Nep, In, SL, Myn, Vit, Indsia, Thl, Mly, Phi; N Ast	+					LC
<i>F. thomsonii</i> Boeckeler	FB	Tr-Str Asia	+					S
<i>F. tomentosa</i> Vahl	03	Nep, Bt, In, SL, Ch, Thl, Vit, Indsia, Phil; tr Afr, Ast, Pac isld.	+					LC
<i>Fuirena umbellata</i> Rottboel	FB	Tr-Str of the world.	+					C
<i>F. ciliaris</i> Linnaeus	121,528	Tr-Str O World	+					
<i>Hypolytrum nemorum</i> (Vahl) Sprengel	FB	Tr Asia to W Pacific	+					S
<i>Isolepis setacea</i> (Linnaeus) R. Brown	772	Pantropic			+	+	+	LC
<i>Kobresia curticeps</i> (Clarke) Kukenthal	FB	C & E Him to Tbt						+ S
<i>K. fragilis</i> Clarke	PC1138	Nep to S&C Ch						+ S
<i>K. pygmaea</i> (Clarke) Clarke	PC1104	Pak to Myn & Ch						+ S
<i>K. uncinoides</i> (Boott) Clarke	PC850	C&E Him to SC Ch						+ S
<i>Kyllinga hervifolia</i> Rottboel	30,786	Pantropic	+	+	+	+		A
<i>K. nemoralis</i> (J. R. & G. Forster) Dandy ex Hutchinson & Dalziel	14,1034	Pantropic	+	+	+			A
<i>K. odorata</i> ssp. <i>cylindrica</i> (Nees) T. Koyama	1031	Trop Him (Kum-Sk), Singpr; Afr; Ast.	+	+	+			LC
<i>K. squamulata</i> Thonning ex Vahl	1033,1161	Tr Afr; In, Pak; WInd.			+	+		S
<i>K. tenuifolia</i> Steudel	785			+	+			S
<i>Lipocarpha chinensis</i> (Osbeck) Kern	27	Tr-Str O World	+	+	+	+		C
<i>L. squarrosa</i> (Linnaeus) Goetgh	FB	In Subcont - S Ch, Vit & Mly.	+	+				S

Species, variety & sub-species	Exsiccatae	General distribution	Altitudinal distribution					Status
			T	L	M	U	C	
<i>Pycreus diaphanus</i> Schrader ex Romer & Schultes) Hooper & T. Koyama	FB	Tr-Str Asia				+	+	S
<i>P. flavidus</i> (Retzius) T. Koyama	FB	Eur, Mad; S & SE Asia, Ast.	+	+	+	+		C
<i>P. polystachyos</i> (Rottboel) P. Beauvois	1320	In, Np, BD, Myn.	+	+				C
<i>P. pumilus</i> (Linnaeus) Nees	1006	Tr-Str O World	+	+				A
<i>P. sanguinolentus</i> (Vahl) Nees ex Clarke	10,24,49	O World	+	+	+	+		A
<i>P. stramineus</i> Clarke	221,996	Nep to Mly	+	+	+			VC
<i>P. sulcinux</i> Clarke	FB	Tr-Str Asia to Ast.	+	+	+			LC
<i>P. uniloides</i> (R. Brown) Urban	FB	Tr-Str of world.		+	+	+		LC
<i>Rhynchospora rugosa</i> var. <i>griffithii</i> (Boeckeler) Verma & V. Chandra	FB	Tr-Str of world.	+	+	+			S
<i>R. rubra</i> (Laureiro) Makino	FB	Tr-Str of O World	+					S
<i>Schoenoplectus atriculatus</i> (Linnaeus) Palla	60	Tr of O World.	+	+				VC
<i>S. juncooides</i> (Roxburgh) Palla	1162	SW Asia, Mad, Pak & In, Ch, Jap, Mly, Hawaii, Ast.	+	+	+	+		C
<i>S. mucronatus</i> (Linnaeus) Palla	1310	In; Eur to Jap; Mly, Mad, Aust & Afr.	+	+	+	+		C
<i>S. triqueter</i> (Linnaeus) Palla	1302	Eur-Ch, Japan; Tajik, SW Asia, Afg, Pak, N to NE India; Egypt, S Africa.	+					C
<i>Scirpus michelianus</i> Linnaeus	FB	O World	+					LC
<i>S. ternatanus</i> Reinwardt ex Miquel	PC1305	E Him, Tbt, Tr-Str Asia		+	+	+		S
<i>Scleria biflora</i> Roxburgh	795	Tr-Str Asia	+	+				R
<i>S. caricina</i> (R. Brown) Bentham	312	Tr-Str Asia to W Pacific	+					R
<i>S. levis</i> Retzius	706	Tr-Str Asia to W Pacific	+	+				LC
<i>S. terrestris</i> (Linnaeus) Swartz	1016,1158	Tr-Str Asia to N Ast.	+	+	+			LC
<i>S. parvula</i> Steudel	775	Tr-Str O World		+	+	+		LC
<i>S. rugosa</i> R. Brown	749	Tr-Str Asia to N Ast.		+	+	+		LC
<i>S. lithosperma</i> (Linnaeus) Swartz	FB	Tr-Str of world		+				S

Oplismenus undulatifolius (Arduino) P. Beauvois [Poaceae]: a new record for West Bengal, India

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Abstract

Oplismenus undulatifolius (Arduino) P. Beauvois (Poaceae) has been reported for the first time from West Bengal (Darjiling Hills). A detailed description and illustration of this temperate grass have been provided for its easy identification.

Key words: *Oplismenus undulatifolius*, Poaceae, new record, West Bengal

The genus *Oplismenus* P. Beauvois (Poaceae) is a small genus of annual or perennial grasses of tropical – temperate zones. Mabberley (2005) recognized 7 species for *Oplismenus* distributed in tropical and warmer areas of the world. According to Scholz (1981) the genus has 9 species and 18 infraspecific taxa out of which three species have been recorded for Indian territory in the *Flora of British India* (Hooker 1896). So far, only two of its species *O. compositus* (Linnaeus) P. Beauvois and *O. burmannii* (Retzius) P. Beauvois were known to grow in West Bengal including Terai, Duars and the Darjiling part of the Eastern Himalaya (Hara 1966; Das & Chanda 1987; Noltie 2000).

Oplismenus undulatifolius (Arduino) P. Beauvois is known to grow in the warm-temperate regions of the northern hemisphere, extending southward on the uplands of Africa, South Africa, India (Davey & Clayton 1978), Bhutan and Nepal (Hara *et al* 1978; Noltie 2000). *O. undulatifolius* is sometimes considered synonymous with *O. hirtellus* (Linnaeus) P. Beauvois (Scholz 1981).

During the present survey of angiospermic flora in Darjiling, this species has been collected from Sepoydhura, near Kurseong, at an altitude of 1636 m, which is also the first record of the species from the Darjiling part of the Eastern Himalaya that forms the northernmost part of the Indian state of West Bengal. In the Eastern Himalayan region previously it was known to grow between 2100 to 2700 m amsl (Hara *et al* 1978; Hajra & Verma 1996; Noltie 2000). The present record of the species from 1636 m is also a record for its downward migration that too in Kurseong region where the average ambient temperature generally remains little higher than a locality of similar altitude in Sikkim. A detailed description and illustration of the plant are given below to assist its easy identification.

***Oplismenus undulatifolius* (Arduino) P. Beauvois, Ess. Agrost. 54. 1812; Hooker f., Fl. Brit. India 7: 66. 1896; Bor, Grass. Burma, Ceylon, India & Pakistan 318. 1960; Hara, Stearn & William, Enum. Fl. Pl. Nepal 1: 138. 1978; Hajra & Verma, Fl. Sikkim 1: 261. 1996 ; Noltie, Fl. Bhutan 3(2): 686. 2000. *Panicum undulatifolium* Arduino, Animad. Spec. Alt. 14: t. 4. 1764. [Fig. 1]**

Perennial herbs. Culms stoloniferous, decumbent at base, rooting from lower nodes, 20 – 50 cm tall. Leaf: lamina slightly ovate-lanceolate, 4.5 – 11 × 0.7 – 1.3 cm, margin entire-thickened, finely acuminate, both surfaces moderately pubescent, base unequally sub-rounded; sheaths

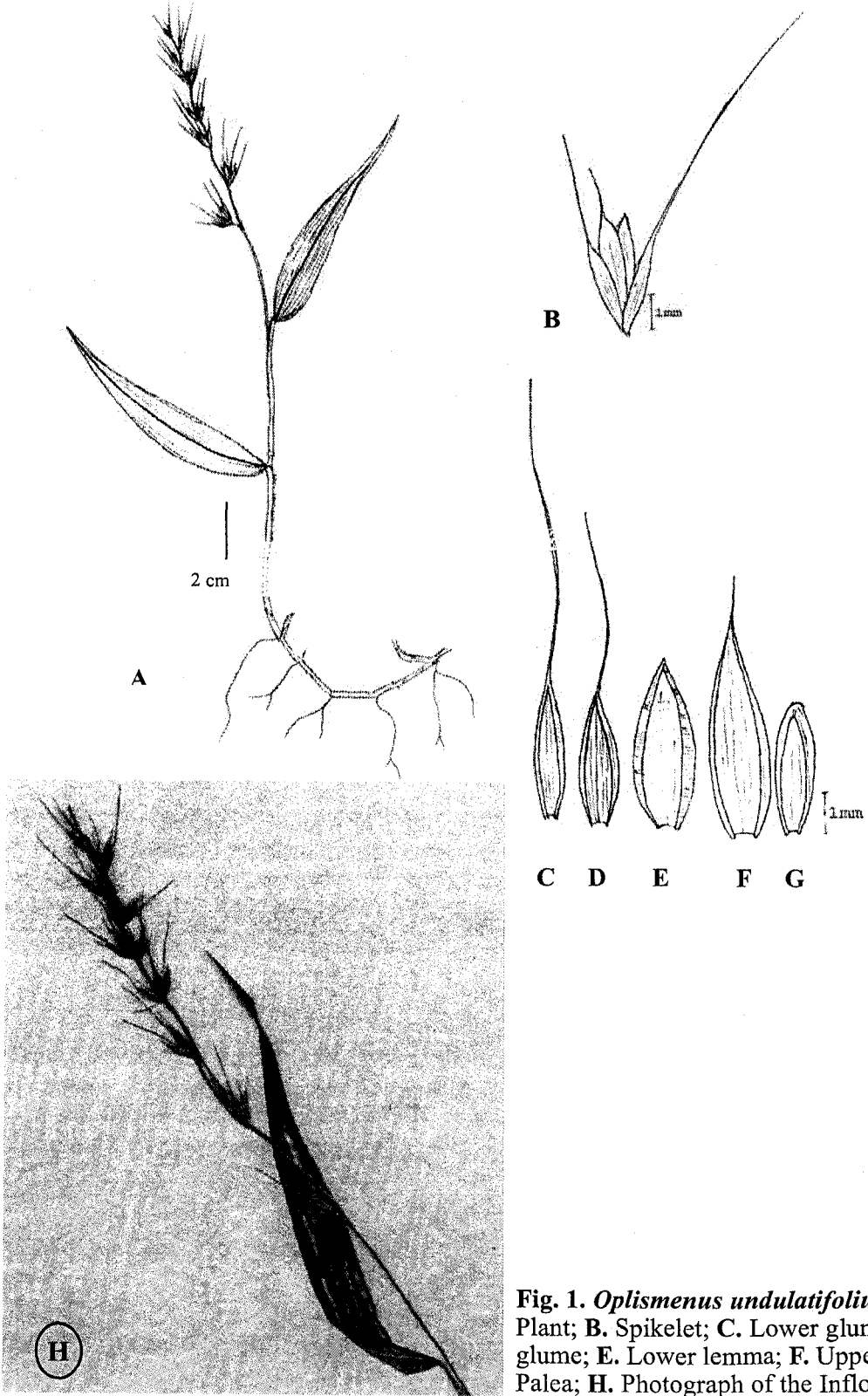


Fig. 1. *Oplismenus undulatifolius*: **A.** Entire Plant; **B.** Spikelet; **C.** Lower glume; **D.** Upper glume; **E.** Lower lemma; **F.** Upper lemma; **G.** Palea; **H.** Photograph of the Inflorescence

smooth to sparsely hispid, open, 1 – 5.5 cm, margins long ciliate; ligule 0.5 – 0.8 mm, densely ciliate; cilia \pm 0.5 mm. Panicle axis erect, 5 – 10 cm, glabrous or minutely hispid; 3 – 6 spikelets in 5 – 10 clusters at nodes; lower ones often with 1–2 mm long stalks, some fertile spikelets solitary along with one awn representing the sterile spikelet; Spikelets lanceolate, 3.5 – 4 mm, hispidulous; glumes unequally awned; lower glume 2.5 – 3 mm, lanceolate, hispid on veins, awns 12 – 14 mm; upper glume elliptic, 2 – 3 mm, awns 4 – 7 mm; lower lemma ovate, 1.9 – 2.1 mm, coriaceous, acute, palea absent; upper lemma lanceolate, herbaceous, 4 – 4.5 mm (excluding awn), hispid on veins, awn 0.8 – 1.2 mm; palea \pm 2.5 mm.

Flowering: August – October

Exsiccatae: Sepoydhura, Darjiling, 1636 m, September 22, 2010, *S Moktan & A P Das 0492A*, (CAL); *0492B* (NBU).

Distribution: INDIA (Kashmir to Sikkim, West Bengal, Khasia Hills, Nilgiri Hills) NEPAL, BHUTAN, CENTRAL EUROPE, SOUTH AFRICA.

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Typhonium roxburghii var. *longispathum* S. Nirola & A.P. Das, var. nov. (Araceae) from Darjeeling Himalaya in West Bengal, India

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Abstract

Typhonium roxburghii var. *longispathum* S. Nirola & AP Das (Araceae), a new variety from Darjeeling part of the the Himalayas is described, differentiated and illustrated. The new variety differs from the type, *Typhonium roxburghii* Schott in morphological characters of leaves, bulbils, spathe blade and spadix.

Key words: *Typhonium roxburghii* var. *longispathum*, new variety, Darjeeling Himalaya

INTRODUCTION

Typhonium Schott is an important genus of Araceae, represented by 68 accepted species (www.theplantlist.org, Version 1.1) distributed in South, South-east and East Asia extending through the pacific islands to Australasia. However, Mabberly (2008) has mentioned 40 species under the genus (including *Sauromatum* Schott). On the other hand, so far, about 10 species has been recorded from India namely *Typhonium blumei* Nicolson; *T. bulbiferum* Dalzell; *T. diversifolium* Wallich; *T. flagelliforme* (Loddiges) Blume; *T. gracile* (Roxburgh) Schott; *T. inopinatum* Prain; *T. listeri* Prain; *T. roxburghii* Schott; *T. trilobatum* (Linnaeus) Schott & *T. khandwaense* Mujaffar, Yasin & Mustakim (Hooker 1893; Nicolson 1981; Karthikeyan *et al.* 1989; Mujaffar *et al.* 2013) of which about 4 species are from the Himalayan regions, though Hara (1971) has recorded only *T. diversifolium* from Eastern Himalaya. In 1994, Noltie recorded only two species (*T. diversifolium* & *T. trilobatum*) in the Flora of Bhutan (including Darjiling Hills, Tarai and Duars of West Bengal and Sikkim).

Some specimen of *Typhonium* in flowering stage were collected from the foothill regions at places like Rongtong and from areas above Sukna during different expeditions to explore the monocot flora of Darjeeling district. The specimens were quite similar to *Typhonium roxburghii* Schott but some characters did not match satisfactorily with the type and protologue. A number of differences in morphological characters were observed in shape and formation of lamina, formation of bulbils, length of peduncle, size and shape of spathe blade, structure of spadix etc. These specimens, hence, identified as a new variety of *T. roxburghii* Schott from Darjeeling Himalaya, which is described and illustrated herein.

Taxonomic treatment

Typhonium roxburghii Schott, Aroideae 1: 12. 1853. Hooker *f.*, Fl. Brit. India 6: 510. 1893.
var. *longispathum* S. Nirola & A.P. Das, var. *nov.*

A small rhizomatous perennial herb. Rhizome tuberous, sub-globose. Leaves 3–7; petiole 10–25 cm, bulbils formed on petioles covering upper $\frac{1}{4}$ th part of its length and extending upto the tip, elongated, black. Lamina variously shaped as entire-hastate to tri-lobed but never completely trifoliolate. Inflorescence appearing after leaves; peduncle 1–3 cm. Spathe: tube sub-globose to oblong-ovoid, 1–2.5 × 0.8–1.5 cm; blade linear-lanceolate, 10–16 cm × 3–5 mm, apex filiform, twisting to curled. Spadix subequaling spathe; female portion 3–5 mm with 3–4 rows of pale yellowish 1-loculed ovaries; sterile portion with single whorl of downward curved staminodes; staminodes 6–10 mm, slightly fimbriate apically; male portion 7–12 mm, yellow; appendix very long and filiform, 10–14 × 0.1–0.2 cm, pale white, lobed at base.

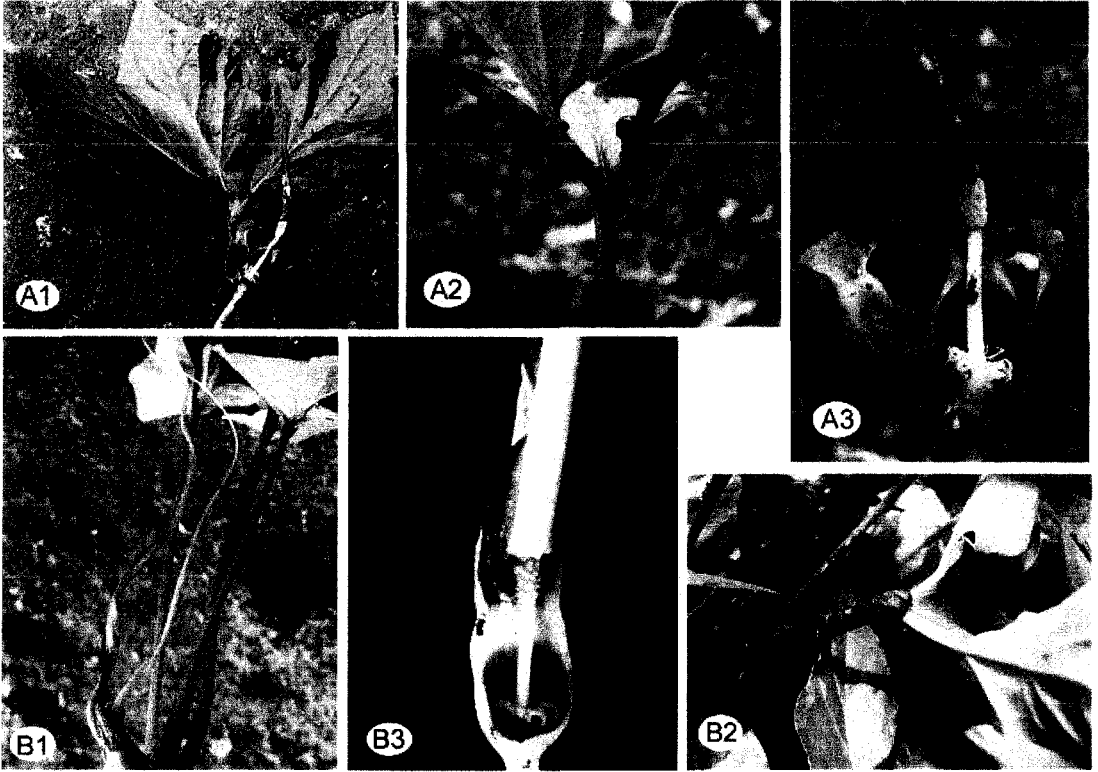


PLATE - I: A. *Typhonium roxburghii* var. *roxburghii*; B. *Typhonium roxburghii* var. *longispathum*: 1. Spathe blade and spadix; 2. Bulbils; 3. Close-up view of inflorescence

Flowering & Fruiting: April – June

Exsiccatae: HOLOTYPE: Below Rongtong, 400 m, *S Nirola & AP Das 1237A*, dtd. 26.04. 2010 (CAL); ISOTYPE: *S Nirola & AP Das 1237B,C,D*, dtd. 26.04. 2010 (NBU).

Status: Rare.

Distribution: Foothill areas of Darjeeling district, West Bengal; ± 400 m; Endemic to Darjiling Hills.

Etymology: With reference to long and filiform spathe blade.

DISCUSSION

The differences between *Typhonium roxburghii* Schott var. *roxburghii* and *Typhonium roxburghii* var. *longispathum* S. Nirola & A.P. Das are displayed in the table below:

Characters	<i>Typhonium roxburghii</i> var. <i>roxburghii</i>	<i>Typhonium roxburghii</i> var. <i>longispathum</i>
Lamina	Lamina variously shaped as entire-hastate to tri-lobed and often completely trifoliolate	Lamina variously shaped as entire-hastate to tri-lobed but never completely trifoliolate
Bulbils	Bulbils develop at apex of petioles and often on petiolule, globose, brown	Bulbils develop along petioles formed above $\frac{3}{4}$ of its length below the apex, elongated and black
Peduncle	Peduncle 2 – 7 cm	Peduncle 1 – 3 cm
Spathe blade	Spathe blade \pm triangular to ovate-lanceolate, apex simply acute	Spathe blade linear-lanceolate, apex long filiform twisting to curly
Spadix	Sterile portion with 3–5 rows of curled staminodes; appendix conic-cylindric, 0.4 – 0.5 cm in diameter, dark purple or black, obliquely truncate at base	Sterile portion with single whorl of downward curved staminodes; appendix very long and filiform, 0.1 – 0.2 cm in diameter, pale white, lobed at base.

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