

# FLORA OF INDIA

VOLUME 12

ASTERACEAE

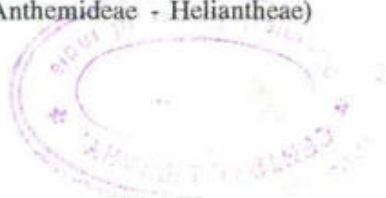
(Anthemideae - Heliantheae)

BOTANICAL SURVEY OF INDIA

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VOLUME 12

ASTERACEAE  
(Anthemideae - Heliantheae)



Editors

P.K. HAJRA

R.R. RAO

D.K. SINGH

and

B.P. UNIYAL

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BOTANICAL SURVEY OF INDIA

CALCUTTA

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Date of Publication : May 1st, 1995

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Price :

Published by the Director, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700 001; composed at Computer Unit, Botanical Survey of India, Northern Circle, Dehra Dun, 248 195, and printed at M/s. Deep Printers, 3/26, Ramesh Nagar, New Delhi-110 015.

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## PREFACE

Continuing with the present series on Flora of India, the editors now take pleasure in presenting the volume on Asteraceae, one of the largest flowering plant families in India, comprising about 1052 taxa in 161 genera (excluding the cultivated ones). In view of its large size the treatment is being presented in two volumes, i.e. Volumes 12 and 13. The entire family is treated under 12 tribes, viz. Anthemideae, Astereae, Calenduleae, Cardueae, Cichorieae, Eupatorieae, Heliantheae, Inuleae, Mutisieae, Senecioneae, Tageteae and Vernoniae. Some of the tribes, such as Cichorieae and Senecioneae, have been further segregated into a number of subtribes. While the delimitation of the tribes has been based on phylogenetic considerations, they are arranged in alphabetical sequence in conformity with the format adopted in the preceding volumes. Similarly, the subtribes, genera, sections, species and infraspecific categories have been arranged alphabetically under respective tribe, subtribe, genus, section or species. The Volume 12 deals with 525 species in 105 genera and 7 tribes, whereas the remaining taxa would constitute the Volume 13.

The editors express their gratitude and appreciation to Dr. T.N. Khoshoo, Emeritus Scientist, and Ex-Secretary, Ministry of Environment & Forests, Govt. of India, who had been the guiding force behind the preparation of Flora of India in its present pattern and gave constant encouragement and facilities during the formative period. They are also thankful to Mr. N.R. Krishnan, I.A.S., Secretary, and Mr. R. Rajamani, I.A.S., Ex-Secretary, Ministry of Environment & Forests, Govt. of India, for the encouragement and facilities received for the continuation of this work. The editors are also thankful to Dr. S.K. Jain, F.N.A., Scientist Emeritus, and Ex Director, Botanical Survey of India, who, by initiating the series 'Fascicle of Flora of India', provided a nucleus for the present work; and to Dr. M.P. Nayar, and Dr. B.D. Sharma, Ex-Directors, Botanical Survey of India, for initiation and continuation of the project, formulation of guidelines and the encouragement and facilities provided to us and the contributors.

The editors also express their thanks to Mr. A.R.K. Sastry, Scientist-SF, Publication Division, Botanical Survey of India, Calcutta for his valuable help in various ways during the entire work, from formulation of guidelines to the publication.

The editors record their appreciation for the hard work put in by various contributors. They also express their thanks to Mrs. R. Mathur, Senior Scientific Assistant, Mr Bholu Ram, Ex-Chief Artist, Botanical Survey of India, and Mr Dev Raj Agarwal, Photographer, Botanical Survey of India, Northern Circle, Dehra Dun, for their help in various ways.

The editors acknowledge the efficient work done by Mr. Sanjay Uniyal, Data Entry Operator at the Computer Unit of Botanical Survey of India at Northern Circle, Dehra Dun in computer typesetting of the manuscript, and the help rendered by Mr. A.K. Pathak, System Analyst, Botanical Survey of India, Southern Circle, Coimbatore, in formatting the data in the initial stage. The editors also record their deep appreciation and gratitude to all the present and retired staff members of Botanical Survey of India in general, and those of Northern Circle, Dehra Dun in particular for their hardwork and wholehearted cooperation which greatly helped us in achieving the objective.

Finally we acknowledge the quick printing of this volume in final form by Deep Printers, New Delhi.

Calcutta  
23.03.1995

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## ABBREVIATIONS

of

### INDIAN LANGUAGES

Abhor	: Abhor	Kum.	: Kumaonese
And.	: Andaman	Lep.	: Lepcha
Asm.	: Assamese	Lus.	: Lushai
Beng.	: Bengali	Mal.	: Malayalam
Bhoj.	: Bhojpuri	Mani.	: Manipuri
Bhut.	: Bhutia	Mar.	: Marathi
Cachar	: Cachar	Mikir	: Mikir
Coorgi	: Coorgi	Miri	: Miri
Eng.	: English	Naga	: Naga
Garo	: Garo	Nep.	: Nepali
Garh.	: Garhwali	Or.	: Oriya
Goa.	: Goanese	Port.	: Portugese
Guj.	: Gujarati	Punj.	: Punjabi
Hindi	: Hindi	Raj.	: Rajasthani
Jain.	: Jaintea	Sans.	: Sanskrit
Jaun.	: Jaunsar	Sant.	: Santal
Kang.	: Kangri	Sind.	: Sindhi
Kan.	: Kannada	Tam.	: Tamil
Kash.	: Kashmiri	Tel.	: Telugu
Kh.	: Khasi	Tipp.	: Tippera (Tripura)
Kon.	: Konkani	Urdu	: Urdu



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*Aster albescens* (DC.) Hand.-Mazz. (BSI, NC, Dehradun)



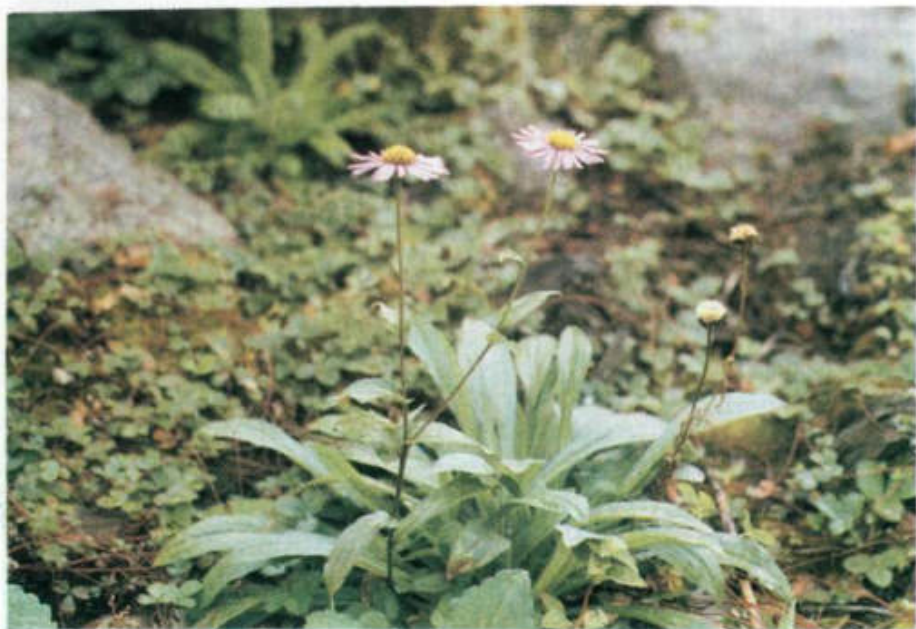
*Anthemis cotula* L. (BSI, NC, Dehradun)



*Aster thomsonii* C.B. Clarke (BSI, NC, Dehradun)



*Cicerbita macrorhiza* (Royle) Beauv. (Courtesy : V: James)



*Aster tricephalus* C.B. Clarke (BSI, SHC, Gangtok)



*Carthamus tinctorius* L. (BSI, NC, Dehradun)





*Cousinia thomsonii* C.B. Clarke (BSI, NC, Dehradun)



*Cirsium Wallichii* DC. var. *Wallichii* (BSI, NC, Dehradun)



*Echinops cornigerus* DC. (BSI, NC, Dehradun)



*Dubyaea hispida* (D. Don) DC. (BSI, NC, Dehradun)



*Erigeron acer* L. (BSI, NC, Dehradun)



*Erigeron multiradiatus* (Lindl. ex DC) C.B. Clarke (BSI, NC, Dehradun)



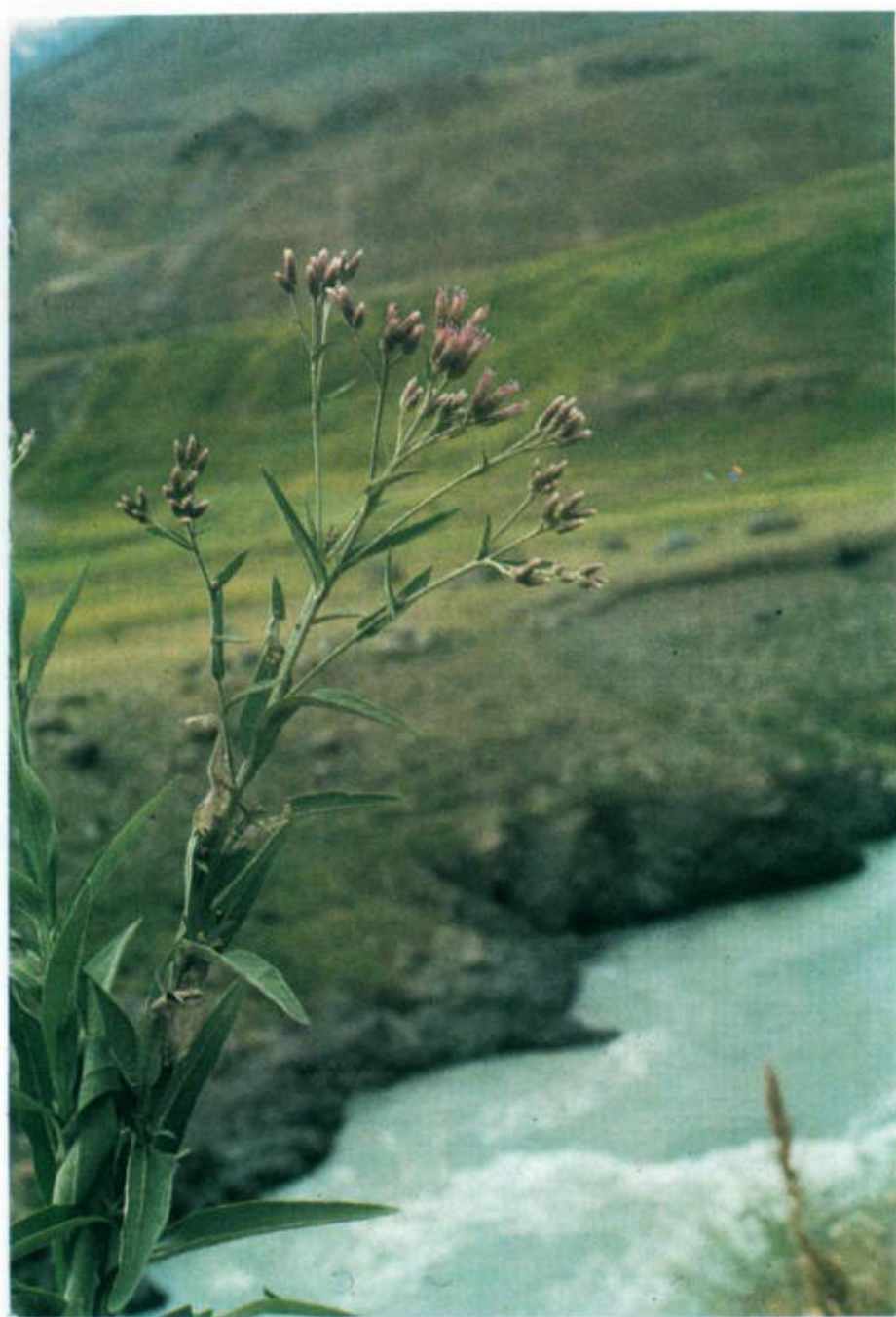
*Jurinea dolomiaea* Boiss. (BSI, NC, Dehradun)



*Leucanthemum vulgare* Lam. (BSI, NC, Dehradun)



*Lactuca dolichophylla* Kitam. (BSI, NC, Dehradun)



*Saussurea albescens* (DC.) Sch.-Bip. (BSI, NC, Dehradun)





*Saussurea ceratocarpa* Decne. (BSI, NC, Dehradun)



*Saussurea costus* (Falc.) Lipsch. - The 'green gold' of the Lahul Valley, H.P. is an Appendix - I species. Its survival depends on the younger generation of the valley. (BSI, NC, Dehradun)



*Saussurea graminifolia* Wallich ex DC. (BSI, NC, Dehradun)



*Saussurea glacialis* Herd. (BSI, NC, Dehradun)



*Saussurea obvallata* (DC.) Edgew. (BSI, NC, Dehradun).



*Solidago virgaurea* L. (BSI, NC, Dehradun)



*Tanacetum tomentosum* DC. (BSI, NC, Dehradun)



*Saussurea simpsoniana* Field. & Gard.) Lipsch.  
(BSI, NC, Dehradun)



*Taraxacum officinale* Web. (BSI, NC, Dehradun)



*Tithonia diversifolia* (Hemsl.) A. Gray (BSI, NC, Dehradun)



*Waldheimia glabra* (Decne.) Regel (BSI, NC, Dehradun)



## ASTERACEAE *nom. cons.*

(Compositae *nom. alt.*)

Herbs, annual or perennial, sometimes shrubs or climbers, rarely arborescent, often with stolons, rhizomes, tubers or fleshy roots, variously pubescent or glandular, rarely laticiferous. Leaves alternate or opposite, sometimes radical, simple or sometimes 2 to many foliate, entire to variously dissected; stipules absent. Flowers actinomorphic or zygomorphic, hermaphrodite, unisexual or neuter, 1 to numerous, aggregated on a common receptacle, enclosed by a common involucre of bracts (phyllaries) forming the heads or capitula. Phyllaries in one or more series, free or connate, valvate or imbricate, green or coloured, herbaceous or scarious. Capitula sessile or peduncled, variously arranged spikes, corymbs, panicles or rarely in glomerules; homogamous or heterogamous or sometimes monoecious, discoid (all florets alike, perfect and have tubular corolla) or ligulate (all florets perfect but with ligulate corolla; ligules conspicuous) or disciform (outer florets filiform, pistillate; ligules inconspicuous) or radiate (ray florets on the periphery, either neutral or pistillate and disc florets on the rest of the receptacle). Receptacle flat, convex, concave or conical, paleaceous or naked. Calyx absent or reduced to pappus of bristles, awns or scales. Corolla sympetalous, of 4-5 petals, tubular, ligulate or bilabiate. Stamens 5 or rarely 4, epipetalous, alternating with corolla lobes; anthers 2-loculed, connate (syngenesious) forming a tube around the style, oblong, introrse with sterile tips, obtuse or sagittate or caudate and tailed at base, dehiscing lengthwise. Style branches 2, filiform or broader, appendaged or not. Ovary inferior, unilocular, terete or compressed; ovule solitary. Fruit an achene (Cypsela), variously ridged and grooved or striate, smooth or with ornamentations, often crowned by the persistent pappus. Pappus in one or more series, simple or feathery, often replaced by bristles, awns or scales. Seeds exalbuminous.

The family constitutes the largest vascular plant family with *ca* 30,000 species and over 1100 genera. Although the family is well represented in temperate or subtropical regions, the species have adapted to varied ecological conditions. In lowland areas, a large number of species have become adventive. In India, the family is represented by *ca* 900 species under 167 genera. The species are distributed widely along sea coasts, cultivated fields, alpine areas in Himalayas and in cold deserts of Ladakh and Lahul-Spiti. A vast majority of them are recent introductions and some obnoxious weeds in the agriculture fields are *Eupatorium* spp., *Mikania micrantha*, *Parthenium hysterophorus*, *Ageratum conyzoides*, *A. houstonianum*, *Tagetes minuta*, *Acanthospermum hispidum*, *Xanthium indicum* and a few others.

Economically the family is important as the source of Sunflower and Safflower oil. Many are useful in native medicines. Several ornamental taxa belonging to *Chrysanthemum*, *Dahlia*, *Cosmos*, *Tagetes*, *Calendula*, *Zinnia* and a few others are popular throughout the world.

Asteraceae form a distinct group whose phylogenetic relationship within the family as well as with other families are not clearly established. Many consider that Asteraceae are allied to both Campanulales and Calycerales (Takhtajan, 1980). Based on palynological evidences (Skvarla *et al.* 1977) the family is said to be closely related to Calyceraceae. According to Cronquist (1981) the Calyceraceae can be no more than 'Collateral allies' of Asteraceae. The family differs from Campanulaceae in having flowers aggregated into capitulum surrounded by involucre bracts, connate anthers, the 2-lobed or 2-fid style, definite number of carpels and ovules and nonendospermous seeds. Therefore, derivation of Asteraceae from Campanulaceae stock is also ruled out.

Rubiales have also been considered as a possible ancestral group by Cronquist (1981). But Asteraceae are quite distinct chemically as well as morphologically. According to Cronquist (1981) the ancestry of Asteraceae probably lies in or near the Rubiaceae, along a line parallel in some respects to the line leading to the Dipsacales and Calycerales.

Within the family, the phylogenetic relationship among the various tribes is also not clear. Some authors consider Heliantheae as the most primitive tribe (Cronquist, 1958). Yet others consider Vernonieae, Mutisieae, Senecioneae as the primitive tribes. In the present treatment of the family Bentham & Hooker's (1873) arrangement of tribes is broadly followed, except for tribe Tageteae which has been treated as a distinct tribe.

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#### KEY TO THE TRIBES

- |   |               |
|---|---------------|
| 1a. Capitula homogamous; florets all ligulate or tubular or tubuliform                          | 2             |
| b. Capitula heterogamous; florets both ray and Disk   | 10            |
| 2a. Florets all ligulate (florets all ligulate in <i>Calamieis</i> but achenes silky, villous.) | 5. Cichorieae |
| b. Florets all tubular  | 3             |

- 3a. Anther cells tailed or auricled or mucronate at the base 4  
 b. Anther cells cleft at base or subentire 5  
 4a. Styles subentire or arms short, hairy or thickened towards the base; leaves mostly spinous margined 4. Cardueae  
 b. Style branches of hermaphrodite florets truncate or appendaged; leaves never spinous margined 10. Senecioneae  
 5a. Leaves opposite 6. Eupatorieae 6  
 b. leaves alternate 12. Vernonieae 7  
 6a. Florets all tubular; style branches subulate, hairy 7  
 b. Florets all tubuliform; style branches linear, obtuse, truncate or appendiculate 8  
 7a. Anther cells tailed or auricled 8  
 b. Anther cells not tailed 9  
 8a. Style arms linear, obtuse or styles of sterile florets undivided 8. Inuleae  
 b. Style arms of hermaphrodite florets truncate or appendaged 10. Senecioneae  
 9a. Involucral bracts 2-many-seriate, dry or with scarious tips 1. Anthemideae  
 b. Involucral bracts uniseriate, herbaceous or foliaceous 7. Heliantheae  
 10a. Achenes large, thick and curved, often deformed; pappus absent 3. Calenduleae 11  
 b. Achenes not as above; pappus various or absent 12  
 11a. Anthers distinctly tailed 14  
 b. Anthers not tailed, sometimes mucronate at the base 9. Mutisieae 13  
 12a. Anther tips without distinct hyaline appendage 8. Inuleae  
 b. Anther tips with distinct hyaline appendage 10. Senecioneae 15  
 13a. Style branches linear, obtuse, non appendiculate 15  
 b. Style branches of hermaphrodite florets, truncate or appendiculate 16  
 14a. Involucral bracts with scarious or hyaline margins and tips 2. Astereae  
 b. Involucral bracts not as above 11. Tageteae 17  
 15a. Receptacle epaleaceous. Pappus hairs capillary 1. Anthemideae  
 b. Receptacle paleaceous. Pappus of scales and paleas or absent 11. Tageteae  
 16a. Involucral bracts uniseriate, valvate, connate nearly to apex 10. Senecioneae  
 b. Involucral bracts 1-many seriate, not connate as above 7. Heliantheae  
 17a. Pappus of white, copious, capillary hairs (paleaceous in *Senecioirahomi* and *S. belgamensis*, but leaves white tomentose beneath with prominent venation) 10. Senecioneae  
 b. Pappus of paleas, bristles or awns, rarely absent 7. Heliantheae

Tribe 1. ANTHEMIDEAE Cass.

(B.D. Naithani)

Herbs or undershrubs, mostly aromatic, glabrous to hoary pubescent or woolly. Leaves alternate, often finely pinnate, pinnatifid, dissected or entire. Heads white, yellow or purplish green, heterogamous, radiate or homogamous, discoid, all bisexual or outer female or neuter. Involucral bracts imbricate, few to many seriate, often dry and scarious or at least the inner ones with scarious margins or tips. Receptacle naked or pubescent or hairy or with deciduous pales. Ray florets present or absent, the ligules 3-toothed or entire. Disc florets yellow, limb usually tubular. Anthers not tailed, usually obtuse at the base, and with a terminal appendage. Style branches truncate or rounded. Achenes small, often angular and truncate, compressed, sometimes winged, unbeaked. Pappus mostly absent or reduced to corona.

Mostly in the old world, principally Mediterranean and S. African; ca 50 genera and ca 1252 species, 12 genera and 66 in India.

*Literature.* BENTHAM, G. & J.D. HOOKER (1873). *Compositae: Genera Plantarum* 2: 163-533. HARLING, G. (1950), (1951). Embryological studies in the Compositae part. Anthemideae - Anthemidinae: *Acta Horti Berg.* 15: 135-168. 1950; Part II Anthemideae-Chrysantheminae: *ibid* 16: 1-56. 1951. SOLBRIG, O.T. (1963). the Tribes of Compositae in S.E. United States *J. Arn. Arb.* 44: 444-445. WODE HOUSE, R.P. (1926). Pollen grain morphology in the classification of the Anthemideae. *Bull. Torr. Bot. Club.* 53: 479-485.

*Notes.* The tribe is fairly uniform and difficult to separate into well marked subtribes. The strongly scented, usually finely dissected, pinnately parted or atleast pinnatisect leaves, the dry and scarious involucrel bracts and the truncate nature of the style branches of the disc florets which are more constant in their shape than in the majority of the tribes of Compositae, are the characteristic features.

Anthemideae are largely insect pollinated but some notably *Artemisia* is wind pollinated. Great deal of variation in the number and size of the pollen grains exists between wind and insect pollinated species.

#### KEY TO THE GENERA

- |  |                              |
|--|------------------------------|
| 1a. Receptacle paleaceous; heads usually rayed   | 2                            |
| b. Receptacle naked or with fimbriate pits; heads rayed or disciform   | 3                            |
| 2a. Heads corymbose; achenes margined.   | 1. <i>Achillea</i>           |
| b. Heads solitary peduncled; achenes 4-5 angled or many ribbed   | 2. <i>Anthemis</i>           |
| 3a. Heads rayed  | 4                            |
| b. Heads disciform   | 7.                           |
| 4a. Diffuse or tufted herbs; peduncles short; achenes 5-angled   | 12. <i>Waldheimia</i>        |
| b. Usually erect herbs; peduncles long; achenes angled or ribbed   | 5                            |
| 5a. Annual herbs; achenes ventrally 3-5-ribbed, dorsally many ribbed or smooth                                 | 8. <i>Matricaria</i>         |
| b. Perennial herbs; achenes ribbed or angled   | 6.                           |
| 6a. Achenes 3-many ribbed; vallecular secretory canals or epicarpic mucilaginous cells absent                  | 5. <i>Chrysanthemum</i> ✓    |
| b. Achenes usually with 10-prominent ribs; vallecular secretory canals or epicarpic mucilaginous cells present | 7. <i>Leucanthemum</i> ✓     |
| 7a. Heads many, racemose, paniced or corymbose   | 8                            |
| b. Heads single  | 9                            |
| 8a. Heads racemose or paniced; involucrel bracts few seriate   | 3. <i>Artemisia</i> ✓        |
| b. Heads in corymbs, involucrel bracts many seriate  | 11. <i>Tanacetum</i> ✓       |
| 9a. Involucrel bracts many seriate, incurved in fruits   | 10. <i>Sphaeromorphaea</i> ✓ |
| b. Involucrel bracts sub 2-seriate, not incurved in fruits   | 10                           |
| 10a. Stoloniferous; heads sessile; corolla of outer florets wanting;   | 9. <i>Soliva</i>             |
| b. Non stoloniferous; heads sessile or peduncled; corolla of outer florets usually present                     | 11                           |
| 11a. Heads sessile or subsessile; involucrel bracts 2-seriate; leaves toothed or lobed                         | 4. <i>Centipeda</i> ✓        |
| b. Heads peduncled; involucrel bracts sub-2-seriate; leaves pinnatifid or pinnatisect                          | 6. <i>Cotula</i> ✓           |

1. *Achillea* L.

Herbs or undershrubs, perennial, pilose or pubescent, often with thick woody rootstock. Leaves alternate, serrulate, pinnatisect or pinnatipartite. Heads heterogamous, radiate, peduncled or sessile, small or medium sized, usually arranged in terminal corymbs, rarely solitary, terminal. Involucral bracts few seriate, more or less scarious margined, Receptacle flat or convex, paleaceous; paleae lanceolate or oblong. Ray florets female; lingule white pink or yellow, short, more or less 3-dentate. Disc florets hermaphrodite, fertile, tubular, compressed and 2-winged; limbs 5-toothed. Anther bases obtuse. Style arms of disc florets with truncate and penicillate tips. Achenes glabrous, smooth, compressed, not winged, oblong or obovate, tips rather broad. Pappus absent.

Temperate regions; ca 200 species, 2 in India.

*Literature.* ISSAR, R.K. (1984) *Achillea millefolium* L. floristic variability of morphological characters. *Ind. For.* 104(2): 90-95. THOMSON, J. (1978). Yarrow, herbs of Achillea. *Vascular* 63(2): 13. *Achillea millefolium*.

## KEY TO THE SPECIES

- 1a. Herbs; leaves 3-pinnatisect; heads 6 mm in diam. 2. *A. millefolium*  
 b. Undershrubs; leaves pectinately - pinnati-partite; heads 9-12 mm in diam. 1. *A. alpina*

1. *Achillea alpina* L.\* Sp. Pl. 899. 1753.-*A. sibirica* Ledeb. *Ind. Sem. H. Dopart.* 1811; *Balakr. in Bull. Bot. Surv. Ind.* 16(1-4): 170. 1974 (1977).

Undershrubs, erect; stems 20-80 cm high, woody. Leaves linear-oblong, 2-10 x 0.5-1.5 cm, pectinately pinnatipartite, segments oblong-lanceolate, mucronate, acutely dentate, 1-2 mm wide, more or less 1 mm apart, appressed-pilose. Heads pale purple to white, in dense corymbs, 9-12 mm in diam.; peduncles 4-10 mm long. Involucral bracts 4-seriate, 4-5 mm long. Achenes 2 x 1 mm. Pappus absent.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: E. Himalayas, between 1200-1900 m. Meghalaya.

N. & C. Asia, China, Indochina and Japan.

*Notes.* This species so far known to occur in China and Siberia is probably introduced as a garden plant and now runs wild.

2. *Achillea millefolium* L., Sp. Pl. 899. 1753; *Hook.f., Fl. Brit. India* 3: 312. 1881.

Fig. 1.

Eng.: *Arrow-root, Blood wort, Camil*; Hindi: *Gandava*; Kash.: *Momadru chopandia*; Mar. (Bombay): *Rojmari*; Urdu: *Biranj, Asifa*.

Herbs, perennial, erect, pubescent, stoloniferous; stems 15-60(-90) cm, leafy. Radical leaves ca 25 cm, 3-pinnatisect, petioled; cauline leaves alternate, oblong-lanceolate, 5-15 cm, 3-pinnatisect; segments linear-subulate, acute to acuminate. Heads simple, crowded in compound corymbs, 6 mm in diam. Involucral bracts few-seriate, glabrous to sparsely pubescent; outer bracts 3-5 x 1 mm, margins brown scarios. Receptacle flat, paleaceous; scales thin, membranous, more or less as long as the florets. Ray florets ca 8 mm long, female; ligule white or pale pink, rounded, reflexed. Disc florets yellow, tubular, 6 mm long; limb 5-lobed. Achenes oblong, flattened, 3 mm long, shining. Pappus absent.

*Fl. & Fr.* May - Oct.

*Distrib.* India: W. Himalayas, in moist and dry grassy slopes, between 1500-3500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Tamil Nadu.

Asia, Europe and N. America.

*Notes.* *Achillea millefolium* L. is a polymorphic species and exhibits a great deal of variation, in the size of the leaves, nature of the leaf segments, colour of the flowers and the indumentum. An ingredient of the Unani drug BRINJASE which is said to be used as derivative and demulcent of *pus*. It is diuretic, expels kidney stones and is useful in fever, nasal congestion and stomach diseases.

## 2. *Anthemis* L.

Herbs, annual, biennial, perennial; stems simple or branched, pubescent. Leaves alternate, usually 1-3 pinnatisect, rarely simple; primary segments usually 3, sometimes finely pinnately or palmately divided into lobes. Heads solitary on more or less naked peduncles, radiate or discoid, hemispheric or turbinate or shortly cylindrical. Involucral bracts 3-or many seriate, inner atleast generally narrowly or broadly scarios margined, outer shorter. Receptacle convex or conical, paleae linear-lanceolate, subulate or oblanceolate, scarios or cartilaginous, acute, mucronate or acuminate at apex, generally as long as disc florets, sometimes longer. Ray florets female, fertile or neuter, 1-seriate; ligule white or yellow, rarely purplish, base of corolla sometimes persistent on achenes. Disc florets hermaphrodite, fertile, tubular; limbs yellow, rarely purplish, 5-dentate, sometimes inflated at base but not saccate. Achenes usually obconical, terete, sometimes dorsiventrally compressed, smooth, ribbed or tuberculate. Pappus absent or very short, paleaceous or of a membranous large or small auricle.

N. & W. Asia and N. Africa; ca 200 species, 1 in India.

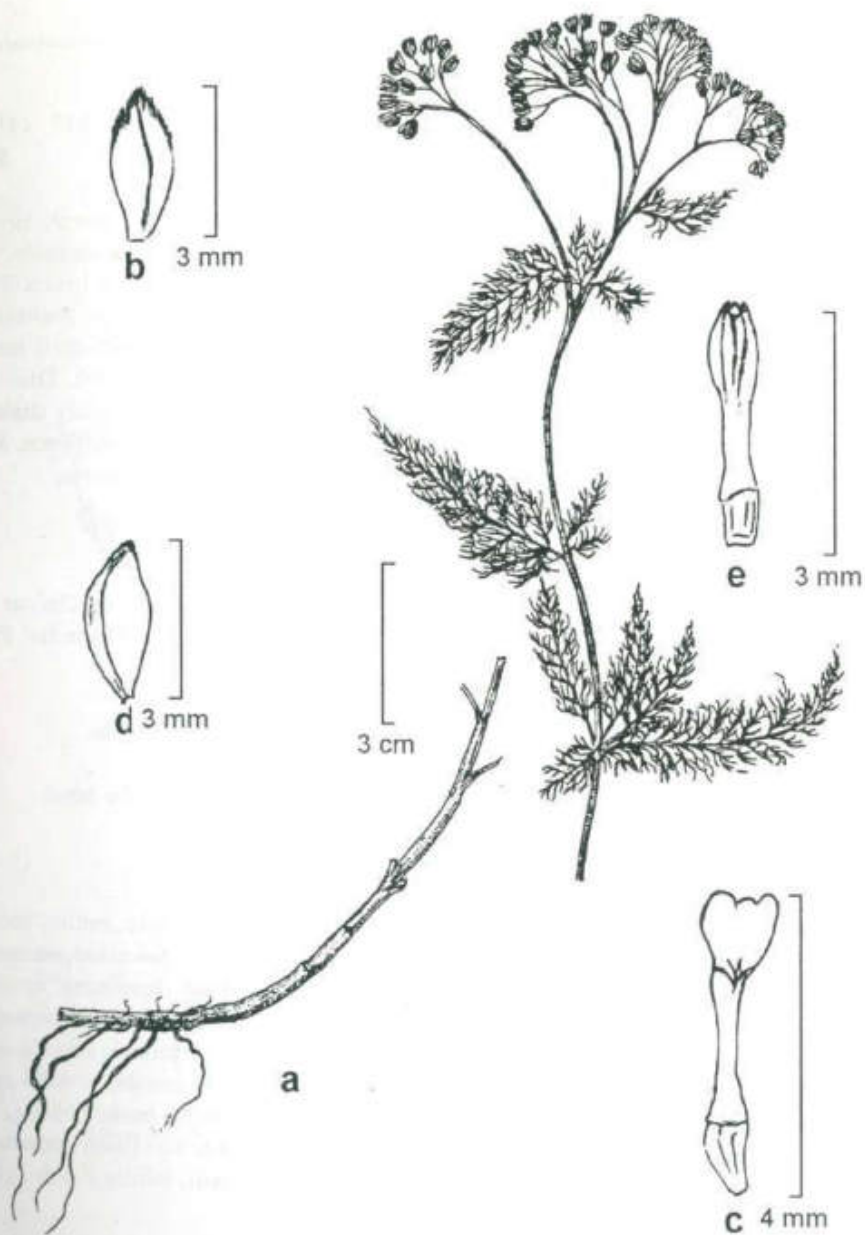


Fig. 1. *Achillea millefolium* L. : a. Habit; b. Involucre bract; c. Outer floret; d. Palea; e. Inner floret.

*Literature.* HARLING, G. (1960). Further embryological and taxonomic studies in *Anthemis* L. and some related genera. *Sy. Bot. Tidskr.* 54: 571-590.

*Anthemis cotula* L., Sp. Pl. 894. 1753; Hook.f. Fl. Brit. India 3: 312. 1881.

Fig. 2.

Herbs, annual, erect, glabrous to sparsely hairy, much branched, foetid, 12-45 cm high. Leaves alternate, 2-4 cm long, bipinnate; segments oblong-linear, acuminate. Heads many in loose corymbs, 15-20 mm in diam., long peduncled, involucre bracts 3-4 mm long, narrowly ovate-lanceolate to elliptic-lanceolate, obtuse with brown scarious tips. Receptacle conic, paleaceous; scales, oblong, linear, hyaline. Ray florets 6 mm long, female, sterile; ligule white, narrowly obovate, nerved, abruptly 3-lobed. Disc florets yellow, tubular, 2 mm long, winged; limb 5-fid with acute lobes, slightly dilated at base. Achenes grey, turbinate, truncate, tubercled, apically collared, 2 x 0.6 mm. Pappus absent or very short, paleaceous or of a membranous large or small auricle.

*Fl. & Fr.* May - Oct.

*Distrib.* India: W. Himalayas, sometimes as an undergrowth in *Cedrus* forest otherwise on shady slopes, between 800-3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, N. Asia, China, N. America, Britain and Canary Islands.

*Notes.* Highly variable with regard to the height, and nature of the head.

### 3. *Artemisia* L.

Herbs or undershrubs, usually strongly aromatic. Leaves alternate, entire, incised or 1-3-pinnatisect. Heads homogamous or heterogamous, solitary or fascicled, racemose or paniced, never corymbose, ovoid or broadly campanulate, small. Involucre bracts few-seriate with scarious margins; the outer shorter. Receptacle flat, convex or hemispheric, naked or pubescent to long hairy. Outer florets female, fertile, 1-seriate; corolla slender, tubular, shortly 2-3-fid. Disc florets hermaphrodite, fertile or sterile; corolla regular, tubular; the limb slightly enlarged or campanulate, 5-fid. Anther bases oblong, entire. Style arms of hermaphrodite florets truncate, usually penicillate tips often connate in the sterile florets. Achenes ellipsoid, oblong, subobovoid, very small, faintly striate, glabrous or pilose. Pappus absent.

North Temperate regions, S. Africa and S. America; most common on arid soils of W. United States and Russian Steppes; ca 400 species, ca 32 in India.

*Literature.* LING, Y.R. (1987). On the Status of *Artemisia dubia* Wallich ex Bess. and *A. myriantha* Wallich ex Bess. (Compositae) *Kew Bull.* 42(2): 443-448. PAMPANINI, R. (1926, 1927, 1929 & 1932)



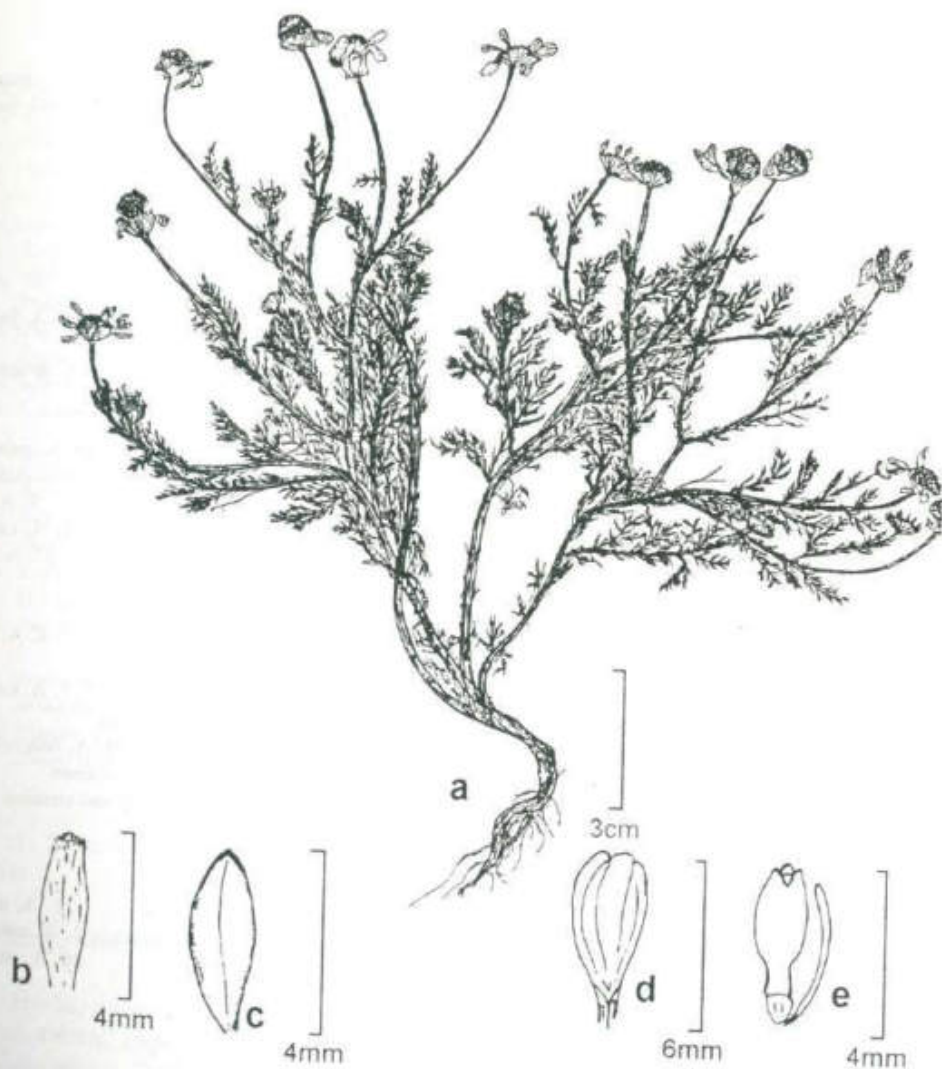


Fig. 2. *Anthemis cotula* L. : a. Habit; b. & c. Involucral bracts; d. Outer floret; e. Inner floret with scale.

Material per 10 studio delle Artemisie Asiatiche. *Nuovo Giorn. Bot. Ital. n. s.* 33: 447-469. 1926; 34: 632-713. 1927; 36: 375-388. 1929; 39: 19-35. 1932. SRINATH, K.V. & M.N. RAMASWAMI (1964). Occurrence of morphological types in *Artemisia pallens* Wall. *Curr. Sci.* 33: 346-347.

## KEY TO THE SPECIES

- |  |                                 |
|--|---------------------------------|
| 1a. Heads homogamous; receptacle naked; florets all fertile  | 18. <i>A. maritima</i>          |
| b. Heads heterogamous; receptacle various; florets all fertile or only the outer female fertile and the disc with sterile florets            | 2                               |
| 2a. Receptacle naked   | 3                               |
| b. Receptacle hairy or obscurely pubescent   | 28                              |
| 3a. Outer florets female, fertile; disc florets sterile  | 4                               |
| b. Outer female florets and disc florets all fertile   | 9                               |
| 4a. Perennial herbs  | 5                               |
| b. Annual herbs  | 8                               |
| 5a. Heads secund; cauline leaves with stipule like appendages at the base  | 16. <i>A. japonica</i> ✓        |
| b. Heads not secund; cauline leaves without the appendages at the base   | 6                               |
| 6a. Leaves entire, weakly toothed; radical leaves 3-fid or absent  | 8. <i>A. dracunculus</i>        |
| b. Leaves 2-3-pinnatisect or pinnatifid, only upper ones entire  | 7                               |
| 7a. Stems pale white; heads in simple or paniced racemes   | 24. <i>A. salsoloides</i>       |
| b. Stems pale green, sometimes purple; heads solitary and distant or in cluster of 2-3-short forming paniced racemes                         | 9. <i>A. dubia</i>              |
| 8a. Heads secund; involucre bracts glabrous; achenes narrowly obovate  | 6. <i>A. capillaris</i>         |
| b. Heads not secund; involucre bracts hairy; achenes narrowly obconic  | 27. <i>A. stricta</i>           |
| 9a. Annual or biennial herbs   | 10                              |
| b. Perennial herbs   | 12                              |
| 10a. Small herbs, ca 15-30 cm high; involucre bracts pubescent; heads rather large   | 4. <i>A. biennis</i>            |
| b. Tall herbs, up to 1.2 m high; involucre bracts glabrous; heads small  | 11                              |
| 11a. Heads hemispheric, pedicelled, secund, drooping in axillary leafy racemes   | 7. <i>A. caruifolia</i> ✓       |
| b. Heads ovoid, erect in very dense axillary erect sessile, compound thyrsoid panicles   | 30. <i>A. tournefortiana</i>    |
| 12a. Heads usually small, 1.25-4 mm in diam., often in spreading paniced spikes or racemes   | 13                              |
| b. Heads rather large 4-8 mm in diam. in simple, sparingly branched, erect axillary and terminal racemes                                     | 27                              |
| 13a. Leaves simple, lobed or serrate   | 14                              |
| b. Leaves pinnatifid, pinnatisect or pinnati-partite   | 15                              |
| 14a. Hoary pubescent or tomentose herbs; leaves ovate-elliptic, lobed; heads ovoid   | 21. <i>A. nilagirica</i>        |
| b. Glabrous herbs; leaves lanceolate, acuminate, serrate; heads globose-campanulate  | 2. <i>A. amygdalina</i>         |
| 15a. Glandular hairy herbs   | 20. <i>A. myriantha</i>         |
| b. Pubescent or tomentose or glabrescent herbs   | 16                              |
| 16a. Rhizomatous perennial herbs   | 17                              |
| b. Rhizomatous perennial herbs   | 17                              |
| 17a. Brown purple or purple herbs  | 18                              |
| b. Herbs more or less green  | 20                              |
| 18a. Cauline leaves with auricled lobes; heads often clustered at the terminal ends embedded in brown ferruginous wool                       | 5. <i>A. campbellii</i> ✓       |
| b. Cauline leaves without auricled bases; heads paniced, not embedded in wool  | 19                              |
| 19a. Leaves grey white to woolly tomentose beneath; heads subglobose or campanulate; corolla tube of hermaphrodite florets broadly attenuate | 23. <i>A. roxburghiana</i>      |
| b. Leaves tomentose beneath; heads hemispheric; Corolla tube of hermaphrodite florets narrowly attenuate                                     | 28. <i>A. stronglylocephala</i> |

- 20a. Heads oblong; involucre bracts glandular hairy 31. *A. verlotiorum*  
 b. Heads campanulate or subglobose; involucre bracts glabrous or tomentose at maturity 15. *A. indica*
- 21a. Leaf segments pectinately pinnatifid; rachis often pectinately winged; heads hemispheric, subsecund 13. *A. gmelinii*  
 b. Leaf segments not pectinately pinnatifid; rachis simple winged; heads often subglobose or campanulate, not subsecund 22
- 22a. Herbs with glabrous stems; leaves pinnate-partite. 29. *A. thellungiana*  
 b. Herbs with puberulous to pubescent stems; leaves 2-pinnatisect or 2-pinnatifid or 2-pinnatipartite 23
- 23a. Stems slender; leaves 2-pinnatipartite, segments incised 14. *A. incisa*  
 b. Stems stout; leaves 3-2-1-pinnatisect; segments not incised 24
- 24a. Leaves 3-2-pinnatisect, white punctate above 12. *A. filiformilobulata*  
 b. Leaves 2-1-pinnatisect, not white punctate above 25
- 25a. Panicles almost entirely leafless; heads campanulate 10. *A. elegantissima*  
 b. Panicles sparsely to densely leafy; heads globose or ovoid-campanulate or ovoid 26
- 26a. Outer involucre bracts densely tomentose 11. *A. eriocephala*  
 b. Outer involucre bracts arachnoid-puberulous 3. *A. austro-himalayana*
- 27a. Leaves white tomentose beneath, segments spreading; corolla not densely villous 32. *A. wallichiana*  
 b. Leaves subsilky villous on both surfaces, segments close-set, short; corolla densely villous 25. *A. stracheyi*
- 28a. Receptacle obscurely pubescent; heads ca 4 mm in diam., subglobose; corolla of hermaphrodite florets almost cupular 22. *A. persica*  
 b. Receptacle covered with long hairs; heads 6-12 mm in diam., hemispheric; corolla of hermaphrodite florets not cupular 29
- 29a. Silky hoary or tomentose perennial herbs, heads 6-8 mm in diam. 30  
 b. Hoary pubescent or tomentose annual or biennial herbs; heads 6-12 mm in diam. 31
- 30a. Tall herbs; heads numerous, somewhat crowded; achenes elliptic-oblong or somewhat obovoid 1. *A. absinthium*  
 b. Dwarf herbs; heads few, solitary or spicate; achenes cylindrical, obscurely ribbed, somewhat auricled at the tips 19. *A. minor*
- 31a. Usually tall herbs, simple or paniculately branched above; anthers aristate 26. *A. sieversiana*  
 b. Dwarf herbs; branches many ascending from the root, spreading in a circular way; anthers acuminate 17. *A. macrocephala*

1. *Artemisia absinthium* L., Sp. Pl. 848. 1753; Hook.f., Fl. Brit. India 3: 328. 1881.

Fig. 3.

Eng.: *Absinth*, *Madderwort*; Hindi: *Vilayati afsanth*; Mal.: *Shula bandha*.

Herbs, perennial, erect, hoary pubescent, 30-90 cm high; stems few or many from the rootstock, angled, densely hoary pubescent, roughly sulcate, slender, terminating in inflorescences. Radical leaves ca 10 cm long, 2-3-pinnatisect, hoary pubescent to dull ferruginous petioled; petioles narrowly winged; segments linear or oblong-linear, obtuse. Heads yellow, compact, arising from the axils of the leaf-like bracts, shortly pedicelled in dense secund racemes, terminating the branches hemispheric, 3 cm in diam. Outer involucre bracts herbaceous, oblong with narrowly scarious margins; 2 x 0.5 mm; inner involucre bracts obovate-orbicular, with scarious margins 3 x 1 mm. Receptacle slightly convex, dull brown hairy. Outer florets 1 x 0.3 mm, female, fertile; corolla red, glandular, slightly obliquely dilated below. Disc florets hermaphrodite fertile,



Fig. 3. *Artemisia absinthium* L. : a. Habit; b., c., & d. Involucral bracts; e. Outer floret; f. Anther; g. Achene.

2 x 0.5 mm, tube widened at the top; limbs 5-fid. Anthers acuminate. Achenes dull-brown, elliptic-oblong to obovoid, 1 x 0.5 mm, slightly concave in the centre rough.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, common on slopes, between 1500-2500 m. Jammu & Kashmir (Srinagar, Banihal, Tangmarg).

Afghanistan, N. Asia and Westwards to Atlantic.

*Notes.* Critical study of the specimens revealed that *Artemisia absinthium* L. is a very distinct species but sometimes confused with *Artemisia sieversiana* in general habit. However, the characteristic perennial habit, hoary pubescence of the stem and the leaves, small, short peduncled heads in small dense secund racemes, and acuminate anthers of the former are sufficient to distinguish it from the latter. Native of Europe, perhaps introduced for medicinal purposes. The whole herb is an aromatic tonic formerly used in debility of the digestive organs. It exercises a powerful influence over the nervous system and causes headache. This phenomenon was known to the travellers from the early times when marching through the extensive tracts of Kashmir and Ladakh.

2. *Artemisia amygdalina* Decne. in Jacq. Voy. Ind. 92. t. 100. 1844; Hook.f., Fl. Brit. India 3: 325. 1881.

Herbs, perennial, large, glabrous; stems stout erect, deeply grooved, many-ribbed, glabrous. Leaves simple, rather membranous, subsessile, lanceolate, caudate, cuneate at the base, acuminate, serrate, 10-15 x 1.5-3 cm, more or less glabrous above, brown white pubescent beneath. Heads few flowered, sub secund in dense short axillary racemes ovoid, ca 3 mm in diam. Involucral bracts oblong, obtuse, glabrous with scarious margins, 3 x 1 mm; outer with green midrib. Receptacle naked. Outer florets female, fertile, 0.5 mm long. Disc florets yellow; hermaphrodite, fertile, tubular, 2 mm long, limb 5-lobed. Achenes not seen.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, between 2500-3000 m. Jammu & Kashmir.

Pakistan and Afghanistan.

3. *Artemisia austro-himalayana* (Y.R. Ling et Puri) Ling et Puri in Guihaia 8(1): 64. 1988. *Artemisia tenuifolia* auct. non Adam. ex DC. Ling et Puri lc. 5(1): 2. 1985.

Herbs, perennial; stems pale yellow or purplish brown erect, striate; branches patently puberulous or glabrescent. Middle and upper cauline leaves 3.5-5.5 x 2-3.5 cm, 1-2-pinnatisect, membranous, papery, short petioled; petioles 0.5-1.5 cm long; basal

stipuliform, half amplexicaul, sparsely pubescent or glabrescent above or arachnoid-pubescent beneath, elliptic in outline; primary segments (3-) 4-5-sect; secondary segments 1-2-sect, elliptic or lanceolate, mucronate at the apices 0.3-1 x 2-2.5 mm. Floral leaves 3-sect or entire. Heads sessile or subsessile, slightly drooping in panicles or 3-5 heads crowded on the branch or solitary or laxly spiked, panicles many ovoid-campanulate or ovoid, 1.5-2.5 mm in diam. Involucral bracts in 3-4 series; outer bracts lanceolate, sparsely arachnoid-puberulous with membranous margins, midrib green; middle and inner long ovate, membranous or submembranous, glabrescent to glabrous. Receptacle minute, naked. Outer florets 7-11, female; corolla narrowly tubular, 2-dentate at the apex. Disc florets 8-12, hermaphrodite, tubular; limb 5-dentate, purple. Anther apices triangular, acute, bases acute. Style arms truncate, penicillate. Achenes long, ovoid or elliptic-ovoid minute.

*Fl. & Fr.* Sept.

*Distrib.* India: W. Himalayas, at 4000 m. Himachal Pradesh and Uttar Pradesh (Garhwal : Niti).

4. *Artemisia biennis* Willd., *Phytogr.* 11, n. 39. 1794; Hook.f., *Fl. Brit. India* 3: 324. 1881. Fig. 4.

Herbs, annual, erect, glabrous to sparsely pilose, 25-60 cm high; stems pale green, rather succulent, sometimes many from base. Lower leaves 5-8 cm long, 2-pinnatifid petioled; segments pinnatifid or toothed; cauline leaves linear-oblong; 2-6 cm long subsessile. Heads yellow or purplish green, many flowered, suberect in short leafy paniced racemes broadly cupular, 4 mm in diam. Outer involucral bracts dull green with narrow brown scarious margins, broadly ovate to obovate, 2.5-3.2 x 2 mm, more or less glabrous; inner involucral bracts obovate with narrow brown scarious apices, 3 x 2 mm. Receptacle broad, convex, naked. Outer florets female, fertile 1.5 mm long, corolla oblong, slightly glandular. Disc florets hermaphrodite, fertile, tubular, 3 mm long, slightly glandular, limb 5-fid. Achenes brown, oblong to oblanceolate, 1.2-1.5 x 1 mm, obscurely angled.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. and E. Himalayas, along shady bank of streams, in waste lands and on grassy hill slopes, between 4000-5000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Tibet and N. China.

5. *Artemisia campbellii* Hook.f. & Thomson ex C.B. Clarke, *Comp. Ind.* 164. 1876; Hook.f., *Fl. Brit. India* 3: 327. 1881.

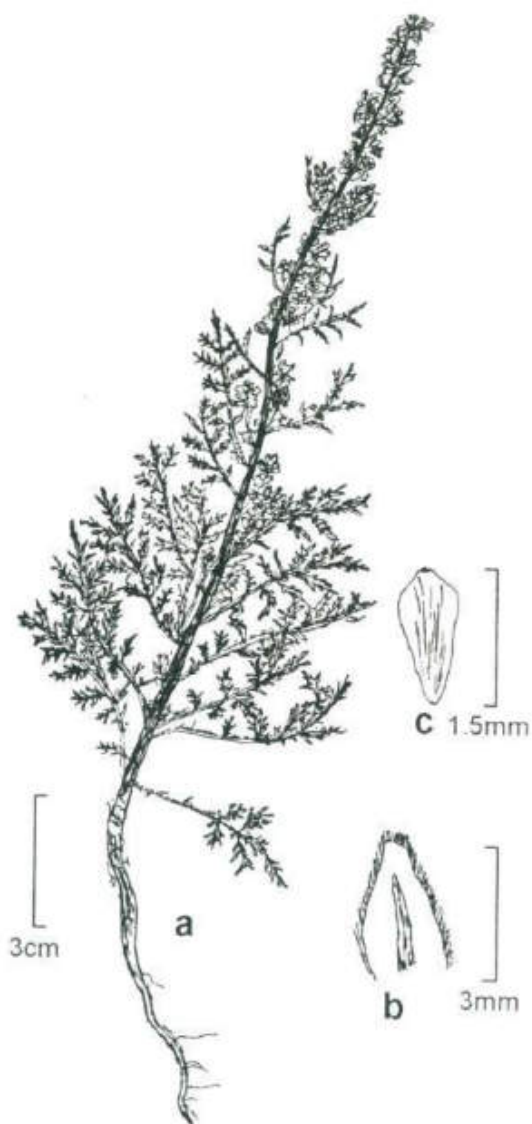


Fig. 4. *Artemisia biennis* Willd. : a. Habit; b. Involucral bract; c. Achene.

Herbs, perennial, erect, strongly scented; branches clothed with brown tomentum, ca 20 cm high; rootstock creeping. Leaves pinnatisect, ovate in outline; segments 2-3-lobed; lobes lanceolate, acute; radical leaves 3-6 cm long; stout petioled, sheathing at base; cauline leaves auricled at base with revolute margins, brown ferruginous above, white tomentose beneath. Heads brown, sessile, clustered in interrupted, simple or racemose spikes hemispheric, 4 mm in diam. Involucral bracts densely woolly, oblong; outer with narrow scarious margins; inner rather scarious. Receptacle very small. Outer florets, female, fertile. Disc florets, hermaphrodite, fertile, tubular. Achenes not seen.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. & E. Himalayas, between 1500-6000 m.

Pakistan, Bhutan and Tibet.

**6. *Artemisia capillaris*** Thunb., *Fl. Jap.* 309. 1787. *A. scoparia* Waldst. & Kit. *Pl. Rar. Hung.* 1: 66. t. 65. 1802; Hook.f., *Fl. Brit. India* 3: 323. 1881. *A. capillaris* Thunb. var. *scoparia* (Waldst. & Kit.) Pamp. in *Nuovo Giorn. Botan. Ital.* n.s. 34: 642. 1926-27.

Fig. 5.

Mah. (Bombay): *Churisaroj, Danti*; Punj.: *Biur, Dona, Durunga, Jhan, Marua*.

Herbs, annual, glabrous to sparsely villous, 20-60 cm high; branches dull purple to pale white, slender, grooved; rootstock woody. Radical leaves broadly ovate in outline, ca 6 cm long, 1-3-pinnatisect; segments setaceous; cauline leaves pinnatisect. Heads sessile, or on short capillary peduncles, secund in densely or sparsely paniced racemes, 0.2-0.25 cm in diam. Involucral bracts oblong, obtuse with white scarious margins, 1-2 mm long glabrous, outer green with scarious margins. Receptacle small, slightly convex, naked. Outer florets female, fertile, 1 mm long, corolla filiform. Disc florets hermaphrodite, sterile, tubular; 1.8 mm long, limb 5-fid. Achenes brown narrowly obovate, 0.8 mm long, obscurely striate.

*Fl. & Fr.* July - Dec.

*Distrib.* India: Indo-Gangetic Plain and W. Himalayas, between 1500-3500 m. Jammu & Kashmir, Himachal Pradesh, Punjab and Uttar Pradesh.

Pakistan, W. Tibet, N. China, Mongolia, Japan and Afghanistan to C. Europe.

*Notes.* A highly variable species.

**7. *Artemisia caruifolia*** Buch.-Ham. in Roxb. *Fl. Ind.* 2: 3: 422. 1832; Hook.f. *Fl. Brit. India* 3: 324. 1881. "*Carnifolia*" (var. *caruifolia* Pamp. in *Nuovo Giorn. Bot. Ital.* n.s. 34: 648. 1927-28).



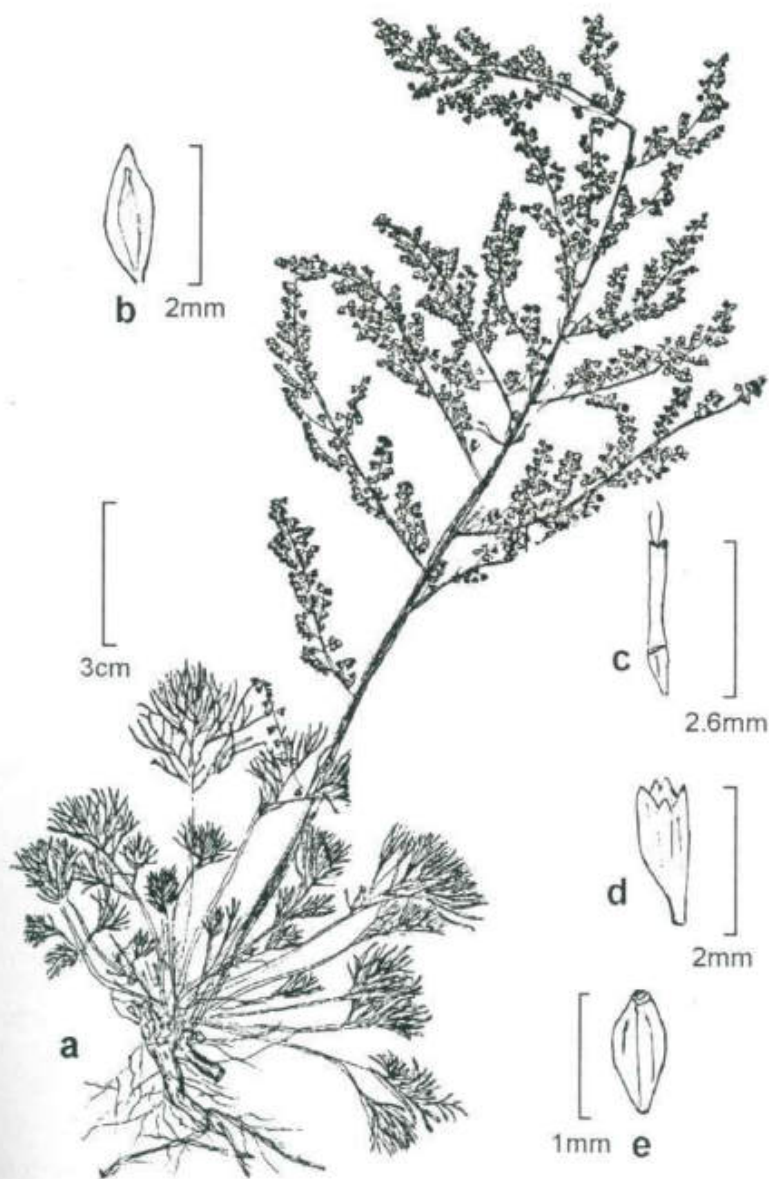


Fig. 5. *Artemisia capillaris* Thunb. : a. Habit; b. Involucral bract; c. & d. Florets; e. Achene.

Herbs, annual, erect, glabrous, ca 0.3-1.2 m high; stems erect, branched above, striate, smooth, densely leafy. Leaves, dark green, thinly multifid sessile; segments very narrow or linear, filiform, ultimate divisions ensiform; those on the branches pinnatifid or pinnate to simple, glabrous on both surfaces. Heads greenish yellow, pedicelled, hemispheric, secund, drooping in axillary leafy racemes 4-5 mm in diam. Involucral bracts brown, glabrous 2-2.2 x 0.5-1 mm; outer broadly oblong, herbaceous with narrow white scarious margins; inner broadly oblong with broad white scarious margins. Receptacle small, hemispheric, naked. Outer florets many, female, fertile; corolla gibbous, margin 3-toothed. Disc florets many, hermaphrodite, fertile, tubular. Achenes not seen.

*Fl. & Fr.* March - April.

*Distrib.* India ; Gangetic Plain, W. Bengal and Assam.

Bangladesh and Nepal.

*Notes.* A native of Nepal, said to have been introduced by Dr. Buchanan into the Calcutta Botanic Garden.

8. *Artemisia dracunculus* L., Sp. Pl. 849. 1753; Hook.f., Fl. Brit. India 3: 321. 1881.

Eng.: *Little dragon, Mugwort, Terragon.*

Herbs, perennial, erect, glabrous, branched, 18-90 cm high; stems sulcate. Radical leaves 3-fid or absent; cauline leaves linear to lanceolate or linear-oblong, entire or toothed, 3-7 cm long. Heads green-brown, sessile or peduncled in paniced racemes, sometimes clustered in threes, horizontal or nodding with rather numerous florets subglobose to campanulate-globose, 2-3 mm in diam. or 2.5-4 mm long. Involucral bracts 2-3 mm long; outer oblong-elliptic, almost entirely herbaceous; inner ovate with very broad dull white scarious margins and a very narrow green or dark brown central portion. Receptacle naked. Outer florets female, fertile, ca 2 mm long, corolla slender, obscurely 3-fid. Disc florets dull brown, hermaphrodite, sterile, more or less ellipsoid, ca 2 mm long. Achenes not seen.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas, on rocky slopes and on sandy river beds, between 2300-3500 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, W. Tibet, Afghanistan, W. Asia and CIS.

*Notes.* The aromatic leaves are credited with aperient stomachic stimulant and febrifuge properties. Authentic specimens not seen. Cultivated or doubtfully recorded.

9. *Artemisia dubia* Wallich ex Bess. in Nouv. Mem. Soc. Nat. Mosc. 3: 39. 1834.  
*A. vulgaris* auct. non L.: Hook.f. Fl. Brit. India 3: 325. 1881. p.p. *A. dracunculus* L.  
 var. *inodora* sensu Pamp. in Nuov. Giorn. Bot. Ital. n.s. 34: 653. 1927. p.p. Fig. 6

Garh.: *Chamra*

Herbs, erect, glabrous or puberulous to pubescent; stems pale green or sometimes purple, up to 40 cm high, grooved and ribbed. Radical leaves 3-fid or absent; cauline leaves 2-7 cm long; lower leaves 2-3-pinnatifid or partite; segments linear-lanceolate to lanceolate, upper narrowly lanceolate, entire, or pinnatisect to trifid acute, glabrous or adpressed puberulous to pubescent beneath. Heads green yellow, glabrous, shining, sessile or shortly peduncled, solitary and distant or in clusters of 2-3, forming paniced racemes or slender lax short racemes subglobose to globose-campanulate, ca 1.5-3 mm in diam. Outer involucral bracts pale white, oblong, obtuse with pale white to thick brown scarious margins, 1.5-3.5 mm long; inner broadly oblong, obtuse, almost hyaline or with narrow scarious margins, ca 2-2.5 mm long. Receptacle naked. Outer florets female, fertile ca 1-2 mm long. Disc florets hermaphrodite, sterile; bluntly tubular, attenuate, ca 1.5-3 mm long, simple or glandular, limb obscurely 5-lobed. Achenes not seen.

#### KEY TO THE VARIETIES

- 1a. Stems pale green, puberulous to pubescent; leaves densely adpressed puberulous to pubescent beneath  
 9.1. var. *dubia*  
 b. Stems more or less purple, often glabrous, scarcely puberulous; leaves not as above  
 9.2. var. *subdigitata*

#### 9.1. var. *dubia*

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, between 2500-4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Bhutan, Tibet and China.

9.2. var. *subdigitata* Ling in Kew Bull. 42(2): 444. 1987. *A. glauca* non Pall.  
 Hook.f., Fl. Brit. India 3: 322. 1881.

*Fl. & Fr.* June - Aug.

*Distrib.* India: W. Himalayas, in drier parts, between 1500-4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.



Fig. 6. *Artemisia dubia* Wallich ex Bess. var. *subdigitata* Ling : a. Habit; b. Involucre bract; c. Outer floret, d. Inner floret.

Pakistan, Nepal, Bhutan and China.

10. *Artemisia elegantissima* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33. 454. 1926.

Herbs, glabrous to sparsely pubescent; stems striate, sulcate. Upper leaves 2-pinnatifid; rachis of upper segments scarcely somewhat constricted, lobes acuminate, mucronate. Heads in large panicles with straight or curved branches, or in small, leafless racemes, campanulate, small and distant or larger and close. Corolla tube of disc florets long, broadly attenuate.

KEY TO THE VARIETIES

- |  |                                 |
|--|---------------------------------|
| 1a. Panicles large, branches curved; heads small, distant.             | 10.1. var. <i>elegantissima</i> |
| b. Panicles rather small, branches straight; heads larger, not distant | 10.2. var. <i>kumaonensis</i>   |

10.1. var. *elegantissima*

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: W. Himalayas, 3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh (Kedarnath).

Pakistan.

10.2. var. *kumaonensis* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 455. 1926.

*Fl. & Fr.* Sept.

*Distrib.* India: W. Himalayas, at 1500 m. Uttar Pradesh (Kumaon : Askote).

11. *Artemisia eriocephala* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 454. 1926.

Fig. 7.

Herbs; stems sparsely puberulous, striate, sulcate. Leaves glabrous above, pubescent beneath; upper leaves 2-pinnatisect; rachis of upper segments somewhat constricted, narrowly mucronate in elongated segments. Heads in exceedingly leafy, lax panicles with straight-spreading branches, or in small, 3-7 headed racemes, globose-campanulate, large, densely tomentose. Corolla of disc florets much glandular; tube elongated, broadly attenuate.

*Distrib.* India: W. Himalayas, at 3500 m. Uttar Pradesh (Garhwal : Niti).

12. *Artemisia filiformilobulata* Ling & Puri in Guihaia 5(1): 1. 1985.

Herbs, perennial; stems, pale yellow or brown purple erect, striate; upper flowering branches 3-10 cm long, puberulous or glabrescent. Lower cauline leaves few, middle and

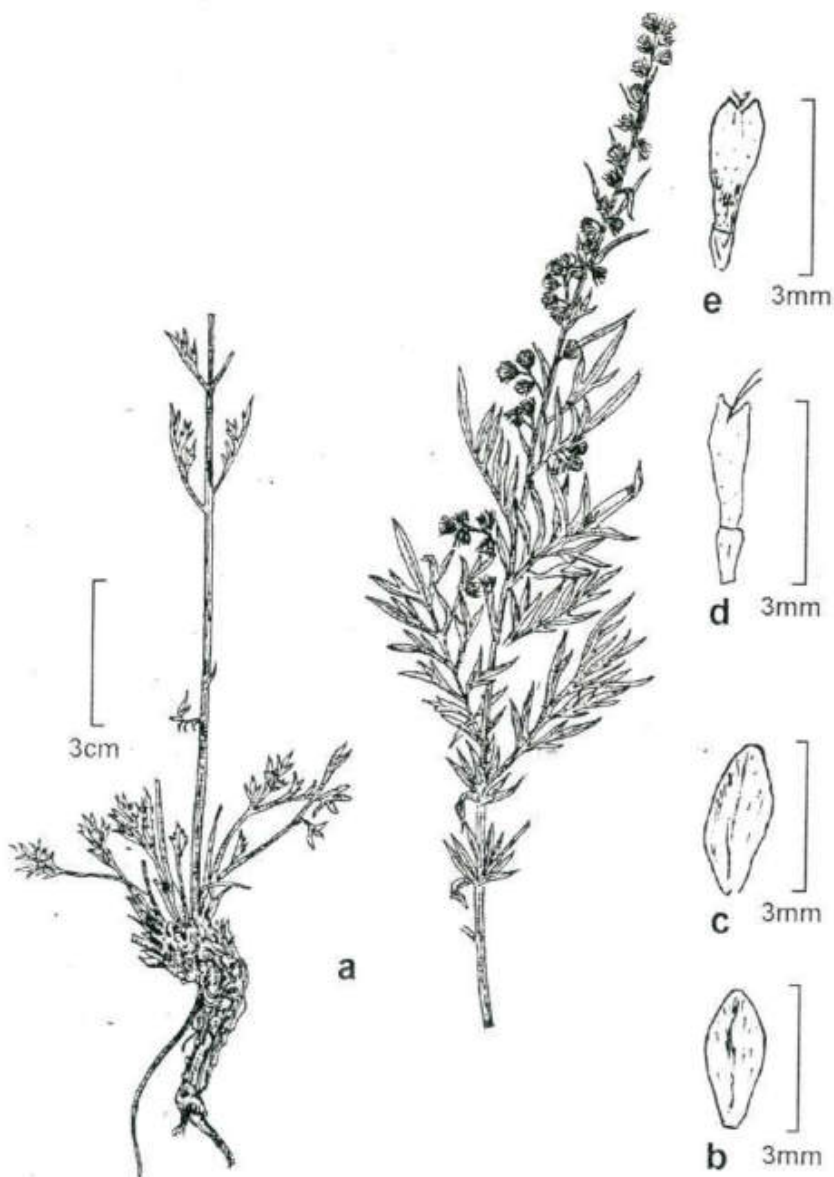


Fig. 7. *Artemisia eriocephala* Pamp. : a. Habit; b. & c. Involucrel bracts; d. Outer floret; e. Inner floret.

upper leaves (3-)-2-pinnatisect, ovate or more or less rotund in outline, 3.5-4.5 x 3.5-4.5 cm, sparsely white-punctate above, arachnoid tomentose or more or less glabrescent beneath, subsessile; segments 0.8-1.8 x 0.5-1.5 mm; primary segments 4-6; secondary segments 1-2, filiform, lanceolate or linear-lanceolate, acuminate; basal segments stipuliform, margins revolute. Floral leaves 1-2-pinnatisect, sessile; segments filiform-lanceolate. Heads sessile in narrow panicles or densely spiked in upper branches ovoid-campanulate or ovoid, 1.5-2 mm in diam. Involucral bracts 3-seriate; outer lanceolate, dorsally puberulous or more or less glabrescent with narrow membranous margins, midrib green; middle and inner oblong-ovate, membranous, glabrous. Receptacle minute, naked. Outer florets 5-7, female; corolla narrowly tubular, 3-2-1-dentate. Disc florets 8-12, hermaphrodite, tubular; limb 5-dentate. Anther-apices triangular, acute. Style branches truncately penicillate. Achenes minute, long-ovoid or elliptic-ovoid.

*Fl. & Fr. Sept.*

*Distrib.* India: W. Himalayas at 5000 m. Himachal Pradesh and Uttar Pradesh (Gangotri).

13. *Artemisia gmelinii* Web. ex Stechm., Dissert de Hortem, 30.1775. *A. sacrorum* Ledeb. in Mim. Acad. St. Per. 5: 571. 1815; Hook.f., Fl. Brit. India 3: 326. 1881. *A. laciniata sensu* Hook.f. non Willd.

Garh. (Bhotia): *Kalapurcha*; Kash. (Ladakh): *Burmack, Tatwen*; Punj.: *Barnak, Chumbar, Jan, Munya*.

Shrub like herbs, perennial, erect, sparsely to densely hoary, sometimes glabrescent, 10-80 cm high; rootstock woody; branches many from the woody rootstock. Leaves 1-6 cm long, 2-3-pinnatisect, more or less spreading, long petioled, segments few to many; lobes linear-broadly oblong, obtuse glabrous or sparsely pubescent above, pubescent to tomentose or apparently white tomentose beneath. Heads 6-20 flowered, short to long peduncled, nodding, hemispheric in racemose panicles 1.5-5 mm in diam. Involucral bracts sparsely to densely hoary tomentose, rarely glabrous; outer green oblong-linear to ovate, with narrow scarious margins, 1.5-3 x 0.2-0.5 mm. Receptacle small, conic, naked. Outer florets female, 1.5-1.8 x 0.5-1 mm, fertile; corolla obscurely lobed, gradually expanding to the base. Disc florets, yellow, hermaphrodite, tubular, 1.8-2.2 x 0.8-1 mm, limb 5-lobed, sparsely glandular. Achenes oblanceolate, slightly curved to the base, truncate at the top, 1 x 0.5 mm, obscurely white ribbed.

KEY TO THE VARIETIES

1a. Stunted shrubs or small perennial herbs; outer involucral bracts oblong-linear

13.2. var. *minor*

b. Large perennials; outer involucral bracts ovate-oblong

- 2a. Leaves hoary or green or white pubescent on both surfaces; heads 15-20 flowered 13.1. var. *gmelinii*  
 b. Leaves glabrous to sparsely pubescent above, hoary to white tomentose beneath; heads 6-12  
 flowered 13.3 var. *vestita*

13.1. var. *gmelinii*

Fig. 8.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas, between 3000-3500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Tibet, C.I.S., Mangolia and N. China.

13.2. var. *minor* (Ledeb.) Naithani, Comb. nov. *Artemisia sacrorum* Ledeb. var. *minor* Ledeb. Fl. Alt. 4: 72. 1833.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, Cold Arid zone, between 4500-5000 m. Jammu & Kashmir (Ladakh).

Tibet, C.I.S., Mangolia and N. China.

13.3. var. *vestita* (Wallich ex DC.) Naithani Comb. et. Stat. nov. *Artemisia vestita* Wallich ex DC., Prodr. 6: 106. 1938; Hook. f., Fl. Brit. Ind. 3: 326. 1881. *A. sacrorum* Ledeb var. *minor* Ledeb. f. *wallichiana* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 690. 1927-28.

Fig. 9.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: W. Himalayas, between 2500-3500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan and N. China.

*Notes.* Kitamura (Enum. Fl. Pl. Nep. 12. 1982) considers *Artemisia sacrorum* Ledeb. conspecific with *Artemisia gmelinii* Web. ex Stechm. But in the present treatment species *gmelinii* has been retained and above two new combinations have been proposed.

14. *Artemisia incisa* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 456. 1926.

Herbs; stems slender, striate, sulcate. Leaves 2-pinnatipartite, apparently thin in dried state; segments close or distant, inciso-lobed; lobes ovate acuminate, mucronate, adpressed-greyish white pubescent or puberulous beneath. Heads many in elongated



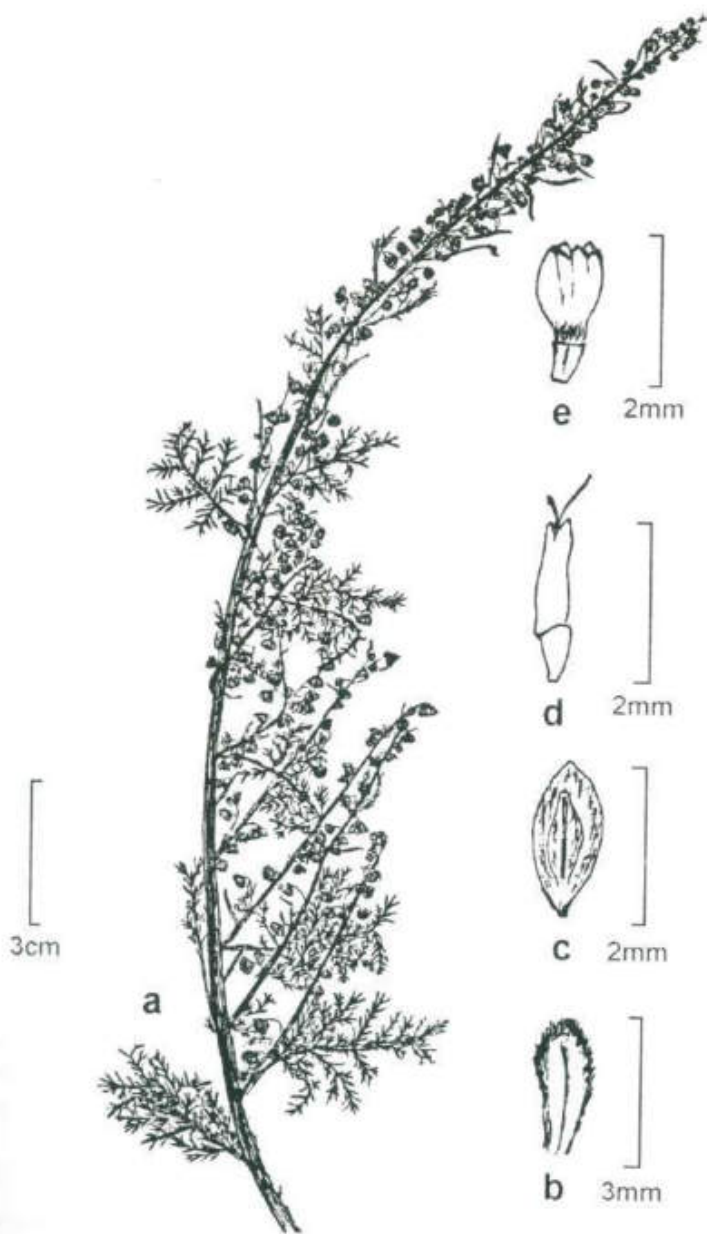


Fig. 8. *Artemisia gmelinii* Web. ex Stechm. var. *gmelinii* : a. Habit; b. & c. Involucral bracts; d. Outer floret; e. Inner floret.

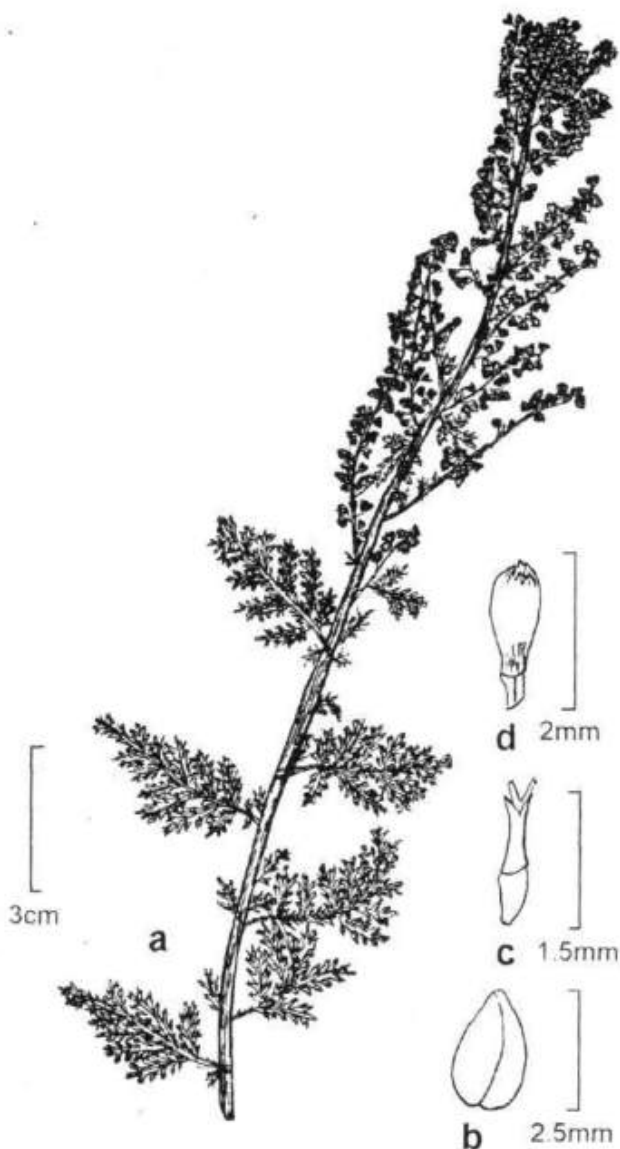


Fig. 9. *Artemisia gmelinii* Web. ex Stechm. var. *vestita* Wallich ex DC.) Naithani.:  
a. Habit; b. Outer involucre bract; c. Outer floret; d. Inner floret.

panicles with narrow or spreading branches naked at base, or in small racemes, small, soon becoming glabrescent. Corolla of disc florets moderately glandular, tube elongate, broadly attenuate.

## KEY TO THE VARIETIES

- 1a. Leaf segments, close, adpressed pubescent or puberulous beneath 14.1. var. *incisa*  
 b. Leaf segments, distant, greyish white pubescent beneath 14.2. var. *kunawarensis*

14.1. var. *incisa* (incl. forma).

*Fl. & Fr.* Oct.

*Distrib.* India: W. Himalayas, between 1200-3000 m. Jammu & Kashmir, and Himachal Pradesh.

Pakistan.

14.2. var. *kunawarensis* Pamp. in *Nuovo Giorn. Bot. Ital.* n.s. 33: 456. 1926.

*Fl. & Fr.* Aug.

*Distrib.* India: W. Himalayas, at 3000 m. Himachal Pradesh.

✓ 15. *Artemisia indica* Willd., *Sp. Pl.* 3: 1846. 1803. *A. grata* Wallich ex Bess. in *Nouv. Mem. Soc. Nat. Mosc.* 3: 57. 1834. *A. vulgaris* auct. non L.: Hook. f. *Fl. Brit. India* 3: 325. 1881. p.p.; Ling in *Kew Bull.* 42(2): 447. 1987.

Herbs, perennial, tall, 0.3-1.2 m high; rhizome prostrate, creeping, rooting; stems simple, striate, sulcate, pubescent. Leaves pinnati-partite or pinnatifid; segments narrow, lanceolate, acuminate, dentate, tomentose beneath; segment apices ovate and mucronate or acuminate or narrowly acuminate. Heads in small or large, dense or lax leafy panicles. Heads campanulate or subglobose, glabrous when young, or tomentose at maturity, simple apparently subsecund in dried state. Corolla of disc florets sparsely glandular, tube gradually longitudinally narrow from the 3/4 of the corolla, attenuate.

## KEY TO THE VARIETIES

- 1a. Leaves pinnati-partite; heads larger 15.2. var. *indica*  
 b. Leaves 2-pinnatifid; heads smaller 15.1. var. *dissecta*

✓ 15.1. var. *dissecta* Pamp. in *Nuovo Giorn. Bot. Ital.* n.s. 33: 459. 1926.

*Fl. & Fr.* March.

*Distrib.* India: Assam.

**15.2. var. indica**

*Fl. & Fr.* March - Dec.

*Distrib.* India: Gangetic Plain, Deccan Peninsula and the Himalayas, ascending up to 3000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, W. Bengal, Assam, Meghalaya and Tamil Nadu.

Myanmar, Thailand, S. China and Japan.

**16. *Artemisia japonica*** Thunb. Fl. Jap. 310. 1784. *A. parviflora* Roxb. ex D. Don, Prodr. Fl. Nepal. 181. 1825; Hook.f., Fl. Brit. India 3: 322. 1881. *A. japonica* var. *parviflora* (Roxb. ex D. Don) Pamp. in Nuovo Giorn. Botan. Ital. n.s. 34. 665. 1927.

**Fig. 10.**

Punj.: *Kanyurts*.

Herbs, perennial, erect or ascending, stout, villous, hoary or glabrous, 30-90 cm high; stems paniculately branched, grooved. Leaves 2-5 cm long, very variable, sessile with a stipule-like appendage at the base; upper cauline leaves linear-cuneate, tip entire or acutely 2-8-fid or flabellately lobulate, rarely pinnatifid; uppermost leaves linear, entire, acute. Heads greenish white, pedicelled, secund in spreading paniced racemes, globose, 2-3 mm diam. Involucral bracts broadly oblong with broad scarious margins, ca 1 mm long; innermost almost hyaline. Receptacle naked. Outer florets, female, fertile; ca 1 mm long, female, fertile; corolla slender, obscurely 3-fid. Disc florets hermaphrodite, sterile, ca 1.5 mm long, tubular; limb 5-fid, lobes acute with purple tips. Achenes ellipsoid, very small, smooth.

*Fl. & Fr.* July - Dec.

*Distrib.* India: Temperate Himalayas, Indo-Gangetic Plain and Deccan Peninsula, between 1500-3000 m. Jammu & Kashmir, Himachal Pradesh, Punjab (Rare), Uttar Pradesh, Bihar, Sikkim, Meghalaya, Orissa, Rajasthan, Karnataka and Kerala.

Pakistan, Nepal, Bhutan, Myanmar, Afghanistan and Japan.

*Notes.* Highly variable with regard to the size and shape of the leaves. Hara *et al.* (Nepal, 1982) reported var. *lanata* Pamp. from Kashmir to Nepal. As there are no specimens available in any Indian Herbaria, this has been excluded from the main treatment. The plants are aromatic.

**17. *Artemisia macrocephala*** Jacq. ex Bess. in Bull. Soc. Nat. Mosc. 9: 28. 1836; Hook.f., Fl. Brit. India 3: 329. 1881.

**Fig. 11.**

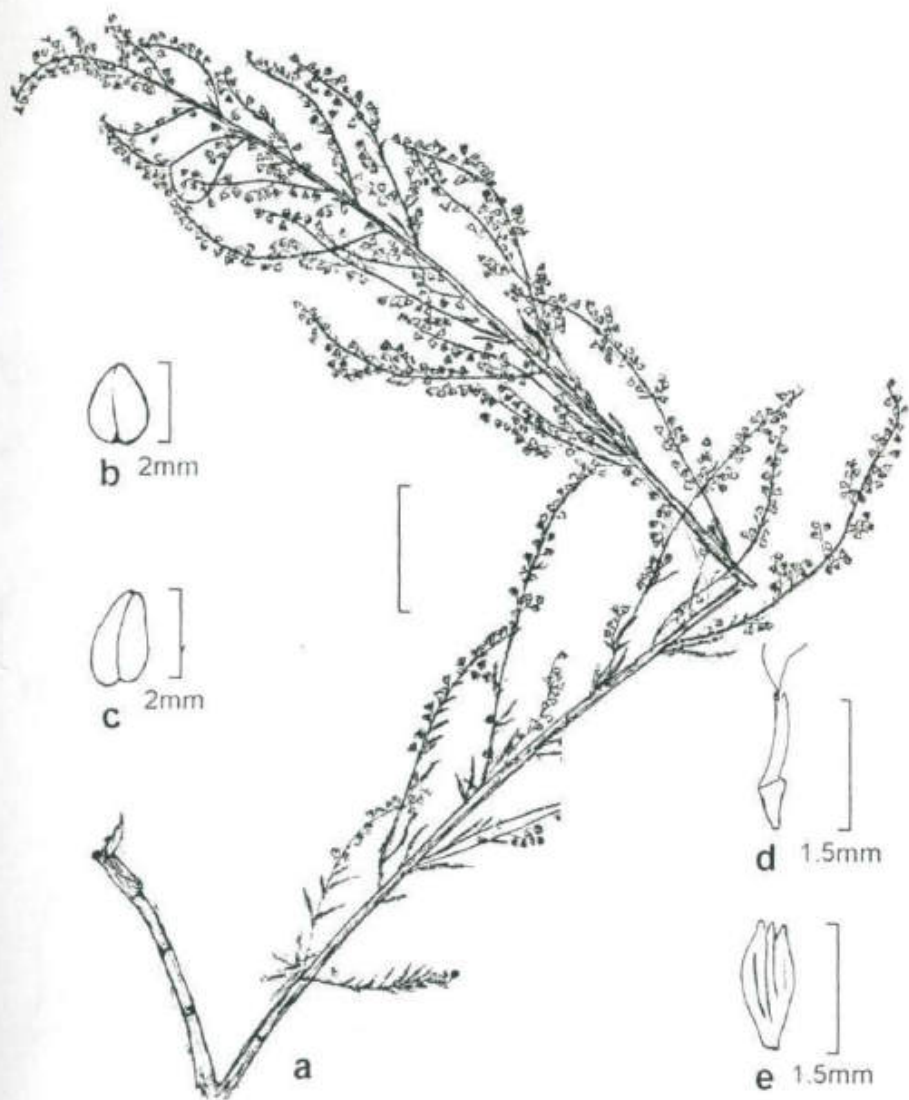


Fig. 10. *Artemisia japonica* Thunb. : a. Habit; b. & c. Involucre bracts; d. Outer floret; e. Inner floret.

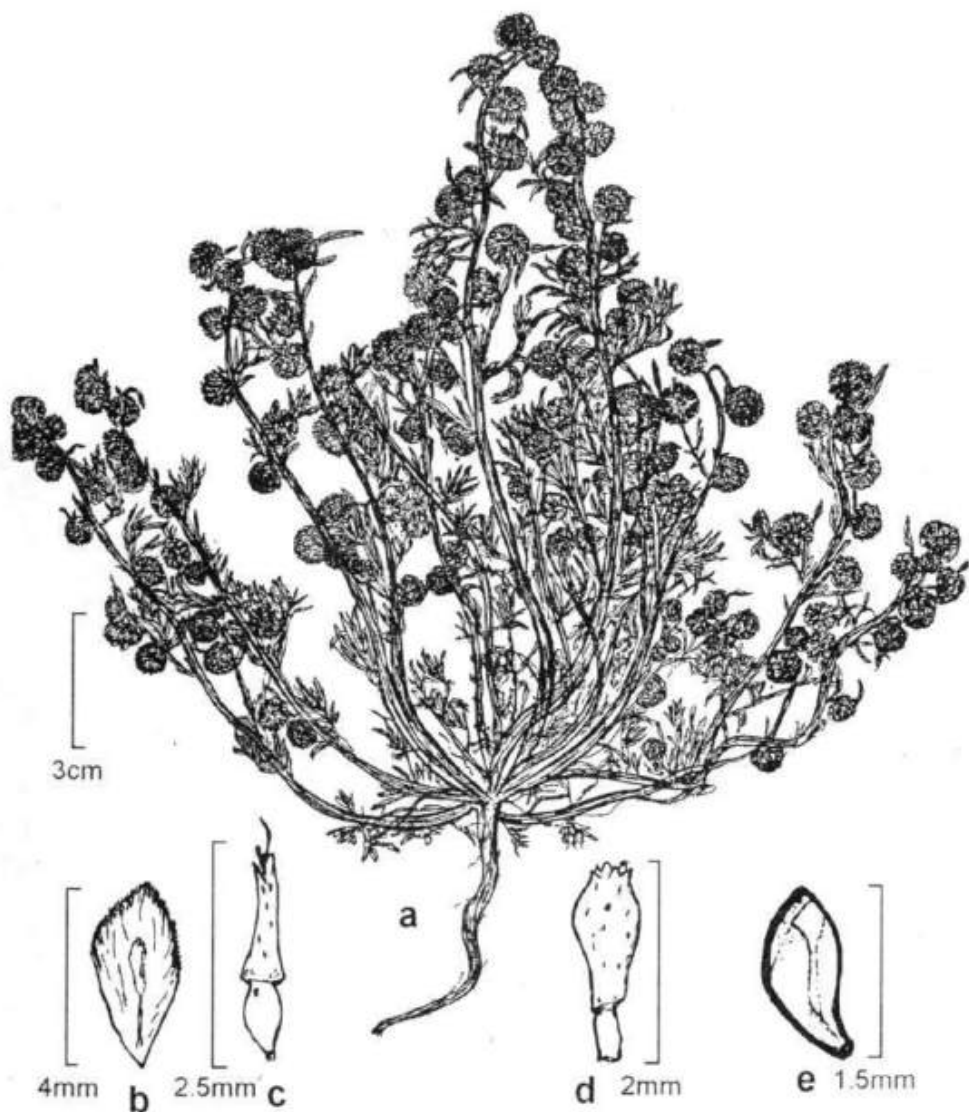


Fig. 11. *Artemisia macrocephala* Jacq. ex Bess. a. Habit; b. Involucral bract; c. Outer floret; d. Inner floret; e. Achene.

Herbs, annual, erect, often decumbent, hoary tomentose, 10-20 cm high; branches many from base, rather stout, spreading in a circle. Leaves 1.5-2 cm long, 2-pinnatisect, white tomentose, lower petioled, gradually sessile upwards; segments linear, obtuse or obscurely acute. Heads shortly peduncled, secund, nodding, distantly racemed at the end of branches, broadly hemispheric, 0.8-1 cm in diam. Outer involucral bracts linear, 4 x 1 mm, herbaceous, tomentose; inner oblong, tomentose, with broad scarious margins, 2-4 x 1.5-2 mm. Receptacle hairy; hairs long, straight. Outer florets female, fertile 1.5-2.5 x 0.5 mm, fertile; corolla narrowly oblong, slightly dilated at the base, glandular, obscurely fid. Disc florets yellow hermaphrodite, fertile, tubular, 1.5-1.8 x 0.5-1 mm, hardly exerted, glandular; limb 5-fid, ovate, acute. Anthers acuminate. Achenes brown, oblanceolate, 1 x 0.8 mm, obscurely angled.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, along sandy river beds and alpine meadows, between 3000 - 4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Afghanistan, W. Tibet, China and C. Asia.

18. *Artemisia maritima* L., Sp. Pl. 846. 1753. *et ed.* 2, 1186. 1763; Hook.f., Fl. Brit. India 3: 323. 1881.

Eng.: *Drooping Sea-wormwood*; Garh.: (Bhotia): *Safedpurcha*; Guj.: *Chhuvaria-jamoda*, *Kirmanidinechi*; Mar.: *Kirmaniova*, *Surabandi*, (Bombay): *Kiramaniova*; Sans.: *Chhara*, *Jantunashava*; Urdu.: *Darmanah*.

Herbs or shrubs, perennial, erect or spreading, stunted, hoary tomentose, aromatic; rootstock woody, branched; stems many, wiry, branched from base, 8-40 cm high. Leaves 0.3-5 cm long, 2-pinnatisect, often white tomentose; segments small, spreading, linear, obtuse; Heads brownish white or yellow, homogamous, suberect or nodding, sessile, crowded in densely or coarsely fascicled spikes, usually with 3-11 florets, subtended by a setaceous leafy bracteole, ovoid or oblong or globose, 0.3-0.4 cm in diam. Involucral bracts broadly oblong to obovate with brown white scarious margins, 2-3 mm long. Receptacle small, naked. Florets all tubular, hermaphrodite, 1.5-2 mm long, fertile. Achenes not seen.

#### KEY TO THE VARIETIES

- 1a. Heads ovoid or oblong; involucral bracts broadly oblong to narrowly obovate; florets 5. 18.1. var. *maritima*  
 b. Heads globose; involucral bracts obovate, usually boat shaped; florets 6-11. 18.2. var. *thomsoniana*

18.1. var. *maritima*

Fig. 12.

*Fl. & Fr.* July - Sept.

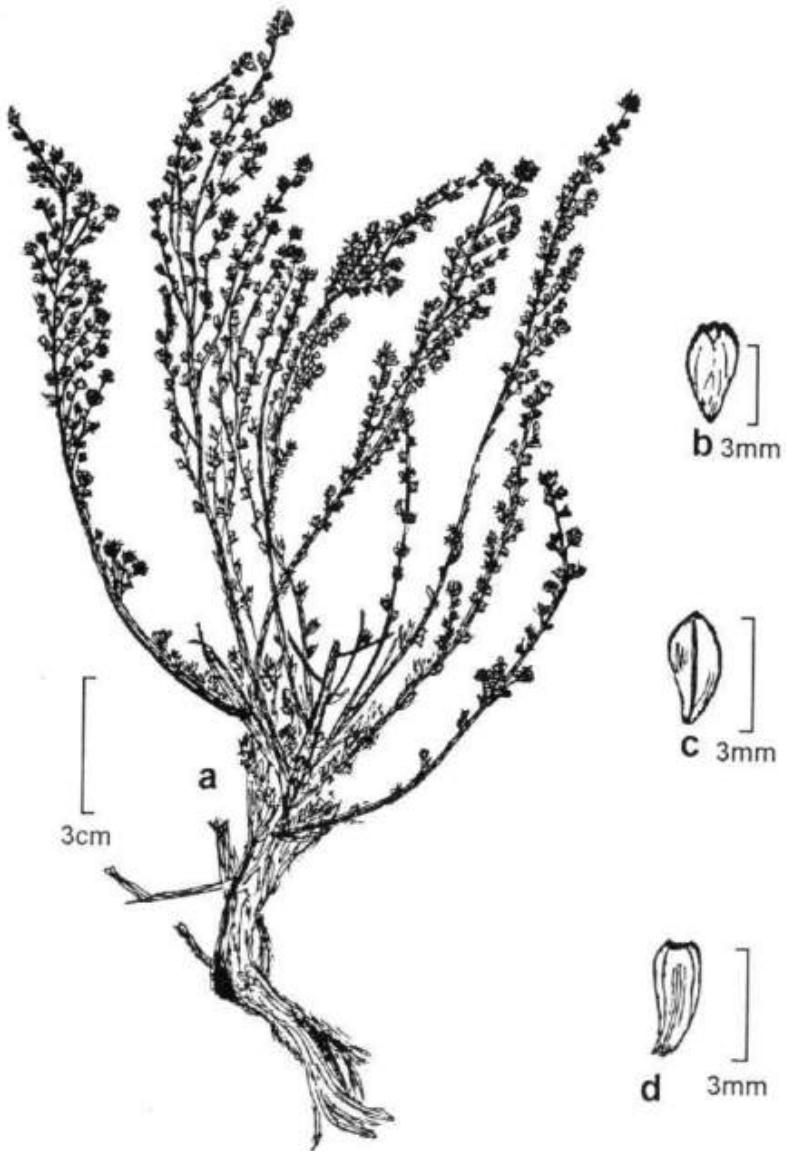


Fig. 12. *Artemisia maritima* L. var. *maritima* : a. Habit; b. Head; c. & d. Involucral bracts.



*Distrib.* India: W. Himalayas, on open dry rocky slopes, between 2000-3000 m. Uttar Pradesh.

W. Tibet, N. Asia and Europe.

**18.2. var. thomsoniana** C.B. Clarke, Comp. Ind. 160. 1876. *A. brevifolia* Wallich ex DC., Prodr. 6: 103. 1838; Hook.f., Fl. Brit. India 3: 324. 1881. **Fig. 13.**

*Fl. & Fr.* Aug.

*Distrib.* India: W. Himalayas, on exposed sandy slopes, between 4500-5300 m. Jammu & Kashmir (Ladakh).

Pakistan and Nepal.

*Notes.* *Artemisia maritima* L. which is of great economic significance has been found to contain high percentage of santonin.

**19. Artemisia minor** Jacq. ex Bess. in Bull. Soc. Nat. Mosc. 9: 22. 1836; Hook.f., Fl. Brit. India 3: 329. 1881. **Fig. 14.**

Herbs, perennial, small, pale green to silky white tomentose, 5-10 cm high; branches often several, spreading from the branched woody rootstock. Cauline leaves 0.5-1 cm long, flabellate, 2-pinnatifid, petioled or sessile; segments small; lower leaves densely imbricating, 0.5-2 cm long, flabellately 2-pinnatifid, sessile; segments linear, obtuse. Heads bracteate, shortly peduncled to subsessile upwards, solitary, sometimes crowded at the ends of branches, spicate, 0.5-0.8 cm in diam. Involucral bracts broadly ovate, white tomentose with broad scarious margins; inner broadly ovate to ovate-lanceolate with more or less hairy scarious margins. Receptacle hairy. Outer florets female, fertile; narrowly oblong, 1.2 x 0.5 mm, corolla obscurely lobed. Disc florets yellow hermaphrodite, fertile, tubular, 2 x 1 mm, sparsely glandular, narrowed to the base; limb purple brown, 5-fid pubescent, acute. Anthers acuminate. Achenes cylindric, 1.2 x 0.8 mm, obscurely ribbed, winged, somewhat auricled at the top.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, on stony slopes and alpine meadows between 4500-5000 m. Jammu & Kashmir (Ladakh) and Sikkim.

Pakistan, Bhutan, W. & E. Tibet and China.

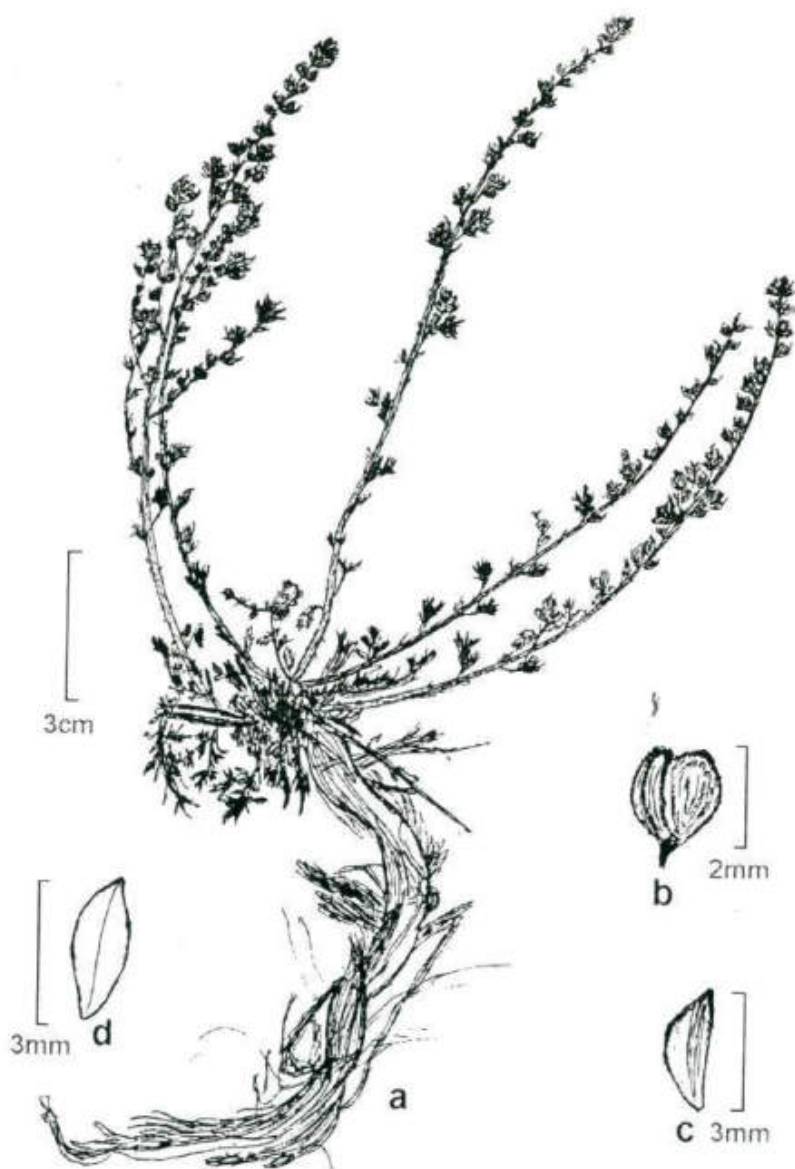


Fig. 13. *Artemisia maritima* L., var. *thomsoniana* C.B. Clarke : a. Habit; b. Head; c. & d. Involucrel bracts.

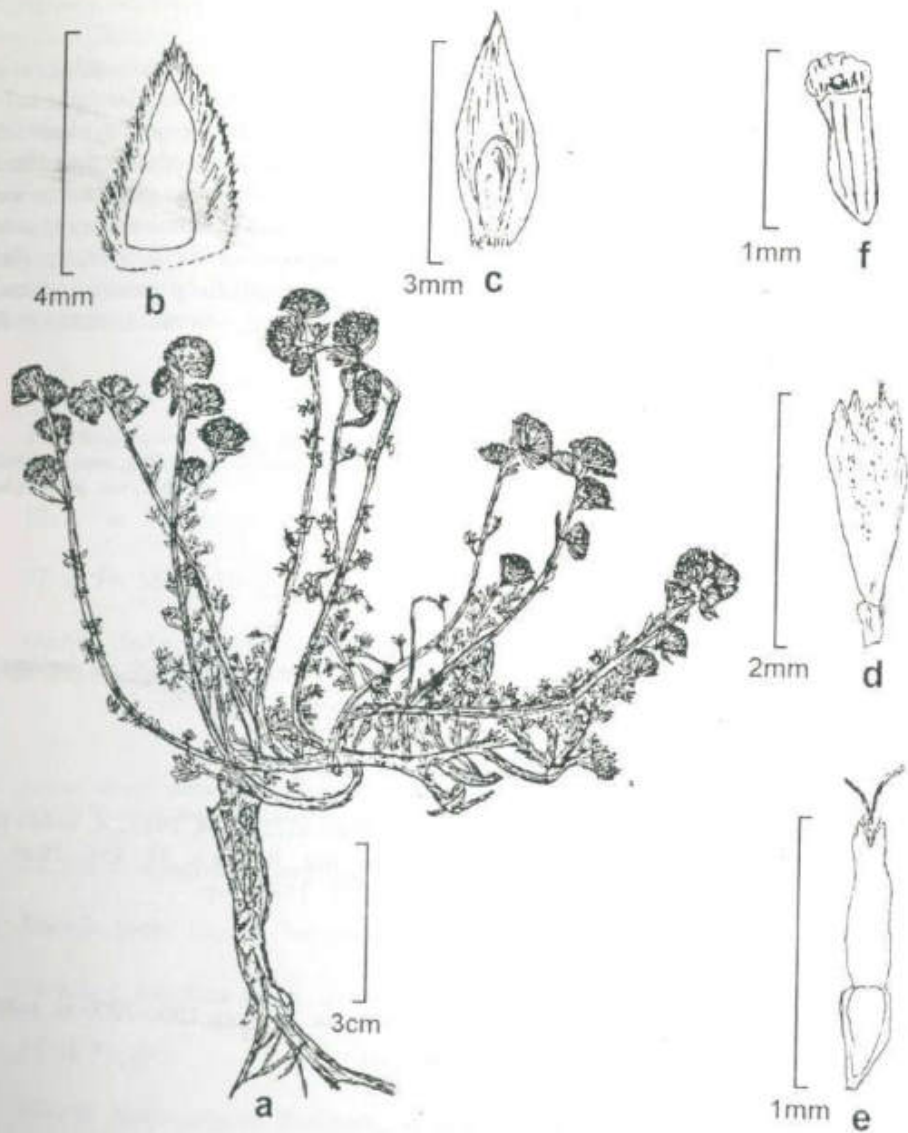


Fig. 14. *Artemisia minor* Jacq. : a. Habit; b. & c. Involucre bracts; d. Outer floret; e. Inner floret; f. Achene.

20. *Artemisia myriantha* Wallich ex Bess. in Nouv. Mem. Soc. Nat. Mosc. 3: 51. 1834. *A. vulgaris auct non.* Hook.f. Fl. Brit. India 3: 325. 1881. p.p.

Herbs, perennial, glandular hairy; stems up to 1 m high rhizome horizontal. Leaves pinnatisect or middle and the upper leaves pinnati-partite, scabrous to glandular hairy above, glabrous or densely pale white lanate beneath; segments irregularly, coarsely dentate-lobed; lower segments rarely lobed; rachis of upper segments constricted. Heads in pyramidal panicles or simple racemes, globose or oblong campanulate, sometimes well spaced. Involucral bracts ovate-lanceolate, obtuse more or less glabrous or hairy; outer herbaceous. Receptacle naked. Outer florets female, fertile; corolla slender, sparsely glandular, 3-fid. Disc florets hermaphrodite, fertile, tube small, attenuate, sparsely glandular; limb 5-fid. Achenes elliptic oblong, ca 1.2 mm long, smooth, truncate at the apices, faintly striate.

#### KEY TO THE VARIETIES

- |   |                                |
|---|--------------------------------|
| 1a. Leaves glabrous beneath                 | 20.1. var. <i>myriantha</i>    |
| b. Leaves densely pale white lanate beneath | 20.2. var. <i>pleiocephala</i> |

#### 20.1. var. *myriantha*

*Fl. & Fr.* Oct. - Dec.

*Distrib.* W. & E. Himalayas and N.E. region, between 1500-3000 m. Jammu & Kashmir, Uttar Pradesh, Sikkim, Assam and Meghalaya.

Pakistan, Nepal, Bhutan, N. Myanmar and S.W. China.

20.2. var. *pleiocephala* (Pamp.) Ling in Kew Bull. 42(2): 444. 1987. *A. dubia* var. *myriantha* f. *pleiocephala* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 451. 1926. *A. vulgaris auct. non L.*: Hook.f., Fl. Brit. India 3: 325. 1881. p.p.

*Fl. & Fr.* Oct. - Dec.

*Distrib.* India: W. Himalayas and Deccan Peninsula, between 1500-2000 m. Jammu & Kashmir, Himachal Pradesh and Karnataka.

China)

*Notes.* The species has insect repellent properties. Medicinally, it is claimed to be an anthelmintic, expectorant and antiseptic.

21. *Artemisia nilagirica* (C.B. Clarke) Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 452. 1926. *A. vulgaris* var. *nilagirica* C.B. Clarke, Comp. Ind. 162. 1876. *A. vulgaris auct. non L.*: Hook.f. Fl. Brit. India 3: 325. 1881. p.p.

Eng.: *Fleabone, Indian Wormwood, Mugwort*; Garh.: *Kunja*; Hindi: *Dona, Gathirome, Magtari, Nugduna, Samri and Samri* (Dehra Dun); Mar.: *Gathona, Surband, Nagdona* (Bombay); Nep.: *Titapat*; Or.: *Doyona, Gondhoinaro*; Sans.: *Barha Granthika, Vishirnakhya*; Tam.: *Mashibattiri, Tirunama*; Tel.: *Devanamu, Mashipatri*.

Herbs, robust, more or less slender, hoary pubescent or tomentose, 1-1.5 m tall; stems paniculately branched, leafy. Leaves large, ovate-elliptic or prominently lobed, or incised laciniate, up to 18 x 18 cm, prominently nerved beneath, nerves and branches densely tomentose. Heads hermaphrodite, crowded or lax in large, lax or dense, sparsely leafy panicles, globose-campanulate, exceedingly tomentose. Disc florets small; corolla densely minutely glandular, tube gradually longitudinally narrowed from the 3/4 of the corolla, attenuate.

## KEY TO THE VARIETIES

- 1a. Exceedingly robust herbs; panicles dense 21.1. var. *nilagirica*  
 b. Tall, more or less slender herbs; panicles lax 21.2. var. *septentrionalis*

21.1. var. *nilagirica*

*Fl. & Fr.* May - Dec.

*Distrib.* India: Deccan Peninsula, up to 2500 m. Maharashtra, Karnataka, Tamil Nadu and Kerala.

## KEY TO THE FORMS

- 1a. Leaves incised; stems not deeply angular, sulcate 21.1.1. f. *nilagirica*  
 b. Leaves lobed; stems deeply angular 21.1.2. f. *lobulata*

21.1.1. f. *nilagirica* Pamp. in *Nuovo Giorn. Bot. Ital.* n.s. 33: 453. 1926.

*Distrib.* India: Deccan Peninsula. Maharashtra (Bombay).

21.1.2. f. *lobulata* Pamp. in *Nuovo Giorn. Bot. Ital.* n.s. 33: 456. 1926.

*Fl. & Fr.* Oct.

*Distrib.* India: Deccan Peninsula, at 2500 m. Tamil Nadu.

21.2. var. *septentrionalis* Pamp. in *Nuovo Giorn. Bot. Ital.* n.s. 33: 453. 1926.

*Distrib.* India: W. Himalayas, at 1500 m. Himachal Pradesh (Simla).

22. *Artemisia persica* Boiss., *Diagn. Ser.* 1, 6: 91. 1845; Hook.f., *Fl. Brit. India* 3: 327. 1881.

Guj.: *Pardesi dauno*; Mar.: *Davana*.

Herbs, perennial, erect, hoary pubescent, 20-90 cm high; rootstock woody; stems many from the woody rootstock, paniculately branched above, leafy. Leaves ovate, small or flabellate, 2-3-pinnatisect, white pubescent; segments minute, linear or obovate, obtuse, spreading; rachis simple or pectinate. Heads numerous, pedicelled, secund, nodding in short or long axillary straight, erect racemes, subglobose, ca 4 mm in diam. Outer involucre bracts obovate, 2 x 1 mm, white tomentose; inner dull brown broadly oblong, with scarious margins. Receptacle small, convex, obscurely white pubescent. Outer florets female, fertile, 1 mm long. Disc florets hermaphrodite, cupular, very small, 1.2 mm long, glabrous or pubescent. Achenes not seen.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas, between 3000-3500 m. Jammu & Kashmir and Uttar Pradesh.

Tibet and Afghanistan.

**23. *Artemisia roxburghiana*** Wallich ex Bess. in Bull. Soc. Nat. Mosc. 9: 57. 1836; Hook.f., Fl. Brit. India 3: 326. 1881.

Herbs, perennial; rhizome horizontal, creeping; stems brown purple more or less, robust, ca 1 m high, simple, grooved, more or less minutely pubescent or gradually more tomentose. Leaves ca 6 cm long, 2-pinnatifid, rachis narrow, more or less minutely pubescent or consistently silky, grey white or white woolly beneath; lower leaves oblong, long petioled; oblong, middle and upper ovate, sessile, segments small, ovate-lanceolate acute, cuspidate or mucronate, margins revolute or not, pubescent above, densely hoary or white tomentose beneath. Heads sessile or shortly pedicelled, more or less minutely cobwebby tomentose or densely woolly in elongate, pyramidal narrow panicles, campanulate or subglobose, 3-4 mm in diam. Involucre bracts 2-3-seriate, pubescent or tomentose, ovate or narrowly to broadly oblong with broad scarious margins. Receptacle small, flat, naked. Outer florets female, fertile; corolla narrowly tubular, obscurely 3-fid. Disc florets hermaphrodite, fertile, tubular, glandular with short tube. Achenes not seen.

#### KEY TO THE VARIETIES

- |   |                                |
|---|--------------------------------|
| 1a. Leaves minutely pubescent on both surfaces; segments small, ovate   | 23.4, var. <i>roxburghiana</i> |
| b. Leaves consistently silky white or white woolly beneath; segments ovate, acuminate or mucronate or linear or linear-lanceolate | 2                              |
| 2a. Leaf segments small, secund, ovate-lanceolate; florets not purple in dried state  | 23.2, var. <i>hypoleuca</i>    |
| b. Leaf segments elongate, narrowly linear or linear-lanceolate; florets evidently purple in dried state                          | 3                              |

- 3a. Segments glabrous above, white or hoery tomentose beneath; margins not revolute 23.1. var. *acutiloba*  
 b. Segments sparsely adpressed pubescent or glabrescent above, densely tomentose beneath; margins strongly revolute 23.3. var. *purpurascens*

23.1. var. *acutiloba* Pamp. in Giorn. Bot. Ital. n.s. 33: 174. 1926.

*Fl. & Fr.* May - Oct.

*Distrib.* India: W. Himalayas, between 1500-3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan.

23.2. var. *hypoleuca* (Edgew.) Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 173. 1927. *A. hypoleuca* Edgew. in Trans Linn. Soc. Bot. 20: 71. 1846; *A. roxburghiana* var. *grata* Hook.f., Fl. Brit. India 3: 326. 1881. (*non A. grata* Wallich)

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, between 1800-3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan.

23.3. var. *purpurascens* (Jacq.) Hook.f., Fl. Brit. India 3: 326. 1881. *A. purpurascens* Jacq. ex Bess. in Bull. S. Imp. Nat. Mosc. 9: 60. 1836; DC., Prodr. 6: 115. 1837. *A. revoluta* Edgew. in Trans. Linn. Soc. Bot. 20: 720. 1846. **Fig. 14.**

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, between 2000-3500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan and Nepal.

23.4. var. *roxburghiana*

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: W. Himalayas, between 1000-3500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Nepal and China.

24. *Artemisia salsoloides* Willd., Sp. Pl. 3: 1832. 1803; Hook.f., Fl. Brit. India 3: 321. 1881.

Herbs, perennial, erect, glabrous or sparsely villous, 6-60 cm high; stems pale, shining many from the crown, or stout, branched from the very base, angled, rootstock stout woody, sometimes 30 cm long. Leaves 3-7 cm long, 2-3-pinnatisect, glaucous; segments slender, oblong, entire; radical leaves many or absent, glabrous or ferruginous hairy; upper cauline quite entire. Heads sessile or pedicelled, shining on simple or paniced racemes broadly ovoid or subglobose, 2.5-4 mm diam. Involucral bracts obtuse, with white or black brown, scarious margins, 2-3 mm long. Receptacle naked. Outer florets female, fertile; corolla 3-fid. Disc florets hermaphrodite, sterile, tubular, ca 2 mm long, limb 5-fid, lobes acute. Achenes elliptic, ellipsoid, ca 1.5 mm long, smooth, delicately ribbed.

#### KEY TO THE VARIETIES

- 1a. Tall herbs, 20-60 cm long; heads in simple or branched racemes; involucral bracts with white scarious margins 24.2. var. *salsoloides*  
 b. Dwarf herbs, ca 6-8 cm long; heads solitary in terminal racemes; involucral bracts with black brown margins 24.1. var. *wellbyi*

#### 24.1. var. *salsoloides*

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 3000-4500 m. Jammu & Kashmir and Uttar Pradesh.

Pakistan, Tibet and China.

#### KEY TO THE FORMS

- 1a. Stems simple, many from the crown. 24.1.2. f. *salsoloides*  
 b. Stem branched from the base. 24.1.1. f. *paniculata*

24.1.1. f. *paniculata* (Hook.f.) Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 697. 1926-27. *A. salsoloides* var. *paniculata* Hook.f., Fl. Brit. India 3: 321. 1881.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 3000-4500 m. Jammu & Kashmir.

Pakistan and China.

24.1.2. f. *salsoloides* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 696. 19-27.



*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 3000-4500 m. Jammu & Kashmir and Uttar Pradesh.

Pakistan and Tibet.

24.2. var. *wellbyi* (Hemsl. et Pearson) Ostenf. in Hedin, S. Tibet 6(3): 40. 1922; Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 697. 1927. *A. wellbyi* Hemsl. et Pearson in J. Linn. Soc. Bot. 35: 183. 1902.

*Fl. & Fr.* Aug.

*Distrib.* India: W. Himalayas, at 5000 m. Jammu & Kashmir (Rupsu).

Pakistan, Bhutan and China.

25. *Artemisia sieversiana* Ehrh. ex Willd., Sp. Pl. 3: 1845. 1803; Hook.f., Fl. Brit. India 3: 329. 1881. Fig. 15.

Beng.: *Dana, Dona*; Guj.: *Damro*; Hindi: *Dauna*; Mar.: *Davana, Rana davana*, (Bombay): *Downa*; Sans.: *Agnidamanaka, Dandi, Pushpachamara*; Urdu.: *Afsantin*.

Herbs erect, annual or biennial, sparsely hoary pubescent, 25-90 cm high; stems pale green, often paniculately branched upwards, more or less angled, sulcate. Leaves generally 2-pinnatisect, sometimes pinnatifid or simply lobed, gradually becoming entire upwards; segments linear to oblong, obtuse. Heads bracteate, lax, long pedicelled in paniced racemes, secund, sometimes clustered in two's, nodding, 5-6 mm in diam. Outer involucre bracts oblong, herbaceous with obscure scarious margins, 4 mm long, inner ones oblong to ovate, with broad scarious margins, 3 x 3 mm, hoary pubescent innermost broadly oblong, with broad scarious margins, 3 x 1.5 mm, glabrous. Receptacle hairy. Outer florets female, fertile, 1 x 0.5 mm, corolla dull white, slightly dilated at the base, glandular, obscurely lobed. Disc florets fertile, hermaphrodite, yellow tubular, 1.5-2 x 0.5 mm, glabrous or sparsely glandular; limb 5-fid, ovate, acute. Anthers aristate. Achenes brown, obovate, 1.5 x 0.8 mm, obscurely trigonous.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, on marshy and sandy soil, between 2500-3500 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, W. Tibet, China and Westwards to S. Russia.

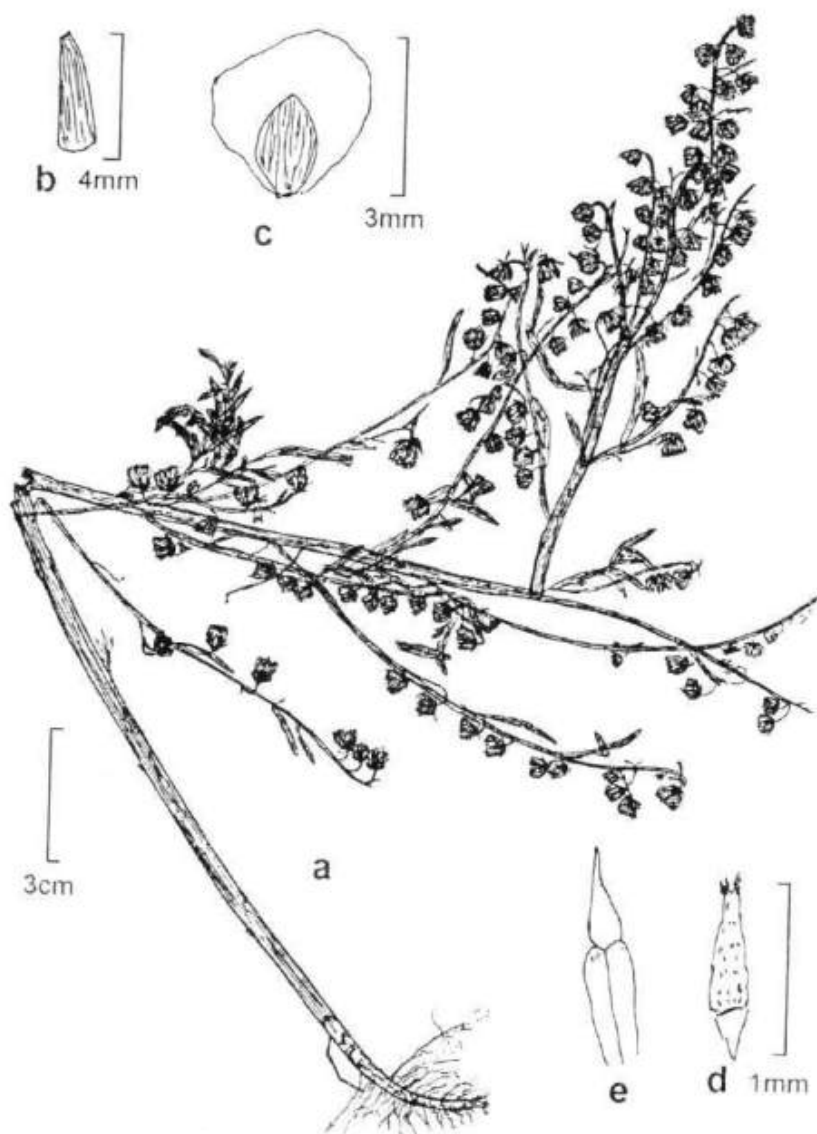


Fig. 15. *Artemisia sieversiana* Ehrh. ex Willd. : a. Habit; b. & c. Involucral bracts; d. Outer floret; e. Anther.

*Notes.* The plant is a good tonic, febrifuge and anthelmintic. It is applied externally as discutient and antiseptic.

**26. *Artemisia stracheyi*** Hook.f. & Thomson ex C.B. Clarke, *Comp. Ind.* 164. 1876; Hook.f., *Fl. Brit. India* 3: 328. 1881.

Herbs, perennial, dwarf, softly villous tomentose, branched; branches annual, simple, erect, stout from the rootstock; rootstock woody, ca 30 cm long, numerous branched, thick, clothed with sheathing bases of old leaves. Radical leaves narrowly oblong in outline, ca 10 cm long, 2-pinnatisect, long petioled; densely villous on both surfaces; segments close set, short, linear or lanceolate, more or less acute. Heads short pedicelled, nodding, forming a simple, terminal, secund, stout, leafless raceme, broadly hemispheric, ca 8 mm in diam. Involucral bracts numerous, obovate, tomentose with braod brown scarios margins. Receptacle broad. Outer florets female, fertile. Disc florets hermaphrodite, fertile, densely villous; limb 5-fid. Achenes cuneiform, ca 2 mm long, compressed.

*Distrib.* India: W. Himalayas, between 5000-5500 m. Jammu & Kashmir.

Tibet and China.

**27. *Artemisia stricta*** Edgew. in *Trans. Linn. Soc.* 20: 73. 1846; Hook.f., *Fl. Brit. India* 3: 323. 1881. *A. edgeworthii* Balakr. in *J. Bombay Nat. Hist. Soc.* 63: 329. 1967.

Herbs, annual, laxly villous or glabrate, branched, 6-20 cm high, rarely attaining up to 60 cm; stems pale purple to dark brown, simple or many, erect or diffuse, branches often from the base, spreading, prostrate narrowly grooved. Radical leaves 1-3-pinnatisect, petioled; segments linear to oblong-lanceolate; cauline leaves feebly divided or entire 0.5-2.5 cm long. Heads greenish white, in solitary, erect or clustered spikes, subglobose 0.2-0.3 in diam. Involucral bracts broadly ovate to oblong; outer hairy with scarios margins, often marked with brown lines, rarely-glabrous. Receptacle naked. Outer florets female, fertile. Disc florets hermaphrodite, sterile. Achenes narrowly obconic.

#### KEY TO THE FORMS

- 1a. Stems simple, straight, erect  
b. Stems many, diffuse, small

27.2. *f. stricta*  
27.1. *f. diffusa*

**27.1. *f. diffusa*** Pamp. in *Nuovo Giorn. Bot. Ital.* n.s. 34: 705. 19-27.

*Fl. & Fr.* July - Aug.

*Distrib.* India: E. Himalayas, 4500 m. Sikkim.

**27.2. f. stricta** Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 705. 19-27.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, between 3000-5000 m. Jammu & Kashmir (Ladakh-Leh), Himachal Pradesh and Uttar Pradesh.

Tibet and S.W. China.

**28. Artemisia strongylocephala** Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 176. 1926.

Herbs, perennial; rhizome horizontal; stems purple, 30-70 cm high, grooved, obtusely angled, distinctly long hairy. Leaves pinnatifid; segments dentately lobed; lobes acuminate, mucronate; rachis narrow, more or less pilose above, tomentose beneath. Heads peduncled, upper subsessile in lax flowered, moderately leafy panicles with or without naked, wide spreading, small branches, hemispheric, ca 4 mm in diam. Involucral bracts purple. Disc florets purple, hermaphrodite; corolla tube small, glandular, gradually narrow, attenuate.

#### KEY TO THE VARIETIES

- 1a. Panicles widely spreading, branches long; heads evidently peduncled **28.2. var. strongylocephala**  
 b. Panicles narrowly pyramidal, branches small; heads very frequently subsessile **28.1. var. cachemirica**

**28.1. var. cachemirica** Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 176. 1927.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, between 1525-3550 m. Jammu & Kashmir (Kargah valley) and Himachal Pradesh.

**28.2. var. strongylocephala**

*Fl. & Fr.* Sept.

*Distrib.* India: W. Himalayas, between 2130-3200 m. Jammu & Kashmir and Uttar Pradesh.

**29. Artemisia thellungiana** Pamp. in Nuovo Giorn. Bot. Ital. n.s. 33: 457. 1926; Razi in Rec. Bot. Surv. Ind. 18: 5. 1959.

Herbs, slender; stems glabrous, striate, sulcate. Leaves pinnati-partite; rachis wide, more or less constricted at the upper segments; segments coarsely irregularly dentate-lobed; lobes ovate-mucronate at the apices, glabrous above, adpressed pubescent beneath.

Heads in pyramidal, leafy panicles with simple branches, nearly puberulous, gradually becoming glabrescent to glabrous. Disc florets hermaphrodite; corolla tube sparsely glandular, apparently elongate, thick, small, attenuate.

*Fl. & Fr.* Aug.

*Distrib.* India: E. Himalayas, between 1200-2500 m. Sikkim.

**30. *Artemisia tournefortiana*** Reichnb., Ic. Exot. 1: 6, t. 5. 1824; Hook.f., Fl. Brit. India 3: 324. 1881.

Herbs, annual, erect, glabrous, simple or thyrsoïdly branched, ca 1 m high; stems pale white to dull purple. Lower leaves 8-15 cm long, 2-pinnatisect, petioled; rachis lobulate; segments obscurely pinnatifid or toothed; upper cauline leaves 2-8 cm long, sessile. Heads greenish white to purple, in dense, axillary, erect, sessile compound thyrsoïd panicles 3 mm long. Outer involucre bracts ovate-oblong with white scarious margins, 2 x 1.2 mm, glabrous; inner broadly oblong with broad scarious margins, 2.5 x 2 mm. Receptacle naked. Outer florets fertile, female, 1.2 mm long, narrow, oblong, slightly glandular. Disc florets hermaphrodite, fertile, tubular, 2 mm long, slightly narrowed to the base, sparsely glandular; limb 5-fid. Achenes brown, oblong, 0.8 mm long, obscurely angled.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, on sandy soil, between 2500-4000 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, W. Tibet, Afghanistan and C. Asia.

**31. *Artemisia verlotiorum*** Lamotte in Mem. Ass. France. Cong. Clerm. Ferr. 511. 1876; Ling in Kew Bull. 42(2); 447. 1987. *A. vulgaris* auct. non L.: Hook.f. Fl. Brit. India 3: 325. 1881. p.p. *A. leptostachya* DC., Prodr. 6: 113. 1838. p.p.

Herbs, perennial, perennial; stems tall, grooved, 0.3-1.25 m high, growing from a long rhizome. Leaves pinnatifid or partite; segments small, linear or linear-lanceolate, grey beneath and green above. Heads sessile or pedicelled in slender leafy, branched racemes, oblong, erect, 2-3 mm in diam. Involucre bracts oblong, obtuse with scarious margins. Receptacle naked. Outer florets female, fertile 2.5 mm long. Disc florets hermaphrodite, fertile, tube short, attenuate; limb 5-lobed. Achenes grey, ellipsoid, ca 1 mm long, smooth, striate.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: W. & E. Himalayas, between 1000-2000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Assam.

China and Formosa.

**32. *Artemisia wallichiana*** Bess. in Nouvo Mem. S. Nat. Moscow 3: 69. 1834. *A. moorcroftiana* Wallich ex DC., Prodr. 6: 117. 1838; Hook.f., Fl. Brit. India 3: 327. 1881. *A. brunnea* Pamp. in Rend. Sem. Fac. Sci. Univ. Caliarì 8: 168. 1938.

Herbs, perennial, hoary or tomentose or glabrous becoming yellow, ca 30-60 cm high; rootstock creeping; stems simple below. Leaves 2-pinnatifid, ovate or oblong in outline, white tomentose beneath; rachis pinnatifid; segments spreading, ovate or lanceolate, acute. Heads woolly tomentose or partially woolly pubescent, with 15-20 florets, sessile, solitary or in clusters along the racemes, or forming interrupted elongated spikes, broadly hemispheric or subglobose or campanulate, 4-6 mm in diam. Involucral bracts 3 x 0.8-1.5 mm; outer obovate, white tomentose; inner broadly oblanceolate or narrowly obovate. Receptacle broad, hemispheric. Outer florets female, fertile, slender, ca 1.2 mm long. Disc florets more or less dull purple; hermaphrodite, fertile, 2 x 0.5 mm, fertile, limb 5-fid. Achenes ca 1 mm long.

#### KEY TO THE FORMS

- |  |                             |
|--|-----------------------------|
| 1a. Heads subglobose, woolly tomentose           | <b>32.2. f. wallichiana</b> |
| b. Heads campanulate, partially woolly pubescent | <b>32.1. f. nitida</b>      |

**32.1. f. nitida** (Pamp.) Naithani, *Comb. nov. Artemisia moorcroftiana* Wallich ex DC. f. *nitida* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 681. 1927.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 3000-4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan and Tibet.

**32.2. f. wallichiana**

*Fl. & Fr.* Sept.

*Distrib.* India: W. Himalayas, between 2500-3000 m. Uttar Pradesh (Pithoragarh).

#### EXCLUDED SPECIES

*Artemisia Astro-yunnanensis* Ling et Y.R. Ling in Bull. Bot. Res. 4(2): 20, Fig. 4: 10-18. 1984. *A. burmanica* Pamp. f. *latiloba* Pamp.

Nagaland, Manipur, Mizoram, Tripura, Specimen not seen.

*Artemisia decaisnei* F.W. Klatt in Abh. Natuf. Ges. Halle. 15: 329. 1882.

Reported from India without any precise locality, specimen not seen.

*Artemisia grandis* Pamp. in Nuovo Giorn. Bot. Ital. n.s. 34: 632. 1927.

Reported from Kashmir, (Razi in *Rec. Bot. Surv. Ind.* 18: 5. 1959); specimen not seen.

*Artemisia lactiflora* Wallich ex DC. Prodr. 6: 115. 1837.

Nagaland, Manipur, Mizoram specimen not seen

*Artemisia lavandulaefolia* DC. Prodr. 110. 1837. *A. vulgaris* auct non L.

Maharashtra, Meghalaya, specimen not seen.

*Artemisia nepalensis* Ness in Flora 14: 290. 1831.

Reported from E. Himalayas, specimen not seen.

*Artemisia pamirica* C. Winkl in Acta petrop. 9: 329. 1890.

Jammu & Kashmir, Ladakh (Sassura Pass), 5000 m. Literature not seen.

*Artemisia robusta* (Pamp.) Ling et Y.R. Ling, comb. nov. MSS. *A. stronglylocephala* Pamp. var. *sinensis* Pamp. f. *robusta* Pamp. *A. dubia* Wallich ex Bess. var. *myriantha*. (Wall. ex Bess.) Pamp.

North India and Sikkim, Specimen not seen.

*Artemisia velutina* Pamp. *A. dubia* Wallich ex Bess. var. *legitima* (Bess.) Pamp. f. *communis* Pamp. Subf. *intermedia* Pamp.

Jammu & Kashmir, Uttar Pradesh, Nagaland, Manipur and Mizoram. specimen not seen.

#### 4. Centipeda Lour.

Herbs, annual or perennial. Leaves alternate, entire to toothed. Heads yellow, heterogamous, disciform, sessile on the branches or racemose, hemispheric. Involucral bracts 2-seriate, spreading in fruits. Receptacle naked. Outer florets female, fertile, many seriate, corolla minute, obscurely lobed. Disc florets hermaphrodite, fertile, few, tubular;

limb campanulate, 4-fid. Anther bases obtuse, entire. Style arms of hermaphrodite florets short, truncate. Achenes 4-angled, tip obtuse, angles hairy, hairs sometimes hooked. Pappus absent.

Madagascar, Afghanistan, Indo-Malesia, Australia, New Zealand, Polynesia and Chile; 6 species, 1 in India.

*Centipeda minima* (L.) A. Br. & Aschers., Ind. Sem. Fl. Berol. App. 6: 1867. *Artemisia minima* L., Sp. Pl. 849. 1753. *Centipeda orbicularis* Lour., Fl. Cochinch. 493. 1790; Hook. f., Fl. Brit. Ind. 3: 317. 1881.

Beng.: *Chhikni*; Eng.: *Sneeze-weed*, *Sneeze-wort*; Guj.: *Chhikeni*; Hindi: *Nagdowana*, *Nakehhikni*; Mar.: *Nakashi*; *Nakchhikni*; (Bombay): Urdu: *Nakachhikani*.

Herbs, annual, prostrate; stems many from the slender woody rootstock, 10-20 cm high. Leaves alternate, obovate-oblong, distantly toothed, narrowed to the base, 1-1.2 x 0.3 cm. Heads yellow, discoid, solitary, axillary, sessile or subsessile, globose, 2.5-4 mm in diam. Involucral bracts 2-seriate, ovate to spatulate, 2 x 1 mm. Receptacle naked. Outer florets many, female, cylindrical less than 1 mm long, tapering to the base; corolla 4-lobed. Disc florets few, hermaphrodite, tubular, less than 1 mm long; limb campanulate, 4-lobed. Achenes 4-angled, tip ca 1 mm long, obtuse, angles hairy. Pappus absent.

*Fl. & Fr.* India: Throughout the plains of India, in moist places.

Pakistan, Nepal, Sri Lanka, Afghanistan, Malaya Peninsula, Australia, Tropical Asia and Pacific Islands.

*Notes.* Promotes sneezing and thus relieves nasal congestion in colds. The powdered herb is sold in drug shops as a remedy for cold and toothache [Duthie *Fl. Upper Gang. Plain* 406. 1960 (repr. ed.)].

## 5. *Chrysanthemum* L.

Herbs or rarely shrubs, annual or perennial. Leaves alternate, entire, toothed, lobed or pinnatifid. Heads heterogamous, rayed (very rarely disciform) terminal, long peduncled, or smaller and corymbose, hemispheric or broader, large. Involucral bracts many-seriate, broad, appressed with coloured margins. Receptacle naked. Ray florets female, 1-seriate, fertile; ligule white, yellow or rosy, spreading. Disc florets hermaphrodite, fertile, tube terete or 2-winged; limb 4-5-fid. Anther bases obtuse, entire. Style arms of hermaphrodite florets with truncate penicillate tips. Achenes subterete or angled, variously ribbed or winged. Pappus absent or reduced to a cup or auricle.



Europe, Asia and America. Majority of them cultivated; ca 200 species, 4 in India.

*Literature.* HENRY, A. (1902). The wild forms of the *Chrysanthemum*. *Gard. Chron.* III, 31: 301-302.  
SMITH, E.D. (1935) Ancient history of the *Chrysanthemum*. *Bull. Chrysanth. Soc. Amer.* 3: 6-15.

*Notes.* Opinions differ with regard to the generic circumscription of *Chrysanthemum*, *Tanacetum* and *Ajania*. Some authors have transferred the species of *Chrysanthemum* under *Tanacetum*, while others prefer to retain the genus as such. The latter treatment has been followed here.

#### KEY TO THE SPECIES

- 1a. Pappus obscure 2
- b. Pappus a large membranous, dimidiate or lobed sheath or coriaceous cup, lobed to the base 3
- 2a. Rootstock woody; stem branched from the base, puberulous and viscid; ligule spreading 4. *C. tibeticum*
- b. Rootstock tuberous; stem solitary or rarely 2 from the rootstock, woolly upwards; ligule recurved 1. *C. atkinsonii*
- 3a. Viscid pubescent shrubs; achenes strongly 5-ribbed; pappus a membranous dimidiate or lobed sheath 3. *C. stoliczkaei*
- b. Laxly villous or woolly herbs; achenes many-ribbed; pappus a coriaceous cup, lobed to the base 2. *C. pyrethroides*

1. *Chrysanthemum atkinsonii* C.B. Clarke, *Comp. Ind.* 147. 1876; Hook.f., *Fl. Brit. India* 3: 315. 1881. *Tanacetum atkinsonii* (C.B. Clarke) Kitam. in *Enum. Fl. Nep.* 3: 45. 1982.

Herbs, perennial, strongly aromatic, 15-30 cm high; rootstock tuberous, fusiform, fleshy. Stems solitary or rarely 2 from the rootstock, sparsely hairy or woolly upwards. Radical leaves 10-15 cm long, pinnatisect, petioled; cauline leaves oblong-lanceolate with brown scarious margins, 5-7 cm long, more or less glabrous. Receptacle convex, naked. Ray florets, purple, female, 2 x 0.4 cm, ligule oblong, linear, recurved, obscurely 3-fid. Disc florets hermaphrodite, ca 5 mm long, slender, tubular; limb 5-fid, tipped with brown. Achenes narrowly obconic, angular, ca 3 mm long, strongly 5-ribbed. Pappus absent.

*Fl. & Fr.* July - Aug.

*Distrib.* India: E. Himalayas, between 4000-5000 m. Sikkim (Lachham valley).

Bhutan and Tibet.

2. *Chrysanthemum pyrethroides* (Kar. & Kir.) B. Fedtsch-Rostit., *Turke st.* 737. 1915. *Richteria pyrethroides* Kar. & Kir. in *Bull. Soc. Imp. Nat. Misc.* 120. 1842. *Chrysanthemum richteria* Benth. in *Gen. Pl.* 2: 426. 1873; Hook.f., *Fl. Brit. India* 3: 315. 1881.

Herbs, perennial, erect, laxly villous or woolly, 15-30 cm high; branches tufted, short, leafy; rootstock woody. Radical leaves 3-10 cm x 1-1.5 cm, 2-3-pinnatisect; segments oblong-linear, aristate; cauline leaves few, 2-7 x 0.3-1.5 cm, 2-3-pinnatisect. Heads solitary on long, more or less naked, 1-3 cm in diam; peduncles arising from the separate tufts or sometimes from the branches. Involucral bracts oblong-lanceolate to elliptic-lanceolate, acute, margins scarious brown purple, 4-5 x 1 mm; outermost bracts villous outside. Receptacle spherical, naked. Ray florets female, 1.3 x 0.4 cm; ligule white, obscurely 3-fid, nerved. Disc florets yellow, hermaphrodite, more or less campanulate, 3 x 0.5 mm, limb 4-5-fid, lobes ovate, acute. Achenes cylindrical, slightly curved upwards, 3 x 0.5 mm, prominently many-ribbed. Pappus a coriaceous cup, lobed nearly to the base; lobes broadly oblong, 1 x 0.5 mm, scarious brown at the tips,

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, generally on rocky slopes between 4500-5500 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan and W. Tibet.

*Notes.* A highly variable species with regard to indumentum and colour of flowers.

**3. *Chrysanthemum stoliczkai*** C.B. Clarke, *Comp. Ind.* 147. 1876; Hook.f. *Fl. Brit. India* 3: 314. 1881; Nair, *Fl. Bash. Himal.* 148. 1977. **Fig. 16.**

Herbs, perennial, erect, viscid pubescent, branched, 15-30 cm high; rootstock woody. Radical leaves petioled, 2-4 cm long, 1-2-pinnatisect; segments linear-oblong, aristate; cauline leaves 2-3 cm long, pinnatisect, sessile, segments dense to sparse, linear-oblong, aristate. Heads solitary on long, more or less naked peduncles, 2-4 cm in diam. Involucral bracts oblong-lanceolate to lanceolate, acute 3-5 x 1 mm; outer with brown scarious margins; inner with white scarious margins. Receptacle broad, naked. Ray florets female 1.4 x 0.4 cm; ligule white, obscurely 3-fid, nerved. Disc florets yellow, hermaphrodite, tubular, slightly campanulate, 6 x 0.5 mm, limb 4-5-fid, lobes ovate, acute. Achenes cylindrical, 3 x 0.5 mm, strongly 5-ribbed. Pappus dimidiate, 1-2 x 1 mm, membranous.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 3000-4000 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, W. Tibet and China.

**4. *Chrysanthemum tibeticum*** Hook.f. & Thomson ex C.B. Clarke, *Comp. Ind.* 147. 1876; Hook.f., *Fl. Brit. India* 3: 314. 1881.

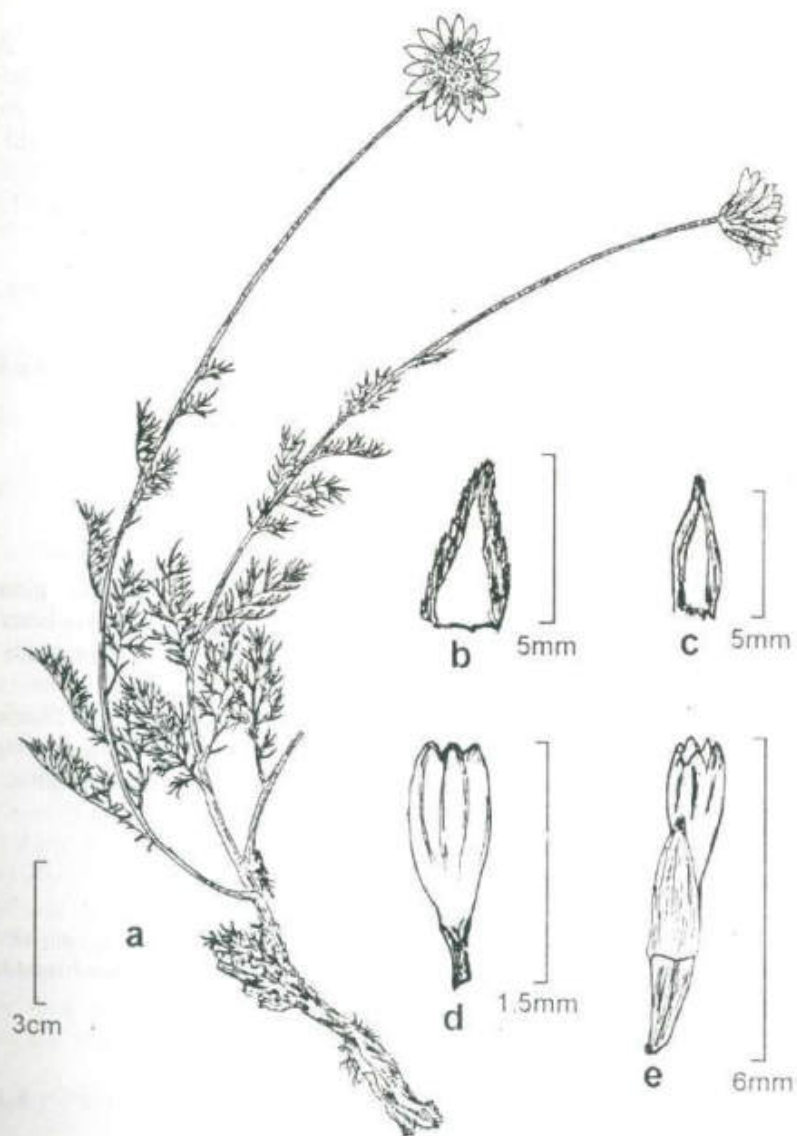


Fig. 16. *Chrysanthemum stoliczkai* C.B. Clarke : a. Habit; b. & c. Involucre bracts; d. Outer floret; e. Inner floret with pappus.

Herbs, aromatic, viscid puberulous, 12-30 cm high; branches many, slender, woody, leafy upwards. Leaves 0.5-1.3 cm long, pinnatifid, segments linear oblong, acute or obtuse, mucronate. Heads white, solitary, 1.5-2 cm in diam., long peduncled, terminating the branches. Involucral bracts viscid pubescent, 2-3 x 0.5 mm; outer lanceolate, acute, margins brown scarios; inner oblong, obtuse, margins pale white scarios. Receptacle convex, naked. Ray florets female, 6-7 x 2 mm; ligule white, minutely 3-fid, nerved. Disc florets yellow, hermaphrodite, tubular, terete or 2-winged or more or less campanulate, 3 x 1 mm; limb 4-5-fid, lobes ovate, acute. Achenes angled and narrowly winged, 2 x 0.5 mm. Pappus none.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, between 3000-4500 m. Jammu & Kashmir and Himachal Pradesh.

W. Tibet and China.

## 6. *Cotula* L.

Herbs, annual or perennial, often creeping. Leaves alternate, pinnatifid or pinnatisect, rarely entire or toothed. Heads heterogamous, rarely homogamous, hemispheric or campanulate. Involucral bracts sub-2-seriate, often with scarios margins. Receptacle naked. Outer florets female, fertile, 1-2-seriate fertile; corolla conic or absent. Disc florets hermaphrodite, all fertile or inner sometimes sterile, tubular; limb 4-lobed. Anther bases obtuse. Style arms truncate or obtuse, of sterile florets sometimes entire. Achenes of female or of all flowers stipitate, compressed, sometimes sheathed above by the base of the corolla. Pappus absent or sometimes short, auriculate.

Throughout the world; 75 species, 4 in India.

*Literature.* HARA, H. (1942). On *Cotula australis* and *C. hemisphaerica*. *J. Jap. Bot.* 18: 3-5. VAID, K.M. & H.B. NAITHANI, (1970). *Cotula australis* (Sieb. & Spreng.) Hook.f. A new Record For N.W. & E. Himalayas, *Ind. For.* 96(6): 426-428.

### KEY TO THE SPECIES

- |   |                            |
|---|----------------------------|
| 1a. Achenes of outer florets glandular  | 3. <i>C. australis</i>     |
| b. Achenes of outer florets not glandular                                       | 2                          |
| 2a. Corolla of female florets prominent, 3-4-toothed, prominently lobed at base | 2. <i>C. aurea</i>         |
| b. Corolla of female florets, absent or minute, 2-toothed, not lobed at base    | 3                          |
| 3a. Leaf segments deeply cut, achenes of disc florets not winged                | 4. <i>C. hemisphaerica</i> |
| b. Leaf segments decurrent, lobed, achenes of disc florets narrowly winged      | 1. <i>C. anthemoides</i>   |

1. *Cotula anthemoides* L., Sp. Pl. 891. 1753; Hook.f., Fl. Brit. India 3: 316. 1881.

Hindi: *Babuna*; Khas.: *Tulohe*; Punj.: *Babuna*; Urdu.: *Babunah*.

Herbs, annual, pale green, weak, procumbent or decumbent, glabrous; stems many from the rootstock, 5-20 cm long. Leaves slightly thick, 1-5 cm long, 2-pinnatisect or pinnatifid; petiole half amplexicaul; segments narrowly oblong, slightly curved; ultimate segments obtuse, shortly mucronate. Heads yellow, solitary on long, naked filiform peduncles, 3-5 mm in diam. Involucral bracts narrowly oblong, obtuse, 1 x 0.5 mm, prominently nerved inside, slightly scarious at the tips. Receptacle naked, tubercled. Outer florets female, fertile; corolla minute. Disc florets hermaphrodite, fertile, tubular, 2 x 1 mm; corolla, broadly campanulate. Achenes ovate, with thick narrow wings, that of ray florets broad, flat.

*Fl. & Fr.* Dec. - April.

*Distrib.* India: E. & W. Himalayas and Indo-Gangetic Plain, at lower elevations. Himachal Pradesh, Punjab, Uttar Pradesh, Bihar, Sikkim, Madhya Pradesh and Rajasthan.

Pakistan, China and N. & S. Africa.

*Notes.* The heads warmed with oil are used as an external remedy for rheumatism.

2. *Cotula aurea* Loeffl., *Iten.* 163. 1758; Hook.f., *Fl. Brit. India* 3: 316. 1881. *Matricaria aurea* (Loeffl.) Boiss., *Fl. Or.* 3: 324. 1875.

Herbs, annual, procumbent or ascending, glabrous, 7-12 cm high; stems many from the rootstock, slender. Leaves 1-2 cm long, 1-2-pinnatisect segments, linear, 1-2-pinnatisect, acute or obtuse, mucronate, 1-2 cm long, flacid, papilose. Heads yellow, solitary in axillary and terminal, long, naked peduncles, 3-6 mm diam. Involucral bracts 2-seriate 2.5 x 1 mm; outer ovate-oblong with dull scarious margins; inner obovate, more or less hyaline, scarious along the margins with few thin brown lines. Receptacle naked, conic, pitted. Outer florets female, tubular, 0.8 mm long, flat, more or less straight; corolla 3-4-toothed, prominently lobed at base. Disc florets hermaphrodite, ca 1 mm long, tubular, campanulate, slightly curved in the middle; corolla generally 4-toothed, narrowly winged at base. Achenes of the outer florets dull white, long, obovate, slightly curved at the base, 0.5 mm striate. Pappus none.

*Fl. & Fr.* Dec. - April.

*Distrib.* India: Indo-Gangetic Plain, ascending in the W. Himalayas up to, 1500 m. Jammu & Kashmir and Punjab.

Pakistan, Persia, Syria, Malta, Algeria and Spain.

*Notes.* The achenes become mucilaginous when wet.

✓ 3. *Cotula australis* (Sieb. ex Spreng.) Hook.f., Bot. Antarch. Voy. 2(1): 128. 1852 et Handb. N. Zeal. Fl. 1: 128. 1853. *Anacyclus australis* Sieb. ex Spreng. in Linnaeus Syst. Veg. (ed. 16) 3: 497. 1826.

Herbs, annual, weak, procumbent or ascending, pubescent, much branched, flaccid, 10-20 cm high; branches slender, spreading, glabrous or clothed with long lax hairs. Leaves 1-4 x 0.5-1 cm; 1-2-pinnatisect, segments oblong-linear, acute or mucronate. Heads green, solitary on long filiform branches, 3-4 mm in diam. Involucral bracts 2-seriate, scarious at the margins. Receptacle naked. Outer florets female; corolla none. Disc florets few, hermaphrodite, tubular; limb 4-toothed at the apex. Achenes of ray florets flat, glandular and winged; those of disc florets thick, not winged. Pappus almost absent.

*Fl. & Fr.* Feb. - Dec.

*Distrib.* India: wide spread weed along rivers, marshy places, etc., between 1500-2000 m. Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh, Meghalaya, W. Bengal, Tamil Nadu and Kerala.

China, Sri Lanka, Australia, S. Africa and W. USA.

*Notes.* A native of Australia.

✓ 4. *Cotula hemisphaerica* (Roxb.) Wallich ex C.B. Clarke, Comp. Ind. 150. 1876. *Artemisia hemisphaerica* Roxb., Fl. Ind. ed. 2, 3: 422. 1832; Hook.f., Fl. Brit. India 3: 316. 1881.

Herbs, annual, prostrate or erect, annual, glabrous to villous; stems many from the rootstock, 10-20 cm long. Leaves 1-3 cm long, 1-2-pinnatisect; uppermost simple; segments many, linear, aristate. Heads yellow, yellow, hemispheric, solitary, peduncled, erect in flowers, slightly drooping in fruits, 4-5 mm in diam. Involucral bracts scarious along the margins. Receptacle naked. Outer florets female, fertile; petals none or 2-toothed. Disc florets hermaphrodite, prominently tubular, companulate. Achenes angled; that of ray florets minute, not winged.

*Fl. & Fr.* Dec. - April.

*Distrib.* India: Indo-Gangetic Plain, a weed of paddy fields ascending in the Himalayas up to 800 m. Uttar Pradesh, Bihar, W. Bengal, Assam, Manipur and Meghalaya.

China and Japan.

### 7. *Leucanthemum* Mill.

Herbs, perennials or rarely annuals; stems erect or decumbent, usually leafy. Leaves simple, oblong, spathulate or obovate, margins crenate, serrate or pinnatifid. Heads heterogamous, radiate, solitary, terminal, hemispherical. Involucral bracts 3-4-seriate, lanceolate or oblong, inner ones hyaline or scarious margined. Receptacle more or less flat, naked. Ray florets white or yellow, female, 1-seriate, fertile, ligule conspicuous. Disc florets, yellow, hermaphrodite, fertile, tubular, limb 5-lobed. Anther base obtuse, entire. Style arms of hermaphrodite florets truncate, penicillate. Achenes homomorphic, more or less terete or 10-ribbed, with epicarpic mucilaginous cells on ribs, vallecular secretary canals present. Pappus a corona or auricle, sometimes rudimentary or absent.

Europe and N. Asia; ca 20 species, 1 in India, on hills as an escape.

*Notes.* Some authors treat *Leucanthemum* Mill. as a distinct genus, whilst others reduce it to *Chrysanthemum* L.

✓ *Leucanthemum vulgare* Lam., Fl. Fr. 2: 137. 1779. *Chrysanthemum leucanthemum* L., Sp. Pl. 888. 1753.

Herbs, perennial, erect, glabrous, or hairy, 10-100 cm high; rootstock woody, sometimes trailing. Stems 2-3 from the rootstock. Basal leaves glaucous, broadly to narrowly spathulate, margins crenate to dentate, 5-10 cm long; cauline leaves narrowly oblong to spathulate, crenate to dentate, 1.2-5 x 0.3-1.2 cm, glaucous. Heads solitary on long, 2-5 cm in diam.; peduncles, more or less naked, terminating the stem or sometimes the branches. Involucral bracts 4 x 0.15 mm; outer broadly lanceolate, margins, scarious; inner oblong-lanceolate, prominently brown scarious at the tips. Receptacle flat, naked. Ray florets female, 1.5 x 0.4 cm; ligule white, obtuse or obscurely 3-fid, nerved. Disc florets yellow, hermaphrodite, tubular, campanulate, 3 x 0.8 mm, tube more or less winged or folded; limbs 5-fid, lobes ovate, acute. Achenes obconic-cylindric, 2 x 0.5 mm, usually prominently 10-ribbed, crowned by the persistent style base. Pappus minute or auricle like or absent.

*Fl. & Fr.* April - Nov.

*Distrib.* India: Gangetic Plain and W. Himalayas, ascending up to 2500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and W. Bengal.

Pakistan, China and N. America.

### 8. *Matricaria* L.

Herbs, annual or perennial. Leaves alternate, 2-3-pinnatisect. Heads solitary, terminal, sometimes corymbose, rayed (rarely disciform), hemispheric. Involucral bracts

few-seriate, appressed, margins usually scarious brown, outer shorter. Receptacle naked. Ray florets female, fertile or sterile; ligule white. Disc florets hermaphrodite, fertile, tubular, terete or 2-edged; limb 4-5-fid. Anther bases obtuse, entire. Style arms of hermaphrodite florets with truncate and penicillate tips. Achenes oblong, often incurved, faces glandular or rugulose, truncate, dorsally convex and ribbed or not, ventrally 3-5-ribbed. Pappus very short, coroniform, dimidiate or absent.

Europe, N. and S. Africa, Asia and America; ca 60 species, 2 in India.

*Literature.* JEFFEREY, C. (1979). Notes on the lectotypification of the names of *Cacalia* L., *Matricaria* L., and *Gnaphalium* L. *Taxon* 28 (4): 349-351.

#### KEY TO THE SPECIES

- 1a. Heads 1.2-2 cm in diam.; ligule 0.8-1.5 cm long 2. *M. recutita*  
 b. Heads ca 8 mm in diam.; ligule hardly 2-3 mm long 1. *M. disciformis*

1. *Matricaria disciformis* (Sch.-Bip.) DC., Prodr. 6: 51. 1838. *Tripleurospermum disciforme* Sch.-Bip., Tanacet. 34. 1844. *M. corymbifera* DC., Prodr. 7: 297. 1838.

Herbs, erect, glabrous, 30-50 cm high; rootstock woody; stems terete or striate, many from the rootstock, branched upwards, slender. Leaves 2-3-pinnatisect; segments finely dissected, setaceous with mucronate tips; lower leaves 2-3 cm long; upper leaves 1-1.5 cm long. Heads long peduncled, solitary or in terminal corymbs, ca 8 mm in diam. Outer involucre bracts broadly oblong with white scarious margins, 2-2.5 mm long; inner oblanceolate with narrow, white scarious margins, 3 mm long. Receptacle globose, convex, naked. Ray florets yellow, female, fertile, ca 3 mm long; ligule obscurely lobed at tip. Disc florets hermaphrodite, fertile, tubular, ca 3 mm long, limb 5-fid. Achenes cylindrical, ca 1 mm long, dorsally smooth, ventrally 3-ribbed. Pappus absent.

*Fl. & Fr.* Dec. - Aug.

*Distrib* India: W. Himalayas, in dry places between 2500-4500 m. Himachal Pradesh (Kulu); rare.

Afghanistan and Turkistan.

*Notes.* There is a solitary specimen of *Matricaria disciformis* in Kashmir University Herbarium from Kulu, Himachal Pradesh.

2. *Matricaria recutita* L., Sp. Pl. 891. 1753. *M. chamomilla* L., Sp. Pl. 891. 1753 et ed. 2. 1256. 1763; Hook.f., Fl. Brit. India 3: 315. 1881.

Eng.: German chamomile, Wild chamomile; Guj.: Babuna; Nep.: Cambomilla; Punj.: Babuna; Urdu.: Babunah.



Herbs, annual, erect, glabrous, aromatic, ca 30 cm high. Leaves 2-3 cm long, 3-pinnatisect; segments filiform, slightly falcate. Heads solitary, 1-1.5 cm in diam., long peduncled. Involucral bracts broadly lanceolate to oblong with white scarious margins, 2 x 0.5 (-1) mm. Receptacle conic, naked, elongating in fruits. Ray florets white female, 0.8-1.5 x 0.2-0.3 cm; ligule obscurely 3-fid, reflexed at maturity. Disc florets hermaphrodiate, tubular, campanulate, 2 x 0.5 mm; limb 5-fid; lobes ovate. Achenes cylindrical, 1 x 0.5 mm, ventrally ribbed, narrowly winged along the margins. Pappus absent.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: N.W. India, ascending in the Himalayas up to 3000 m. Jammu & Kashmir, Himachal Pradesh, Punjab and Uttar Pradesh.

Pakistan, Iraq, Japan, N. Asia and Westwards to Atlantic.

*Notes.* Sometimes the receptacle gets divided into two broad claw-like structures in populations growing on moist gravelly soils.

The flower heads and the oil obtained by distillation from the plant are used in India as a substitute for the true chammomile (*Anthemis nobilis*) [Duthie, J.F. (1960) repr. ed. *Fl. Upper Gang. Plain* 1: 433.]

### 9. *Soliva* Ruiz & Pavon

Herbs. Leaves alternate, pinnatisect. Heads sessile, surrounded by leaves. Involucral bracts in 2 subequal rows. Receptacle flat, naked. Ray florets female; corolla absent. Disc florets usually functionally male or sterile, tubular; limb 4 or rarely 2 or 3-dentate. Anther bases obtuse. Style rigid, persistent. Achenes glabrous, compressed with a smooth thin wing. Pappus absent.

Mostly in Australia and S. America; 12 species, 1 in India.

*Literature.* BENTHAM, G. (1866) *Flora Australiensis*. London, 7: 552. BHATTACHARYYA, U.C. (1963). *Soliva anthemifolia* R. Br. (Compositae)- A new Record for India. *Bull. Bot. Surv. Ind.* 5(3&4): 375-76. MUNZ, P.A. (1959) *A. California Flora*. California 1233.

*Soliva anthemifolia* (A. Juss.) R. Br. in *Trans. Linn. Soc.* 12: 102. 1817. Bhattacharyya in *Bull. Bot. Surv. Ind.* 5 (3 & 4): 375-376. 1963. *Gymnostyles anthemifolia* A. Juss., *Ann. Mus. Paris* 4: 262. t. 61, f. 1. 1804.

Herbs, annual or biennial, stoloniferous; stems short. Radical leaves simple, oblong to oblong-lanceolate, 3-10 cm long, 2-pinnatifid, erect or patent; segments lanceolate-

oblong, acute, apiculate, often acute dentate, thinly white long hairy; petioles short with a broadened base. Heads many, axillary and terminal, 2-3 mm in diam. (mature ones 0.8-1 cm in diam.), sessile. Involucral bracts 2-seriate, ovate-oblong, acute, 0.3-0.4 cm long, thinly long white pilose. Receptacle flat, naked, villous within. Ray florets in several rows, female, without corolla. Disc florets tubular, 0.25-0.3 cm long, male or sterile; limb pale-yellow, 2-3 toothed, pubescent, gradually tapering to the base; sterile florets with prominent pistillode with or without anthers, admixed with the fertile males. Anthers obtuse at base. Achenes cuneate, truncate, 1.5-2 cm long, with thick corky transversely wrinkled wings, hairy on the rounded upper angles, tipped with 0.2 cm long, persistent, hardened style. Pappus absent.

*Fl. & Fr.* Dec. - April.

*Distrib.* India: in puddles, dried up canals and in moist places in cultivated fields, between 400-700 m. Jammu & Kashmir, Uttar Pradesh, Delhi and Rajasthan.

Australia and S. America.

### 10. *Sphaeromorphaea* DC.

Small prostrate perennial; stems crisped hairy; rootstock woody. Leaves alternate, sessile, obovate. Heads yellow, heterogamous, disciform, hemispheric, axillary, subsolitary, shortly peduncled. Involucral bracts many-seriate, oblong, obtuse, coriaceous, incurved in fruit. Receptacle naked. Outer florets female, fertile, many seriate, corolla elongate, slender, tubular, inflated below. Disc florets hermaphrodite, fertile, tubular; limb 4-cleft. Anther bases obtuse, entire. Style 2-fid. Achenes subcylindric, slender, broadly ribbed, hairy at the base. Pappus absent.

Monotypic genus, mainly in Thailand, China and S. India.

*Sphaeromorphaea australis* (Less.) Kitam., in Acta Phyto. Geobot. 6: 80. 1937.  
*Epaltes australis* Less. in Linnaea 5: 148. 1831 et Syn. Comp. 206. 1832.  
*Sphaeromorphaea russeliana* DC., Prodr. 6: 140. 1838; Hook.f., Fl. Brit. India 3: 317. 1881.

Herbs; rootstock 15-30 cm long, stout, woody; stems much branched; branches 15-30 cm long, straggling, flexuous, woody below. Leaves obovate or oblanceolate, obtuse, toothed, 0.6-2.5 cm long, narrowed into a very short petiole, gland-dotted beneath. Heads globose, 4-6 mm in diam. Involucral bracts broadly oblong or obovate, obtuse, coriaceous, obscurely pubescent.

*Fl. & Fr.* May

*Distrib.* India: in open fields. Orissa.

Thailand and China.

### 11. *Tanacetum* L.

Herbs, annual or perennial. Leaves usually pinnatisect. Heads yellow, heterogamous or homogamous, disciform, corymbose (rarely large, long peduncled and solitary). Involucral bracts many-seriate, appressed, margins often scarious and brown; outer smaller. Receptacle flat or convex, naked. Outer florets absent or female, fertile, 1-seriate, terete or compressed, 2-3-fid. Disc florets hermaphrodite, fertile, tube stout, cylindrical; limb 5-fid. Anther bases obtuse, entire. Style arms of hermaphrodite florets with truncate penicillate tips. Achenes compressed, 5-angled or ribbed, or of the outer florets triquetrous, truncate. Pappus annular or coroniform or absent, rarely with a dimidiate auricle.

North temperate regions; 70 species, 12 in India.

#### KEY TO THE SPECIES

- |   |                               |
|---|-------------------------------|
| 1a. Leaves cuneiform, 3-fid   | 6. <i>T. gossypinum</i>       |
| b. Leaves 1-3-pinnatisect, or pinnatifid  | 2                             |
| 2a. Leaves all cauline; stems or branches all flowering   | 3                             |
| b. Leaves radical and cauline; only elongating stems from the root flowering, the rest short and flowerless   | 7                             |
| 3a. Involucral bracts nearly glabrous   | 4                             |
| b. Involucral bracts pubescent to woolly  | 5                             |
| 4a. Heads ca 6 mm in diam.; stems strict, leafy upwards; leaves pinnatisect   | 4. <i>T. fruticosum</i>       |
| b. Heads ca 4 mm in diam.; stems corymbosely branched above; leaves palmately pinnatifid  | 5. <i>T. gracile</i>          |
| 5a. Receptacle conical; stem sparsely leafy; leaves 1-2.5 cm long;  | 1. <i>T. artemisioides</i>    |
| b. Receptacle convex or hemispheric; stem densely leafy upwards; leaves 0.6-1.25 cm long;   | 6                             |
| 6a. Stems elongate, hoary or woolly, few, robust; leaves 2-3-pinnatisect; involucral bracts broadly oblong; achenes rounded at the tip                  | 8. <i>T. nubigenum</i>        |
| b. Stems short, tomentose, very many, crowded; leaves palmately pinnatisect; involucral bracts orbicular, pubescent; achenes with a minute terminal cup | 10. <i>T. tibeticum</i>       |
| 7a. Small herbs; radical leaves up to 2.5 cm long; segments minute, short acute, incurved   | 7. <i>T. nanum</i>            |
| b. Tall and robust herbs, rarely small; radical leaves 2.5-25 cm long; segments subfiliform to linear, acute or obtuse                                  | 8                             |
| 8a. Stem 0.6-1.2 m tall; leaves pinnatifid; segments rigidly bristly at the apices; pappus of an acutely dentate corona                                 | 12. <i>T. tripinnatifidum</i> |
| b. Stem up to 60 cm high; leaves palmately or 2-pinnatisect; segments linear or linear ovoid or subfiliform, acute or obtuse; pappus absent             | 9                             |
| 9a. Stems few or many from the woody rootstock; leaves palmately pinnatifid; involucral bracts broadly ovate  | 11. <i>T. tomentosum</i>      |
| b. Stem solitary or subsolitary from the woody rootstock; leaves 2-pinnatisect; involucral bracts oblong or linear oblong                               | 10                            |

- 10a. Radical leaves 12-25 cm long, slender, linear; involucre bracts with broad scarious purple margins  
 2. *T. dolichophyllum*  
 b. Radical leaves 5-10 cm long, oblong or oblong-slender in outline; involucre bracts with narrow scarious pale margins 11
- 11a. Stem softly tomentose; involucre bracts densely woolly; florets numerous 9. *T. robustum*  
 b. Stem silky tomentose or hoary; involucre bracts densely pubescent; florets ca 20 3. *T. falconeri*

1. *Tanacetum artemisioides* Sch.-Bip. ex Hook.f., Fl. Brit. India 3: 318. 1881.  
*Artemisia fasciculata* C.B. Clarke, Comp. Ind. 162. 1876. non M.B. *Chrysanthemum artemisioides* (Less.) Kitam. in Acta Phyto. Geobot. 19(4-6): 94. 1963.

Herbs, perennial, pale white, tall, slender, erect, adpressed pubescent, 30-60 cm high; stems simple or branched from the base, spreading, sulcate. Leaves 1-2.5 cm long, subpalmately 1-2-pinnatisect; segments small, oblong, obtuse; radical leaves petioled, ca 2 cm long, white adpressed pubescent; cauline sessile. Heads sessile, ca 4 mm in diam. in clusters or peduncled in small, flat-topped or rounded corymbs, with ca 20 florets, less than 2.5 cm in diam., terminating the long slender branches. Involucre bracts broadly concave, 3-4 mm long, coriaceous, pubescent, pale white scarious at the apices; outer herbaceous, pubescent. Receptacle conic, naked. Outer florets absent or female, fertile, 1-seriate. Disc florets hermaphrodite, fertile; tube cylindric; limb 5-fid. Achenes not seen.

Fl. & Fr. Aug. - Oct.

Distrib. India: W. Himalayas, in temperate regions between 2500-3000 m. Jammu & Kashmir (Ladak).

Pakistan, Bhutan and W. Tibet.

2. *Tanacetum dolichophyllum* (Kitam.) Kitam. in Enum. Fl. Pl. Nepal 3: 45. 1982.  
*Chrysanthemum dolichophyllum* Kitam in Acta Phyto. Geobot. 33: 73. 1968. *T. longifolium* Wallich ex DC., Prodr. 6: 130. 1838. p.p. (non Thunb. 1794-1800); Hook.f., Fl. Brit. India 3: 320. 1881.

Hindi: *Guggul*.

Herbs, perennial, erect, laxly villous, 15-40 cm high; stems pale, striate, sparsely hairy; rootstock thick, woody, crowned with the shining bases of old petioles. Leaves 2-pinnatisect, hairy; segments oblong-linear or subfiliform, acute; radical leaves ca 15 cm long, petioled; cauline ca 10 cm long, sessile. Heads with 50-60 florets, woolly, dense in terminal corymbs, less than 1.25 cm in diam. Involucre bracts narrowly oblong, acute to acuminate, ca 7 mm long. Receptacle hemispheric, naked. Outer florets absent. Disc florets hermaphrodite, fertile, ca 6 mm long with the achenes, tube cylindric; limb 5-fid. Achenes narrowly obovoid, ca 2 mm long, 5-ribbed. Pappus absent.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, in temperate regions between 3500-4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Nepal and Bhutan.

*Notes.* The oil is employed as liniment for gout, rheumatism, bruises and chronic ulcers. Internally it is used as vermifuge but toxic in large doses.

3. *Tanacetum falconeri* Hook.f., Fl. Brit. India 3: 320. 1881.

Fig. 17.

Herbs, perennial, silky tomentose or hoary, 30-60 cm high; stems robust, grooved. Radical leaves 5-10 cm long, linear-oblong in outline, 2-pinnatisect, segments linear, narrow, acute. Heads peduncled, with ca 20 florets, in branched corymbs with linear or divided leaves, ca 8 mm in diam. Involucral bracts densely pubescent, linear-oblong with narrow, pale margins. Achenes pale, linear-oblong, ca 6 mm long, more or less dilated upwards, pericarp loose, truncate at the tip and lobed.

*Fl. & Fr.* July

*Distrib.* India: W. Himalayas, between 3000-4000 m. Jammu & Kashmir (Sonamarg) and Himachal Pradesh.

Pakistan and W. Tibet.

*Notes.* A variable species with regard to the size of the corymbs.

4. *Tanacetum fruticosum* Ledeb., Fl. Alt. 4: 58. 1833; Hook.f., Fl. Brit. India 3: 318. 1881.

Herbs, perennial, erect, hoary or woolly, 20-45 cm high; stems many from the perennial rootstock, slender, woody, branched above, leafy; rootstock woody. Leaves 6-12 mm long, 1-2-pinnatisect, segments spreading, broadly to narrowly oblong-linear, obtuse. Heads many, sessile or peduncled in corymbs, ca 6 mm in diam. Involucral bracts many-seriate, broadly oblong, nearly glabrous, pale or faintly coloured scarious margins. Receptacle conic, naked. Outer florets absent, or female, fertile, 1-seriate, terete or compressed, 2-3-fid. Disc florets hermaphrodite, fertile; tube cylindrical; limb 5-fid. Achenes not seen.

*Fl. & Fr.* Aug. - Sept.

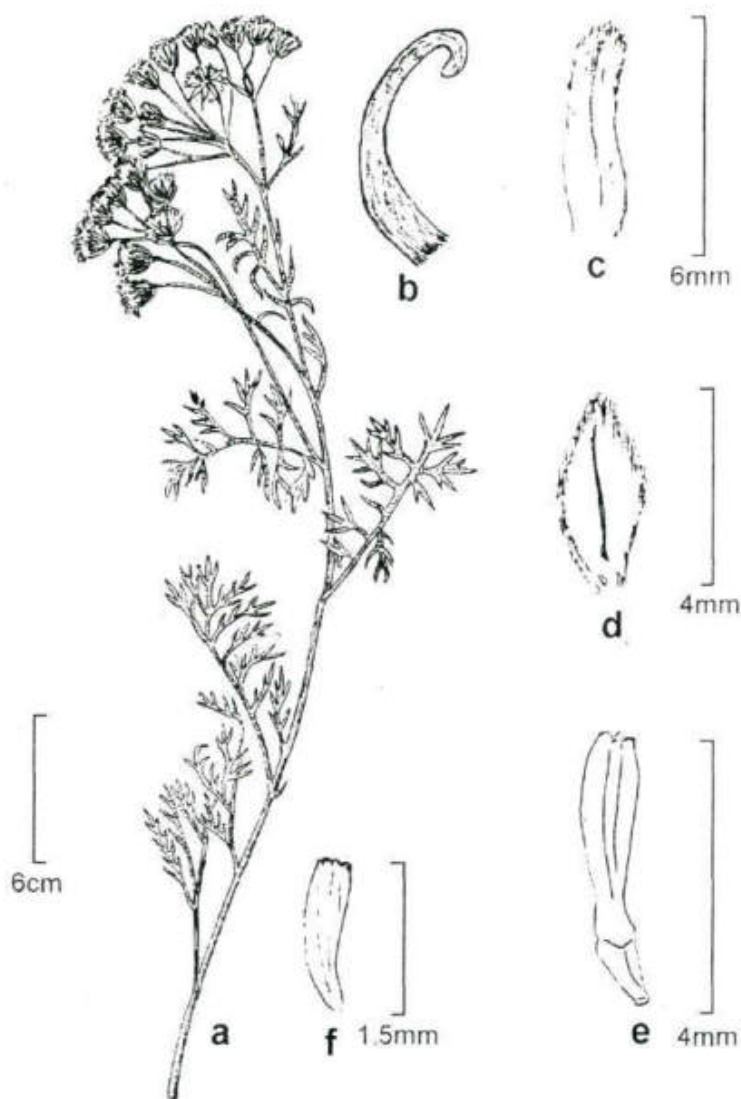


Fig. 17. *Tanacetum falconeri* Hook.f. : a. Habit; b., c. & d. Involucre bracts; e. Floret; f. Achene.

*Distrib.* India: W. Himalayas, between 4000-5000 m. Jammu & Kashmir.

Pakistan, W. Tibet, Afghanistan, Turkistan, USSR and Mongolia.

*Notes.* The herb is used as a tonic and anthelmintic.

**5. *Tanacetum gracile*** Hook.f. & Thomson in Fl. Brit. India 3: 318. 1881. *T. fruticosum* C.B. Clarke, Comp. Ind. 153. 1876. *non* Ledeb.

Herbs, perennial, aromatic hoary pubescent, 30-60 cm high; stems pale yellow, many from the woody rootstock, slender, sulcate, adpressed pubescent, corymbosely branched above; branches spreading; rootstock woody. Leaves few, scattered, 1.2-2.5 cm long, palmately 2-pinnatisect; segments short, broad, obtuse. Heads golden yellow, in small corymbs terminating the branches, ca 4 mm in diam. Involucral bracts many-seriate, broadly oblong, scarious, ca 2 mm long, glabrous. Receptacle conic, naked. Outer florets absent or female, fertile, 1-seriate. Disc florets hermaphrodite, fertile; tube cylindrical, limb 5-fid. Achenes obovoid with a terminal cupule.

*Fl. & Fr.* Aug.

*Distrib.* India: W. Himalayas, in temperate regions on dry slopes between 3000-5000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan and W. Tibet.

**6. *Tanacetum gossypinum*** Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 154. 1876. Hook.f., Fl. Brit. India 3: 321. 1881. *Chrysanthemum gossypinum* (Hook.f. & Thomson ex C.B. Clarke) Kitam. in Acta Phyto. Geobot. 23: 74. 1968.

Herbs, perennial, white to pale brown, densely tufted, dwarf, woolly, 2-15 cm high; stems short, densely clothed with short, silky, imbricating, ca 3 mm long leaves; flowering shoots 2.5-5 cm long, stout, simple, densely leafy; rootstock woody. Leaves cuneiform, 6-8 mm long, 3-fid. Heads in rounded, terminal, dense woolly clusters, ca 6 mm in diam. Involucral bracts linear-oblong with scarious purple margins. Receptacle hemispheric, naked. Outer florets absent or fertile, female, 1-seriate. Disc florets hermaphrodite, fertile, ca 4 mm long, including the achenes, tube cylindrical; limb 5-fid. Achenes narrowly obovoid; pericarp lax, tip small, cupular. Pappus absent.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: W. & E. Himalayas, in the alpine region on the Tibetan frontier, between 5500-6000 m. Uttar Pradesh and Sikkim.

Nepal and Bhutan.

7. *Tanacetum nanum* C.B. Clarke., Comp. Ind. 155. 1876. Hook.f., Fl. Brit. India 3: 320. 1881.

Herbs, perennial, small, hoary, 5-10 cm or rarely more high; stems sparsely minute leaved; rootstock thick, woody, excessively branched. Radical leaves petioled, ovate in outline, 12-25 mm long, 2-pinnatisect; segments short, incurved, acute, sparsely hoary above, densely villous beneath; cauline leaves many, small, sessile. Heads capitate ovate, solitary or 2-3-or many, terminating the stems, ca 8 mm in diam. Involucral bracts elliptic, obtuse, woolly, with brown, dentate, scarious margins. Receptacle convex, naked. Outer florets absent or female, fertile, 1-seriate. Disc florets hermaphrodite, fertile; tube cylindrical; limb 5-fid. Ripe achenes not seen.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 4000-5500 m. Jammu & Kashmir (Nubra), Himachal Pradesh (Kunawur) and Uttar Pradesh.

W. Tibet and C. Asia.

8. *Tanacetum nubigenum* Wallich in DC., Prodr. 6: 130. 1838; Hook.f., Fl. Brit. India 3: 318. 1881. *Chrysanthemum nubigenum* (DC.) Hand. - Mazz. Symb. Sin. 7: 1113. 1936.

Fig. 18.

Hindi: *Guggul*.

Herbs, perennial, erect, hoary or woolly, 10-20 cm high; stems many, rather woody from woody rootstock, densely leafy upwards. Leaves 2-3-pennatisect; segments short, linear, subacute or obtuse; radical leaves petioled, up to 7 cm long; cauline petioled, becoming gradually sessile, 0.6-2.5 cm long. Heads many, peduncled or sessile, in dense corymbs, up to 8 mm in diam. Involucral bracts broadly oblong, herbaceous, woolly with broad scarious purple brown margins. Receptacle hemispheric, naked. Outer florets absent or female, fertile, 1-seriate. Disc florets hermaphrodite, fertile, ca 2 mm long; fertile, tube cylindrical; limb 5-fid. Achenes oblong-ovoid, 5-ribbed, rounded at the tip. Pappus absent.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. & E. Himalayas, in alpine regions between 3500-4500 m. Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan and Tibet.

9. *Tanacetum robustum* Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 154. 1876; Hook.f., Fl. Brit. India 3: 320. 1881.



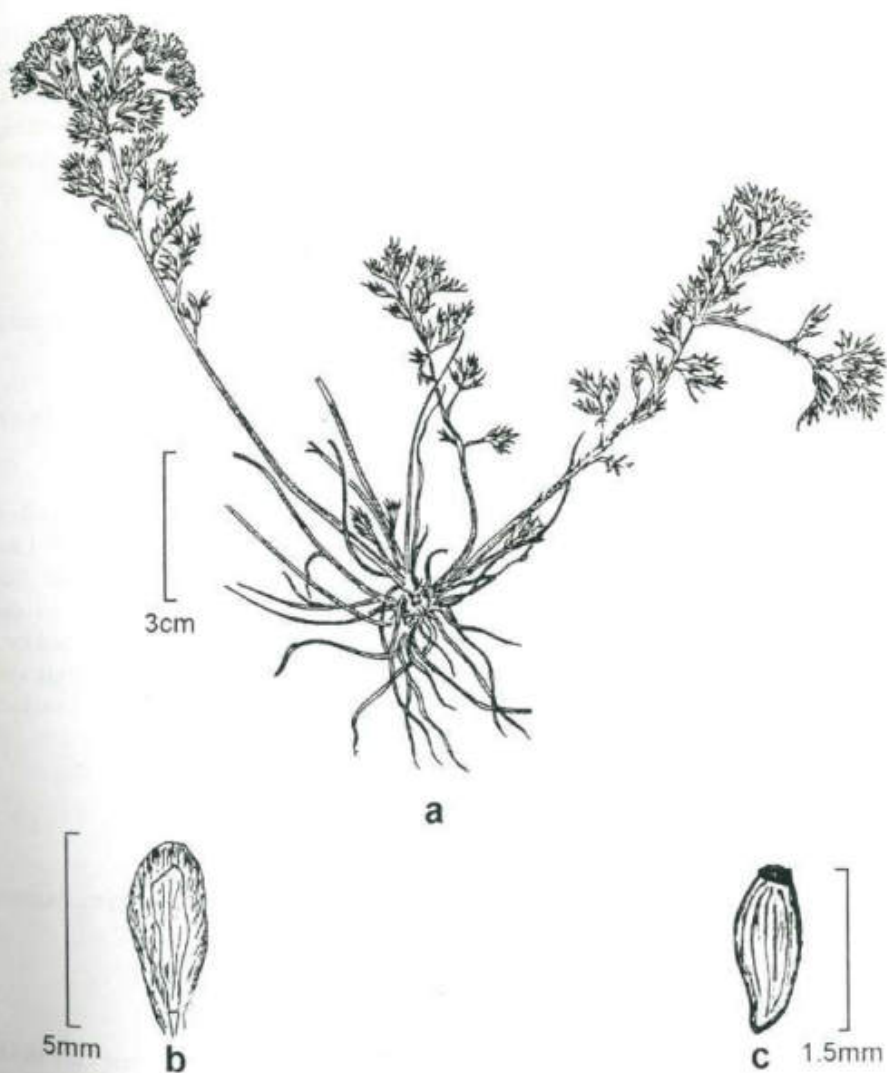


Fig. 18. *Tanacetum nubigenum* Wallich : a. Habit; b. Involucral bract; c. Achene.

Herbs perennial, softly tomentose, very robust, 60-90 cm high; stems subsolitary, robust, angled; rootstock woody. Leaves oblong in outline, 2-pinnatisect, segments white, linear-obovoid, obtuse, villous; radical leaves long petioled, 7-10 cm long; cauline few. Heads with numerous florets, in branched corymbs with very stout, woolly and leafy branches and peduncles, ca 8 mm in diam. Involucral bracts densely woolly, oblong with very narrow scarious margins. Receptacle convex, naked. Outer florets absent or female, fertile, 1-seriate. Disc florets hermaphrodite, fertile; tube cylindric; limb 5-fid. Achenes ca 4 mm long, 4-angled, not at all elongated upwards. Pappus absent.

*Fl. & Fr.* May - July.

*Distrib.* India: W. Himalayas, between 3500-4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

**10. *Tanacetum tibeticum*** Hook.f. & Thomson ex C.B. Clarke, *Comp. India*. 154. 1876; Hook.f., *Fl. Brit. India* 3: 319. 1881.

Herbs, perennial, dwarf, tufted, tomentose, 3-9 cm high; stems many, crowded on the rootstock, densely leafy upwards, hoary or woolly; rootstock thick, woody. Leaves dense, ca 1.2 cm long, palmately pinnatisect; segments short, linear, obtuse. Heads yellow, more or less globose, capitate or loosely corymbose, 8-12 mm in diam. Involucral bracts ovate-oblong or orbicular, ca 3 mm long, pubescent with broad brown or pale scarious margins. Receptacle convex or hemispheric, naked. Outer florets absent or female, fertile, 1-seriate. Disc florets hermaphrodite, fertile, 2.5 mm long including the achenes; tube cylindric; limb 5-fid. Achenes 5-ribbed with a minute terminal cup. Pappus absent.

*Fl. & Fr.* June - July.

*Distrib.* India: W. & E. Himalayas, in dry places between 3500-5000 m. Jammu & Kashmir, Himachal Pradesh and Sikkim.

Pakistan.

**11. *Tanacetum tomentosum*** DC., *Prodr.* 6: 130. 1838. *T. senecionis* Gay in DC., *Prodr.* 6: 129. 1838; Hook.f., *Fl. Brit. India* 3: 319. 1881. Fig. 19.

Punj.: *Purkar*.

Herbs, perennial, tomentose or woolly, erect, up to 25 cm; stems few or many, stout, from woody rootstock. Leaves 2.5-7 cm long; palmately pinnatisect; segments short or long, oblong-linear, obtuse, tomentose; radical leaves ca 10 cm long, petioled; cauline ca 5 cm long. Heads capitate or in woolly corymbs on sparsely leafy stems, ca 5 mm in diam. Involucral bracts broadly ovate-oblong, woolly with broad, more or less

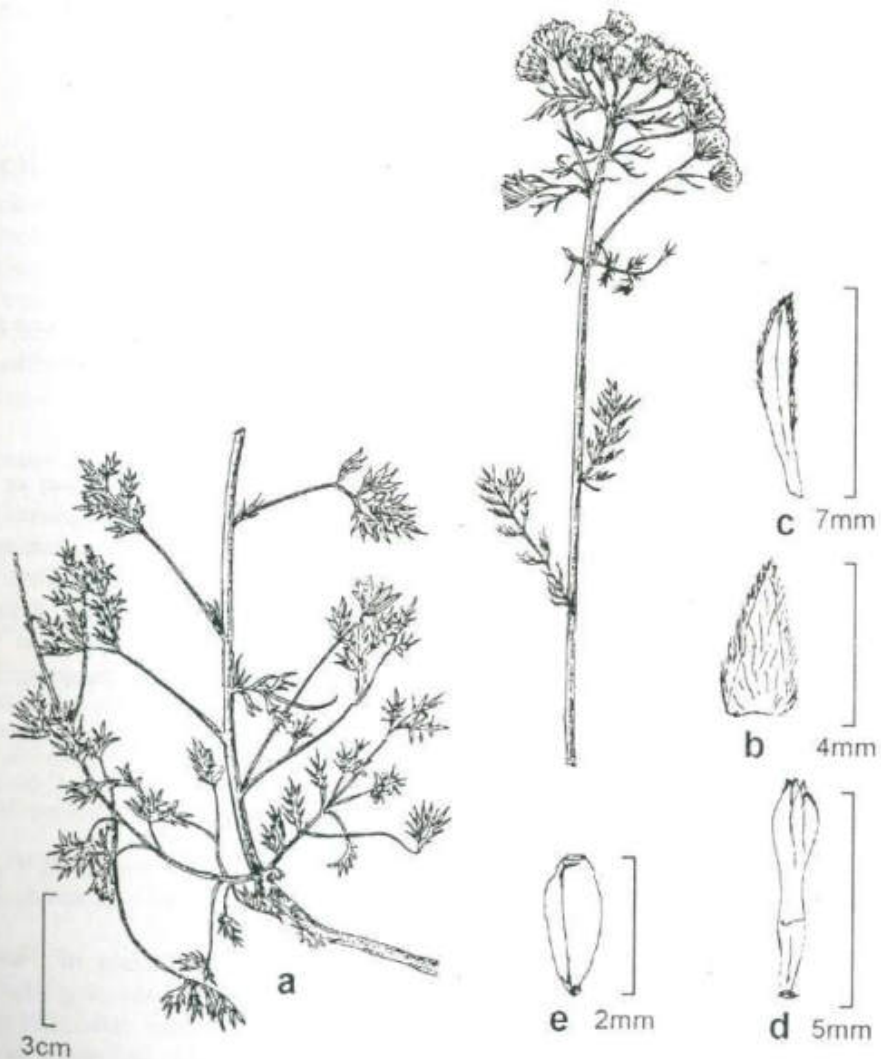


Fig. 19. *Tanacetum tomentosum* DC. : a. Habit; b. & c. Involucral bracts; d. Floret; e. Achene.

brown to pale white scarious margins, ca 5 mm long. Receptacle convex or hemispheric, naked. Outer florets absent or female, fertile, 1-seriate. Disc florets hermaphrodite, fertile; tube cylindric; limb 5-fid. Achenes obovoid or cuneate, compressed, angled, tip rounded without a cupule. Pappus absent.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 3500-4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan.

*Notes.* It is a very variable species with regard to the habit. Some workers treated *Tanacetum tomentosum* DC. and *Tanacetum senecionis* Gay as distinct species.

## 12. *Tanacetum tripinnatifidum* Oliver in Hook. Ic. 4: 2306. 1894.

Herbs, perennial, erect, aromatic, 0.6-1.2 m ; stems ridged, glabrous or hairy, sparsely villous near the nodes. Cauline leaves 2-3-pinnatifid, sessile; segments linear, glabrous or feebly hairy, rigidly bristly at the apex. Heads, yellow, hemispheric, homogamous many flowered, peduncled. Involucral bracts more or less pilose; outer lanceolate, acuminate; inner oblanceolate with fimbriate dentate-margins. Receptacle convex, naked. Achenes (immatured) slightly incurved, 5-ribbed, narrowed below, truncate at the apex. Pappus scarious, 3-4-times smaller than the ovary, unequally incised or 5-6-parted; segments acute.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, at 5000 m. Jammu & Kashmir.

Pakistan.

*Notes.* This species is sometimes confused with some forms of *Tanacetum longifolium* Wallich ex DC.

### EXCLUDED SPECIES

*Tanacetum tenuifolium* Jacq. ex DC., Prodr. 6: 129. 1838.

Specimen not seen.

*Tanacetum griffithii* (C.B. Clarke) Muradayan in Biol. Zhuru. Armen 23(2): 90. 1970. *Chrysanthemum griffithii* C.B. Clarke, Comp. Ind. 148. 1876.

*Tanacetum mutellina* Hand.-Mazz. in Anz. Akad. Wiss. Wien. Math.-Nat. 1924.  
1 x 1. 203. 1925.

*Tanacetum vulgare* L., Sp. Pl. 844. 1753.

## 12. *Waldheimia* Kar. & Kir.

Herbs, perennial, diffuse or tufted. Leaves alternate, cuneate, 3-5-toothed, pinnatisect. Heads heterogamous, hemispheric, often large, terminal, sessile or peduncled. Involucral bracts many-seriate, margins scarious, lacerate, often black. Receptacle flat, naked. Ray florets neuter, 1-seriate; ligule white, rosy or liliac, spreading, entire. Disc florets yellow, hermaphrodite, fertile, tubular; limb 5-fid. Anther bases truncate or with short connate auricles. Style arms of hermaphrodite florets broad with truncate penicillate tips. Achenes of hermaphrodite florets 5-angled, glabrous and glandular; of female empty. Pappus of rigid brown or reddish, wavy flattened bristles, sometimes dilated at the tips and with split margins.

Predominantly Himalayan and C. Asiatic; ca 8 species, 5 in India in alpine regions.

### KEY TO THE SPECIES

- |  |                         |
|--|-------------------------|
| 1a. Leaves cuneiform, 3-fid or 3-lobed or toothed  | 2                       |
| b. Leaves oblong or linear oblong, 1-2-pinnatifid or 2-pinnatisect                                       | 4                       |
| 2a. Glabrous or feebly woolly herbs; heads more than 2 cm in diam.; pappus slender, not dilated at tips  |                         |
|  | 1. <i>W. glabra</i>     |
| b. Densely woolly herbs; heads less than 2 cm in diam.; pappus more or less dilated at tips              | 3                       |
| 3a. Heads short peduncled; involucral bracts membranous with broad, pale brown, deeply fimbriate margins | 5. <i>W. vestita</i>    |
| b. Heads sessile; involucral bracts woolly with narrow, brown scarious margins                           | 2. <i>W. nivea</i>      |
| 4a. Woolly herbs; involucral bracts woolly   | 4. <i>W. tomentosa</i>  |
| b. Glabrous herbs; involucral bracts glabrous  | 3. <i>W. stoliczkai</i> |

1. *Waldheimia glabra* (Decne.) Regel in Acta. H. Petrop 6: 309. 1879. *Allardia glabra* Decne. in Jacq. Voy. 4 (Bot.): 88 t. 96. 1844; Hook.f., Fl. Brit. India 3: 313. 1881.

Herbs, perennial, tufted or creeping, strongly aromatic, glabrous. Leaves cuneiform, 1-4 cm long; lobes entire or toothed, glabrous or sparsely woolly. Heads terminal, sessile or short peduncled, 1.5-2 cm in diam. Involucral bracts glabrous or rarely sparsely woolly, ovate-lanceolate to elliptic-lanceolate with dark purple scarious margins, 4-6 x 0.5-1 mm. Receptacle hemispheric to flat, naked. Ray florets purple, neuter, 1.3 x 0.3 cm; ligule broadly elliptic to elliptic oblong, entire or obscurely 3-fid. Disc florets yellow, hermaphrodite, tubular, 4 x 0.5 mm, sparsely glandular, swollen at base; limb 5-fid, dark purple, ovate, acute. Achenes more or less flat, 1.5 x 0.5 mm, angled, glandular, with truncate apices. Pappus pale yellow to brown, linear, acute, slightly connate at base, 2 mm long, scanty in ray florets and copious in disc florets.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas, between 3800 - 5500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

E. & W. Tibet and Altai Mts.

*Notes.* The plants are strongly aromatic. Woolly nature of the leaves as mentioned by Hooker (1881) is not conspicuous in all the specimens examined.

2. *Waldheimia nivea* (Hook.f. & Thomson ex C.B. Clarke) Regel in Acta Hort. Petrop. 6: 308. 1879. *Allardia nivea* Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 145. 1876; Hook.f., Fl. Brit. India 3: 313. 1881.

Herbs, perennial, woolly; stems creeping, rather slender and naked. Leaves very small, cuneiform, 3-lobed, 4-8 mm long; lobes short, obtuse, embedded in wool. Heads terminal, sessile, 1-1.5 cm in diam. Involucral bracts white woolly, ovate-lanceolate to elliptic with narrow brown scarious margins, 6 x 1 mm. Receptacle flat, naked. Ray florets pale pink to blue, neuter; 1 x 0.2-0.3 cm, ligule broadly elliptic, gradually narrowed to the base, prominently 2-fid, nerved. Disc florets, yellow hermaphrodite, tubular, sparsely glandular, 5 x 0.5 mm; limb 5-fid; lobes, ovate, acute. Achenes obscurely obconic, ca 2 mm long, angled, glandular. Pappus pale brown, linear, flattened at the tips, ca 4 mm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, between 4500 - 5500 m. Jammu & Kashmir.

Pakistan and W. Tibet.

*Notes.* *Waldheimia nivea* is one of the characteristic species adapted to alpine meadows by their cushion forming habit.

3. *Waldheimia stoliczkai* (C.B. Clarke) Ostanf, in Heads, South Tibet 6(3): 38 (List Fl. Pl. Asia) 1922. *Allardia stoliczkai* C.B. Clarke, Comp. India. 145. 1876; Hook.f., Fl. Brit. India 3: 313. 1881. Fig. 20.

Herbs, perennial, erect, glabrous, perennial, 6-15 cm high; stems many from the loose tuft. Leaves 2-4 cm long, 2-pinnatisect; rachis gradually expanded to the base; segments linear, acute or aristate. Heads terminal, peduncled, 2 cm in diam. Involucral bracts ovate-lanceolate to narrowly elliptic, dark-brown, fimbriate or scarious margined, 5-7 x 1-2 mm, glabrous to hyaline. Receptacle flat, naked. Ray florets neuter; 0.5-1.3 x 0.1-0.2 cm; ligule pink, narrowly elliptic, 3-fid, nerved. Disc florets yellow, female,

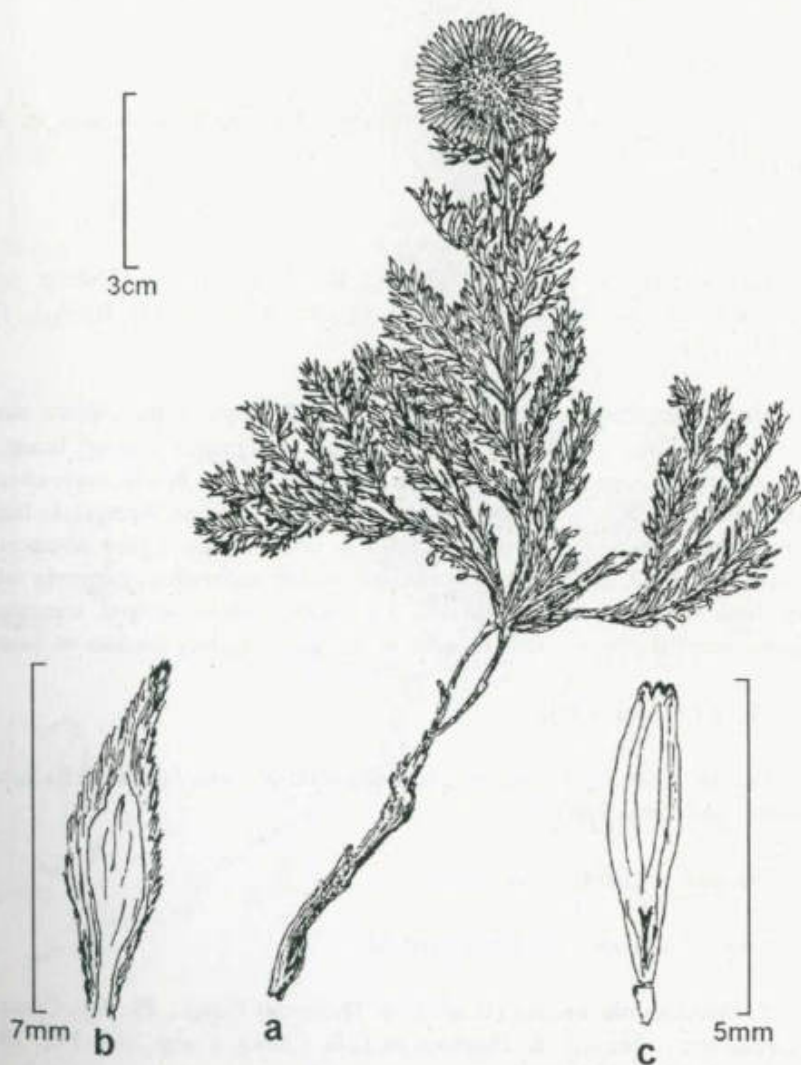


Fig. 20. *Waldheimia stoliczkai* (C.B. Clarke) Ostanf. : a. Habit; b. Involucral bract; c. Outer floret.

2-3 x 0.5 mm, tubular, limb 5-fid, sparsely glandular, slightly dilated at base. Achenes obscurely obconic, angled, 1 x 0.5 mm. Pappus pale yellow, linear, flat, broader at tips, slightly connate at base, 2 mm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, between 4000-5000 m. Jammu & Kashmir and Himachal Pradesh.

W. Tibet.

4. *Waldheimia tomentosa* (Decne.) Regel in Acta Hort Petrop. 6: 310. 1879. *Allardia tomentosa* Decne. in Jacq. Voy. 4 (Bot.): 87.t.95. 1844; Hook.f., Fl. Brit. India 3: 313. 1881. **Fig. 21.**

Herbs, perennial, strongly aromatic, tufted, white or dull brown woolly. Leaves oblong in outline, 3-7 cm long, 1-2-pinnatisect; segments oblong, linear, mucronate. Heads terminal, peduncled, 5-7 cm in diam. Involucral bracts ovate-oblong to ovate-lanceolate, 6-9 x 3 mm, woolly with brown scarious margins. Receptacle flat, naked. Ray florets, purplish white, neuter, 1.5-2.5 x 0.4-0.5 cm; ligule oblanceolate-oblong, prominently 2-fid, nerved. Disc florets yellow, hermaphrodite, narrowly tubular, 4 x 0.2 mm; limb 5-fid. Achenes cylindrical, 3 x 0.8 mm, angles winged, truncate at the apex. Pappus purplish, linear, flat, broader at the apex, slightly connate at base.

*Fl. & Fr.* June - Aug.

*Distrib.* India: W. Himalayas, between 4000-5500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Nepal and W. Tibet.

*Notes.* The leaves are highly variable.

5. *Waldheimia vestita* (Hook.f. & Thomson) Pamp., Fl. del. Carac. 208. 1930. *Allardia vestita* Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 145. 1876; Hook.f., Fl. Brit. India 3: 313. 1881.

Herbs, perennial, strongly aromatic; branches tufted, creeping, white woolly; mature stems clothed with remains of old leaves. Leaves cuneiform, 3-5 lobed or linear oblanceolate, entire upwards, 1.5-2 cm long. Heads terminal, shortly peduncled, 1.5-2.5 cm in diam. Involucral bracts white woolly, broadly to narrowly lanceolate with brown fimbriate margins, 0.5-1 x 0.05-0.2 cm. Receptacle flat, naked. Ray florets pink, neuter, 1.5 x 0.3 cm; ligule narrowly elliptic, obscurely 3-fid. Disc florets hermaphrodite,



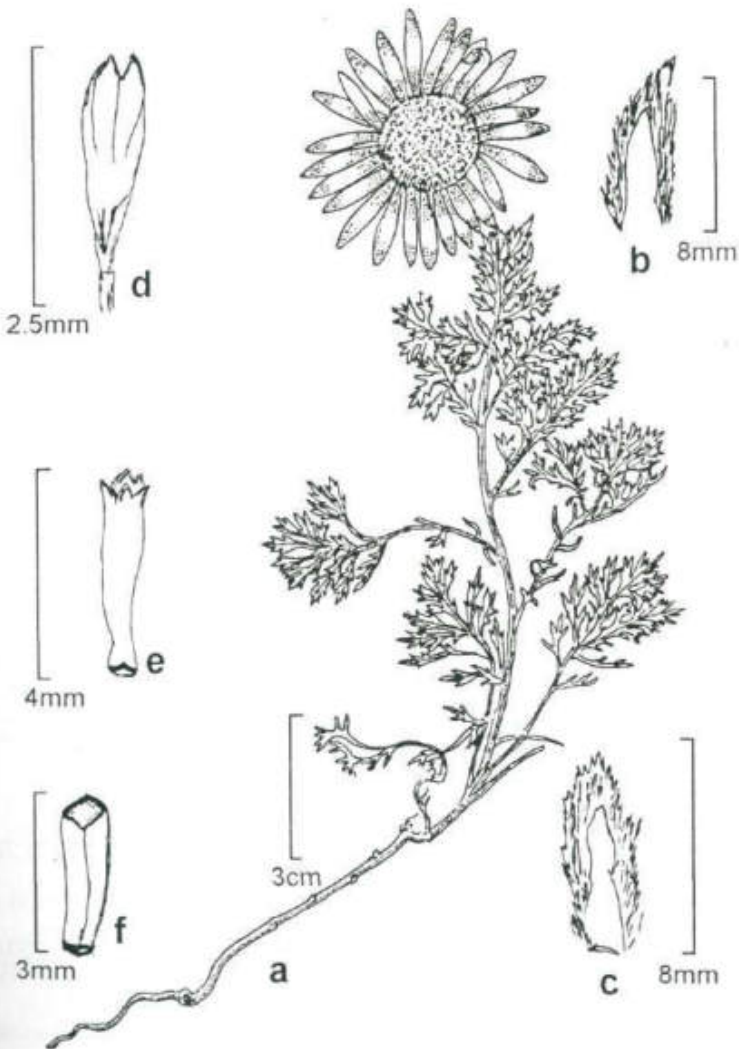


Fig. 21. *Waldheimia tomentosa* (Decne.) Regel : a. Habit; b. & c. Involucral bracts; d. Outer floret; e. Inner floret; f. Achene.

yellow, tubular, sparsely glandular, slightly inflated at the base, 4 x 0.5 mm; limb 5-fid; lobes ovate, acute. Achenes obscurely obconic, 1.5 x 1 mm, angled, glandular, crowned by the style base. Pappus yellow, almost equalling the corolla tube, linear, flattened at the tips.

*Fl. & Fr.* Aug.

*Distrib.* India: W. Himalayas, between 4000-5000 m. Jammu & Kashmir; rare.

W. Tibet.

#### CULTIVATED SPECIES

*Achillea setacea* Wedd., *Kit-P. Rar. Hung.* 1: 68.t.66. 1802.

*Achillea squarrosa* Ait. in *Hort. Kew ed.* iii. 242. 1789.

*Artemisia annua* L., *Sp. Pl.* 847. 1753. (*A. stewartii* C.B. Clarke).

Cultivated in Kashmir by CIMAP organisation.

*Artemisia pallens* Wallich ex DC., *Prodr.* 6: 120. 1838. (*A. paniculata* Roxb.)

Known as DAVANA, cultivated in some states. (Bombay)

*Cenia turbinata* Pers., *Syn. Pl.* 2: 463. 1807; *Hook.f., Fl. Brit. India* 3: 266. 1881.  
(in note)

*Chrysanthemum carinatum* Schousbe. *Vextr. Marokko.* 198. t. 6. 1801.

Eng.: *Tricolor chrysanthemum.*

Several garden races are in cultivation.

*Chrysanthemum cinerarifolium* Vis. *Fl. Dalmat.* 2: 88. 1847.

Eng.: *Dalmatian Pyrethrum.*

A source of insect powder and sometimes cultivated for ornament in gardens. Native of Yugoslavia and Italy.

*Chrysanthemum coccineum* Willd., *Sp. Pl.* 3: 2144. 1803.

Eng.: *Common Pyrethrum*.

A good florists and cut flower Plant.

**Chrysanthemum coronarium** L., Sp. Pl. 890. 1753.

Eng.: *Garland chrysanthemum*.

**Chrysanthemum coronopifolium** Vill., Fl. Delphin. 98. 1786.

**Chrysanthemum daucifolium** Pers., Syn. Pl. 2: 462. 1807.

**Chrysanthemum foeniculaceum** Steud., Nom. Bot. ed. 1. 192. 1821.

**Chrysanthemum frutescens** L., Sp. Pl. 890. 1753.

Eng.: *Paris Daisy, Marguerite*.

**Chrysanthemum indicum** L., Sp. Pl. 889. 1753.

Little known in cultivation. A native of China and Japan.

**Chrysanthemum morifolium** Ramat.: in J. Hist. Nat. Paris 2: 240. 1792 (in Inot.)

Eng.: *Florists chrysanthemum*.

This is the chrysanthemum of commerce. Native of E. Asia.

**Chrysanthemum myconis** L., Sp. Pl. ed. 2. 1254. 1763.

A native of S. Europe.

✓ **Chrysanthemum parthenium** (L.) Bernh., Syst. Verz. Erf. 145. 1800.

Eng.: *Feverfew*.

An old garden favourite, cultivated in Punjab (Hoshiyarpur). Native of Europe.

**Cotula coronopifolia** L., Sp. Pl. 892. 1753.

Cultivated in Uttar Pradesh.

## Tribe 2. A S T E R E A E Cass.

(P.K. Hajra)

Herbs or a few shrubs, usually perennials, sometimes annuals. Leaves usually alternate, entire or toothed, occasionally divided. Inflorescence various. Heads variously coloured, usually heterogamous, disciform or radiate with one to many marginal series of mostly female florets, rarely sterile. Involucral bracts imbricate, in many series, mostly with a narrow hyaline margin. Receptacle usually naked, pitted or shortly fimbriate, rarely paleaceous. Outer florets female or absent; corolla ligulate or tubular, longer or shorter than involucre. Disc floret yellow, hermaphrodite, usually fertile; corolla regular, with five or rarely four teeth or short lobes. Anthers tailless, obtuse at base or rarely sagittate with acute auricles. Style branches of fertile disc florets more or less flattened with terminal papillose or hirsute appendage. Achenes usually small, flat, with nerve like margins, more or less five or more ribbed, becoming terete, rarely winged or beaked. Pappus usually setose, copious, in one or more rows.

Cosmopolitan, mostly in temperate and montane regions; ca 100 genera and ca 2000 species, 18 genera and 83 in India.

*Notes.* With tailless anthers and appendages of style branches the tribe can be easily distinguished from others. J.D. Hooker (1881) treats five subtribes under the tribe Asteroideae, i.e. Homochromeae, Grangeineae, Bellideae, Heterochromeae and Conyzeae. As the characters of these subtribes are more or less overlapping, the tribe is treated as such without any subdivisions.

*Literature.* BENTHAM, G. (1873). Notes on the classification, history and geographic distribution of the Compositae. *J. Linn. Soc. Lond. Bot.* 13: 335-577. t. 8-11. CARLQUIST, S. (1966). Wood Anatomy of Astereae (Compositae). *Trop. Woods.* 113: 54-84. GRAU, J. (1977). Astereae - systematic review. In: HEYWOOD, V.H., J.B. HARBORNE, B.L. TURNER (eds.) *The Biology and Chemistry of Compositae* Vol. 1: 539-565. HARLING, L. (1951). Embryological studies in the Compositae Part III, Astereae. *Acta Horti Berg.* 16: 73-120. WAGENITZ, G. (1977). New aspects of the systematics of Asteridae. *Pl. Syst. Evol. Suppl.* 1: 375-395.

## KEY TO THE GENERA

- |  |                         |
|--|-------------------------|
| 1a. Flowers usually in scorpioid panicles                                    | 17. <i>Solidago</i>     |
| b. Flowers usually not in scorpioid panicles                                 | 2                       |
| 2a. Ray florets absent   | 3                       |
| b. Ray florets present   | 5                       |
| 3a. Pappus a short tube with fimbriate mouth                                 | 8. <i>Grangea</i>       |
| b. Pappus absent   | 4                       |
| 4a. Receptacle with flat top; achenes with thickened margins                 | 6. <i>Dichrocephala</i> |
| b. Receptacle with conic or convex top; achenes without thickened margins    | 5. <i>Cyathocline</i>   |
| 5a. Pappus scanty very short, of 3-5 caducous bristles or absent, paleaceous | 6                       |
| b. Pappus hairs usually long, copious (except <i>Kalimeris</i> )             | 9                       |

- |  |                           |
|--|---------------------------|
| 6a. Achenes not prominently beaked   | 13. <i>Myriactis</i>      |
| b. Achenes usually prominently beaked  | 7                         |
| 7a. Ray florets 1-seriate  | 3. <i>Brachycome</i>      |
| b. Ray florets 2-3-seriate   | 8                         |
| 8a. Receptacle flat; disc florets fertile  | 16. <i>Rhynchospermum</i> |
| b. Receptacle convex; disc florets often sterile   | 11. <i>Lagenifera</i>     |
| 9a. Heads disciform or with inconspicuous ray florets, almost as long as or scarcely longer than involucre           | 10                        |
| b. Heads distinctly radiate, ligules clearly longer than involucre   | 16                        |
| 10a. Herbs with spreading branches; all flowers tubular  | 18. <i>Thespis</i>        |
| b. Herbs or shrubs; female flowers tubular or with short ligules   | 11                        |
| 11a. Pappus hairs very short, subpaleaceous  | 10. <i>Kalimeris</i>      |
| b. Pappus hairs long, copious  | 12                        |
| 12a. Usually erect, stout herbs  | 4. <i>Conyza</i>          |
| b. Rambling or erect shrubs  | 13                        |
| 13a. Ligules usually long and broad (over 1 cm long, 1 mm broad); disc flowers usually more than 1 mm broad          | 14                        |
| b. Ligules usually smaller and narrower (less than 1 cm long, 1 mm broad); disc flowers usually less than 1 mm broad | 15                        |
| 14a. Usually erect shrubs; leaves 7.5-10.0 cm long   | 14. <i>Psiadia</i>        |
| b. Usually subscaudent shrubs; leaves 3.5-6.0 cm long.   | 12. <i>Microglossa</i>    |
| 15a. Pappus of ray and disc achenes alike  | 1. <i>Aster</i>           |
| b. Pappus of ray achenes short those of disc longer  | 9. <i>Heteropappus</i>    |
| 16a. Ligules minute (ca 3 mm)  | 2. <i>Brachyactis</i>     |
| b. Ligules large (ca 5-8 mm)   | 17                        |
| 17a. Pappus often double   | 7. <i>Erigeron</i>        |
| b. Pappus usually 1-seriate  | 15. <i>Psychrogeton</i>   |

### 1. *Aster* L.

Herbs or shrubs, rootstock usually rhizomatous; stems usually leafy, branched or unbranched, pubescent, villous, glandular or eglandular. Leaves alternate, cordate, ovate, elliptic, lanceolate, linear or spatulate, sessile or stalked. Heads solitary or many, corymbose or paniced. Involucre hemispheric or campanulate; bracts few to many-seriate, subequal, imbricate. Ray florets, white, pink, purplish or blue, female, 1-2-seriate; ligule relatively long or broad. Disc florets yellow or purplish, bisexual, usually ca 1 mm broad, 5-lobed. Receptacle flat or convex, foveolate or fimbriate, sometimes pseudo paleaceous. Anther bases obtuse or entire. Achenes compressed.

America, Euresia and Africa; ca 60 species, ca 23 in India.

*Literature.* GRIERSON, A.J.C. (1964) A revision of the Asters of the Himalayan area. *Notes Roy. Bot. Gard. Edinb.* 26: 67-163. f. 1-11, t. 8-16.

#### KEY TO THE SPECIES

- |                              |    |
|------------------------------|----|
| 1a. Heads usually many       | 2  |
| b. Heads solitary or up to 4 | 11 |

- 2a. Pappus usually reddish or reddish brown 3  
 b. Pappus usually white or buff 7
- 3a. Heads ca 6 mm across 2. *A. albescens* 4  
 b. Heads usually 10-15 mm across 4
- 4a. Pappus usually 2.5-3 mm long 5  
 b. Pappus usually 5 mm long 6
- 5a. Leaves distantly denticulate; ligules ca 7 mm long 18. *A. sikkimensis* 0  
 b. Leaves entire; ligules ca 1.0-1.5 cm long 3. *A. altaicus*
- 6a. Involucral bracts spatulate 1. *A. ageratoides* subsp. *alatopectiolata* 22. *A. trinervius*  
 b. Involucral bracts linear 8  
 9
- 7a. Heads 2.0-3.5 cm across 11. *A. indamellus*  
 b. Heads 0.6-1.5 cm across 15. *A. peduncularis*  
 17. *A. pycnophyllus* 10
- 8a. Leaves elliptic or oblanceolate, 1.0-5.0 x 0.5-1.5 cm 18. *A. sikkimensis*  
 b. Leaves ovate or lanceolate, 3-15 x 1.5-7.5 cm 23. *A. vestitus*
- 9a. Heads usually 0.6-0.8 cm across 12  
 b. Heads usually 1-1.5 cm across 19
- 10a. Herbs, flexuose, glabrous or puberulous; leaves 6-17 x 1.5-5 cm 13  
 b. Herbs, densely glandular pubescent; leaves 2.5-6.5 x 0.5-1.5 cm 14
- 11a. Heads usually 2.5-8 cm across 6. *A. diplostephioides*  
 b. Heads usually up to 2 cm across 7. *A. falconeri* 15
- 12a. Ligules 2.5-3.5 cm long 17  
 b. Ligules up to 2 cm long 16
- 13a. Upper parts of peduncle naked; involucral bracts usually uniseriate 20. *A. thomsoni* 16  
 b. Upper parts of peduncle leafy; involucral bracts usually 2-3-seriate 21. *A. tricephalus* 16. *A. platylepis* 8. *A. flaccidus*
- 14a. Pappus hairs red or pale brown 15  
 b. Pappus hairs whitish 17
- 15a. Leaves acuminate 20. *A. thomsoni* 16  
 b. Leaves obtuse or acute 16
- 16a. Pappus hairs reddish 21. *A. tricephalus*  
 b. Pappus hairs brown 16. *A. platylepis* 8. *A. flaccidus*
- 17a. Herbs, rarely more than 15 cm high  
 b. Herbs, up to 80 cm high 18
- 18a. Leaves ovate or lanceolate 15. *A. peduncularis*  
 b. Leaves usually linear-elliptic or obovate-oblong 13. *A. molliusculus*
- 19a. Pappus yellow white or pinkish 20  
 b. Pappus usually reddish or brownish 25
- 20a. Ligules ca 1 cm long 21  
 b. Ligules 1.5-2.5 cm long 22
- 21a. Leaves linear-elliptic or obovate-oblong, or lanceolate, 2-3-toothed 13. *A. molliusculus*  
 b. Leaves oblanceolate-spathulate or linear, entire 14. *A. neoelegans* 0
- 22a. Heads ca 1.5 cm across 23  
 b. Heads ca 2.0 cm across 24
- 23a. Achenes silky hairy; pappus 1.5 mm long 4. *A. asteroides*  
 b. Achenes densely white pubescent; pappus ca 5 mm long 19. *A. stracheyi* 12. *A. laka*
- 24a. Leaves cordate at base; petioles 5-8 cm long 10. *A. himalaicus* 0  
 b. Leaves rounded or attenuate at base; petioles 1.0-4.5 cm long 26
- 25a. Herbs up to ca 35 cm high 27  
 b. Herbs up to ca 100 cm high 27
- 26a. Petioles 2.5-5.0 cm long; involucral bracts glandular and pilose; achenes ca 1.0 cm long 9. *A. heliopsis*  
 b. Petioles 5-8 cm long; involucral bracts sparsely white villous; achenes ca 3 mm long 12. *A. laka*

27a. Leaves half amplexicaul at base

b. Leaves attenuate at base

28a. Strigose pubescent herbs; ray florets ca 16

b. Sparsely or moderately pilose herbs; ray florets 30-60

21. *A. tricephalus*

28

3. *A. altaicus*

5. *A. barbellatus*

1. *Aster ageratoides* Turcz. subsp. *alatopetiolata* Kitam. in Fauna & Fl. Nep. Himal. 247. 1955. *A. trinervius* D. Don subsp. *ageratoides* (Turcz.) Grierson in Note Roy. Bot. Gard. Edin. 26: 102. 1964. p.p.

Herbs, erect, pubescent, rhizomatous, 0.5-1.5 m high. Leaves elliptic-lanceolate, acuminate at apex, attenuate at base, 4-8 x 1.2-5 cm, sparsely or densely scabrous above, sometimes glabrescent or finely pilose, thin and papery in texture, sometimes bullate, distantly serrate at margin, distinctly 3-nerved, nerves supra basal. Heads 0.5-1.0 cm broad, many. Involucral bracts ca 5 mm long, 3-seriate, spatulate. Ray florets ca 15; tube ca 2 mm long; ligule white to pale pink, ca 8 mm long. Disc florets ca 5 mm long; tube ca 2 mm long. Style appendages lanceolate. Achenes brownish, obovate, ca 3 mm long, 2-3-ribbed, hairy. Pappus reddish ca 5 mm long, simple.

*Fl. & Fr.* July - Oct.

*Distrib.* India: E. Himalayas, 1700-3500 m. Sikkim, Meghalaya and Nagaland.

Nepal, Bhutan, S.E. Tibet, N.E. Myanmar, S. & C. China and Indo-China.

*Notes.* Grierson (1964) treats *A. trinervius* D. Don subsp. *ageratoides* (Turcz.) as a distinct subspecies. But Hara (Enum. Fl. Pl. Nepal 3: 13. 1982) treats this as a synonym.

2. *Aster albescens* (DC.) Hand. - Mazz. in Acta Hort. Goteb. 12: 205. 1938. *Amphirhapis albescens* DC., Prodr. 5: 343. 1836. *Microglossa albescens* (DC.) Benth. ex C.B. Clarke, Comp. Ind. 59. 1876. *Aster cabulicus* Lindl. in Bot. Reg. 62. 1843. Fig. 22.

Shrubs, erect, 50-150 cm high. Leaves elliptic-lanceolate or ovate, acute, cuneate at base, entire or crenately toothed, 2.5-15 x 0.5-3 cm, glabrous or greyish pilose or white tomentose beneath, sessile or shortly petiolate. Heads loosely clustered on the branches of spreading corymb, ca 6 mm across. Involucral bracts ca 4 mm, 3-4-seriate, subcoriaceous, often purplish at tip. Ray florets 20-30; tube ca 2 mm long; ligule, blue, pink, mauve or white, ca 4 mm long. Disc florets ca 4 mm long; basal tube ca 1 mm long. Style appendages ca 5 mm long. Achenes greyish brown, ca 2 mm long, 4-5-ribbed, hairy. Pappus brownish or reddish, ca 4 mm long.

*Fl. & Fr.* June - Sept.



Fig. 22. *Aster albescens* (DC.) Hand.-Mazz. : a. Habit; b. Disc floret; c. Ray floret.



*Distrib.* India: Himalayas, 1600-4000 m on open hill slopes. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan, Tibet, China and Myanmar.

*Notes.* Handel-Mazzetti (1938) recognised two varieties, viz. *niveus* and *glandulosus* based on W. Chinese specimens. These two varieties have also been described from Himalayas, which are keyed out as follows.

#### KEY TO THE VARIETIES

- |   |                              |
|---|------------------------------|
| 1a. Leaves thickly covered by dense white felted indumentum beneath | 2.2. var. <i>niveus</i>      |
| b. Leaves glabrous, densely glandular                               | 2.1. var. <i>glandulosus</i> |

2.1. var. *glandulosus* Hand.-Mazz. in J. Bot. 76: 284. 1938.

*Fl. & Fr.* June - Aug.

*Distrib.* India: Himalayas, 1600-4000 m open hill slopes. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

2.2. var. *niveus* Hand.-Mazz. in J. Bot. 76: 284. 1938.

*Fl. & Fr.* June - Aug.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

*Note.* The species being very variable, there are overlapping characters, and on the basis of indumentum and glandular characters it is not proper to retain the varieties of Handel-Mazzetti. However, in the absence of more material in the herbaria and lack of intermediate forms the varieties are retained in the present treatment.

3. *Aster altaicus* Willd., Enum. Hort. Berol. 881. 1809; Hook.f. Fl. Brit. India 3: 251. 1881. *A. angustifolius* Lindl. ex Royle, Ill. Bot. Himal. 251. t. 58. 1839. (non Jacq.). *A. spartioides* C.B. Clarke, Comp. Ind. 48. 1876. *Heteropappus altaicus* (Willd.) Novopokr. var. *canescens* (Nees) Serg. in Kirlov Fl. W. Siberia 11: 226. 1949. *Calimeris canescens* Nees, Gen. et Sp. Aster, 229. 1832. *Galatella juncea* Lindl. ex Royle Ill. Bot. Himal. 251. t. 50. 1835. *Heteropappus semiprostratus* Grierson. in Notes Roy Bot. Gard. Edinb. 26 (1): 151. 1964. Fig. 23.

Herbs, erect or semiprostrate, green or greyish green, 40-100 cm high, strigose pubescent, branched. Leaves linear-lanceolate, oblanceolate, or spatulate, acute or obtuse at apex, attenuate at base, entire, 1-7 x 0.5-1.5 cm, appressed strigose pubescent,



Fig. 23. *Aster altaicus* Willd.:a. Habit.

sessile. Heads solitary at ends of branches or several forming loose terminal corymbs, ca 1.5 cm across. Involucral bracts 2-3-seriate, 4-6 mm long, linear-lanceolate, acuminate. Ray florets ca 16; tube ca 2 mm long, ligule pale blue or mauve, 1-1.5 cm long. Disc florets yellow, 3-5 mm long, minutely pubescent; tube ca 2 mm long, lobes unequal. Style appendage triangular. Achenes pale brown, ca 2 mm long, obovate, glandular above. Pappus reddish brown, 2-5 mm long, simple.

*Fl. & Fr.* June - Aug.

*Distrib.* India: W. Himalayas, 3500-4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan, Pakistan, Iran, China, Altai Mountain and Nepal.

*Note.* A polymorphic species.

4. *Aster asteroides* (DC.) O. Kuntze, Rev. Gen. Pl. 315. 1891. *Heterochaeta asteroides* DC., Prodr. 5: 282. 1836; Hook. f., Fl. Brit. India 3: 250. 1881 (under *Aster heterochaeta* Benth.).

Herbs, erect, green or purplish, villous or glandular pubescent, 4-20 cm high, with tuberous rootstock. Leaves ovate, elliptic, linear-lanceolate, acute or obtuse at apex, usually entire or 1-2-denticulate, 1-4 x 0.5-1.5 cm, glabrous or villous, upper sessile, lower petioled; petiole 1-3 cm long. Heads solitary, ca 1.5 cm across. Involucral bracts 2-3-seriate, ca 1 cm long, acuminate, pubescent or villous. Ray florets many; tube ca 1 mm long, ligule bluish purple or mauve, 1.5-2.5 cm long. Disc florets, orange yellow or purplish, ca 5 mm long. Style appendages lanceolate. Achenes brownish, ca 3 mm long, silky hairy. Pappus white or yellowish, ca 1.5 mm long, double; outer setae paleaceous.

*Fl. & Fr.* May - July.

*Distrib.* India: Himalayas, in open damp places, 3600-4800 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan, Tibet and W. China.

X 5. *Aster barbellatus* Grierson in Notes Roy. Bot. Gard. Edinb. 26(1): 119. 1964.

Herbs, 30-60 cm high, sparsely or moderately pilose, rhizomatous or stoloniferous. Leaves finely hirsute, glandular; basal leaves spatulate, obtuse or acute, attenuate at base into a broad petiole, entire, or with 3-4 shallow teeth at margin, 3.0-6.5 x 0.9-1.2 cm, cauline leaves spatulate or oblong, 3-11 x 0.8-1.5 cm. Heads 1.5-2.5 cm across.

Involucral bracts 1-2-seriate, oblong or spatulate, ca 1.0 cm long, acute or obtuse, herbaceous, sparsely pilose, ciliate. Ray florets 30-40; tube 2 mm long; ligule mauve or blue, 1.5-2 cm long. Disc florets yellow, ca 6 mm long, tube ca 2 mm long, lobes 1.5 mm long. Style appendages lanceolate. Achenes ca 3 mm long, obovate, finely silky hairy, sparsely glandular at apex. Pappus reddish, 4-5.5 mm long, simple, setae thick, barbellate above.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Himalayas, 3000-3600 m. Sikkim.

Nepal, Bhutan and Tibet.

6. *Aster diplostephioides* (DC.) C.B. Clarke, *Comp. Ind.* 45. 1876; Hook.f., *Fl. Brit. India* 3:251. 1881. *Heterochaeta diplostephioides* DC., *Prodr.* 5: 282. 1836.

Fig. 24.

Herbs, perennial; stem 10-45 cm high, erect, unbranched, viscid. Leaves glandular, sparsely villous on veins and margins; basal leaves oblanceolate, acute or mucronate at apex, entire or denticulate, 4-12 x 1-2 cm, petiolate; cauline leaves lanceolate, acute at apex, entire, 2.5-3.5 x 0.3-0.5 cm. Heads solitary, 4.5-7.5 cm across. Involucral bracts uniseriate, ca 1.5 cm long, linear lanceolate, acuminate, villous hairy at base. Ray florets many; ligule, mauve or bluish violet, ca 3 cm long. Disc florets purple at tip, yellow or orange within ca 6 mm long. Style appendages ca 1 mm long, lanceolate. Achenes pale brown, ca 3 mm long, obovate, 4-ribbed, hairy. Pappus white, ca 5 mm long, double.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Himalayas, 3000-4500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan, Tibet and China.

7. *Aster falconeri* (C.B. Clarke) Hutch. in *Gard. Chron.* ser. III. 47: 389. 1910. *A. diplostephioides* (DC.) C.B. Clarke var. *falconeri* C.B. Clarke, *Comp. Ind.* 45. 1876.

Herbs, viscid-pubescent, 10-45 cm high. Basal leaves spatulate or oblanceolate, obtuse or acute at apex, tapering at base, distantly denticulate; 4-15 x 0.5-2.5 cm, villous or glandular pubescent, cauline leaves spatulate or lanceolate, acute at apex, rounded and semiamplexicaul at base, entire or denticulate, 1.5-7.5 x 0.5-2.0 cm. Heads solitary, up to ca 8 cm across. Involucral bracts 2-3-seriate, imbricate, ca 1.5 cm long, lanceolate acuminate, glandular and villous. Ray florets bluish or bluish mauve, white at base; ligule

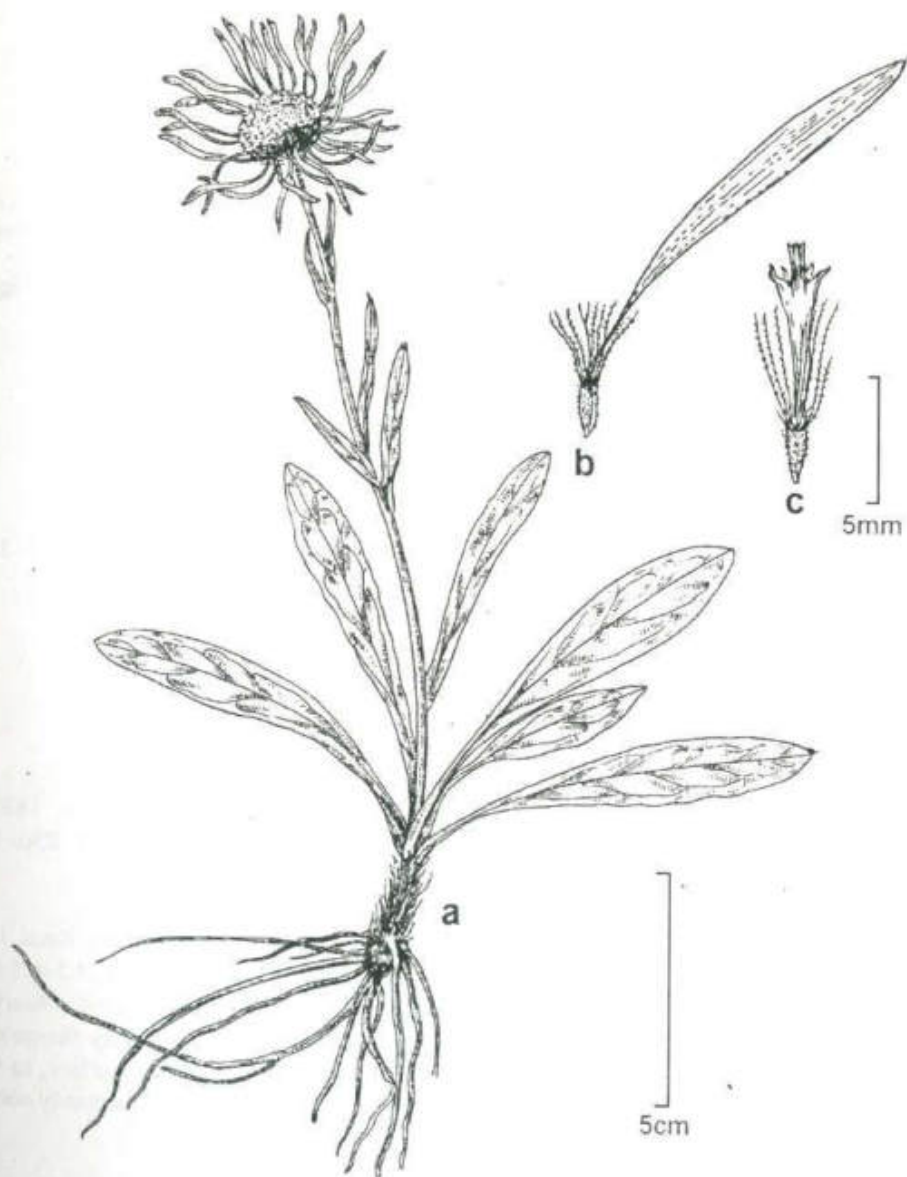


Fig. 24. *Aster diplostephioides* (DC.) C.B. Clarke : a. Habit; b. Ray floret; c. Disc floret.

2.5-3.5 cm long; tubes ca 3 mm long. Disc florets yellow or orange, ca 6 mm long, lobes ca 2 mm long, basal tubes ca 2 mm long. Style appendages triangular. Achenes ca 4 mm long, 4-ribbed, glandular. Pappus buff or pale brown, ca 2-6 mm long.

## KEY TO THE SUBSPECIES

- |  |                               |
|--|-------------------------------|
| 1a. Stems and leaves silvery villous, eglandular | 7.1. subsp. <i>falconeri</i>  |
| b. Stems and leaves glandular pubescent          | 7.2. subsp. <i>nepalensis</i> |

7.1. subsp. *falconeri*

Fig. 25.

*Fl. & Fr.* May - Aug.

*Distrib.* India: W. Himalayas, 3000-4000 m. Jammu & Kashmir.

Pakistan.

7.2. subsp. *nepalensis* Grierson in Notes Roy. Bot. Gard. Edinb. 26(1): 141. 1964.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas, 3500-4000 m, Uttar Pradesh (Kumaun).

Nepal.

8. *Aster flaccidus* Bunge in Mem. Acad. Sci. St. Petersb. 2: 599. 1835. *A. heterochaeta* C.B. Clarke, Comp. Ind. 44. 1876; Hook.f., Fl. Brit. India 3: 250. 1881. *A. tibeticus* Hook.f., Fl. Brit. India 3: 251. 1881. *p.p.*

Herbs, perennial, erect, villous or glandular hairy, 3-15 cm high. Basal leaves spatulate or obovate, acute or obtuse, attenuate at base, ciliate at margins, 1.5-6.5 x 0.5-1.5 cm, villous on both surfaces, cauline 2-3, near lower part of stem. Head solitary, 3-4 cm across. Involucral bracts 2-seriate, ca 1 cm long, linear-lanceolate. Ray florets many; tube ca 2 mm long; ligule, blue or mauve, 1.2-2 cm long. Disc Florets yellow, ca 6 mm long. Style appendages lanceolate. Achenes brownish, ca 2 mm long, narrowly obovate, 2-ribbed. Inner pappus ca 6 mm long; outer whitish, ca 1 mm long.

## KEY TO THE SUBSPECIES

- |  |                                |
|--|--------------------------------|
| 1a. Leaves villous, pubescent on both surfaces; peduncles villous pubescent, not prominently glandular | 8.1. subsp. <i>flaccidus</i>   |
| b. Leaves usually glabrous or ciliate; peduncles distinctly glandular                                  | 8.2. subsp. <i>glandulosus</i> |

8.1. subsp. *flaccidus*

Fig. 26.

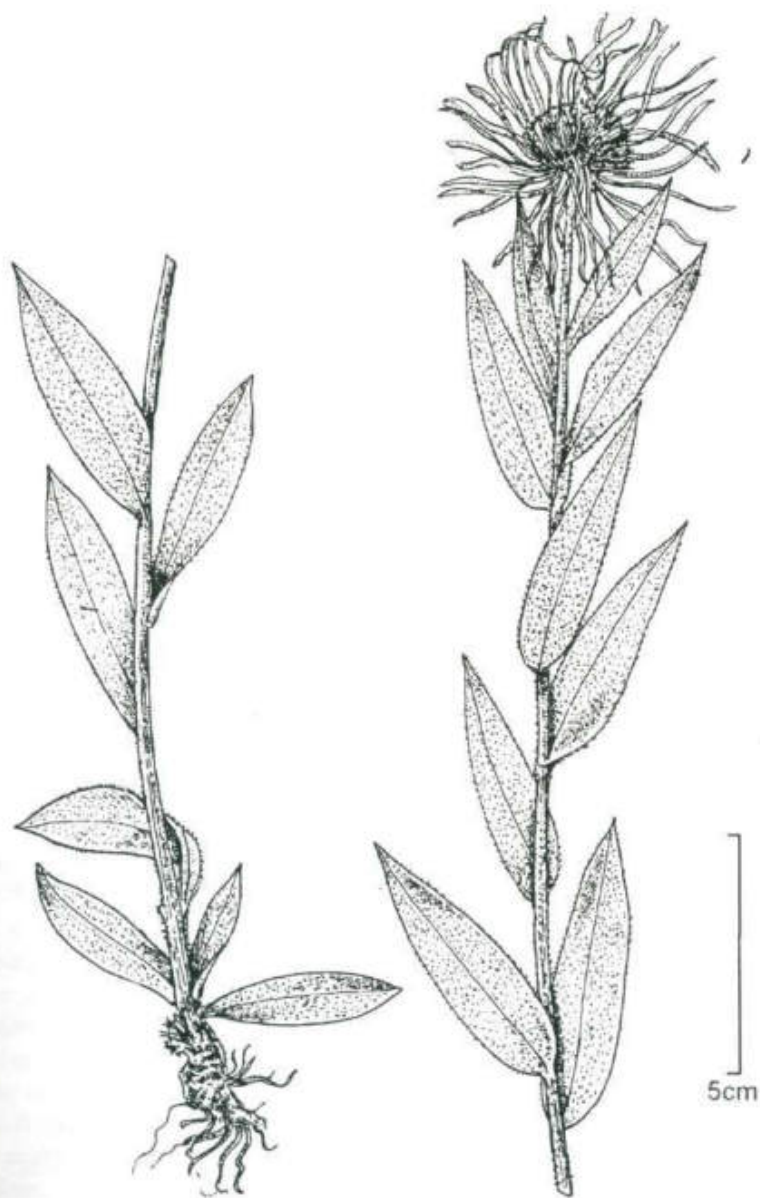


Fig. 25. *Aster falconeri* (C.B. Clarke) Hutch. subsp. *falconeri* : a. Habit.

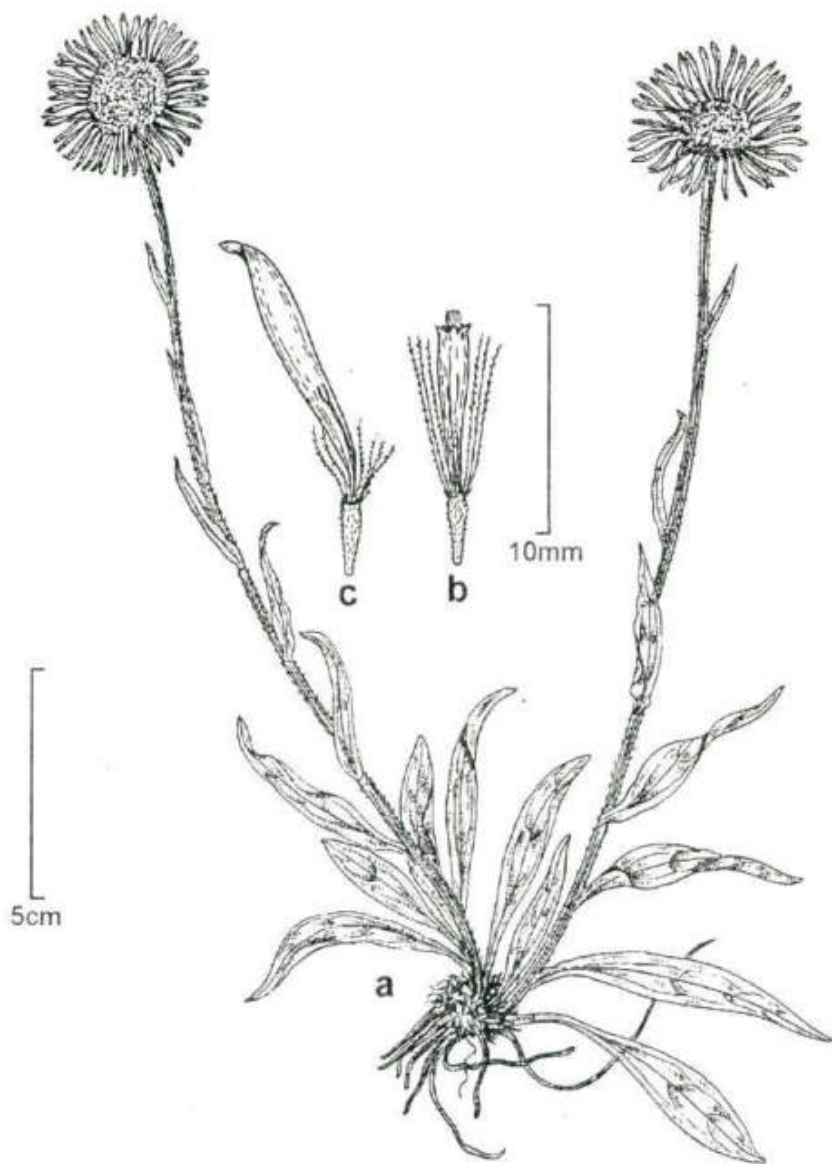


Fig. 26. *Aster flaccidus* Bunge subsp. *flaccidus*: a. Habit; b. Disc floret; c. Ray floret.



*Fl. & Fr.* June - Sept.

*Distrib.* India: Himalayas, 3500-5000 m, on alpine slopes. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim

C. Asia, Tibet, Pakistan, Nepal and S.W. China.

8.1. subsp. *flaccidus* forma *griseo-barbatus* Grierson in Notes Roy. Bot. Gard. Edinb. 26(1): 131. 1964.

Involucral bracts darker and more shaggy than the typical *flaccidus*.

*Fl. & Fr.* July - Sept.

*Distrib.* India: E. Himalayas. Arunachal Pradesh and Sikkim.

Bhutan.

8.2. subsp. *glandulosus* (Keissl.) Onno in Bibl. Bot. 106: 66. 1932.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir and Himachal Pradesh.

Tibet.

9. *Aster heliopsis* Grierson in Notes Roy. Bot. Gard. Edinb. 26(1): 124. 1964.

Herbs, perennial, rhizomatous 15-35 cm high; stem erect, pilose, intermixed with stalked glandular hairs. Basal leaves oblong or cordate, obtuse or mucronulate at apex, entire or denticulate at margin, 2-4 x 1.3 cm; petioles 2.5-5 cm long; cauline leaves elliptic, 2.4 x 1.2-2 cm, glandular and pilose on the veins, semiamplexicaul at base. Heads solitary, 1.8-2.2 cm across. Involucral bracts 2-seriate, 1.5 cm long, glandular and pilose, acute at apex. Ray florets many; tube ca 2 mm long; ligule blue lilac, ca 1.5 cm long. Disc florets 4-4.5 mm long; tube ca 1 mm long. Style appendages broadly triangular, acute. Achenes pale brown, ca 1 cm long, obovate, 2-ribbed, glandular and sparsely pilose. Pappus brownish, ca 5 mm long, simple.

*Fl. & Fr.* Aug.

*Distrib.* India: Sikkim; rare.

Nepal and Bhutan.

*Notes.* Very rare; there is no specimen in Indian Herbaria.

**10. *Aster himalaicus*** C.B. Clarke, *Comp. Ind.* 43. 1876; Hook.f., *Fl. Brit. India* 3: 250. 1881.

Herbs, perennial, erect, rhizomatous, villous, 10-45 cm high. Leaves oblong, obovate, lanceolate, oblanceolate or broadly elliptic, acute or obtuse, mucronate, entire or 2-3-denticulate at margin, rounded or attenuate at base, 1-5 x 0.2-2.5 cm, villous or glandular pubescent; cauline sessile, semiamplexicaul. Heads usually solitary, ca 2 cm across. Involucral bracts green or purplish tinged, 2-3-seriate, ca 1 cm long, elliptic-oblong, pubescent. Ray florets many; tube ca 2 mm long; ligule purplish blue, ca 1.5 cm long. Disc florets yellow or purplish, ca 7 mm long, villous at base; tube ca 2 mm long, lobes ca 1.0 mm long. Style appendages broadly triangular. Achenes brownish, ca 3 mm long, obovate, 2-ribbed, pilose. Pappus white or creamy, ca 5 mm long.

*Fl. & Fr.* July - Oct.

*Distrib.* India: Himalayas, 3500-4500 m. Jammu & Kashmir, Uttar Pradesh, Arunachal Pradesh and Sikkim.

Nepal, Bhutan, Myanmar, Tibet and S.W. China.

**11. *Aster indamellus*** Grierson in *Notes Roy. Bot. Gard. Edinb.* 26(1): 87. 1964. *A. pseudamellus* Hook.f., *Fl. Brit. India* 3: 249. 1881. *A. amellus* auct. non Linn. C.B. Clarke, *Comp. Ind.* 41. 1876. Fig. 27

Herbs, rhizomatous, 20-40 cm high, pubescent. Leaves elliptic or oblanceolate, acute or obtuse and mucronulate at apex, cuneate at base, entire or toothed, 1-5 x 0.5-1.5 cm, appressed hairy; sessile or subsessile. Heads ca 2.0 cm across. Involucral bracts green or purplish, 2-3-seriate, ca 6 mm long, appressed pubescent, lanceolate or obovate, foliaceous. Ray florets 15-30; tubes ca 3 mm long; ligule, blue, mauve or pink, ca 1-1.5 x 0.2-0.3 cm. Disc florets ca 5 mm long; tube ca 2 mm long. Style appendages lanceolate. Achenes pale brown, ca 3 mm long, white pubescent. Pappus white, 5 mm long, simple.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas, 2000-4000 m, open hill slopes. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan, Pakistan, Nepal and Tibet.

**12. *Aster laka*** C.B. Clarke, *Comp. Ind.* 49. 1876; Hook.f., *Fl. Brit. India* 3: 253. 1881.



Fig. 27. *Aster indamellus* Grierson: a. Habit.

Herbs, erect, rhizomatous, villous pubescent, 10-20 cm high. Leaves ovate or oblong, obtuse or mucronate, cordate at base, dentate, 4-5 x 3-4 cm, pilose; petiole ca 5-8 cm long. Heads 1-3, ca 2.5 cm across. Involucral bracts green or purplish, 3-seriate, 1-2 cm long, sparsely white villous, green or purplish, membranous. Ray florets many; tube ca 3 mm long, ligules mauve, ca 2 mm long. Disc florets mauve, ca 7 mm long; mauve, tube ca 2 mm long, lobes ca 1.5 mm long. Style appendages ca 0.5 mm long, ovate. Achenes brownish, ca 3 mm long, obovate, 2-ribbed, silky hairy. Pappus white, simple or double.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas. Jammu & Kashmir and Himachal Pradesh.

Endemic.

13. *Aster molliusculus* (Lindl. ex DC.) C.B. Clarke, *Comp. Ind.* 45. 1876; Hook.f., *Fl. Brit. India* 3: 251. 1881. *Diplopappus molliusculus* Lindl. ex DC., *Prodr.* 5: 277. 1836. *D. roylei* Lindl. ex DC. *Prodr.* 5: 276. 1836.

Herbs, perennial, 6-60 cm high; stems pubescent or sparsely villous, erect or ascending from a woody rootstock. Leaves linear elliptic or obovate-oblong or lanceolate, acute at apex, cuneate at base, 1.2-5 x 0.3-1 cm, pubescent or glabrous beneath, 3-nerved, margins entire or 2-3-toothed. Heads usually solitary, long peduncled, 1.5-3 cm across. Involucral bracts, straw coloured below, brownish or purplish above, 2-3-seriate, 0.4-1.0 cm long, narrow lanceolate, acuminate, glabrous or pubescent. Ray florets many; tube ca 2 mm long; ligule pink or lilac, ca 1.0 cm long. Disc florets yellow, ca 5 mm long; tube ca 2 mm long, lobes minute. Style appendage triangular. Achenes pale brownish, ca 3 mm long, linear, 4-ribbed, silky hairy. Pappus whitish, 3-5 mm long, double or simple.

#### KEY TO THE VARIETIES

- 1a. Herbs, 12-60 cm high; leaves 1.5-5.0 x 0.3-1.0 cm  
b. Herbs, 6-10 cm high; leaves ca 1.0 x 0.2 cm

- 13.2. var. *molliusculus*  
13.1. var. *minor*

13.1. var. *minor* Grierson in *Notes Roy. Bot. Gard. Edinb.* 26: 115. 1964.

*Fl. & Fr.* Apr. - May.

*Distrib.* India: W. Himalayas. Himachal Pradesh.

Endemic.

13.2. var. *molliusculus*

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas, 1800 - 3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan.

14. *Aster neoelegans* Grierson in Notes Roy. Bot. Gard. Edinb. 26: 118. 1964. *A. elegans* Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 44. 1876. p.p. (non Willd., 1803 nec Nees 1832). *A. tricephalus* auct. non C.B. Clarke 1876, Hook.f., Fl. Brit. India 3: 250. 1881 p.p.

Herbs, perennial, 40-75(100) cm high, unbranched, slender; rhizome stoloniferous. Leaves oblanceolate, spathulate or linear, acute or obtuse at apex, attenuate at base, entire, 5-7 x 0.8-1 cm, finely pubescent, sessile. Heads usually 1-2, ca 1.5 cm across. Involucral bracts 1-2-seriate, 0.6-0.8 cm long, finely pubescent. Ray florets 35-40; tube ca 2 mm long; ligule white, mauve or bluish violet, ca 1 mm long. Disc florets ca 5 mm long; tube ca 2 mm long. Style appendages lanceolate. Achenes light brown, obovate, ca 3 mm long, sparsely silky with a few glands above. Pappus whitish, ca 4.5 mm long, simple.

*Fl. & Fr.* Jul. - Sept.

*Distrib.* India: E. Himalayas, 3200 m. Sikkim.

Bhutan and Tibet.

15. *Aster peduncularis* Wallich ex Nees, Gen. et Sp. Ast. 24. 1832. *Amphirhapis peduncularis* DC., Prodr. 5: 344. 1836. *Aster asperulus* (DC.) Hook.f., Fl. Brit. India 3: 252. 1881. Fig. 28.

Herbs, perennial, 10-80 cm high, erect, usually flexuose, glabrous or thinly villous below, glandular or villous above. Leaves ovate or lanceolate, coarsely serrate, acute or acuminate at apex, cuneate, rounded or cordate at base, tapering to broad, sheathing or winged petiole, 3-15 x 1.5-7.5 cm, villous on both surfaces or sparsely hairy, distinctly 3-nerved. Heads solitary or many, ca 2.5-3.5 cm across. Involucral bracts green or purplish tinged, 2-seriate, up to ca 1.8 cm long, ovate or linear-lanceolate, finely glandular or villous or sparsely hairy. Ray florets many; tube ca 2 mm long; ligule bluish mauve or white, ca 0.8-1.5 cm long. Disc florets yellow, 5-6 mm long; tube ca 2 mm long. Style appendages lanceolate. Achenes obovate, ca 2-4 mm long, hairy. Pappus whitish or buff, 3-5 mm long, simple.

*Fl. & Fr.* Sept. - Oct.

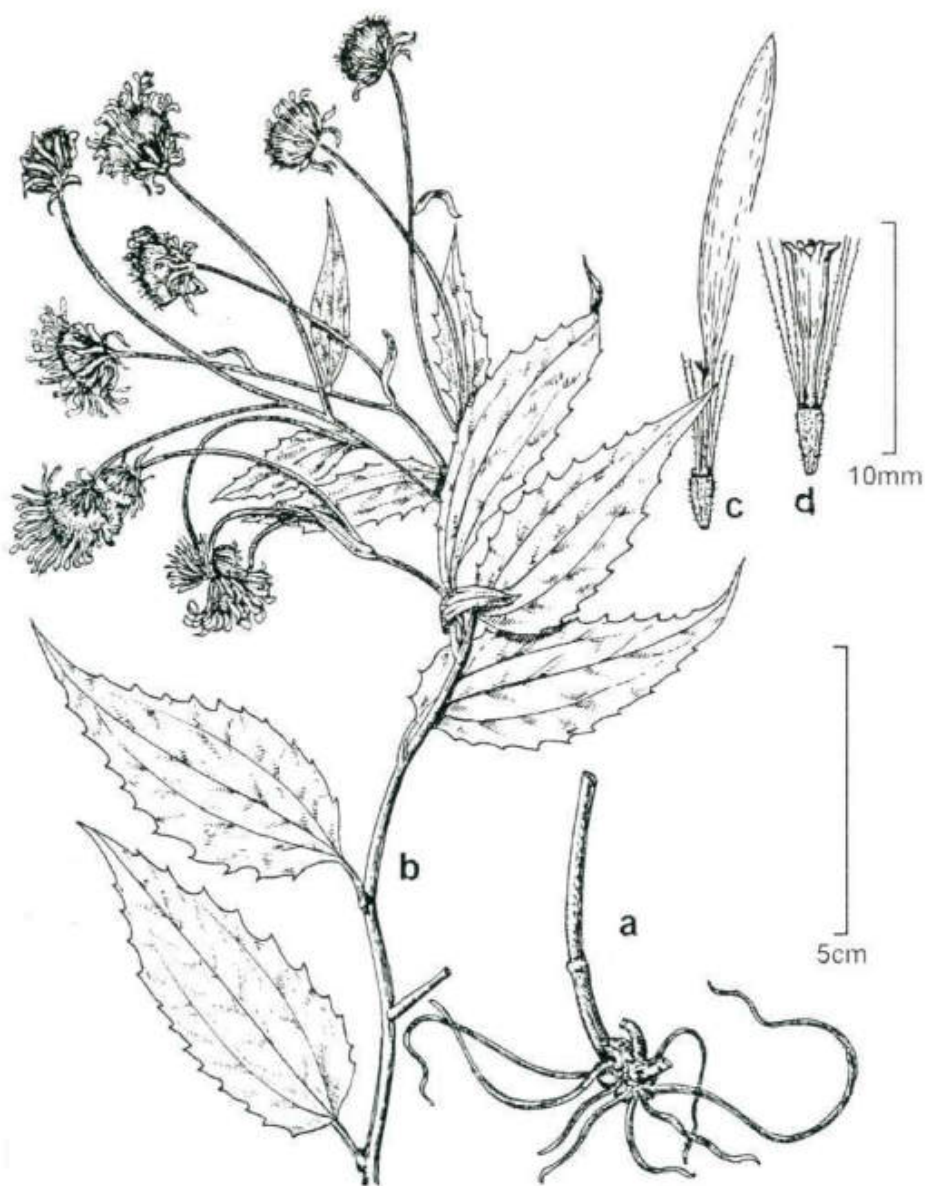


Fig. 28. *Aster peduncularis* Wallich : a. & b. Habit; c. Ray floret; d. Disc floret.

*Distrib.* India: W. Himalayas, 1800-2700 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan.

**16. *Aster platylepsis* Chen in Kew Bull. 39(1): 159. 1984.**

Herbs, erect 20-30 cm high; stem brown or purplish, slender, terete, grey pubescent. Leaves ovate, obtuse with minute apiculum at apex, subcordate or rounded at base, amplexicaul, sinuate-crenate, 4.2-7.6 x 0.8-2.2 cm, hispidulous above, pubescent beneath. Head solitary, 3-4 cm above uppermost leaf, 3.5-4 cm across. Involucral bracts 2-3-seriate, 1.3-1.9 cm long, hispidulous. Ray florets in 1-3-series; ligule, ca 1.4 cm long, bluntly 2-3-toothed. Disc florets narrowly funnel shaped, ca 4.5 mm long. Style very slender, arms erect. Pappus brown, at least when dry.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India : E. Himalayas. Sikkim.

**17. *Aster pycnophyllus* W.W. Sm. in Notes Roy. Bot. Gard. Edinb. 8: 332. 1915.**

Herbs, rhizomatous, 30-60 cm high, flexuous, glabrescent below, villous above. Leaves ovate or ovate-lanceolate, acuminate at apex, rounded or cordate at base, dentate at margins, 7-10 x 3-4 cm, sparsely pilose, glandular hairy on each side or glabrescent beneath; petioles usually 1-2 cm long. Heads many, in paniculate, corymbs, ca 6-8 mm broad. Involucral bracts purplish blue, 3-4-seriate, ca 3-4 mm long. Disc florets yellow, ca 4 mm long; tube ca 1 mm long. Style appendages narrowly lanceolate. Achenes obovate, ca 1.5 mm long, sparsely pubescent. Pappus whitish or buff, ca 4 mm long, simple.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: N.E. India. Nagaland.

China, Myanmar and Tibet.

**18. *Aster sikkimensis* Hook.f. in Bot. Mag. t. 4557. 1851 & Fl. Brit. India 3: 252. 1881.**

Herbs, perennial, erect, 0.9-1.2 m tall, much branched, flexuose, glabrous or puberulous. Cauline leaves lanceolate, acuminate at apex, sessile or attenuate, subpetiolate and auriculate or semiamplexicaul at base, distantly denticulate at margin, 6-7 x 1.5-5 cm, membranous, usually sparsely pubescent. Heads many, in terminal

corymbs, ca 1.5 cm across. Involucral bracts ca 4 mm long, lanceolate, acuminate, 2-3-seriate, finely pubescent. Ray florets many; tube ca 1.5 mm long; ligule, white, pink, blue or purple, ca 7 mm long. Disc florets purplish, ca 4 mm long; tube ca 1 mm long. Achenes brownish, obovate, ca 2 mm long, 4-5-ribbed, sparsely silky pilose.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: E. Himalayas, Sikkim and W. Bengal.

Nepal.

**19. *Aster stracheyi*** Hook.f., *Fl. Brit. India* 3: 250. 1881 & in *Bot. Mag.* t. 6912. 1886.

Herbs, erect or ascending, villous 5-6 cm high with many long, stolons. Leaves elliptic, spatulate, oblong or obovate, obtuse or acute at apex, attenuate at base, entire or 1-2-denticulate, 1-3 x 0.5-1.5 cm, sessile or attenuated to a short petiole. Heads solitary, ca 1.5 cm broad. Involucral bracts purplish tinged, 2-seriate, ca 1 cm long, glabrous or ciliate at base, lanceolate. Ray florets 30-40; tubes ca 1 mm long; ligule ca 1.5 cm long, blue, mauve. Disc florets ca 5 mm long, yellow, tubes ca 2 mm long, lobes ca 1 mm long. Style appendages lanceolate. Achenes obovate, ca 3 mm long, densely white pubescent. Pappus white or pinkish, ca 5 mm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Himalayas, 3500-4500. Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal and Bhutan.

**20. *Aster thomsonii*** C.B. Clarke, *Comp. Ind.* 48. 1876; Hook.f., *Fl. Brit. India* 3: 252. 1881. *Callimeris flexuosus* Royle ex DC., *Prodr.* 5: 258. 1836. **Fig. 29.**

Herbs, erect, laxly branched, villous, flexuous, 25-60 cm high. Leaves elliptic-ovate, broadly acuminate, cuneate at base, coarsely serrate, 5-10 x 2-5.5 cm, membranous, finely pubescent or villous, subsessile or sessile. Heads 1-4 (-10), 2.5-4.5 cm across, long peduncled. Involucral bracts green, 0.8-1.5 cm long, 2-3-seriate, subequal, villous, ovate, acuminate, herbaceous. Ray florets 25-30; tube ca 2 mm long; ligule, pink or purplish, ca 1.5 cm long. Disc florets ca 3-4 mm long; tube ca 1 mm long, lobes ca 1 mm long. Style appendages lanceolate, ca 5 mm long. Achenes obovate-lanceolate, 2-4 mm long, hairy, pilose, 2-4-ribbed. Pappus pale brown, ca 2 mm long.

*Fl. & Fr.* Oct. - Nov.



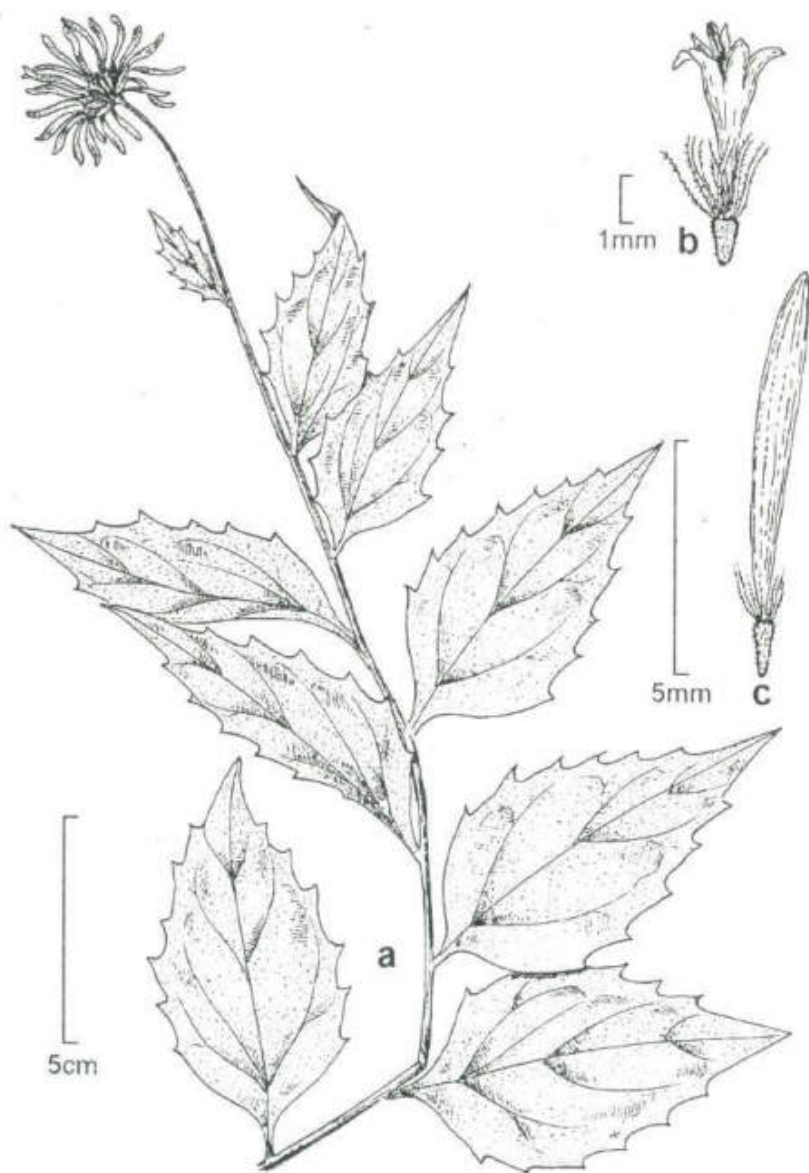


Fig. 29. *Aster thomsonii* C.B. Clarke : a. Habit; b. Disc floret; c. Ray floret.

*Distrib.* India: W. Himalayas, 2000-3000 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan.

21. *Aster tricephalus* C.B. Clarke, *Comp. Ind.* 43. 1876; Hook.f., *Fl. Brit. India* 3: 210. 1881.

Herbs, perennial, 15-60 cm high. Leaves spathulate, oblanceolate, elliptic or lanceolate, obtuse or acute at apex, half amplexicaul at base, entire or with 2-3 teeth at margin, 3.5-6.5 x 0.5-2.0 cm, glandular, pilose. Heads usually 1-3, 2-3 cm across. Involucral bracts 1-2-seriate, 1-1.5 cm long, oblanceolate, acute or obtuse, ciliate. Ray florets blue or white, many; tube ca 2 mm long. Disc florets 5 mm long, pubescent; tube ca 2 mm long, lobes ca 1 mm long. Style appendage lanceolate. Achenes obovate, ca 4 mm long, 2-ribbed, pubescent, glandular at apex.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: E. Himalayas, 2800-4500 m. Sikkim, Arunachal Pradesh and W. Bengal.

Nepal, Bhutan and Tibet.

22. *Aster trinervius* Roxb. ex D. Don, *Prodr. Fl. Nepal.* 177. 1825, non Gilib. (1791). *A. ageratoides* Turcz. subsp. *trinervius* var. *spathulatus* Kitam., in *Fauna & Fl. Nep. Himal.* 247. 1955. *A. scabridus* C.B. Clarke, *Comp. Ind.* 47. 1876. (non E. Mey ex DC. 1836).

Herbs, perennial, 50-100 cm high; stems terete, smooth or striate, glabrescent below, finely pubescent above or almost hispid, leafy. Leaves lanceolate, rarely oblong or elliptic, obtuse, acute or acuminate at apex, entire or serrulate at margins, rounded or acute at base to a short petiole, 5-10 x 1.5-2.5 cm, scabrid on both surfaces, occasionally glabrescent or finely pilose; upper cauline leaves sessile. Heads corymbose, ca 1 cm across. Involucral bracts 3-seriate, linear, obtuse or acute, glabrous or finely pubescent. Ray florets usually white, sometimes pale pink, 10-15. Disc florets yellow. Stamens and styles much exserted. Achenes obovate, ca 3 mm long. Pappus reddish, ca 5 mm long, with a few short hairs.

#### KEY TO THE VARIETIES

- 1a. Herbs, slender, sparsely pubescent; heads small  
b. Herbs, robust, densely pubescent; heads large

- 23.1. var. *trinervius*  
23.2. var. *wattii*

22.1. var. *trinervius*

*Fl. & Fr.* Sept - Oct.

*Distrib.* India: E. Himalayas and N.E. region. Sikkim, Arunachal Pradesh and Meghalaya.

Nepal and Myanmar.

**22.2.** var. *wattii* (C.B. Clarke) Grierson in Notes Roy. Bot. Gard. Edinb. 26: 102. 1964. *Aster wattii* C.B. Clarke, Comp. Ind. 40. 1876.

*Fl. & Fr.* Oct. - Dec.

*Distrib.* India: N.E. India, 795-1980 m. Nagaland and Manipur.

*Notes.* Grierson (1964) treats two subspecies, i.e. *Aster trinervius* subsp. *trinervius* and *Aster trinervius* subsp. *ageratoides* on the basis of basal and suprabasal trinervation and texture of the leaves. He could study specimen from Sikkim, Meghalaya, and Nagaland deposited in BM, K, E. Hara (1982) treats subspecies *ageratoides* as synonym of *A. ageratoides* subsp. *alatopetiolata*.

**23.** *Aster vestitus* Franch. in J. de Bot. 10: 378. 1896; Grierson in Notes Roy. Bot. Gard. Edinb. 26: 89. 1964. *A. sherriffianus* Hand. - Mazz. in J. Bot. 76: 285. 1938.

Herbs, perennial, erect, rhizomatous, 60-130 cm high, densely glandular pubescent. Leaves lanceolate acute, apiculate at apex, rounded to cuneate at base, subentire or with 2-3 small teeth at margin, 2.5-6.5 x 0.5-1.5 cm, glandular pubescent on both surfaces, sessile. Heads many in terminal corymbs, 1 cm across. Involucral bracts purplish towards apex, straw coloured at base, ca 5 mm long, lanceolate, acute or acuminate, glandular pubescent. Ray florets 20-30; tube ca 1 mm long, ligule white, ca 1 cm long. Disc florets ca 4 mm long; tube ca 1.5 mm long, lobes ca 1 mm long. Style appendages triangular. Achenes brownish, obovate, ca 2.5 mm long, laterally compressed, 3-ribbed, silky hairy. Pappus whitish, ca 4 mm long, simple.

*Fl. & Fr.* July - Oct.

*Distrib.* India: E. Himalayas. Sikkim.

Bhutan, Tibet, China and Myanmar.

#### EXCLUDED SPECIES

*Aster pilosus* Willd. var. *demotus* Blake in Rhodora 32: 129. 1930.

Herbs, suberect or decumbent, up to 75 cm high. Leaves linear, acute at apex, up to ca 3.5 cm long. Heads heterogamous, white with purplish tinge, usually solitary on leafy branches. Involucral bracts 2-3-seriate, 5-7 mm long, obovate to linear; outer smaller. Ray florets 2-4-seriate; ligule up to ca 1 cm long; female, purplish, fertile. Disc florets purplish; corolla tube 4-5-fid. Receptacle small, naked. Achenes ca 1 mm long. Pappus white.

*Note.* A native of America, this species has recently been reported from Jammu & Kashmir (Kaul in J. Bombay Nat. Hist. Soc. 72: 609. 1975). Perhaps an escape from cultivation.

*Aster tibeticus* Hook.f. in Fl. Brit. India 3: 251. 1881.

Perennials, 10-30 cm high, pubescent or villous, slender, erect, sparingly leafy. Radical leaves lanceolate or oblanceolate, obtuse or acute at apex, quite entire at margin, 2.5-5.0 cm long (including petiole); cauline linear-oblong, obtuse, sessile. Heads 2.5-5 cm across, usually solitary. Outer involucral bracts linear, acute, pubescent or villous. Ligule blue, many, 1.2-1.5 cm long. Achenes ca 2 mm long, flat, glabrescent. Pappus white, ca 4 mm long; outer hairs very few, short, subulate.

*Distrib.* India: W. Himalayas. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

*Note.* Grierson (1964) treats *A. tibeticus* Hook.f. *p.p.* as synonym of *A. flaccidus* Bunge. While Stewart (1972) says, "*A. tibeticus* Hook.f., Fl. Brit. India 3: 251. teste Grierson, is *nomen confusum*. Most specimens so named are *A. flaccidus* ssp. *glandulosus*".

## 2. *Brachyactis* Ledeb.

Herbs, annual or perennial. Leaves alternate. Heads heterogamous, rayed, solitary, axillary or few in leafy panicles. Ray florets female, fertile; 1-many-seriate; fertile; ligule bluish or rosy, minute. Disc florets bisexual, fertile, tubular, limb 5-cleft. Involucral bracts half as long as the flowers, 2-3-seriate, narrow; outer often leafy. Receptacle flat, naked or pitted. Anther-bases obtuse, entire. Style arms of bisexual flowers narrow, flattened, tips narrowly lanceolate. Achenes narrowly obovate, quite flat. Pappus hairs sub-2-seriate; outer shorter.

Asia and N. America; ca 6 species, 3 in India.

### KEY TO THE SPECIES

- 1a. Leaves oblong-lanceolate or ovate  
b. Leaves obovate

1. *B. anomalum*  
2

- 2a. Heads large, 8-15 mm across  
 b. Heads small, 4-6 mm across

2. *B. pubescens*  
 3. *B. roylei*

1. *Brachyactis anomalum* (DC.) Kitam. in Fl. E. Himal. 3: 113. 1975. *Erigeron anomalum* DC., Prodr. 5: 293. 1836. *Brachyactis menhodora* Benth. in Hook., Icon. Pl. 12.t. 1106. 1872; Hook.f., Fl. Brit. India 3: 253. 1881.

Herbs, erect, aromatic, 30-90 cm high, glandular pubescent, branched. Leaves oblong-lanceolate or ovate, serrate, 2.5-10.5 x 1.0-3 cm; upper sessile, half amplexicaul, decurrent; lower long petioled; petiole 1.5-6.0 cm. Heads 1.2-1.5 cm across, usually terminal or at the end of branches. Involucral bracts herbaceous, few, linear, pubescent; outer 1-2, often much larger and leafy. Florets pale blue; ligule longer than styles. Achenes ca 2.5 mm, nearly glabrous. Pappus reddish, ca 5 mm long.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: Himalayas. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal and S. Tibet.

2. *Brachyactis pubescens* (DC.) Aitch. & C.B. Clarke in J. Linn. Soc. 18: 68. 1880. *Conyza pubescens* DC., Prodr. 5: 381. 1836. *Brachyactis robusta* Benth. in Hook.f., Icon. 12: sub. 1106. 1872; Hook.f., Fl. Brit. India 3: 254. 1881.

Annuals, erect, 30-50 m high, erect stout, glandular-pubescent, branched. Leaves obovate, toothed, narrowed at base; petiole short. Heads ca 1-1.5 cm across, in racemes, pedicellate; pedicels 1-3.5 cm long. Involucral bracts many, 2-3-seriate, ca 4-5 mm long, pubescent, subequal, narrow, oblong, acute; inner somewhat scarious. Female flowers many-seriate, all filiform. Bisexual flowers 5-20. Achenes obovate-lanceolate, ca 2-4 mm long, hairy. Pappus white or brownish, ca 4-5 mm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Afghanistan and Pakistan.

3. *Brachyactis roylei* (DC.) Wendelbo in Nytt, Mag. B. 1:62. 1952. *Conyza roylei* DC. Prodr. 5: 381. 1836. *Brachyactis umbrosa* Benth. in Hook., Icon. Pl. 12: Sub. t. 1106. 1872; Hook.f., Fl. Brit. India 3: 253. 1881. *B. wanquensis* C.B. Clarke, Comp. Ind. 61. 1876. *Conyza umbrosa* Karel & Kiril. in Ledeb. Fl. Ross. 2: 498. 1845.

Herbs, annual, 12-30 cm high, glandular-pubescent, branched from base; branches 10-20 cm long, ascending, leafy. Leaves obovate, lobulate, cuneate at base, 1.2-2.5 x 0.3-0.6 cm, pubescent on both surfaces. Heads ca 1.2 cm across, often one in every leaf axil, sessile or long peduncled; peduncles 1-4 cm long. Involucral bracts biseriata, ca 3 mm long. Female florets many-seriate, filiform; ligule minute. Achenes obovate ca 2 mm long, sparingly silky. Pappus ca 5 mm long, reddish or whitish.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

C. Asia, Afghanistan, Pakistan and Nepal.

### 3. *Brachycome* Cass.

Herbs, usually scapigerous, sometimes branched. Heads heterogamous, rayed, small, solitary. Involucral bracts 2-seriate. Receptacle convex, naked. Ray florets 1-seriate. Disc florets bisexual, tubular, limb 5-cleft. Anther bases obtuse, entire. Achenes compressed. Pappus paleaceous, scanty or absent.

Australia, Africa, N. America, New Zealand; ca 75 species, 1 in India.

*Note.* *B. iberidifolia* Benth., a native of Australia, is grown as an ornamental in some places.

***Brachycome assamica*** C.B. Clarke, Comp. Ind. 40. 1876; Hook.f., Fl. Brit. India 3: 243. 1881.

Shrubby, 15-30 cm high, glabrous; branches sharply angled. Leaves linear, alternate, sessile. Heads small, solitary, terminal. Involucral bracts 1-2-seriate, elliptic or ovate, margins scarious. Flowers radiate; outer row ligulate; ligule white with violet tinge, much longer than involucral bracts. Style branches ovate-lanceolate. Achenes terete-striate, narrowed above, beaked. Pappus absent.

*Distrib.* India: Upper Assam, in the Dihing river.

*Note.* The occurrence of this species in India is doubtful. C.B. Clarke included this on the basis of specimen supposed to have been collected from Assam region (CAL). Hooker (1881) also mentions this on the authority of Clarke (1876). But for the present study neither type nor any authentic specimen could be located in CAL.

4. *Conyza* Less. *nom. cons.*

Herbs; branchlets usually ribbed. Leaves alternate, linear, obovate or spatulate, pinnately veined, margin entire to crenate-serrate. Heads heterogamous, disciform, corymbose or paniced, axillary or terminal, usually many. Involucral bracts multi-seriate, linear-lanceolate; outer smaller. Receptacle flat or convex, naked or pitted, fimbriate. Outer florets female, fertile, 2-many-seriate, filiform, rarely ligulate, 2-3-toothed. Disc florets bisexual, fertile, few, tubular, 5-toothed. Anther bases obtuse, entire. Style arms of female flattened, usually slender. Achenes minute, laterally compressed. Pappus slender, 1-2-seriate, scabrous.

Temperate and subtropical regions of the world; ca 60 species, 10 in India.

## KEY TO THE SPECIES

- |  |                              |
|--|------------------------------|
| 1a. Pappus hairs white or dirty white or yellow  | 2                            |
| b. Pappus hairs usually red  | 5                            |
| 2a. Pappus hairs yellow  | 3. <i>C. bonariensis</i>     |
| b. Pappus hairs white or dirty white   | 3                            |
| 3a. Heads pale rosy or purplish  | 4. <i>C. canadensis</i>      |
| b. Heads yellowish   | 4                            |
| 4a. Pappus ca 2 mm long, white   | 8. <i>C. semipinnatifida</i> |
| b. Pappus ca 4 mm long, dirty white  | 10. <i>C. sumatrensis</i>    |
| 5a. Plants not viscid; heads 0.2-0.3 cm across   | 9. <i>C. stricta</i>         |
| b. Plants viscid; heads 0.4-1.5 cm across  | 6                            |
| 6a. Leaves elliptic-oblong, narrowed at both ends, acute, entire or faintly dentate; corolla pink or pale violet | 6. <i>C. leucantha</i>       |
| b. Leaves oblong-spathulate, serrate-pinnatilobed, obtuse at apex  | 7                            |
| 7a. Leaves pinnatilobed  | 1. <i>C. aegyptiaca</i>      |
| b. Leaves serrate-dentate or coarsely toothed or often entire  | 8                            |
| 8a. Pappus hairs 4 mm long   | 7. <i>C. rufa</i>            |
| b. Pappus hairs 2-3 mm long  | 9                            |
| 9a. Leaves narrowly linear   | 2. <i>C. angustifolia</i>    |
| b. Leaves obovate-spathulate, oblong or lanceolate   | 5. <i>C. japonica</i>        |

1. *Conyza aegyptiaca* (L.) W. Ait., Hort. Kew. ed. 1. 3: 183. 1789. Hook. f., Fl. Brit. India 3: 258. 1881. *Erigeron aegyptiacus* L. Mant. 1:112. 1767. Pl. "aegyptiacum".

Herbs, annual-biennial, erect, hirsute. Stems usually simple. Leaves lanceolate or obovate-lanceolate or oblong-spathulate, obtuse-apiculate at apex, unequally pinnatifidly lobed, 3-5(-8) x 0.5-1.5(-2) cm, upper sessile, semiamplexicaul at base; basal shortly petioled. Heads 0.5-1 cm across, crowded or in compact corymbs. Peduncles ca 0.5 cm long. Involucral bracts 2-3-seriate, linear, lanceolate, 0.3-0.6 cm long, glandular-pubescent. Outer florets ca 0.3 cm long, filiform. Disc florets ca 0.4 cm long. Achenes ca 1 mm long, sparingly hairy with a thickened margin. Pappus hairs 5-8 mm long.

*Fl. & Fr.* Sept. - May

*Distrib.* India: In dry open places. Jammu & Kashmir, Uttar Pradesh, Karnataka and Tamil Nadu.

Bangladesh, Africa, China, Japan and Australia.

2. *Conyza angustifolia* Roxb., Hort. Beng. 61. 1814, (*nom. nud.*) et Fl. Ind. ed. 2, 3: 429. 1832; Hook.f., Fl. Brit. India 3: 258. 1881.

Herbs, annual, 60-100 cm or more high; stem erect, simple or with slender branches, scaberulous, woody below. Leaves narrowly linear, serrate, sessile. Heads 0.6-0.8 cm across, in slender, open peduncled cymes. Involucral bracts lanceolate, broad scarious margined. Achenes minute, sparsely silky. Pappus hairs reddish, ca 2 mm long, very caducous as a whole.

*Fl. & Fr.* May - June

*Distrib.* India: C. and E. Himalayas, ca 1300 m. Sikkim.

Nepal and Bhutan.

*Notes.* The species is closely allied to *C. bonariensis*.

3. *Conyza bonariensis* (L.) Cronq. in Bull. Torrey Bot. Club. 70: 632. 1943. *Erigeron bonariensis* L., Sp. Pl. 863. 1753.

Herbs, erect, branched or simple, hirsute, up to ca 1.5 m tall. Leaves oblanceolate, linear-lanceolate, cuneate at base, coarsely serrate-incised at margin, 1-8 x 0.3-1.5 cm, acute at apex. Heads ca 0.5-1.0 cm across, in long leafy panicles. Involucral bracts ca 0.4 cm, coarsely hairy. Corolla of ray florets purplish tipped, 0.3-0.4 cm long; of disc florets pale yellow. Achenes ca 1 mm long, subglabrous. Pappus yellowish, hairs ca 3 mm long.

*Fl. & Fr.* June - Jan.

*Distrib.* India: In open grasslands, waste places and along roadsides. Himachal Pradesh, Uttar Pradesh, Sikkim, Arunachal Pradesh, Meghalaya and Tamil Nadu.

Sri Lanka, Pakistan and Bhutan.

*Notes.* A pantropic weed of S. American origin, introduced into S. Europe, India and other countries.



4. *Conyza canadensis* (L.) Cronq. in Bull. Torrey Bot. Club 79: 632. 1943.  
*Erigeron canadensis* L., Sp. Pl. 863. 1753. Hook.f., Fl. Brit. India 3: 254. 1881.

Fig. 30.

Herbs, annual, 15-90 cm high; stems slender, much branched above, pubescent, hirsute or nearly glabrous. Leaves linear or linear-lanceolate, entire or toothed. Heads 0.5-0.6 cm across, peduncled, in elongated branched panicles. Involucral bracts narrow, glabrate, acuminate. Ligules pale rosy or purplish, pale. Achenes ca 1 mm long, flat, nearly glabrous. Pappus hairs dirty white, ca 3 mm long.

Fl. & Fr. June - Aug.

Distrib. India: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Meghalaya, Orissa, Andhra Pradesh and Tamil Nadu.

Nepal and Pakistan.

Notes. A cosmopolitan weed of N. American origin.

5. *Conyza japonica* (Thunb.) Less. ex DC., Prodr. 5: 382. 1836; Hook.f., Fl. Brit. India 3: 258. 1881. *Erigeron japonicum* Thunb. in Fl. Jap. 312. 1784. *Conyza stricta* Wallich, Cat. 105. 3044. (*nom. nud.*). *C. multicaulis* DC., Prodr. 5: 383. 1836.

Fig. 31.

Herbs, erect, 15-30 cm high, villous or woolly, rarely glabrate, usually unbranched. Leaves obovate-spathulate, oblong or lanceolate, serrate or crenate, 1-8 x 0.5-3 cm, sessile. Heads globose, ca 8 mm across. Involucral bracts lanceolate, scarious margined, pubescent. Corolla yellow (white?). Achenes ca 1 mm long, nearly glabrous. Pappus reddish brown, ca 3 mm long.

Fl. & Fr. April - July.

Distrib. India: Common in open grasslands and along roadsides. Arunachal Pradesh, Assam, Nagaland, Manipur, Mizoram, Meghalaya, Sikkim, Uttar Pradesh, Himachal Pradesh, W. Bengal, Bihar, Orissa, Karnataka, Tamil Nadu and Kerala.

Nepal, Pakistan, China, Japan, Afghanistan, Thailand and Malesia.

6. *Conyza leucantha* (D. Don) Ludlow & Raven in Kew Bull. 17: 71. 1963. *Erigeron leucanthus* D. Don, Prodr. Fl. Nepal. 171. 1825. *E. falcatum* D. Don, Prodr. Fl. Nepal. 171. 1825. *Conyza viscidula* Wallich ex DC., Prodr. 5: 383, 1836; Hook.f., Fl. Brit. India 3: 258, 1881.

Herbs, annual-biennial, erect, stout, much branched, viscid, up to 1 m or more. Leaves lanceolate or oblong-lanceolate or elliptic-oblong, acute at both ends, entire or

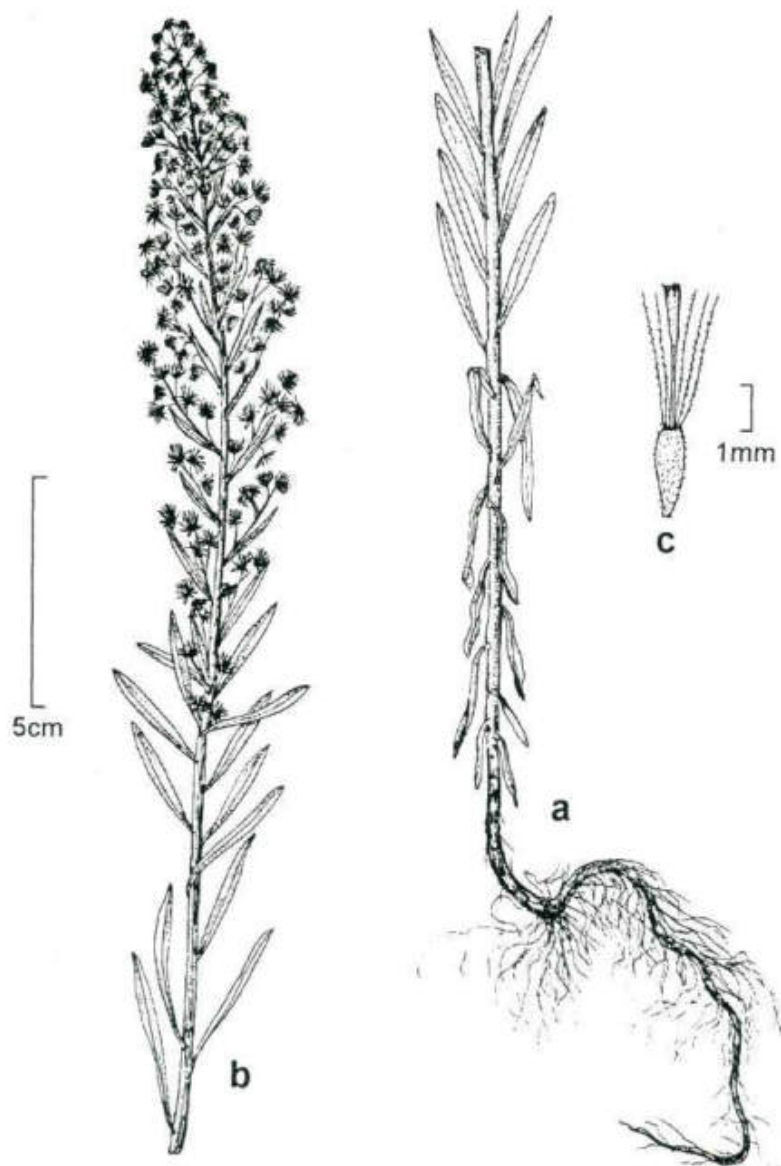


Fig. 30. *Conyza canadensis* (L.) Cronq. : a. & b. Habit; c. Floret.

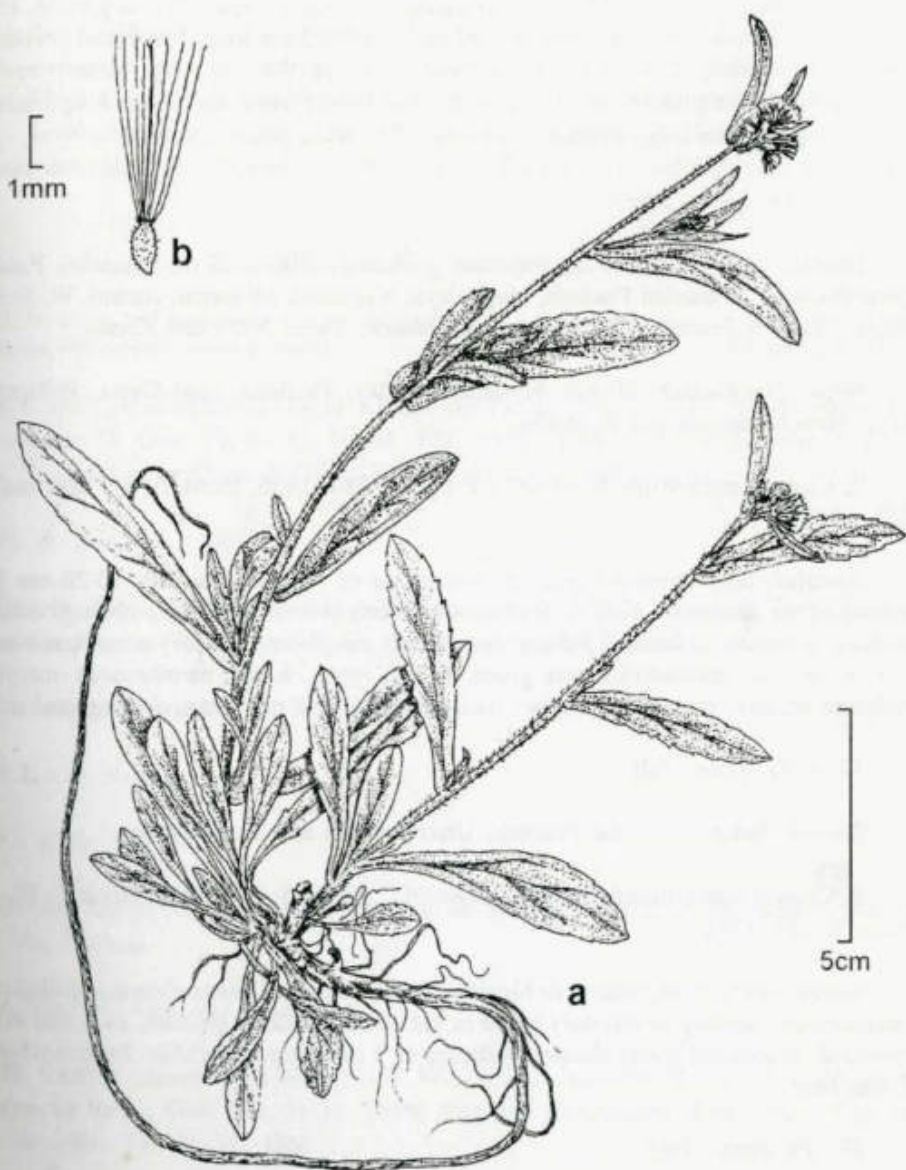


Fig. 31. *Conyza japonica* Less. : a. Habit; b. Floret.

crenate-serrate, 2-10 (-15) x 1-3 cm, glandular-pubescent, tapering into petiole. Heads ca 0.8-1 cm across, in loose corymbs; peduncles 0.3-0.5 cm long. Involucral bracts pale violet or purplish, 2-3-seriate, linear-lanceolate, ca 0.4 cm long, acute, scarious margined. Corolla pinkish, ca 0.3 cm long. Disc florets white, ca 0.5 cm long. Achenes minute, ca 0.4 mm long. Pappus hairs reddish to white, ca 4 mm long.

*Fl. & Fr.* Feb. - Sept.

*Distrib.* India: In forest clearings and grasslands, 700-1200 m. Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh, Meghalaya, Nagaland, Mizoram, Assam, W. Bengal, Bihar, Madhya Pradesh, Maharashtra, Karnataka, Tamil Nadu and Kerala.

Nepal, Bangladesh, Bhutan, Myanmar, Malay, Thailand, Indo-China, Philippines, Java, New Caladonia and Australia.

7. *Conyza rufa* Wallich. ex DC., Prodr. 5: 384. 1836; Hook.f., Fl. Brit. India 3: 259. 1881.

Annulas, corymbosely branched, tomentose or villous; branches 10-20 cm long, spreading or prostrate. Leaves obovate or oblong-obovate or linear-oblong, coarsely toothed, attenuate at base, 2.5-5 cm long. Heads subglobose, in corymbose panicles, ca 0.8 cm across. Involucral bracts green, broad, ovate, acute, membranous margined. Achenes minute, pubescent. Pappus hairs reddish, ca 4 mm long, shining, caducous.

*Fl. & Fr.* June - July

*Distrib.* India: Himachal Pradesh, Uttar Pradesh and Tamil Nadu.

8. *Conyza semipinnatifida* Wallich ex DC., Prodr. 5: 382. 1836; Hook.f., Fl. Brit. India 3: 257. 1881.

Herbs, erect, stout, villous or hirsute, 30-60 cm high. Leaves obovate-spathulate or oblanceolate, acutely or obtusely lobed or cut. Heads yellow, globose, ca 6 mm across, crowded. Involucral bracts slender. Achenes ca 1 mm long, glandular. Pappus white, ca 2 mm long.

*Fl. Fr.* June - July

*Distrib.* India : Arunachal Pradesh.

Myanmar and Bangladesh.

9. *Conyza stricta* Willd., Sp. Pl. 3: 1922. 1803. Hook.f., Fl. Brit. India 3: 258. 1881.

Herbs, ca 60 cm (-100 cm) high, hispid-pilose or hoary, corymbosely branched. Leaves narrowly linear-spathulate to oblanceolate, entire or coarsely serrate or rarely pinnatifid, 2-4 x 0.5-0.8 cm. Heads numerous, peduncled, corymbose, 0.3-0.4 cm across. Involucral bracts linear-lanceolate to oblong-lanceolate, 0.1-0.2 cm long, acute, scarious margined. Achenes minute, puberulous. Pappus hairs reddish, ca 1 mm long.

## KEY TO THE VARIETIES

- 1a. Herbs, hoary; leaf margin entire to coarsely serrate . . . . . 9.2. var. *stricta*  
 b. Herbs, hispid-pilose; leaves pinnatifid . . . . . 9.1. var. *pinnatifida*

9.1 var. *pinnatifida* (D. Don) Kitam. in Fl. E. Himal. 337. 1966. *Erigeron pinnatifidum* D. Don, Prodr. Fl. Nepal. 172. 1825. Hook.f., Fl. Brit. India 3: 259. 1881. *C. adenocarpa* Dalz. & Gibs., Bombay Fl. 125. 1861.

✓ Fl. & Fr. Sept. - Oct.

*Distrib.* India: Exposed grassy hill slopes, 1000-2700 m. Sikkim, Tamil Nadu, Karnataka, Kerala, W. Bengal, Bihar, Orissa and Andhra Pradesh.

E. Africa, Myanmar, Thailand and China.

9.2. var. *stricta*

Fl. & Fr. Sept. - Oct.

*Distrib.* India: W. Himalayas, 600-2000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Africa, W. Asia, and Myanmar.

10. *Conyza sumatrensis* (Retz.) E.H. Walker in J. Jap. Bot. 46: 72. 1971. *Erigeron sumatrensis* Retz., Obs. Bot. 5: 28. 1789. *Erigeron floribundus* (Kunth) Sch.-Bip. in Bull. Soc. Bot. Fr. 12: 81. 1865.

Herbs, ca 0.5-2.0 m tall; stem paniculately branched above, sparsely pubescent. Basal leaves oblanceolate, acute at apex, attenuate at base, serrate-dentate margin, 5-10 x 11.5 cm, subpetiolate; upper leaves linear-lanceolate, 4-5 x 3-4 cm. Heads ca 0.5 cm across, numerous in elongate racemose panicles. Involucral bracts ca 0.5 cm long. Female flowers yellowish, minutely ligulate; bisexual flowers 3-6 per head, corolla ca 0.4 cm long. Achenes ca 1 mm long, sparsely pubescent. Pappus hairs dirty white, ca 4 mm long.

*Fl. & Fr.* Sept. - Jan.

*Distrib.* India: Karnataka.

Nepal, Sri Lanka, Malesia, America and Australia.

*Note.* A pantropic weed of American origin. Grierson (1980), in Dassanayakae (ed.) *Fl. Ceylon* 1: 157, has treated this taxon as *Conyza floribunda* H.B.K.

### 5. *Cyathocline* Cass.

Herbs, annual, erect, branched, fragrant. Leaves alternate, pinnatisect. Heads in terminal panicles, heterogamous, small, not rayed. Involucre hemispheric, bracts subseriate, lanceolate, acute with scarious margins. Receptacle with contracted base and naked concave top. Outer florets many-seriate, female fertile, filiform, 2-toothed. Disc florets bisexual, usually sterile, regular, 5-cleft. Anthers appendaged at tip, bases truncate. Style arms exerted, short. Achenes minute, oblong, smooth. Pappus absent.

Asiatic; ca 2 species, 2 in India.

*Literature.* FAYED, A. (1979). Revision der Grangeinae (Asteraceae) - Astereae, *Mitt. Bot. Staatssam Munchen* 15: 425-576. *Cyathocline* 513-520.

#### KEY TO THE SPECIES

- |   |                       |
|---|-----------------------|
| 1a. Heads 3-4 mm across; flowers bright yellow            | 1. <i>C. lutea</i>    |
| b. Heads ca 5 mm across; flowers purplish white or purple | 2. <i>C. purpurea</i> |

1. *Cyathocline lutea* Law ex Wight in *Calc. J. Nat. Hist.* 7: 158. 1847; Hook.f., *Fl. Brit. India* 3: 246. 1881. *C. flava* C.B. Clarke, *Comp. Ind.* 57. 1876. (non Wight).

Herbs, pubescent, 7.5-22.5 cm high; stems slender, many from base. Radical leaves stellately spreading, linear, revolute, 2.5-5 x 0.3-0.4 cm, bipinnatifid; cauline leaves few, alternate, segments minute. Heads yellow, in subscorpioid cymes, 3-4 mm across. Involucral bracts linear-oblong, ca 2.5 mm long, subobtuse, hairy on the back. Achenes ca 2.5 mm long, smooth. Pappus absent.

*Fl. & Fr.* Oct. - Dec.

*Distrib.* India: W. Ghats and Deccan region, in grasslands, 700-1200 m. Maharashtra, Tamil Nadu and Kerala.

*Notes.* This species can be easily recognised in the field by its deep green leaves and bright yellow flowers.

To read

✓ **2. *Cyathocline purpurea*** (Buch.-Ham. ex D. Don) O. Kuntze, Rev. Gen. Pl. 333. 1891. *Tanacetum purpureum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 181. 1825. *Cyathocline lyrata* Cass. in Ann. Sci. Nat. Ser. 1. 17: 420. 1829. Hook.f., Fl. Brit. Idnia 3: 246. 1881. *Dichrocephala minutiflora* Vaniot. in Bull. Acad. Internat. Geogr. Bot. 12: 242. 1903. **Fig. 32.**

Herbs, annual or biennial, strongly aromatic, glabular-hairy, 12-60 cm high; stems usually purplish or purple tinged, branched from base. Leaves pinnatisect; lower obovate; upper all pinnatifid, 2.5-15 cm long, segments toothed to lobed, glabrescent or thinly hairy. Heads purple or rose purple, ca 5 mm across, in terminal, rounded paniced corymbs. Involucral bracts 2-seriate, pilose, linear-lanceolate, acute. Corolla of marginal florets ca 1.5 mm; of disc florets ca 2 mm long. Achenes minute. Pappus absent.

## KEY TO THE VARIETIES

- |  |                                  |
|--|----------------------------------|
| 1a. Cauline leaves up to 13 x 4.5 cm; segments irregularly serrate; flowers uniformly purple | <b>2.3. var. <i>purpurea</i></b> |
| b. Cauline leaves smaller; flowers white or purplish white                                   | 2                                |
| 2a. Cauline leaves much smaller; heads white in the centre, purple in the periphery          | <b>2.2. var. <i>bicolor</i></b>  |
| b. Cauline leaves deeply incised; flowers pure white   | <b>2.1. var. <i>alba</i></b>     |

**2.1 var. *alba*** Santapau in Kew Bull. 1948: 490. 1949.

*Fl. & Fr.* Nov. - May

*Distrib.* India: W. Ghats. Maharashtra.

Endemic.

**2.2. var. *bicolor*** Santapau in kew Bull. 1948: 490. 1949.

*Fl. & Fr.* Nov. - Mar.

*Distrib.* India : W. Ghats. Maharashtra.

Endemic.

*Notes.* Heads purple at first but soon central florets turn pure white.

✓ **2.3. var. *purpurea***

*Fl. & Fr.* March - Nov.

*Distrib.* India: Himalayas, N.E. region, Gangetic plains and W. Ghats. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Punjab, Assam, Manipur, W. Bengal,

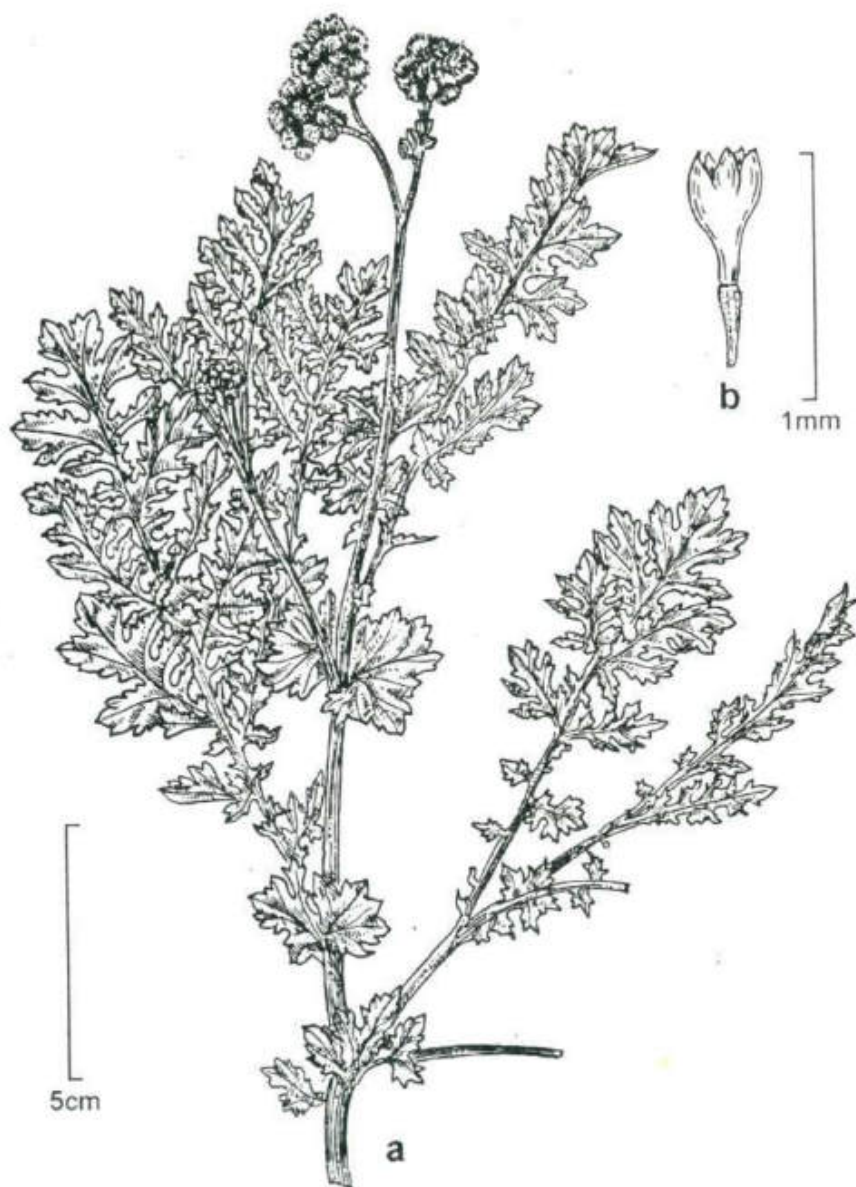


Fig. 32. *Cyathocline purpurea* (Buch.-Ham. ex D. Don) O. Ktze. : a. Habit; b. floret.



Orissa, Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Madhya Pradesh, Maharashtra and Goa.

Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, China and Indo China.

### 6. *Dichrocephala* L'Herit ex DC.

Herbs, annual, branched, glabrous or pubescent. Leaves alternate, toothed, lyrate or pinnatifid. Heads heterogamous, not rayed, small, paniced, globose or hemispheric. Outer flowers female, fertile, slender, many-seriate. Inner or disc flowers bisexual, fertile, fewer, narrow, 4-5 toothed. Involucral bracts sub-2-seriate, slightly unequal, margins dry. Receptacle slightly contracted within the margin, elevated, top flat, naked. Corollas of female flowers reddish, slender, minutely 2-3-toothed or expanded into 3-4-lobed limb. Corollas of bisexual flowers yellow, regular, tubular with a campanulate 3-4-lobed limb, yellow. Anther bases truncate. Style arms of female short, flattened, tips lanceolate. Achenes compressed. Pappus absent or of 2 minute bristles in bisexual flowers.

Africa, China, Java, Madagascar; ca 10 species. 4 in India.

*Literature.* FAYED, A. (1979) Revision der Grangeinae (Asteraceae - Astereae) Mitt. Bot. Staatssam München 15: 425-576, 49 fig., *Dichrocephala* pp. 491-513.

#### KEY TO THE SPECIES

- |   |                                |
|---|--------------------------------|
| 1a. Receptacle slightly elevated                              | 1. <i>D. benthamii</i>         |
| b. Receptacle much elevated                                   | 2                              |
| 2a. Herbs, usually spreading; leaves up to ca 7.5 cm long     | 4. <i>D. integrifolia</i>      |
| b. Herbs, erect, very rigid; leaves usually up to 5.0 cm long | 3                              |
| 3a. Leaves sessile or half amplexicaul; heads ca 4 mm across  | 3. <i>D. hamiltonii</i>        |
| b. Leaves auricled at base; heads usually 6-8 mm across       | 2. <i>D. chrysanthemifolia</i> |

1. *Dichrocephala benthamii* C.B. Clarke, Comp. Ind. 36. 1876; Hook.f. Fl. Brit. India 3: 246. 1881.

Suberect, ca 30 cm high; branches ascending pubescent. Leaves obovate or spatulate, sinuately lobed. Heads hemispheric, ca 3 mm across. Corolla of female flowers elongate, ovoid or suburceolate, minutely toothed. Achenes ca 1 mm long, compressed.

*Fl. & Fr.* June - July

*Distrib.* India: In subtropical region, upto ca 1500 m. Meghalaya.

Bhutan, Nepal, Indo-China and China.

2. *Dichrocephala chrysanthemifolia* (Blume) DC. in Wight, Contrib. Bot. Ind. 11. 1834; et Prodr. 5: 372. 1836; Hook.f., Fl. Brit. India 3: 245. 1881. *Cotula chrysanthemifolia* Blume, Bijdr. 9. 18. 1826.

Herbs, erect, stiff, pubescent, often hoary, very rigid; branches divaricate. Leaves oblong or obovate, coarsely serrate or pinnatifid, auricled at base, ca 5 x 1.2 cm, hispid pubescent. Heads globose or oblong, 6-8 mm across; peduncle ca 5 cm long. Corolla of ray florets short, funnel shaped, 3-5-cleft. Achenes compressed with thickened margin. Pappus absent.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Himachal Pradesh, Uttar Pradesh (up to ca 2500 m), Tamil Nadu and Kerala.

Nepal, Java, Tropical Africa, New Guinea, Philippines, Celebes and Lesser Sunda Islands.

3. *Dichrocephala hamiltonii* Hook.f., Fl. Brit. India 3: 246. 1881. *Cotula sinapifolia* Roxb. Hort. Beng. 62. 1814. *Cotula dichrocephaloides* C.B. Clarke, Comp. Ind. 150. 1876.

Herbs, robust, sparsely pubescent, 15-25 cm high. Leaves obovate, coarsely toothed at margin, 2.5-5 cm long, sparsely pubescent on both surfaces, sessile or half amplexicaul. Heads globose, paniced, ca 4 mm across, shortly peduncled. Involucral bracts very short, obtuse. Receptacle convex. Corolla of female flowers short, inflated, mouth minute, entire. Bisexual flowers funnel shaped, 4-toothed. Achenes cuneiform, flattened, margins thickened. Pappus absent.

*Fl. & Fr.* April - May

*Distrib.* India: Assam.

✓ 4. *Dichrocephala integrifolia* (L.f.) O. Kuntze, Rev. Gen. Pl. 1: 333. 1891. *Hippia integrifolia* L.f. Suppl. Sp. Pl. 389. 1781. *Dichrocephala latifolia* (Pers.) DC. in Wight, Contrib. Bot. India 11. 1834. *Cotula latifolia* Pers. Pers. Syn 2: 464. 1805. Hook.f., Fl. Brit. India 3:245. 1881. *Dichrocephala bicolor* (Roth.) Schlecht. in Linnaea 25: 209. 1952.

Herbs, annual, 15-60 cm high; stem erect or spreading, usually divaricately branched. Leaves very variable, obovate or ovate or lanceolate, often pinnatifid or lyrate with a large, ovate terminal lobe and 1 or 2 pairs of lateral lobes, subacute at apex, coarsely crenate-serrate at margin, 5.0-7.5 x 2.5-3.5 cm, sparsely hairy on both surfaces;

petioles 0.6-1.5 cm long. Heads few, globose, 3-6 mm across, on slender divaricating peduncles. Involucral bracts minute, linear, with scarious margins. Ray florets pink or purplish. Corollas of disc florets yellow, 4-toothed. Achenes ca 1 mm long, smooth or minutely puberulous. Pappus of female flowers absent; of bisexual flowers 2- or 3-bristled.

## KEY TO THE SUBSPECIES

- 1a. Leaves usually obovate or ovate or lanceolate, lateral lobes 1 or 2 pairs      4.2. subsp. *integrifolia*  
 b. Leaves pinnately divided, lateral lobes 2-3 pair      4.1. subsp. *gracilis*

4.1. subsp. *gracilis* (DC.) Fayed in Mitt. B. Staatssam Munchen 15: 500. 1979. *D. gracilis* DC. Prodr. 5: 371. 1836.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas, up to 2600 m. Uttar Pradesh and Sikkim.

Nepal and Madagascar.

4.2. subsp. *integrifolia*

Fig. 33.

*Fl. & Fr.* Aug. - Dec. (Dec.-May).

*Distrib.* India: Tropical and subtropical regions, moist fallow lands, sometimes ascending up to 3000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, W. Bengal, Bihar, Sikkim, Arunachal Pradesh, Nagaland, Assam, Meghalaya, Orissa, Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Maharashtra and Madhya Pradesh.

Nepal, Myanmar, Malaya peninsula, Africa and Pacific Islands.

*Notes.* Yong *et al.* (1985), in *Flora Sinicae* 74: 77. 1985, have used the name *D. auriculata* (Thunb.) Druce, based on Thunberg's *Ethula auriculata*. But *Hippia integrifolia* L.f. (1781) has priority over *E. auriculata* Thunb. (1784). As types of these taxa are not available it is preferred to adopt *D. integrifolia*.

7. *Erigeron* L.

Herbs, annual or perennial, erect or prostrate. Leaves alternate, sessile, entire, dentate or trilobed. Heads heterogamous, solitary or few in a loose raceme. Involucre campanulate; bracts 2-3-seriate, narrow. Ray florets female, many, usually in 2 or more series, with prominent ligules. Disc florets tubular, 5-lobed, bisexual. Anther be obtuse. Receptacle flat or convex, naked. Achenes ellipsoid or narrowly ob compressed. Pappus thin, setose, scabrous, often double.

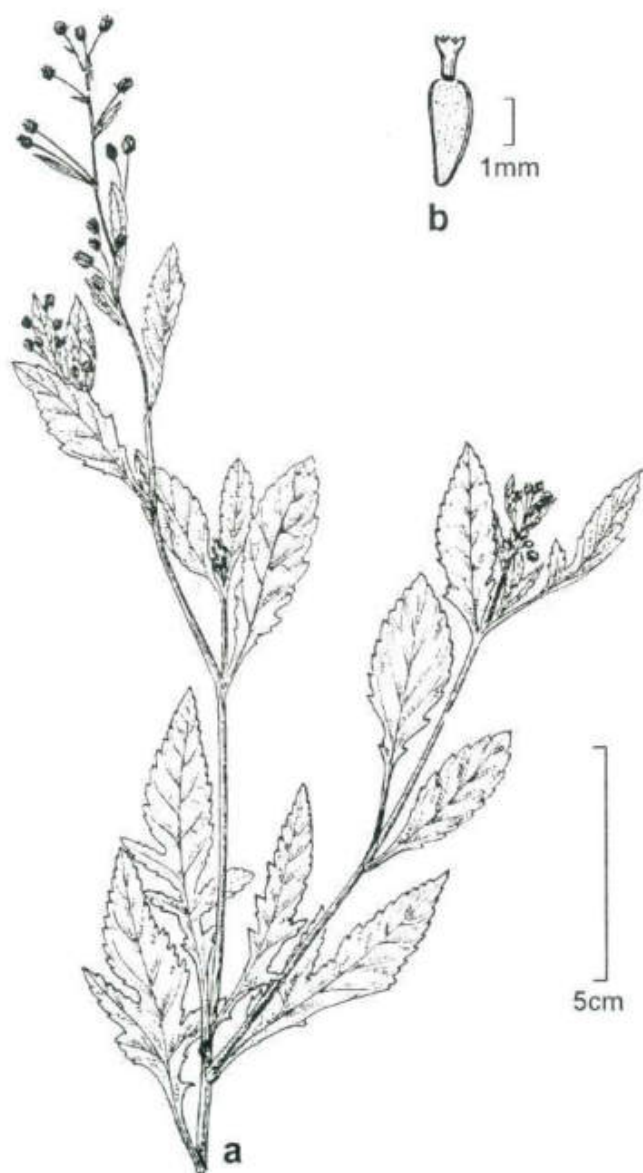


Fig. 33. *Dichrocephala integrifolia* (D. Don) O. Ktze. : a. Habit; b. Floret.

Cosmopolitan, especially N. American; ca 200 species, 14 in India.

*Literature.* BURTT, B.L. (1948). On *Erigeron bonariensis* L. *Kew Bull.* 3: 369-372. CRONQUIST, A. (1943). The separation of *Erigeron* from *Conyza*. *Bull. Torrey Bot. Club* 70: 629, 632. HOFFMAN (1890). Engler & Prantl, *Pflanzenf.* IV. 5: 164. RECHINGER, K.H. (1986). *Compositae-Astereae Erigeron*. *Fl. Iranica* 15-33.

#### KEY TO THE SPECIES

- |  |                              |
|--|------------------------------|
| 1a. Herbs, prostrate   | 5. <i>E. karvinskianus</i> - |
| b. Herbs, erect or semierect   | 2                            |
| 2a. Heads trimorphic   | 3                            |
| b. Heads dimorphic   | 7                            |
| 3a. Heads 2-2.5 cm in diam   | 4                            |
| b. Heads 0.5-1.8 cm in diam  | 6                            |
| 4a. Cauline leaves obovate to spatulate  | 12. <i>E. sublyratus</i> -   |
| b. Cauline leaves lanceolate to ovate-oblong   | 5                            |
| 5a. Inflorescence racemose; ligule white   | 10. <i>E. roylei</i>         |
| b. Inflorescence corymbose or panicle; ligule usually purplish                               | 1. <i>E. acer</i>            |
| 6a. Ligules 4-5 mm long  | 11. <i>E. semibarbatus</i>   |
| b. Ligules 6-9 mm long   | 6. <i>E. kumaonensis</i>     |
| 7a. Heads usually solitary   | 8                            |
| b. Heads usually more than one   | 12                           |
| 8a. Heads 1.5-2 cm in diam.  | 9                            |
| b. Heads more than 2 cm in diam.   | 10                           |
| 9a. Leaves entire  | 7. <i>E. monticolus</i>      |
| b. Leaves subentire  | 2. <i>E. angustissimus</i>   |
| 10a. Herbs, more or less glabrous, up to 30 cm high  | 4. <i>E. bellidioides</i> ✓  |
| b. Herbs, hirsute or pubescent, up to 60 cm high   | 11                           |
| 11a. Heads up to 2.5 cm in diam.   | 13. <i>E. uniflorus</i>      |
| b. Heads up to 5 cm in diam.   | 8. <i>E. multiradiatus</i> ✓ |
| 12a. Herbs, greyish; heads 5-7.5 cm across   | 14. <i>E. wightii</i>        |
| b. Herbs, not greyish; heads usually up to ca 4.5 cm across                                  | 13                           |
| 13a. Inflorescence corymbiform panicle   | 3. <i>E. annuus</i> ✓        |
| b. Inflorescence solitary or few, usually in axillary panicles or on slender scape like stem | 14                           |
| 14a. Flowers white   | 9. <i>E. pusillus</i>        |
| b. Flowers usually purplish  | 15                           |
| 15a. Herbs, usually up to 16 cm high, glabrous or sparsely hairy                             | 7. <i>E. monticolus</i>      |
| b. Herbs, 16-60 cm high, hirsute or pubescent  | 8. <i>E. multiradiatus</i>   |

1. *Erigeron acer* L., Sp. Pl. 863. 1753, 'acre'. Hook.f., *Fl. Brit. India* 3: 255. 1881 (as synonym under *E. alpinus*).

Herbs, hairy, 15-50 cm high. Basal leaves elliptic to obovate, entire or serrate at margin, 2.5-9.5 x 0.5-1 cm; cauline leaves lanceolate, sessile above. Inflorescence corymbose or panicle. Involucre ca 10 mm in diam. Involucral bracts 2-3-seriate, linear-lanceolate, 3-6 mm long, glandular or hirsute-pubescent. Florets trimorphic; ligules purplish, not exceeding the tubular florets, 3-5 mm long; female florets eligulate, ca 3 mm long; disc florets ca 5 mm long. Achenes oblanceolate, ca 2 mm long, sparsely pubescent.

*Note.* A very variable species. Most collections of *E. acer* are wrongly identified as *Erigeron alpinus* which is an European species.

## KEY TO THE VARIETIES

- |   |                              |
|---|------------------------------|
| 1a. Plants usually with dense crispate hairs              | 1.1. var. <i>acer</i>        |
| b. Plants without dense crispate hairs                    | 2                            |
| 2a. Stems usually branched from base; pappus hairs scanty | 1.3. var. <i>multicaulis</i> |
| b. Stems usually unbranched below; pappus hairs numerous  | 1.2. var. <i>khasiana</i>    |

1.1. var. *acer*

Fig. 34.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, 2400-3200m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, China and Eurasia.

1.2. var. *khasiana* (Hook.f.) Hajra *Comb. nov.* *E. alpinus* var. *khasiana* Hook.f., *Fl. Brit. Ind.* 3: 255. 1881.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: N.E. regions, Meghalaya.

Bhutan.

1.3. var. *multicaulis* (Wallich ex DC.) C.B. Clarke, *Comp. Ind.* 53. 187. 1876. *E. multicaulis* Wallich ex DC. *Prodr.* 5: 292. 1836. *E. alpinus* var. *multicaulis* (Wallich ex DC.) Hook.f., *Fl. Brit. India* 3: 255. 1881.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Temperate and alpine Himalayas, 3500-4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan, Pakistan, Nepal, Bhutan and W. Tibet.

2. *Erigeron angustissimum* Lindl. ex DC., *Prodr.* 5: 286. 1836; Hook.f., *Fl. Brit. India* 3: 256. 1881 (under doubtful species)

Stem somewhat woody at base, ascending, much branched; branches without leaves at apex, with solitary head. Leaves linear, absolutely entire, glabrous. Involucre scaly, linear, acuminate, shorter than disc; interior membranous margined. Ligules blue, 2-seriate, narrow, linear. Achenes villous.

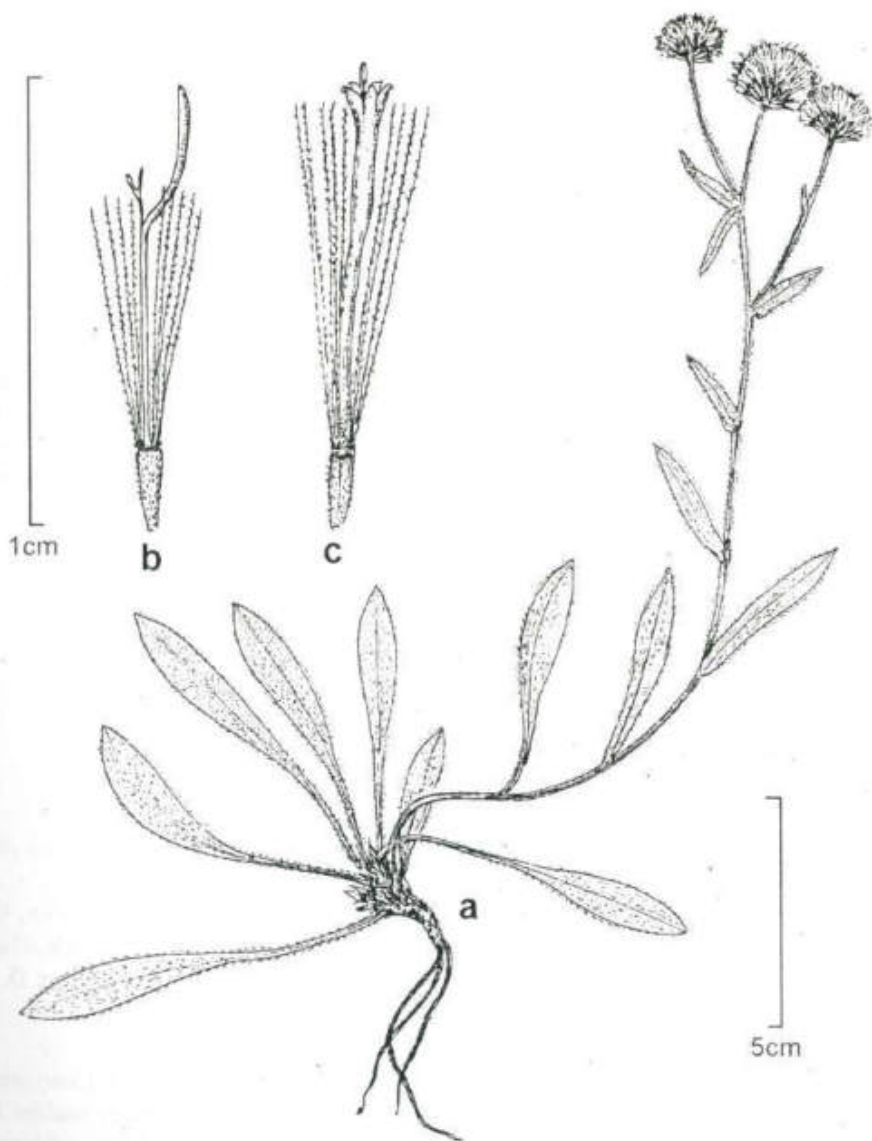


Fig. 34. *Erigeron acer* L. : a. Habit; b. Ray floret; c. Disc floret.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, Jammu & Kashmir.

Pakistan.

*Note.* No specimens are available in Indian Herbaria.

**3. *Erigeron annuus* (L.) Pers., Syn. Pl. 2: 431. 1807. *Aster annuus* L. Sp. Pl. 875. 1753. Fig. 35.**

Herbs, 50-75 cm (or sometimes more) high, sparsely hirsute. Basal leaves broadly ovate or obovate, dentate or subentire at apex, ca 5.5 x 2.5 cm, sparsely appressed hairy, lower cauline leaves ovate-lanceolate; upper lanceolate. Heads 3-many, in corymbiform panicle. Florets dimorphic. Ligules white or pale blue, twice as long as involucre bracts. Disc florets yellow. Achenes ca 1 mm long, minutely pubescent. Pappus of disc achenes double; outer series of minute scales; inner series of minute hairs; pappus of ray achenes of minute scales only.

*Fl. & Fr.* June - Aug.

*Distrib.* India: Himachal Pradesh, Uttar Pradesh, Sikkim and Meghalaya.

Canada, Europe, United States of America and China.

*Notes.* A very variable apomictic species, cultivated or naturalised in some places.

**4. *Erigeron bellidioides* (Buch.-Ham. ex D. Don) Benth. ex C.B. Clarke, Comp. Ind. 55. 1876; Hook.f., Fl. Brit. India 3: 256. 1881. *Aster bellidioides* Buch.-Ham. ex D. Don. Prodr. Fl. Nepal. 177. 1825. *Stenactis bellidioides* (Buch.-Ham. ex D. Don) Nees, Art. 274. 1832.**

Herbs, perennial, usually 10-30 cm high, glabrous or nearly so; stem very slender, sparingly branched. Basal leaves lanceolate, entire or coarsely toothed; cauline leaves oblong or linear-oblong, entire or crenate, sessile. Heads 0.8-2 cm across, solitary, long peduncled, with many slender purple or white ray florets. Ray florets about twice as long as disc florets. Achenes subsilky. Pappus red.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Meghalaya.





Fig. 35. *Erigeron annuus* (L.) Pers. : a. Habit; b. Ray floret; 3. Disc floret.

Nepal, Pakistan and China.

5. *Erigeron karvinskianus* DC., Prodr. 5: 285. 1836. *E. mucronatus* DC., Prodr. 5: 285. 1836.

Herbs, perennial, prostrate or decumbent, sparsely pubescent or glabrous, much branched. Leaves usually narrowly elliptic or oblanceolate, entire or 3(-5)-lobed, acute or acuminate at apex, attenuate at base, 1.0-2.5 x 0.3-0.5 cm. Heads usually 5-7 mm across, solitary; peduncles 5-10 cm long. Involucre ca 4 mm long; bracts linear lanceolate, acuminate, pubescent. Ray florets white to purplish; ligules ca 5 mm long. Disc florets yellow; corolla ca 3 mm long. Achenes ca 1 mm long, sparsely puberulous. Pappus hairs whitish, ca 2 mm long.

*Fl. & Fr.* Almost throughout the year.

*Distrib.* India: Common along the roadsides and on walls. Uttar Pradesh, Sikkim, W. Bengal, Meghalaya, Nagaland, Tamil Nadu and Kerala.

Europe, Nepal, Bhutan, Myanmar and Japan.

*Notes.* A native of Mexico, cultivated and naturalised in all hill stations of India.

6. *Erigeron kumaonensis* (Vierh.) Wendelbo in Nytt Mag. B. 1. 62. 1952. *Trimorpha kumaonensis* Vierh. in Beih. B. Centralb. 19(2): 467.t.6.f. 1. 1906.

Herbs, perennial ca 40 cm high; branches 1-4, erect, uppermost extremely short, over 4-12 cm long. Leaves remotely denticulate. Inflorescence compact. Heads medium. Ligules light blue, ca 6-9 mm long.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, alpine regions up to ca 4000 m. Himachal Pradesh and Uttar Pradesh.

Pakistan and Nepal.

*Notes.* This species is closely allied to *E. semibarbatus* DC.

7. *Erigeron monticolus* DC., Prodr. 5: 292. 1836; Hook.f., Fl. Brit. India 3: 255. 881.

Herbs, perennial, glabrous or sparsely hairy, 8-16 cm high, usually scapigerous, sometimes branching. Radical leaves rosulate, obovate-lanceolate, acute at apex, subentire

at margin. Heads solitary or few on slender scape like stem. Ligules many, twice as long as pappus.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, temperate to alpine regions. Jammu & Kashmir and Uttar Pradesh.

Afghanistan, Pakistan and Nepal.

*Notes.* No specimens of this species are available in Indian Herbaria.

8. *Erigeron multiradiatus* (Lindl. ex DC.) C.B. Clarke, *Colnp. Ind.* 56. 1876, '*multiradiatum*'; Hook. f., *fl. Brit. India* 3: 256. 1881. *Stenactis multiradiatus* Lindl. ex DC., *Prodr.* 5: 299. 1836. *Aster inuloides* D. Don., *Prodr. Fl. Nepal.* 178. 1825.

Fig. 36.

Herbs, 15-60 cm high, hirsute or pubescent; stem stout or slender, simple or branched. Leaves obovate or lanceolate, acute at apex, entire or coarsely toothed, 2.5-8 x 1-2.5 cm, sessile. Heads 3-5 cm across, very variable in size, solitary or corymbose, long stalked. Involucral bracts linear, acute, hairy with or without papery margins. Ray florets dark purple; ligule 1-1.5 cm long, spreading. Disc florets yellow. Pappus scanty.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas, 2500-4500 m, alpine meadows. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan and China.

9. *Erigeron pusillum* Nutt., *Gen.* 2: 148. 1818. '*pusillus*'; Balakr. in *Bull. Bot. Surv. Ind.* 16: 170. 1974.

Herbs or undershrubs, erects slender, 10-80 cm; stems smooth, glabrescent. Leaves cuneate at base, acute at apex, entire at margin, 4-6 x 0.2-0.5 cm, glabrous. Heads 30-50-flowered, in terminal and upper axillary panicles; peduncles slender, naked. Involucral bracts scarious margined with a purple spot near apex. Corolla white, 4-cleft; lobes obtusely triangular.

*Fl. & Fr.* April - Jan.

*Distrib.* India: N.E. Region, open grasslands, 500-1600 m. Meghalaya.

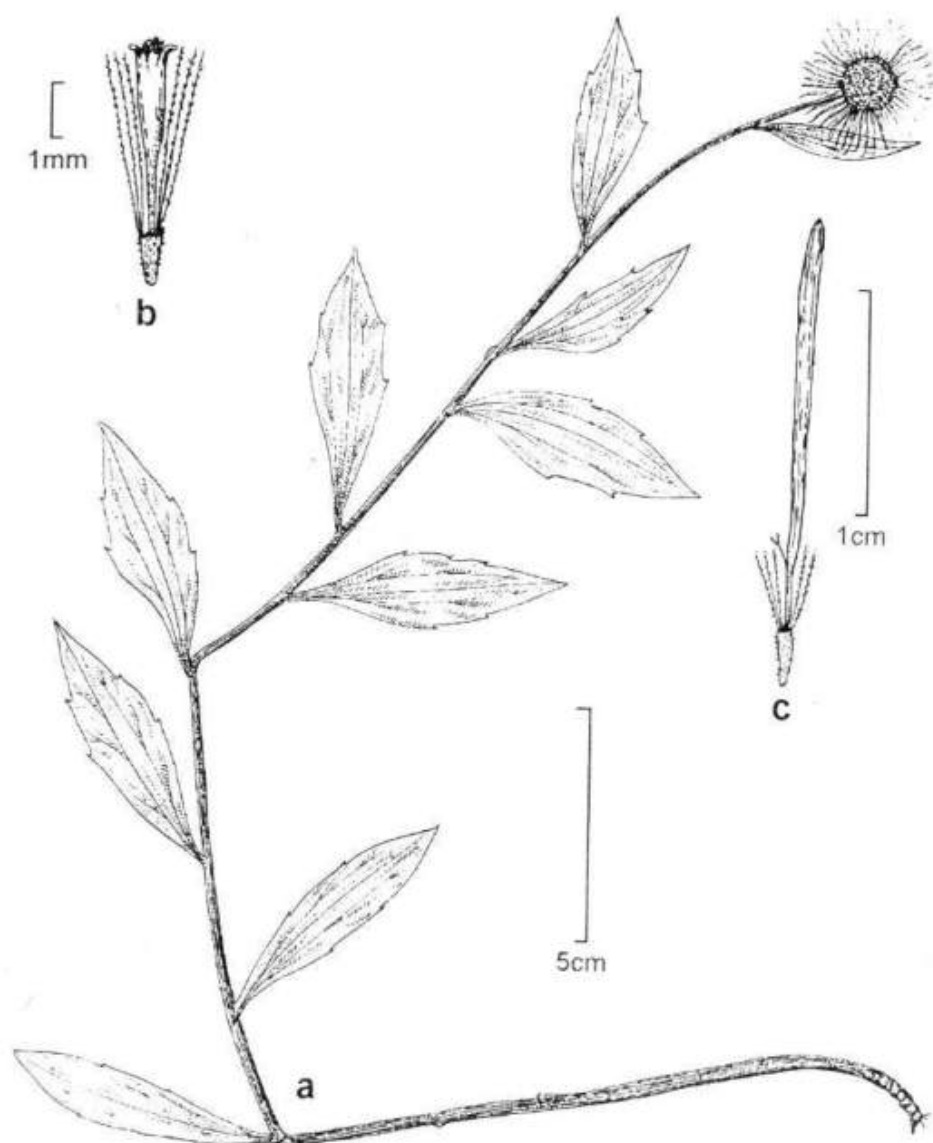


Fig. 36. *Erigeron multiradiatus* (Lindl. ex DC.) C.B. Clarke : a. Habit; b. Disc floret; c. Ray floret.

China, Japan and S. America.

*Notes.* Introduced from Tropical America.

10. *Erigeron roylei* DC., Prodr. 5: 292. 1836. *E. ellissii* Hook.f., Icones Pl. t. 1447. 1883.

Stem erect, hispid. Leaves ovate-oblong, subserrate-scabrid, ciliate, ca 5 x 1.2 cm, 3-nerved; lower leaves attenuate at base; upper sessile. Heads many, pedicellate, in raceme. Involucral bracts, hispid. Ligules of female florets white, sparingly hairy. Corolla of hermaphrodite florets hirsute. Achenes puberulous. Pappus reddish.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas. Jammu & Kashmir and Himachal Pradesh.

Pakistan.

11. *Erigeron semibarbatus* DC., Prodr. 5: 292. 1836. *E. alpinus* L. var. *semibarbatus* (DC.) Hook.f., Fl. Brit. India 3: 255. 1881.

Herbs, robust, hairy or hispid, erect, subsimple. Leaves oblong, mucronate, 5 x 1 cm, often 3-nerved; lower attenuate at base, glabrous; cauline leaves half amplexicaul or narrowed at base. Heads 1-5, 2.2-2.5 cm across or more; peduncles often thickened at top. Tube or ray florets with long hairs. Ligule blue, 160-180, ca 5 mm long. Disc florets tubular, ca 4 mm long. Achenes of ray florets villous. Pappus bristly at base, ca 5 mm long.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas. Jammu & Kashmir.

Afghanistan.

✓ 12. *Erigeron sublyratus* DC. in Wight. Contr. Bot. Ind. 9. 1834. *E. asteroides* Roxb., Fl. Ind. ed. 2. 3: 432. 1832 non Andr. ex Bassel (1921): Hook.f., Fl. Brit. India 3: 254. 1981. *Conyza aegyptiaca* (auct. non DC.) Thw. 1960. *Erigeron hispidus* DC. in Wight, Contrib. Bot. 9. 1834; et Prodr. 5: 292. 1836.

Annuals, branched, 14-60 cm high, erect or decumbent, pubescent or villous. Radical leaves obovate, petioled. Cauline leaves obovate or oblong or spatulate, broadly acute or obtuse at apex, auriculate and half amplexicaul at base, toothed or lobulate at margin, 1.2-6.5 x 0.5-2.5 cm, puberulous on both surfaces. Heads usually 0.5-1 cm across,

solitary on axillary peduncles or subcorymbose. Involucral bracts ca 5 mm long, 1-2-seriate, very narrow or linear-lanceolate, acuminate, puberulous, subscarious. Ray florets, pink or purplish, many; ligule ca 3 mm long. Disc florets yellow; corolla ca 4 mm long. Achenes narrowly obovoid, ca 1 mm long, puberulous. Pappus hairs dirty white ca 4 mm long.

*Fl. & Fr.* Apr. - July

*Distrib.* India: Common in fallow fields. Punjab, Uttar Pradesh, Sikkim, W. Bengal, Assam, Nagaland, Bihar, Orissa, Andhra Pradesh, Tamil Nadu, Karnataka and Kerala.

Nepal and Sri Lanka.

**13. *Erigeron uniflorus* L.**, Sp. Pl. 864. 1753. *E. alpinus* L. var. *uniflorus* Ledeb. Fl. Ross. 2: 490. 1845 (non Hook.f.), *Heterochaeta erigeroides* DC., Prodr. 5: 282. 1836.

Herbs, subscapigerous, hirsute. Radical leaves obovate-lanceolate; cauline linear-oblong. Heads solitary. Involucral bracts 2-3-seriate, linear-lanceolate, sometimes herbaceous, hirsute, longer than disc, recurved. Ligules numerous, linear. Achenes about as long as pappus, villous. Pappus of outer series many paleate, small.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Tibet and China.

**14. *Erigeron wightii* DC.**, Prodr. 5: 286. 1836. *E. alpinus* L. var. *wightii* (DC.) Hook.f., Fl. Brit. India 3: 255. 1881.

Herbs, stout, erect, hispid, greyish. Stems usually unbranched below. Radical leaves many, oblong-lanceolate; cauline narrowed at base. Heads 5-7.5 cm across, few, long peduncled. Ligules many-seriate, pale purplish, as long as pappus. Achenes almost glabrous. Pappus copious.

*Fl. & Fr.* April - May

*Distrib.* India: W. Ghats, upto 2000 m. Tamil Nadu.

Endemic.

## EXCLUDED SPECIES

The following species have also been mentioned from Jammu & Kashmir region (R.R. Rao *et al.* 1987), but their identification are doubtful.

*Erigeron altissimus* Stewart in Nasir et Ali, Ann. Cat. Vas. Pl. W. Pak. 744. 1972.

*Erigeron jaeschkei* Vierh. in Beih. Bot. Centralbl. 19: 491. 1906.

*Erigeron pseudohyrcanicus* Grierson ex Stewart in Nasir et Ali, Ann. Cat. Vas. Pl. W. Pak. 745. 1972.

*Erigeron swatensis* Grierson ex Stewart in Nasir et Ali, Ann. Cat. Vas. Pl. W. Pak. 746. 1972.

### 8. *Grangea* Adans.

Herbs prostrate or suberect, villous. Leaves alternate, pinnatifid. Heads, heterogamous, not rayed, subglobose or globose, terminal or leaf-opposed. Involucre broadly campanulate; bracts few-seriate. Receptacle convex or conical, naked. Outer florets female, 1-many-seriate. Disc florets bisexual, fertile. Corollas of female flowers filiform, shorter than styles; outer 2-fid; inner 2-4-fid; corollas of bisexual flowers regular, with a slender tube, limb 4-5-fid at apex. Anther bases obtuse. Style arms of disc florets flattened, cuneate-obtuse or with triangular points. Achenes flattened or subterete. Pappus cupular.

Africa, Madagascar and Asia; 6 species, 1 in India.

*Grangea maderaspatana* (L.) Poir. in Lam., Encycl. (Suppl. 2) 825. 1812; Hook.f., Fl. Brit. India 3: 247. 1881. *Artemisia maderaspatana* L., Sp. Pl. 849. 1753.

Fig. 37.

Beng.: *Namuti*; Guj.: *Jhinkimurdi*; Hindi: *Mustaru*; Mar.: *Mashipatri*; Tam.: *Mashipatri*; Tel.: *Save*.

Annuals, prostrate, spreading from centre, forming 10-30 cm broad patches; stems many, pubescent or villous. Leaves many, 2.5-6.5 cm long, sinuately pinnatifid with 2-4 pairs of opposite or subopposite lobes, smaller towards base, largest at apex, coarsely serrate-dentate at margin, pubescent on both surfaces. Heads yellow, solitary or 2-nate, on short, leaf-opposed peduncles, globose, 5-8 mm across. Involucral bracts elliptic, obtuse, rigid, densely pubescent. Achenes ca 2 mm long. Pappus a short tube with fimbriate mouth.

Fl. & Fr. March - Nov. (Dec. - June).

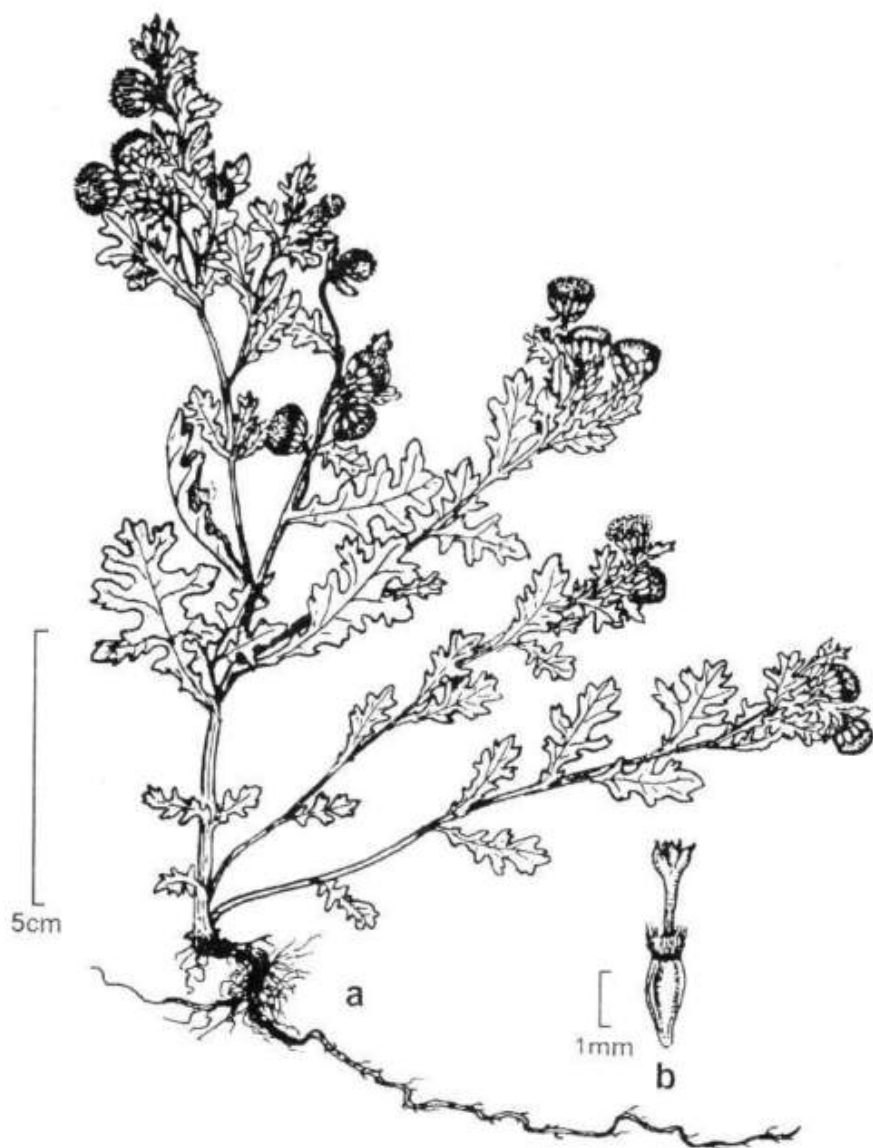


Fig. 37. *Grangea maderaspatana* (L.) Poir. : a. Habit; b. Floret.



*Distrib.* India: Throughout, in plains.

Africa, Sri Lanka, China and Malaysia.

*Notes.* Leaf juice is used in earache, obstructed menses and hysteria and in preparing antiseptic and anodyne fomentations. (Chopra *et al.*, 1956).

### 9. *Heteropappus* Less.

Herbs, annual, biennial or perennial, usually appressed strigose-pubescent and glandular hairy. Leaves linear, oblanceolate or spatulate; nerves indistinct. Heads solitary or in loose terminal racemes or corymbs. Involucral bracts 2-3-seriate, linear-lanceolate with scarious margins. Receptacle slightly convex, foveolate. Ray florets, blue or mauve, usually ligulate. Disc florets yellow, tubular, 5-lobed of unequal length (4 short, 1 long). Style appendages deltoid. Achenes obovate, compressed. Pappus of equal length on all achenes.

E. Asia, Himalayas, Tibet and Iran; ca 6 species, 3 in India.

*Literature.* GRIERSON, A.J.C. (1964) A revision of the Aster of the Himalayan area. *Notes Roy. Bot. Gard. Edinb.* 26(1): 147.

#### KEY TO THE SPECIES

- |   |                                 |
|---|---------------------------------|
| 1a. Ray florets absent                            | 3. <i>H. holohermaphroditus</i> |
| b. Ray florets present                            | 2                               |
| 2a. Leaves entire; involucral bracts ca 6 mm long | 2. <i>H. gouldii</i>            |
| b. Leaves crenate; involucral bracts ca 1 cm long | 1. <i>H. crenatifolius</i>      |

1. *Heteropappus crenatifolius* (Hand.-Mazz.) Grierson in *Notes Roy. Bot. Gard. Edinb.* 26(1): 152. 1964. *Aster crenatifolius* Hand.-Mazz. in *Acta Hort. Gotob.* 12: 217. 1938 (p.p.).

Herbs, glandular-puberulent, branched, 15-40 cm high. Leaves oblanceolate or spatulate, obtuse or acute at apex, attenuate at base, crenately toothed 3-4 x 0.8-1 cm. Heads solitary, ca 1.5 cm across. Involucral bracts green, 2-3-seriate, ca 1 cm long, lanceolate, glandular puberulent. Ray-florets many, tubes ca 2 mm long; ligule mauve or blue, ca 1 cm long. Disc florets yellow, ca 5 mm long; tubes ca 1.5 mm long, lobes unequal. Style appendages triangular. Achenes pale brownish, obovate, ca 2 mm long. Pappus brownish, simple, ca 4 mm long.

*Fl. & Fr.* May - June.

*Distrib.* India: E. Himalayas, ca 2600 m. Sikkim.

Nepal, Tibet and China.

2. *Heteropappus gouldii* (C.E.C. Fischer) Grierson in *Notes Roy. Bot. Gard. Edinb.* 26(1): 153. 1964. *Aster gouldii* C.E.C. Fischer in *Kew Bull.* 286. 1938.

Herbs, 8-25 cm high, spreading, branched, hispidulous or appressed strigose. Leaves linear, oblanceolate or spatulate, obtuse or acute at apex, attenuate at base, 1-3 x 0.3-0.6 cm, appressed hairy, sessile or subsessile. Heads solitary or many, ca 1.5 cm across. Involucral bracts green, 2-3-seriate, ca 6 mm long, herbaceous. Ray florets 20-40, tubes ca 2 mm long; ligule, lilac or blue, ca 1.0 cm long. Disc florets yellow, 3-4 mm long; tubes ca 1 mm long, lobes unequally divided. Achenes obovate ca 2 mm long. Pappus reddish brown simple, ca 3 mm long.

*Fl. & Fr.* Jun. - Sept.

*Distrib.* India: E. Himalayas, upto 5540 m. Sikkim.

Tibet.

**3. *Heteropappus holohermaphroditus*** Grierson in Notes Roy. Bot. Gard. Edinb. 26(1): 155. 1964. Fig. 38.

Herbs, 20-40 cm high; stems simple, pubescent, many from woody base. Leaves oblanceolate, spatulate or broadly linear, oblanceolate, obtuse and mucronate at apex, attenuate at base, entire, 1-2.5 x 0.3-0.5 cm, minutely pilose, sessile. Heads 1-3, 1-1.5 cm across; peduncle 1-5 cm long. Involucral bracts 1-2-seriate, ca 6 mm long. Ray florets absent. Disc florets yellow, ca 5 mm long; yellow, tubes ca 1 mm long; lobes 1-2 mm long. Style appendages lanceolate ca 4 mm long. Achenes pale brown, obovate, ca 3 mm long, sparsely glandular. Pappus reddish brown simple, ca 4 mm long.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, upto ca 3000 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan.

### 10. *Kalimeris* Cass.

Herbs, perennial, erect, branched, sparsely appressed glandular, pubescent. Leaves alternate. Heads heterogamous, solitary or in lax panicles. Involucral bracts 2-3-seriate, imbricate. Ray florets female, ligulate. Disc florets hermaphrodite, tubular, 5-lobed. Anther bases obtuse, entire. Style arms flattened. Achenes compressed, margins thickened or winged. Pappus short, subpaleaceous.

Asia and N. America; ca 12 species, 1 in India.

*Kalimeris indica* (L.) Sch.-Bip., Zoll. Syst. Verz. Ind. Archip. 125. 1854-55.  
*Boltonia indica* (L.) Benth. Fl. Hongk. 174. 1861; Hook. f., Fl. Brit. India 3: 249. 1881.  
*Aster indicus* L., Sp. Pl. 876. 1753.

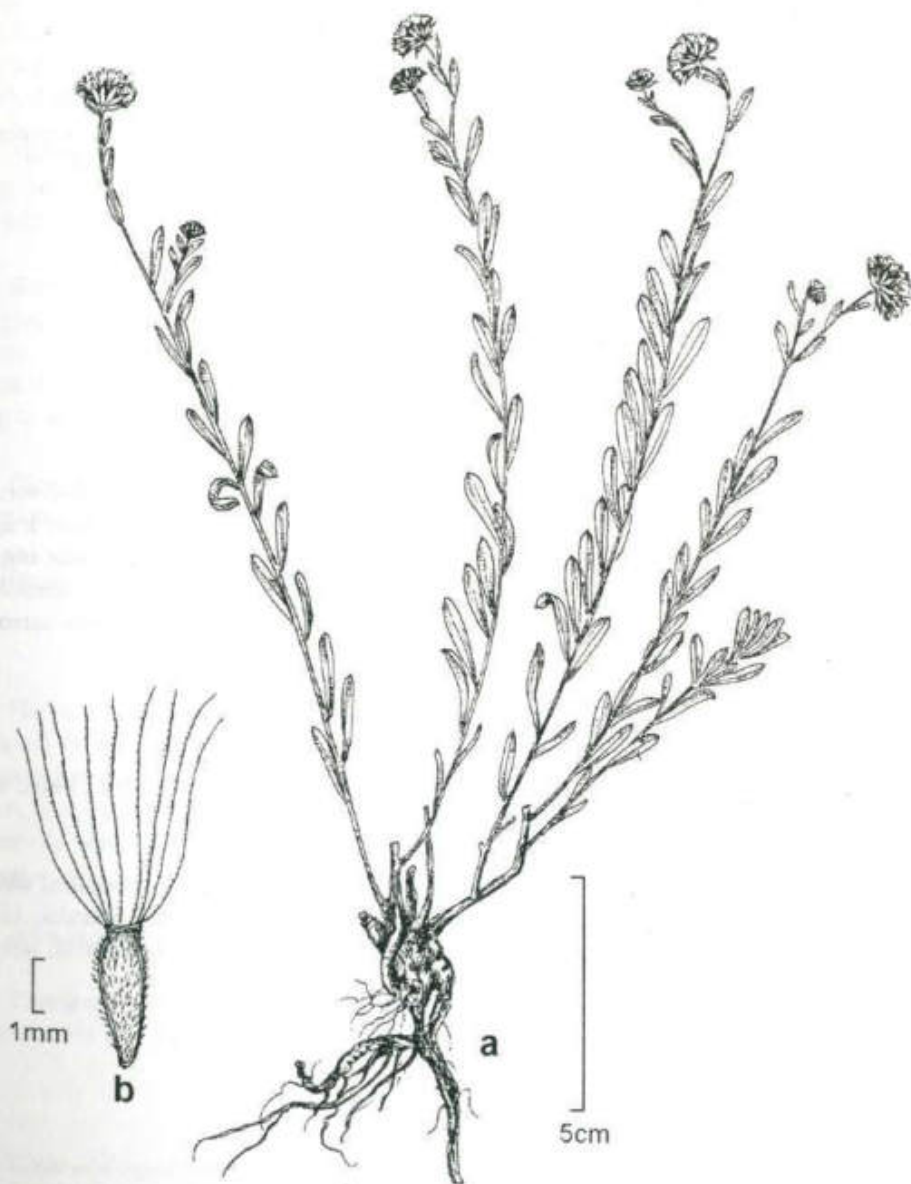


Fig. 38. *Heteropappus holohermaphroditus* Grierson : a. Habit; b. Achene.

Herbs, branched, 30-60 cm high, striate. Leaves oblong-lanceolate, acute at apex, margin 2-6-toothed above middle, 3-6 x 0.6-1.5 cm, glabrescent or sparsely pubescent. Heads many, ca 1 cm across, on leafy branches. Involucral bracts oblanceolate, 2-4 mm long, acute or obtuse, glabrous or sparsely pubescent. Ray florets many; tubes 1-2 mm long; ligule ca 1 mm long. Disc florets ca 3 mm long, tube ca 1 mm long. Achenes ca 2 mm long, finely pubescent. Pappus scales minute, connate below, awned.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Manipur.

China and Myanmar.

### 11. *Lagenifera* Cass.

Herbs, scapigerous. Heads heterogamous, solitary. Involucral bracts sub-2-seriate. Receptacle convex, naked. Ray florets female, fertile 1-3-seriate, ligule white, long or short. Disc florets bisexual, often sterile, tubular, limb 5-cleft. Anther bases obtuse, entire. Style arms of bisexual flowers narrow, flattened, tips triangular or lanceolate. Achenes of ray florets compressed, beaked, margins thickened; of disc florets narrower and sterile. Pappus absent.

C. America, Japan, Borneo and Australia; ca 30 species, 1 in India.

*Lagenifera stipitata* (Labill.) Druce in Rep. Bot. Exch. Club. Brit. 1916. 630. 1917. *Bellis stipitata* Labill. Pl. Nov. Holl. 2: 55.t. 205. 1806.

Herbs, pubescent with thick fibrous rootstock. Leaves radical or subradical oblong or obovate, sinuate-toothed, 2.5-5 cm, pubescent. Scape 7.5-10 cm long, slender. Heads ca 4 mm across. Involucral bracts linear. Ligules white, short. Achenes ovoid, oblong, beak glandular.

*Distrib.* India: N.E. region, ca 2000 m. Meghalaya

S.E. Asia, Sri Lanka and Australia.

### 12. *Microglossa* DC.

Shrubs, subscaudent. Leaves alternate. Heads heterogamous, small, corymbose. Ray florets female, fertile, 1-many-seriate; ligules white, minute. Disc florets few or many, bisexual, fertile, tubular; limb dilated, 3-4-fid. Involucre campanulate; bracts many-seriate, narrow; outer shorter. Receptacle flat, naked or nearly so. Anther bases obtuse,

entire. Style arms of female flowers flattened, tips long, lanceolate. Achenes angled. Pappus hairs copious, slender, 1-2-seriate.

China, Myanmar, Malay Island; 1 in India.

*Microglossa pyrifolia* (Lamk.) O. Kuntze, Rev. Gen. Pl. 1: 353. 1891. *Conyza pyrifolia* Lamk. Encycl. 2: 89. 1786. *M. volubilis* DC., Prodr. 5: 320. 1836; Hook.f., Fl. Brit. India 3: 257. 1881.

Shrubs, rambling, branches grooved. Leaves ovate-lanceolate, obscurely toothed at margin, 3.5-6.0 cm long, glabrous or pubescent beneath, petioled. Heads ca 8 mm across, numerous, clustered on branches of rounded corymbs, peduncled. Involucral bracts lanceolate. Ligules very minute. Achenes compressed, 4-angled, puberulous. Pappus red, ca 3 mm long, much longer than minute achenes.

*Distrib.* India: E. Himalayas and N.E. region. Sikkim, Meghalaya, Manipur, Nagaland, and Mizoram.

Bangladesh, Myanmar, China and Malay Island.

### 13. *Myriactis* Less.

Herbs, annual. Leaves alternate, toothed. Heads white heterogamous, loosely paniced or solitary. Ray florets 2-many-seriate, female, fertile, small, ligulate; ligule spreading or revolute. Disc florets bisexual, fertile, tubular, 5-fid. Involucre hemispheric; bracts few-seriate, narrow, margins scarious. Receptacle broad, convex, naked. Anthers flattened, tips lanceolate. Achenes compressed, obovoid-oblong, margined. Pappus absent.

Asia and Africa; ca 10 species, 5 in India.

*Literature.* SOMDEVA, B.M. WADHWA & R. MATHUR (1981), The genus *Myriactis* Less. (Asteraceae) in W. Himalayas *Ind. J. Forestry* 4(1): 26-29.

#### KEY TO THE SPECIES

- |  |                         |
|--|-------------------------|
| 1a. Ligule of marginal flowers 2-8 mm long, linear or oblanceolate           | 2                       |
| b. Ligule of marginal flowers 0.5-1 mm long                                  | 4                       |
| 2a. Heads 1-1.5 cm across  | 2. <i>M. javanica</i>   |
| b. Heads 3-8 mm across   | 3                       |
| 3a. Ligules 2.5-3 mm long  | 5. <i>M. wightii</i>    |
| b. Ligules 7-8 mm long   | 1. <i>M. assamensis</i> |
| 4a. Marginal flowers ca 10-seriate; ligules of marginal flowers elliptic     | 3. <i>M. nepalensis</i> |
| b. Marginal flowers 3-5-seriate; ligules of marginal flowers elliptic-linear | 4. <i>M. wallichii</i>  |

1. *Myriactis assamensis* C.E.C. Fischer in Kew Bull. 35. 1940.

Herbs, much branched, sulcate, 10-25 cm high. Leaves linear oblanceolate, acute at apex, narrowed to a semiamplexicaul base, entire or 1-2-toothed at margin 1.5-2.5 x 0.2-0.3 cm. Heads solitary, hemispheric, 3-4 mm across; peduncles ca 7 cm long, slender, hispidulous. Involucral bracts 2-seriate, 2-3 mm long, thinly membranaceous, oblong-obtuse, minutely denticulate. Ray florets 2-3-seriate; ligule white, 7-8 mm long, linear. Achenes dark brown, glandular, narrowly oblanceolate, ca 3 mm long, compressed.

*Fl. & Fr.* Jan. - March.

*Distrib.* India: On rocks, ca 900 m. Meghalaya and Nagaland.

Endemic.

2. *Myriactis javanica* (Blume) DC., Prodr. 5: 308. 1836; Hook.f., Fl. Brit. India 3: 247. 1881 (As synonym). *Bellis javanica* Blume, Bijdr. 917. 1826.

Stem hairy. Basal leaves elliptic-obovate or oblong, obtusely apiculate at apex, remotely serrate-crenate; 2-8 x 1-4 cm, hairy on both surfaces, petiole up to ca 5 cm long, narrowly winged; upper leaves lanceolate-elliptic, sessile or subsessile. Heads semiglobose, 5-8 mm long, 1-1.5 cm across; peduncles long, rigid, hairy. Receptacle convex. Ligule 2-4 mm long, narrowly linear or oblanceolate, 3-4-seriate. Corolla of disc florets ca 2 mm long. Achenes 2-3 mm long.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Java.

3. *Myriactis nepalensis* Less. in Linnaea 6: 128.t. 2. 1831; Hook.f., Fl. Brit. India 3: 247. 1881.

Herbs, glabrous, or hispid stems prominently ribbed. Leaves ovate or lanceolate, coarsely serrate 5-12.5 x 2-4 cm, sessile or subsessile. Heads globose, ca 8 mm across, borne on short rigid peduncles, subpaniculate. Involucral bracts acute, reflexed. Ray florets ca 10-seriate. Disc florets few. Achenes ca 1 mm long, mucronate.

*Fl. & Fr.* June - Aug.

*Distrib.* India: Temperate Himalayas, 1,300-3,300 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Arunachal Pradesh.

Nepal, Bhutan, China, Java, Afghanistan and Iran.

4. *Myriactis wallichii* Less. in *Linnaea* 6: 129. 1831; Hook.f., *Fl. Brit. India* 3: 247. 1881. Fig. 39.

Herbs, slender, sparsely hairy, low; stem ribbed. Leaves elliptic-lanceolate, unequally serrate, 1.5-6.5 x 1-2.5 cm, hispidulous on both surfaces; petiole narrowly winged, 1-4 cm long; upper leaves sessile. Heads semiglobose, ca 6 mm across, on slender pedicels, forming a wide paniculate inflorescence. Involucral bracts erect. Marginal flowers 3-5-seriate, elliptic-linear. Receptacle convex. Achenes ca 2 mm long, flat, smooth.

*Fl. & Fr.* June - Aug.

*Distrib.* India: Temperate Himalayas, 3000-4000 m. Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal and Java.

*Notes.* Very closely allied to *M. nepalensis* Less. Some authors (Collett, *Fl. Siml.* 249. 1921) have merged the species with *M. nepalensis*.

5. *Myriactis wightii* DC. in *Wight, Contrib. Bot.* 10. 1834; et *Prodr.* 5: 308. 1836; Hook.f., *Fl. Brit. India* 3: 247. 1881.

Herbs, erect, hirsute-pubescent or villous, (10-15) 60-90 cm high. Lower leaves ovate or lyrate, or obovate - spatulate, 2.5-10 cm, long petioled; upper obovate-oblong, entire or distantly serrate, auricled at base, sessile, sparsely pubescent on both surfaces. Heads 6-8 mm across, long peduncled. Involucral bracts ca 4 mm long, acute or obtuse at apex, scarious at margin, pubescent. Ligule white at first, becoming purplish 2.5-3 mm long, linear, Disc florets yellow, ca 2 mm long. Achenes ca 2 mm long, shortly beaked, oblanceolate, glabrous.

#### KEY TO THE VARIETIES

- 1a. Herbs, pubescent or villous, 60-90 cm high; basal leaves ovate or lyrate, distantly serrate 5.2. var. *wightii*  
 b. Herbs, hirsute, 10-15 cm high; basal leaves, rosulate, obovate-spathulate, quite entire 5.1. var. *bellidioides*

5.1. var. *bellidioides* Hook.f., *Fl. Brit. India* 3: 246. 1881.

*Fl. & Fr.* Oct. - Nov.

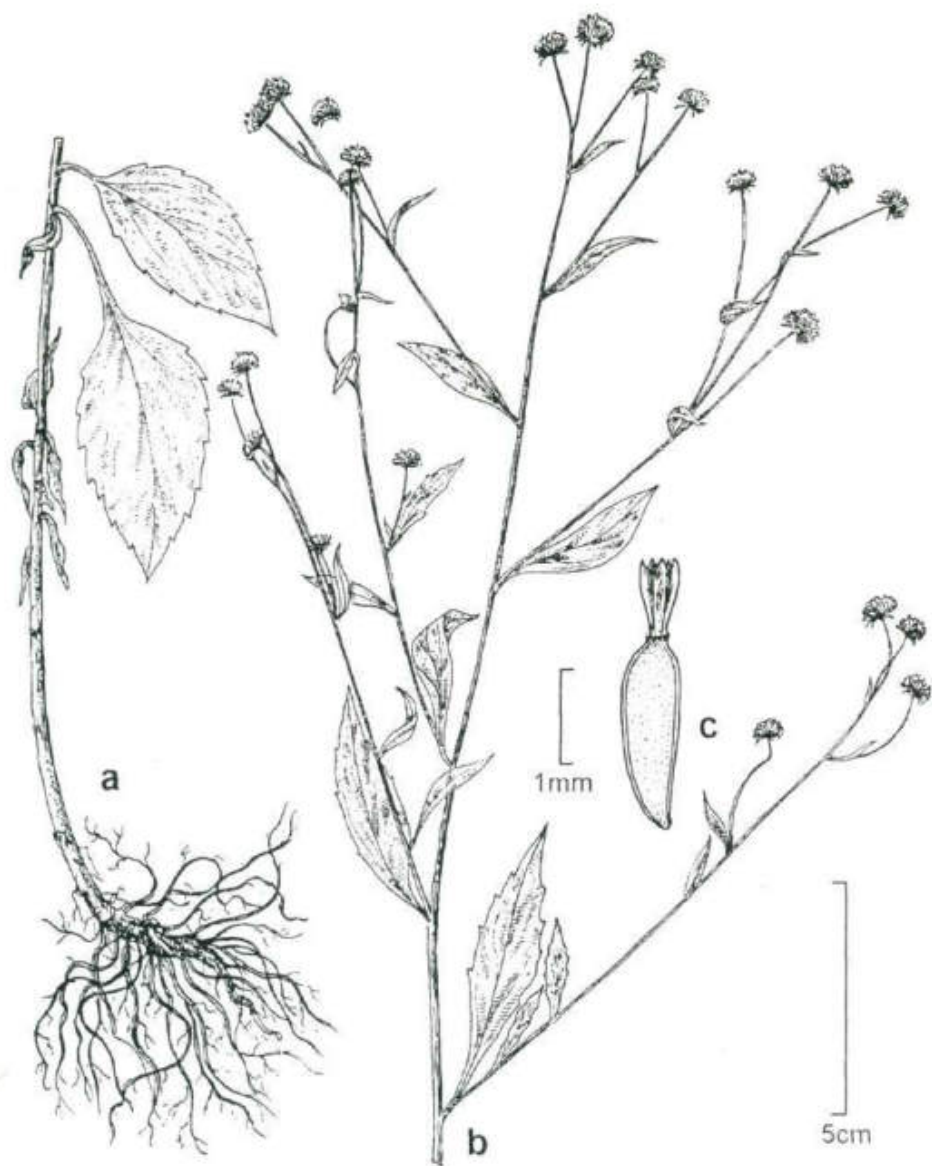


Fig. 39. *Myriactis wallichii* Less. : a. & b. Habit; c. Floret.



*Distrib.* India: ca 2600 mm. Tamil Nadu.

Endemic.

**5.2. var. wightii**

*Fl. & Fr.* April - Aug.

*Distrib.* India: Tamil nadu.

Sri Lanka.

**14. Psiadia Jacq.**

Trees, shrubs or rarely lianas. Leaves alternate, simple, entire or dentate. Heads heterogamous, usually radiate, in corymbs or panicles. Involucre campanulate, many-seriate; bracts scarious at margins. Receptacle convex, naked. Female flowers eligulate or ligulate, ligules small. Disc florets hermaphrodite, tubular-campanulate, 5-lobed. Anthers obtuse at base. Style branches with short appendages. Achenes of female flowers oblong, angular, 3-5-ribbed. Achenes of disc florets sterile. Pappus uniseriate, scabrous.

Africa, Madagascar, Sri Lanka; ca 60 species, 1 in India.

*Psiadia ceylanica* (Arn.) Grierson in Ceyl. J. Sci. Biol. 10: 52. 1972. *Solidago ceylanica* Arn. Nov. Acta. Phys. Mad. Acad. Caes. Leop. Contrib. Nat. Cur. 18: 347. 1836. *Microglossa zeylanica* (Arn.) benth. in Benth. ex Hook.f., Gen. Pl. 2: 282. 1873; Hook.f., Fl. Brit. India 3: 257. 1881.

Shrubs, erect, 1-3 m tall, branches grooved, whitish pubescent when young. Leaves narrowly lanceolate, serrulate or entire at margin, 7.5-10.0 cm long, hoary beneath, petioles 6-8 mm long. Heads ca 3 mm across, many, small, crowded on branches of spreading corymbs. Involucral bracts broadly linear; obtuse, very small. Ligules short, suberect. Achenes ca 1 mm long, angled, hairy. Pappus red, ca 2.5 mm long, twice as long as achenes.

KEY TO THE VARIETIES

- 1a. Leaves distinctly petioled  
b. Leaves sessile or nearly so

- 14.2. var. *ceylanica*  
14.1. var. *beddomei*

**14.1. var. beddomei** (Gamble) Chandrasekaran in Henry *et al.* Fl. Tamil Nadu 2: 46. 1987. *Microglossa zeylanica* var. *beddomei* Gamble. Fl. Madras 2: 479. 1957 (rep. ed.).

*Distrib.* India: Tamil Nadu.

Endemic.

### 1.2. var. *ceylanica*

*Distrib.* India: W. ghats & Deccan region. Kerala and Tamil Nadu.

Sri Lanka.

## 15. *Psychrogeton* Boiss.

Herbs, usually perennial; stems scapose or subscapose. Basal leaves lanceolate, oblanceolate, obovate or rotund, usually petiolate; cauline leaves entire or dentate. Heads usually solitary or few, 1-1.5 cm across, rarely racemose or corymbose. Involucral bracts 1-3-seriate; outer herbaceous; inner scarious margined. Ray florets tubular or ligulate, many; ligule white, yellow or reddish. Disc florets hermaphrodite, few or many. Style of female flowers linear; those of disc florets lanceolate, unappendaged. Achenes usually obovate or oblanceolate. Pappus simple or with few outer bristles.

India, Pakistan, Afghanistan, Persia, Turkistan, Pamir-Hindukush region; 29 species, in India.

1. *Psychrogeton andryaloides* (DC.) Novopkr. ex Krasch. in Acta Inst. Bot. Acad. Sci. U.R.S.S. Ser. 1. Fasc. 3: 343. 1937. *Conyza andryaloides* DC., Prodr. 5: 377. 836. *Erigeron andryaloides* (DC.) Benth. ex C.B. Clarke, Comp. Ind. 52. 1876; Hook.f., Fl. Brit. India 3: 255. 1881.

Herbs, perennial, very stout, densely softly tomentose or woolly, with woody outstock. Leaves spatulate, entire or lobulate at margin, 2.5-5 cm long, densely rounded, petioled. Scapes ca 4 mm long with one or two small linear leaves or without leaves. Heads ca 1.5 cm across. Involucral bracts linear, acute, woolly or pubescent. Ligules short, broad, revolute. Achenes ca 4 mm long, flat, narrow, silky. Pappus white, turning reddish, 1-seriate.

### KEY TO THE VARIETIES

- a. Plants mostly glabrous and glandular
- b. Plants mostly greyish or whitish tomentose
- a. Rays white
- b. Rays yellow

15.2. var. *denudatus*

2

15.1. var. *andryaloides*

15.3. var. *poncinsii*

### 15.1. var. *andryaloides*

Fig. 40.

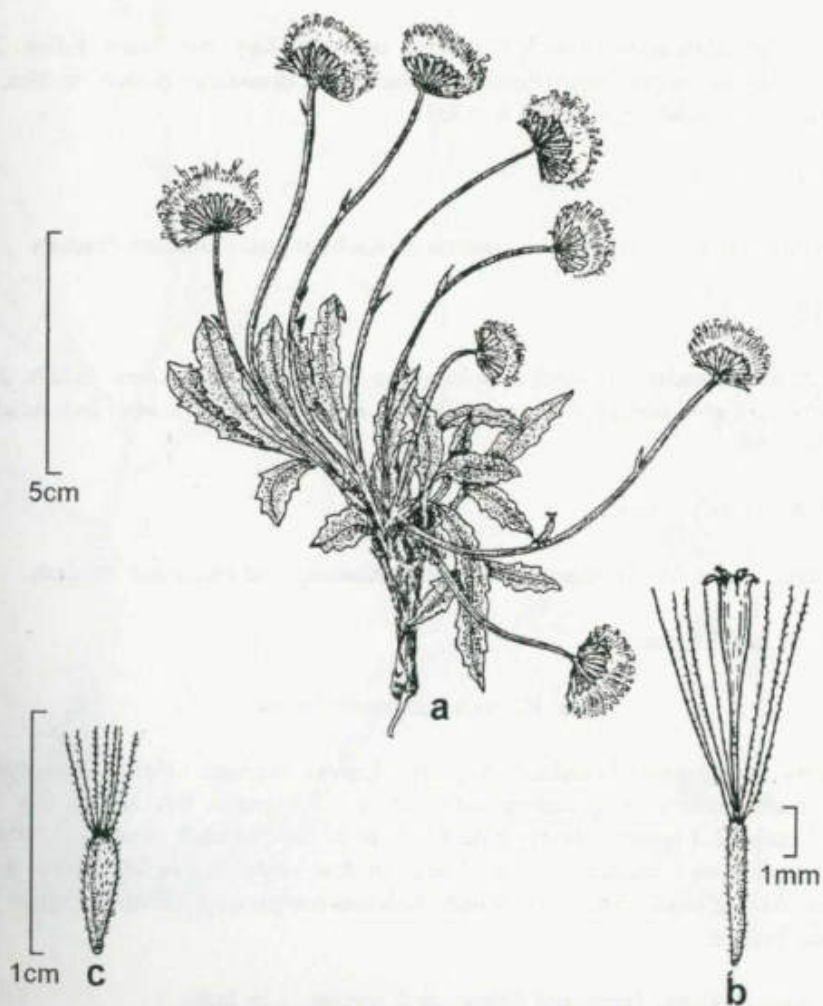


Fig. 40. *Psychrogeton andryaloides* (DC.). Novopkr. ex Krasch. : a. Habit; b. Floret; c. Achene.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh

Tibet and C.I.S.

**15.2. var. *denudatus*** (Botsch.) Grierson in Notes. Roy. Bot. Gard. Edinb. 27(2): 115. 1967. *Erigeron poncinsii* (Franch.) Botsch. var. *denudatus* Botsch. in Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 6. 1959.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir and Himachal Pradesh.

C.I.S.

**15.3. var. *poncinsii*** (Franch.) Grierson in Notes Roy. Bot. Gard. Edinb. 27 (2): 115. 1967. *Erigeron poncinsii* (Franch.) Botsch. in Bot. Syst. Herb. Inst. Bot. Acad. Sci. URSS 6. 1969.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir and Himachal Pradesh.

C.I.S. and Afghanistan.

## 16. *Rhynchospermum* Reinw.

Herbs, puberulous; branches spreading. Leaves alternate. Heads heterogamous, rayed, small, axillary, in spreading leafy panicles. Receptacle flat, naked. Ray florets white, female, 2-3-seriate, shortly ligulate. Disc florets bisexual; tube short, limb 4-5-cleft, campanulate. Involucre short; bracts in few series, lanceolate, with scarious margins. Anther bases obtuse or 2-lobed. Achenes compressed, beaked. Pappus of 3-8 caducous bristles.

E. Asia, Malaya, Japan and China; ca 2 species, 1 in India.

***Rhynchospermum verticillatum*** Reinw. in Syll. Pl. Nov. Ratisbon 2: 8. 1828; Hook.f., Fl. Brit. India 3: 248. 1881.

**Fig. 41.**

Herbs, erect, 60-90 cm high; branches very slender. Leaves lanceolate, acuminate at apex, narrowed at base, entire or coarsely toothed at margin, 2.5-11 x 0.8-3.0 cm,



Fig. 41. *Rhynchospermum verticillatum* Reinw. : a. & b. Habit; c. Disc floret; d. Ray floret.

membranous. Heads ca 4 mm across; peduncle 0.5-1.5 cm long, rigid, stout, axillary, often bracteate. Involucral bracts in few series, lanceolate, margins scarious. Flowers all white or those of the disc pale yellow.

*Fl. & Fr.* July - Oct.

*Distrib.* India: Temperate Himalayas and N.E. region 1300-2600 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Arunachal Pradesh, Meghalaya and Nagaland.

Bhutan, Myanmar, Japan and Malaya Island.

### 17. *Solidago* L.

Herbs, perennial, glabrous or pubescent. Leaves alternate, linear, obovate or oblong-lanceolate, usually chartaceous. Heads yellow, heterogamous, rayed, usually in scorpioid cymes. Receptacle small, usually pitted. Ray florets few, 1-seriate, female, ligulate. Disc florets tubular, 5-fid. Involucre oblong or campanulate; bracts many-seriate, coriaceous. Anther base obtuse. Style arms of bisexual flowers flattened, tips lanceolate. Achenes alternate or angled, 8-12-ribbed. Pappus hairs 1-2-seriate, slender, scabrid.

Eurasia and America; ca 100 species, 4 in India.

*Literature.* HOFFMAN, O. (1890). *Compositae*. In Engler & Prantl. *Nat. Pflanzenfam.* IV. 5: 150. OHWI (1956). *Flora of Japan* P. 1150. RANI, N. & K.M. MATHEW, (1983). In *Matthew Fl.* Tamil Nadu-Carnatic 3(2): 813.

#### KEY TO THE SPECIES

- |   |                          |
|---|--------------------------|
| 1a. Inflorescence recurved or spreading; head minute, ca 2 mm across    | 1. <i>S. canadensis</i>  |
| b. Inflorescence erect, not recurved or spreading; heads 4-15 mm across | 2                        |
| 2a. Heads usually 4 mm across; ray florets minute                       | 3. <i>S. microglossa</i> |
| b. Heads usually 10 mm across; ray florets conspicuous                  | 3                        |
| 3a. Radical leaves usually not decurrent into a long petiole            | 4. <i>S. virgaurea</i>   |
| b. Radical leaves usually decurrent into a long petiole                 | 2. <i>S. decurrens</i>   |

1. *Solidago canadensis* L., Sp. Pl. 878. 1753.

Eng.: *Goldenrod*.

Herbs, glabrous or pubescent, 0.3-1.5 m high, stolons horizontal; stem simple, pubescent. Leaves linear-lanceolate, distantly serrate, narrowed at base, 5-12.5 x 0.5 x 1.5 cm, deep green above, sessile or lower leaves petioled, 3-nerved, pubescent or scabrid above, pubescent beneath. Inflorescence spreading or recurved (cincinnoid racemes), racemes forming large panicles, 15-25 cm long. Heads yellow, 2-4 mm across.

Involucral bracts 2-seriate, lanceolate, 2-5 mm long, Corolla ca 4 mm long. Achenes ca 1-2 mm long, hairy. Pappus almost equalling corolla, 1-seriate, strigose.

*Fl. & Fr.* Oct. - Dec.

*Distrib.* India: On hill slopes, upto 1800 m along the roadsides, near human settlements or along the water course. Cultivated throughout India. Also found as an escape.

*Notes.* A native of North America, mostly grown as an ornamental plant.

2. *Solidago decurrens* Lour., Fl. Cochinch. 501. 1790. *S. pubescens* Wallich, Num. List No. 3226. *S. virgaurea* L. var. *pubescens* (Wallich) C.B. Clarke, Comp. Ind. 35. 1876. *S. virgaurea* L. var. *leiocarpa* (Benth.) A Gray in Mem. Amer. Acad. n.s. 6(1): 393. 1857. *Amphirhapis leiocarpa* Benth. in Hook. London J. Bot. 1: 488. 1842. *S. virgaurea* var. *glabriuscula* C.B. Clarke., Comp. Ind. 35. 1876; Hook.f., Fl. Brit. India 3: 245. 1881.

Herbs, 12-35 cm high; stem erect, somewhat woody, glabrous or nearly so, simple. Radical leaves broadly lanceolate, subcrenate at margin, decurrent into long petiole. Inflorescence oblong, bracteate. Involucral bracts linear-lanceolate. Ligules about 7. Achenes glabrous or pubescent when young. Pappus hairs slender.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Himalayas and N.E. region, 1800-3000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Meghalaya.

Nepal.

*Notes.* Hooker (1881) treated two varieties under *S. virgaurea*, namely *pubescens*, and *leiocarpa*. As there are no clearcut distinctions between the two, these varieties have been merged under *S. decurrens* by some workers. As the types have not been examined the latter treatment is followed here.

3. *Solidago microglossa* DC., Prodr. 5: 332. 1836; N. Rani & Matthew in Matthew Fl. Tamil Nadu Carnatic 3(2): 813. 1983.

Herbs, ca 75 cm high. Leaves obovate-lanceolate, acute at apex, cuneate at base, entire or serrate at margin, 5-10 x 0.5-1.5 cm, chartaceous, scabrid, pubescent, sessile. Inflorescence a panicle. Heads yellow, heterogamous, crowded, ca 4-5 mm across. Involucral bracts multiseriate, pubescent; inner ca 3 mm long; outer smaller. Ray florets

female, multiseriate; inner bisexual. Corolla ca 2 mm across; tube ca 4 mm. Stamens exerted; anthers ca 1.5 mm long, sagittate. Ovary ca 1 mm, linear, pubescent; style ca 5 mm long. Achenes angled or ribbed, pubescent. Pappus 1-seriate, ca 4 mm long, barbellate.

*Fl. & Fr.* July - Aug.

*Distrib.* India: Karnataka and Tamil Nadu (introduced).

Native to Brazil.

4. *Solidago virgaurea* L., Sp. Pl. 880. 1753; Hook.f., Fl. Brit. India 3: 245. 1881.

Fig. 42.

Herbs, erect, 30-60 cm high, pubescent, usually unbranched. Lower leaves oblong-lanceolate, toothed, acute at apex, narrowed at base 7-12 x 3-5.5 cm, pubescent, petiole 3-11 cm long; upper leaves ovate-lanceolate, entire or toothed, 4-9 x 0.5-2 cm, sessile or shortly petioled. Inflorescence axillary or terminal, leafy, in spike like cluster, 5-25 cm long. Heads yellow, 1-4, 0.5-1.5 cm across. Involucral bracts 5-8 mm long, narrow, acute. Ray florets 8-12 mm long. Disc florets ca 8 mm long. Achenes pubescent, 1-2 mm long. Pappus hairs slender.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Himalayas and N.E. region, in *Quercus-Rhododendron* forests and in moist open places, 3000-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Assam and Meghalaya.

Asia, Europe, Pakistan and Nepal.

*Notes.* Very variable species and closely allied to *S. decurrens*.

### 18. *Thespis* DC.

Herbs, annual, branched, glabrous. Leaves alternate, toothed. Heads yellow, heterogamous, disciform, minute, globose. Involucre hemispheric; bracts broad, obtuse, herbaceous, sub-2-seriate; receptacle flat or convex, naked. Outer florets female, many-seriate. Disc florets neutral, few, regular; tube very short, limb narrowly campanulate, 4-fid. Anther bases obtuse, entire or 2-fid. Style arms short, flattened, subacute. Achenes small. Pappus hairs ca 10, short, dilated.

Nepal, Bangladesh, Myanmar, Tenasserim, Thailand and India; ca 3 species, 1 in India.



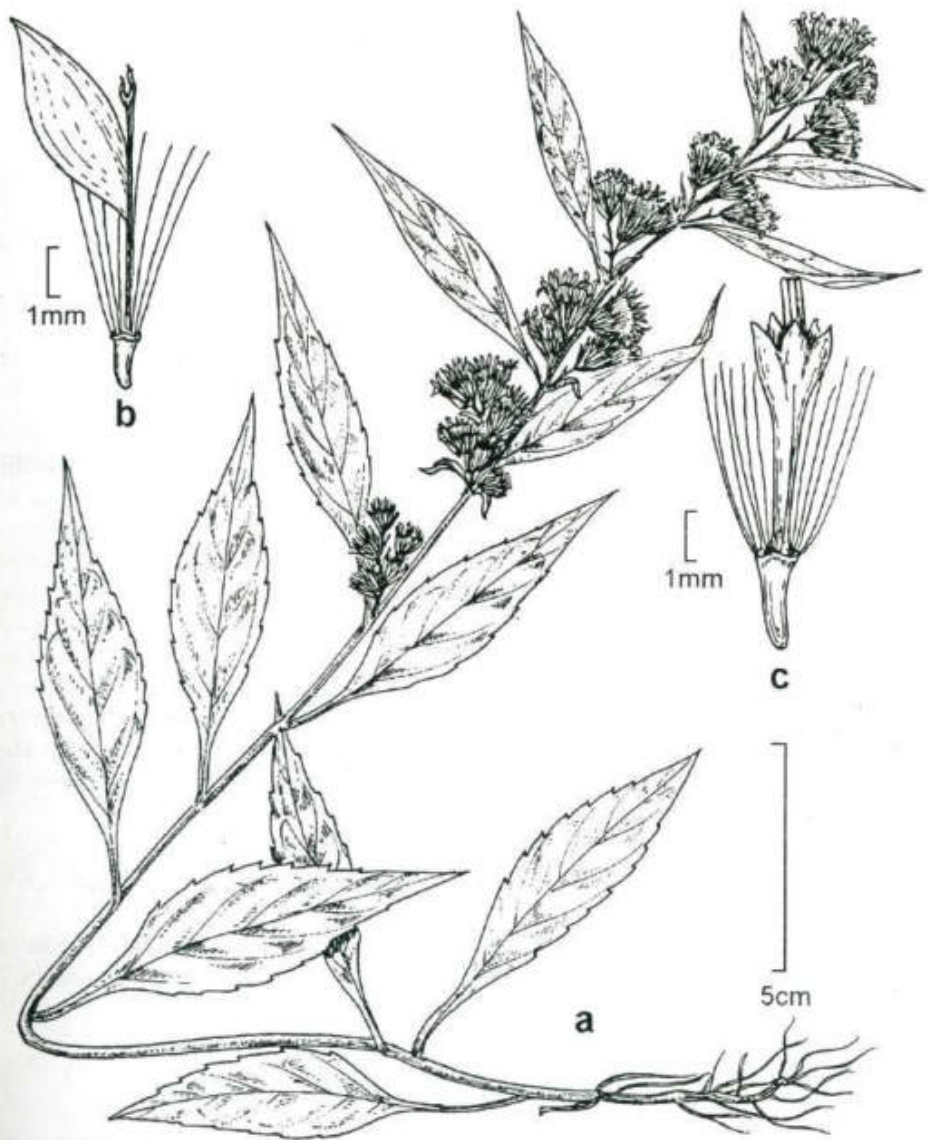


Fig. 42. *Solidago virgaurea* L. : a. Habit; b. Ray floret; c. Disc floret.

*Thespis divaricata* DC., in Guill. Arch. Bot. 2: 517. 1833; *et* Prodr. 5: 376. 1836; Hook.f., Fl. Brit. India 3: 259. 1881. *Cotula divaricata* Wallich Cat. 3238 A. 1831 (*nom. nud.*). *Cotula sinapifolia* Roxb. in Wallich. Cat. 3287 G. *Thespis erecta* DC., Prodr. 5: 375 1836.

Herbs, glabrous or setulose, 7-60 cm high; branches spreading. Leaves elliptic to oblong or obovate, toothed, attenuate at base, 1.5-4.5 cm; petiole 1.5-4 cm long. Heads ca 3-5 mm across, crowded. Ray florets fertile, often without corolla. Disc florets sterile. Involucral bracts ovate, obtuse with 3 distinct nerves. Achenes very small, slightly margined, minutely papillose.

*Fl. & Fr.* May - June.

*Distrib.* India: Uttar Pradesh, Sikkim, Assam, Meghalaya and Tripura.

Nepal, Bangladesh, Myanmar, Tenasserim, S.W. China, Thailand and Indo-China.

#### CULTIVATED SPECIES

*Bellis perennis* L., Sp. Pl. 886. 1753.

Eng.: *True or English Daisy.*

Herbs, 7.5-15 cm high. Leaves spatulate or obovate, 2.5-5 cm long, pubescent, forming basal tuft, toothed, narrowed into a margined petiole. Heads 2.5-5 cm across; peduncle hairy. Involucral bracts oblong-obtuse, hairy. Ray florets many, linear; ligule white or rosy, incurved or reflexed.

*Distrib.* A native to W. Europe, cultivated or rarely found as an escape.

*Calotis hispidula* (F. Muell.) F. Muell. in Trans. Vist. Inst. 129. 1853; Sharma & Jamwal in Ind. J. For. 7: 333. 1984. *Cheioloma hispidulum* F. Muell. Linnaea 25: 401. 1852.

Eng.: *Hairy burr-daisy.*

Diffuse annuals, much branched; stems 3-20 cm long, slender, spreading. Leaves tapering towards base, distantly 3-toothed or entire, 3-12 x 1-3 mm. Heads heterogamous, ca 4 mm across, in fruit ca 7 mm across. Involucral bracts sub-3-seriate, lanceolate-elliptic, or hairy outside. Receptacle convex, naked, pitted. Ray florets female, ligulate; ligule yellow, minute. Disc florets yellow, bisexual, fertile, tubular, 5-toothed. Achenes dark brown, ca 2 mm long, compressed. Pappus of 5-6 stiff, spreading, distantly barbellate hairs.

*Distrib.* Australian species usually cultivated, rarely found as an escape.

3. *Vittadinia australis* A. Rich., Ess. Fl. Nouv. Zel. 261. 1832. *V. triloba* DC., Prodr. 5: 261. 1836.

*Note.* The Australian daisy, naturalised on most hill stations of India. However no specimens could be located in Indian herbaria. Some specimens so identified seem to be *Erigeron mucronatus* DC.

### Tribe 3. CALENDULEAE Cass.

(R.R. Rao)

Herbs, much branched. Leaves alternate or rarely opposite, entire, or toothed or lobed. Heads heterogamous with the ray florets (female) in 1 or 2 rows, fertile or sterile; the central disc florets bisexual, male or sterile. Receptacle naked or few setaceous. Involucral bracts usually narrow, in 2-3 rows, herbaceous or with scarios margins. Corolla mostly yellow or orange; of ray florets ligulate, trilobed, spreading or reduced; those of the disc florets five lobed and regular. Anthers terminally appendaged, sagittate at base with acute or obtuse auricles. Styles of fertile disc florets with truncate and penicillate tips. Achenes of various and irregular shapes, mostly curved and winged or sometimes thick and hard, epappose.

Chiefly African and Mediterranean; 10 genera and ca 76 species; 1 genus and 2 in India.

The Tribe Calenduleae has affinities with Cynaroideae on one hand and Senecionideae on the other, although none of them be regarded as ancestral to them.

The tribe Calenduleae has its primary centre of diversification in South Africa, where morphologically most primitive types are found. The group was first created by Cassini (1821-24) to accommodate 9 genera, six of which were established by himself. Lessing (1832) retained only the Type genus *Calendula* in Calendulae and reduced to a subtribe of the Cynareae. But Bentham (1873) again raised the Calenduleae to tribal rank, which has been followed by many other subsequent workers.

The Calenduleae has two chief centres of distribution, one Mediterranean and the other South African. The genus *Calendula* has its main distribution in Mediterranean region.

*Literature.* BENTHAM, G. (1873). Notes on the classification, history and geographical distribution of Compositae. *J. Linn. Soc. Bot.* 13: 335-577. CRONQUIST, A. (1955). Phylogeny and taxonomy of the Compositae. *Am. Midl. Nat.* 53: 478-511. SOLBRIG, O.T. (1963). Subfamilial nomenclature in Compositae.

*Taxon* 12: 229-235. SOLBRIG, O.T. (1963). The tribes of Compositae in the Southeastern United States. *J. Arn. Arb.* 44: 436-461.

### Calendula L.

Herbs. Leaves mostly alternate. Heads heterogamous with female florets (ray florets) 1-2-seriate, fertile; central disc florets sterile and another row fertile. Receptacle naked. Involucral bracts in one or two series, with scarios margins. Anthers appendaged at apex, sagittate at base with acute auricles or tails. Style branches or fertile flowers truncate, penicillate; undivided in sterile florets. Achenes irregular, incurved, often winged, epappose.

Mediterranean region, Europe, Africa, W. Asia; ca 30 species, 2 in India, one species widely cultivated.

#### KEY TO THE SPECIES

- |  |                          |
|--|--------------------------|
| 1a. Achenes not beaked, dorsally muricate; ligules orange yellow | 2. <i>C. officinalis</i> |
| b. Achenes beaked, dorsally echinate; ligules sulphur yellow     | 1. <i>C. arvensis</i>    |

1. *Calendula arvensis* L., Sp. Pl. ed. 2, 1303. 1763; Hook.f., Fl. Brit. India 3: 358. 1881.

Herbs, annual, erect, branched, 20-40 cm high, pubescent. Leaves radical and cauline; radical leaves oblong, spatulate, entire, 3-8 x 0.4-1.4 cm, hairy; upper cauline leaves more or less lanceolate or oblanceolate, amplexicaul at base. Heads terminal, peduncled, 4-6 cm across, radiate. Involucral bracts in 2 series, hairy. Ray florets female, fertile; ligulate flowers 3-lobed, exceeding the involucral bracts. Disc flowers concolorous or violet purple. Achenes 1.2-2 cm long, all incurved; those of ray florets dorsally echinate, beaked; inner muricate.

*Fl. & Fr.* March - April.

*Distrib.* India: Jammu & Kashmir.

Europe, W. Asia and China.

2. *Calendula officinalis* L., Sp. Pl. 921. 1753; Hook.f., Fl. Brit. India 3: 357. 1881.

Fig. 43.

Herbs, annual, erect, viscid pubescent. Stems angular, glandular hairy, particularly in terminal part. Leaves spatulate-obovate, semiamplexicaul at base, entire or remote denticulate, 3-6 x 1-2.5 cm. Heads pedunculate, orange yellow, 4-5 cm across. Involucral bracts lanceolate, 1-1.2 cm long acute, glandular hairy, margin scarios. Ray florets 2-3-seriate, female, fertile; ligules 3-dentate, 2-3 cm long. Disc florets 0.5-0.7 cm long,



Fig. 43. *Calendula officinalis* L. : a. Portion of the twig; b. Achenes.

sterile, 5-dentate. Anther bases sagittate. Style arms undivided. Achenes oblong, 1-1.5 cm long, curved, outer ones warty ribbed, inner ones prickly warty.

*Fl. & Fr.* March - May.

*Distrib.* India: Cultivated and often run wild near cultivated fields and fallows in Northern India, 500-900 m. Punjab, Haryana and Uttar Pradesh.

China, Pakistan, Afghanistan and Europe.

*Note.* A native of Mediterranean region, mostly grown for yellow or orange, ornamental flower heads.

#### Tribe 4. C A R D U E A E Cass.

(Cynaroideae)

(P.K. Hajra)

Herbs, mostly thistle like. Leaves alternate, sinuate, lobed or divided, rarely entire, mostly spiny or prickly. Heads mostly large, homogamous with tubular, fertile or rarely dioecious flowers. Involucral bracts imbricate in many rows, prolonged into a spine or bristle or with membranous edges. Receptacle thick, hard or fleshy, bristly or hairy, rarely naked. Corolla deeply cleft. Anthers sagittate at base, appendages elongated. Style branches short, commonly united up to the obtuse or acute tips. Achenes usually narrow or flat.

Basically northern hemisphere and old world, a few genera common in the New World in both North and South America; ca 50 genera and 1500 species, 21 genera and 119 species in India.

*Literature.* BENTHAM, G., (1873). Notes on classification, History and Geographical distribution of compositae (Cynaroideae) J. Linn. Soc. Bot. 13: 466-471.

*Note.* *Echinops*, being quite distinct from all other genera of the tribe, is often treated as a separate tribe Echinopsidae.

#### KEY TO THE GENERA

- |   |                     |
|---|---------------------|
| 1a. Heads one flowered, crowded into involucrate, globose balls | 11. <i>Echinops</i> |
| b. Heads many flowered, separate                                | 2                   |
| 2a. Leaves spiny  | 3                   |
| b. Leaves not spiny   | 10                  |

- |   |                        |
|---|------------------------|
| 3a. Involucre bracteate at base by spinous leaves; basal areole oblique or lateral                                  | 6. <i>Carthamus</i>    |
| b. Involucre not bracteate as above; basal areole horizontal  | 4                      |
| 4a. Leaves white veined; filaments connate below into a sheath  | 19. <i>Silybum</i>     |
| b. Leaves not as above; filaments free  | 5                      |
| 5a. Pappus hairs free   | 9. <i>Cousinia</i>     |
| b. Pappus hairs connate into a ring at the base   | 6                      |
| 6a. Receptacle with deep pits having dentate margins  | 16. <i>Onopordum</i>   |
| b. Receptacle not pitted  | 7                      |
| 7a. Pappus hairs feathery   | 8                      |
| b. Pappus hairs not feathery  | 9                      |
| 8a. Heads bisexual  | 8. <i>Cirsium</i> ✓    |
| b. Heads unisexual  | 4. <i>Breea</i> ✓      |
| 9a. Filaments hairy   | 5. <i>Carduus</i> ✓    |
| b. Filaments glabrous   | 15. <i>Olgaea</i>      |
| 10a. Involucral bracts with hooked bristles   | 3. <i>Arctium</i>      |
| b. Involucral bracts without hooked bristles  | 11                     |
| 11a. Achenes with 3-concentric ridges below the top   | 21. <i>Zoegia</i>      |
| b. Achenes without concentric ridges  | 12                     |
| 12a. Heads heterogamous (rarely homogamous)   | 13                     |
| b. Heads homogamous   | 15                     |
| 13a. Achenes 10-15-costate  | 2. <i>Amberboa</i>     |
| b. Achenes compressed, subcylindrical, 4-angled or 4-5-costate  | 14                     |
| 14a. Cauline leaves pinnatisect into linear segments; involucral bracts not appendaged; achenes villous             | 10. <i>Crupina</i>     |
| b. Cauline leaves various; involucral bracts often appendaged; achenes glabrous or pubescent                        | 7. <i>Centaurea</i>    |
| 15a. Outer involucral bracts with ovate-lunulate, searious, appendage; inner with oblong appendage                  | 1. <i>Acroptilon</i>   |
| b. Involucral bracts not appendaged as above  | 16                     |
| 16a. Basal areole oblique or lateral  | 17                     |
| b. Basal areole horizontal  | 18                     |
| 17a. Filaments glabrous   | 18. <i>Serratula</i>   |
| b. Filaments papillose  | 20. <i>Tricholepis</i> |
| 18a. Filaments hairy  | 12. <i>Goniocaulon</i> |
| b. Filaments glabrous   | 19                     |
| 19a. Pappus hairs many-seriate, rough or feathery   | 14. <i>Jurinea</i>     |
| b. Pappus hairs 1-seriate, simple or feathery   | 20                     |
| 20a. Perennials; receptacle flat or convex, densely paleaceous, setose or rarely naked; pappus 1-2-seriate, plumose | 17. <i>Saussurea</i>   |
| b. Biennials; receptacle more or less flat, setose; pappus 2-seriate, outer dimidiate                               | 13. <i>Hemistepta</i>  |

### 1. *Acroptilon* Cass.

Herbs, perennial, rhizomatous. Heads homogamous, solitary, terminal. Involucral bracts many-seriate, appendaged. Florets hermaphrodite, tubular. Achenes obovoid, indistinctly striate. Pappus caducous, barbellate or plumose; outer shorter; inner elongate.

Orient, C. Asia; 2 species, 1 in India.

*Acroptilon repens* (L.) DC., Prodr. 6: 663. 1837. *Centaurea repens* L., Sp. Pl. 916. 1753.

Herbs upto 50 cm high; stems and branches striate, densely leafy. Leaves oblong-lanceolate to linear, entire or remotely dentate, recurved, on the margins, upto 15 x 3 mm, sessile. Involucral bracts many seriate; outer with broadly ovate to lunulate, scarious, appendage; inner with oblong appendage; appendage densely ciliate on back and margins. Corolla pink or violet. Achenes obovoid, ca 3 mm long, smooth. pappus twice as long as the achenes.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, 1500-3000 m. on grassy, moist soil. Jammu & Kashmir.

Pakistan, Iran, C.I.S. and N. America.

## 2. *Amberboa* (Pers.) Less.

Annuals. Leaves alternate. Heads heterogamous, purple, violet or blue. Ray florets 1-seriate, neutral. Disc florets bisexual, fertile tube slender, short; limb cylindric, 5-fid. Involucral bracts many-seriate; outer shorter, acute, awned or spinescent; innermost narrow, acute. Receptacle flat, densely bristly. Filaments glabrous or hairy; anther bases sagittate, auricles connate, shortly tailed. Style filiform; arms free or connate. Achenes obovoid or oblong, subulate or angled, 5-15-ribbed. Pappus bristles many-seriate; outermost shorter; innermost 2-4, dialated and flattened.

Mediterranean to C. Asia; ca 20 species, 2 in India.

*Literature.* ILJIN, M.M. (1932). A critical survey of the genus *Amberboa* Less. *Bull. Jord. Bot. Acad. Sci. URSS* 30: 101-116. (In Russian with a brief English resume). SHARMA, A.M. (1982). *J. Econ. Tax. Bot.* 3(2): 529.

### KEY TO THE SPECIES

- 1a. Heads ca 1.2 cm across  
b. Heads ca 2 cm across

2. *A. ramosa*  
1. *A. moschata*

1. *Amberboa moschata* (L.) DC., Prodr. 6: 560. 1838. *Centaurea moschata* L., Sp. Pl. 909. 1753.

Herbs, annual or biennial, up to 70 cm high, sparingly branched. Basal leaves undivided, rarely lobed, remotely dentate, petiolate; upper pinnately lobed to pinnatisect, dentate, sessile. Heads long peduncled, ca 2 cm across. Inner bracts with broadly ovate appendage. Corolla pink. Achenes without pappus.



*Fl. & Fr.* Jan. - April.

*Distrib.* India: Punjab.

S.W. Asia and Europe.

*Note.* Usually cultivated as an ornamental plant, sometimes found as an escape. There is no specimen in BSD and DD.

2. *Amberboa ramosa* (Roxb.) Jafri in Scientist 3: 29. 1959. *Carduus ramosus* Roxb., Fl. Ind. 3: 407. 1832. *Volutarella ramosa* (Roxb.) Sant., Pl. Saurashtra 22. 1953. *V. divaricata* (DC.) Benth. & Hook.f., Gen. Pl. 2: 416. 1873; Hook.f., Fl. Brit. India 3: 383. 1881. *Microlonchus divaricatus* DC., Prodr. 6: 562. 1838. *Tricholepis procumbens* Wight, Ic. t. 1139. 1846. Fig. 44.

Hindi: *Badaward*; Mar.: *Sakaji*.

Herbs, straggling, dichotomously branched, spreading; branches 2.5-5 cm long, angled, smooth or scabrid. Leaves usually oblong or obovate, entire, toothed or pinnatifid, 2.5-5 x 0.6-1.5 cm; lobes mucronate, often undulate or crisped. Heads ca 1.2 cm across. Involucral bracts ovate, with long spreading or recurved spinescent awns, glabrate, reddish; spines ca 6-8 mm long, smooth. Receptacular bristles short. Corolla ca 1.2 cm long, straight, pale purple. Achenes narrow ca 5 mm long, 4-5-angled, grooved and punctate between angles. Pappus silvery brown ca 1.2 cm long.

*Fl. & Fr.* April - Dec. (Jan. - March).

*Distrib.* India: On dry stony ground and sandy river banks, upto 1000 m. Uttar Pradesh, Bihar, Orissa, Madhya Pradesh, Rajasthan, Andhra Pradesh, Karnataka and Tamil Nadu.

Pakistan and Afghanistan.

*Note.* Plant is used as tonic, aperient, deobstruent, febrifuge, slightly mucilaginous and used in coughs (Chopra *et al.*, 1956).

### 3. *Arctium* L.

Herbs, erect, branched. Leaves radical or cauline. Heads homogamous, solitary or fascicled, terminal. Flowers all similar, bisexual, fertile, tubular, purplish; limb cylindric, 5-fid. Involucral bracts many-seriate, appressed, tips subulate, spreading, glochidiate. Receptacle flat, densely bristly. Filaments glabrous; anther bases sagittate;

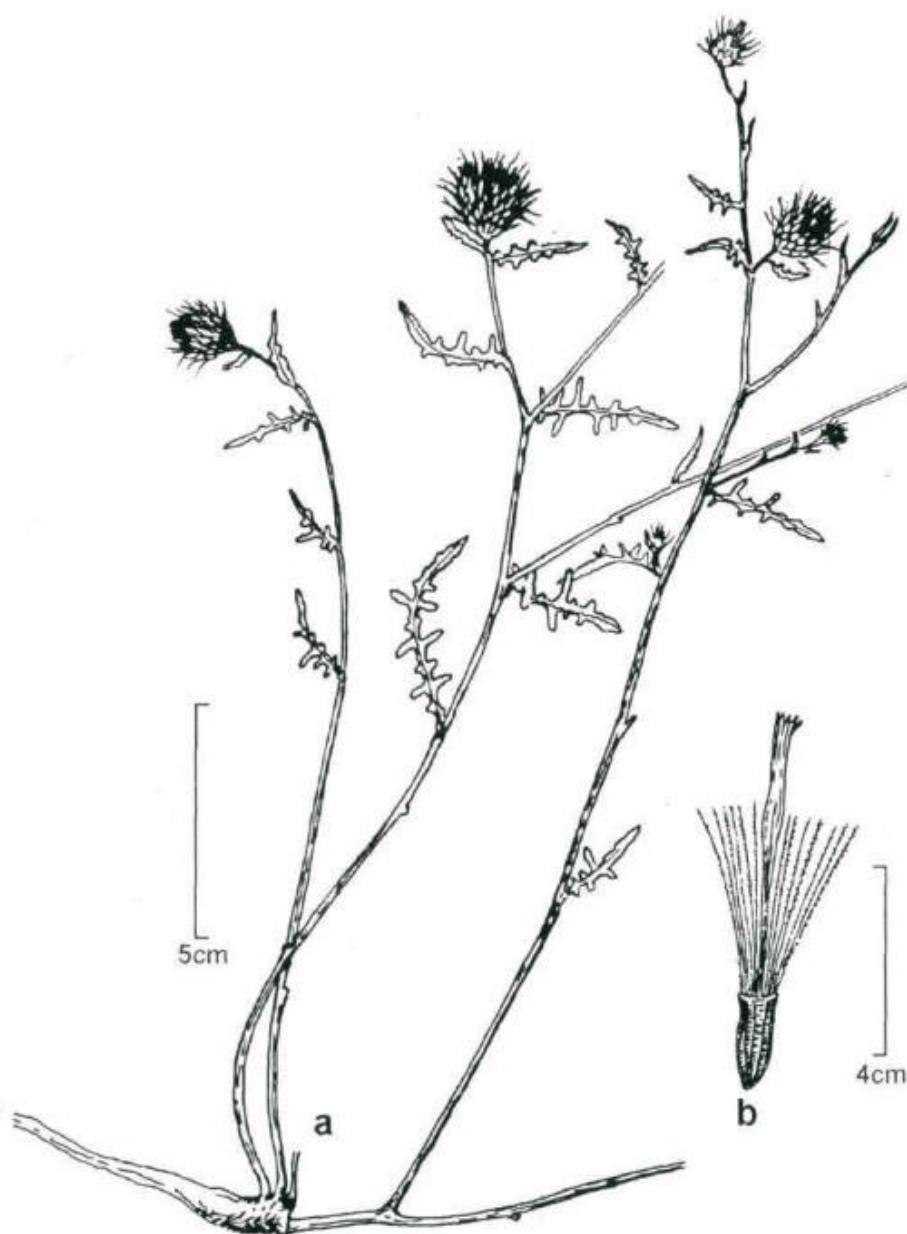


Fig. 44. *Amberboa ramosa* (Roxb.) Jafri : a. Habit; b. Achene.

tails setaceous. Style arms linear. Achenes oblong, subtriquetrous, many ribbed, glabrous, shining, truncate, base unequal. Pappus hairs short, serrulate, deciduous.

Eurasia; ca 6 species, 1 in India.

*Literature.* ARENES, J. (1950). *Bull. Jard. Bot. Bruxelles* 20: 67-156.

*Arctium lappa* L., Sp. Pl. 816. 1753; Hook.f., Fl. Brit. India 3: 359. 1881.

Fig. 45.

Herbs, 60-120 cm high. Leaves ovate-cordate, usually cottony beneath, sinuate at margins, 3-15 x 5-30 cm; petiole 1-10 cm long. Heads ca 1.8-3.8 cm across, subcorymbose, glabrous or cottony; peduncle 1-2.5 cm long, stout. Involucre globose in bud; bracts slender, subulate, hooked at tip spreading. Corolla and stamens purple. Style white. Achenes grey mottled with black, 6-7 mm long, angled and ribbed. Pappus ca 2 mm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, on open hill slopes, 3700-4300 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Pakistan and Afghanistan.

*Notes.* Roots medicinal.

#### 4. *Breea* Less.

Herbs, erect, leafy. Leaves alternate, sinuate-pinnatifid. Heads solitary, fascicled or corymbose. Flowers usually unisexual, purplish. Involucre ovoid, globose or hemispheric bracts many-seriate; outer usually foliaceous, spiny; inner gradually longer, usually with recurved tips; innermost scarious. Receptacle bristly. Filaments hairy or glabrous. Anther bases sagittate. Style arms short. Achenes obovoid, glabrous. Pappus hairs feathery.

W. & N. Asia, China, Europe. 1 in India.

✓ *Breea arvensis* (L.) Less., Syn. Comp. 9. 1832. *Serratula arvensis* L., Sp. Pl. 820. 1753. *Crisium arvense* (L.) Scop., Fl. Carn. ed. 2, 2: 126. 1772. *Cnicus arvensis* (L.) Roth, Catalecta B. 1: 115. 1797. *C. candicans* Wallich, Cat. n. 2893. 1831. Fig. 46.

Beng.: *Sialkanta*; Eng.: *Canada thistle*.

Herbs, erect, 60-90 cm high. Stems many from base, usually simple, leafy, cobwebby tomentose above. Leaves sinuate or pinnatifid, 7.5-12.5 cm long, more or less

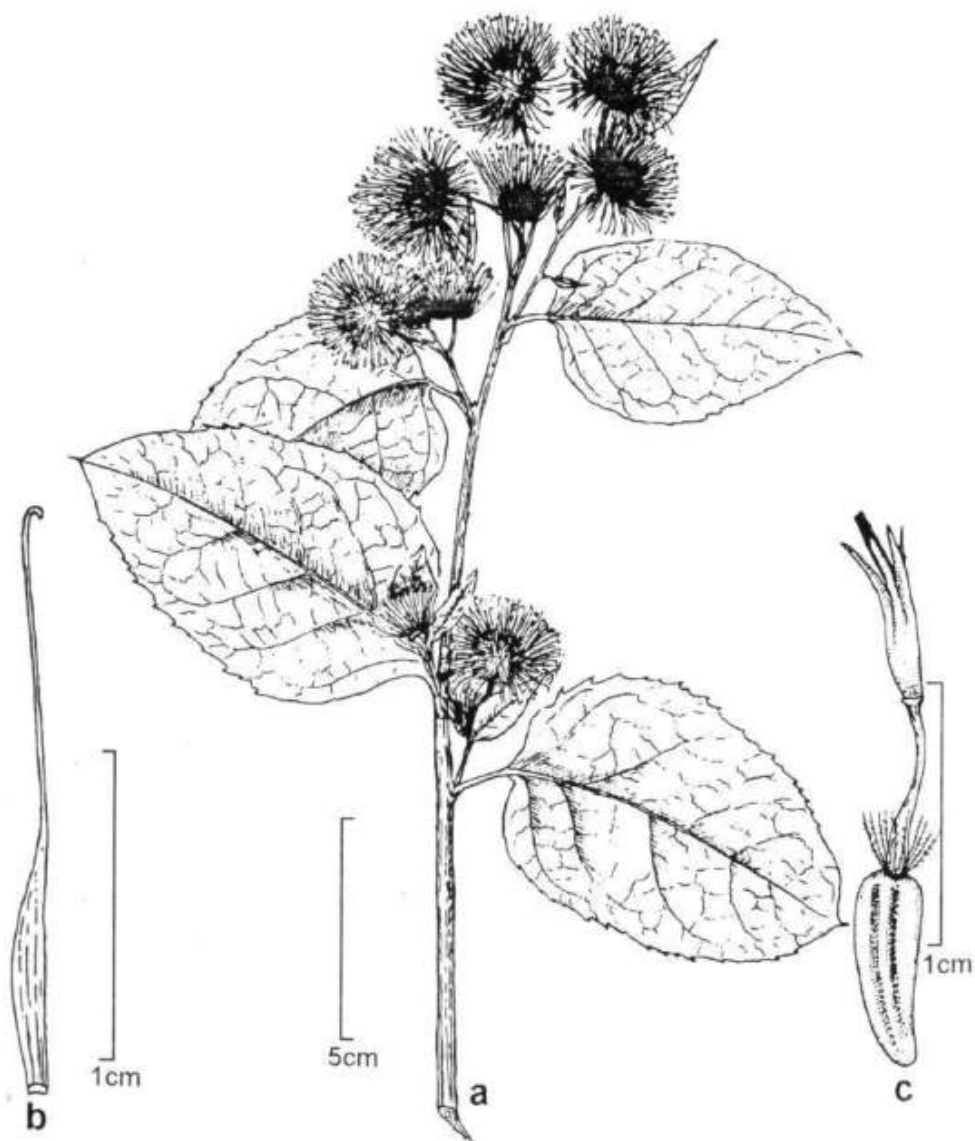


Fig. 45. *Arctium lappa* L. : a. Habit; b. Involucre; c. Floret.

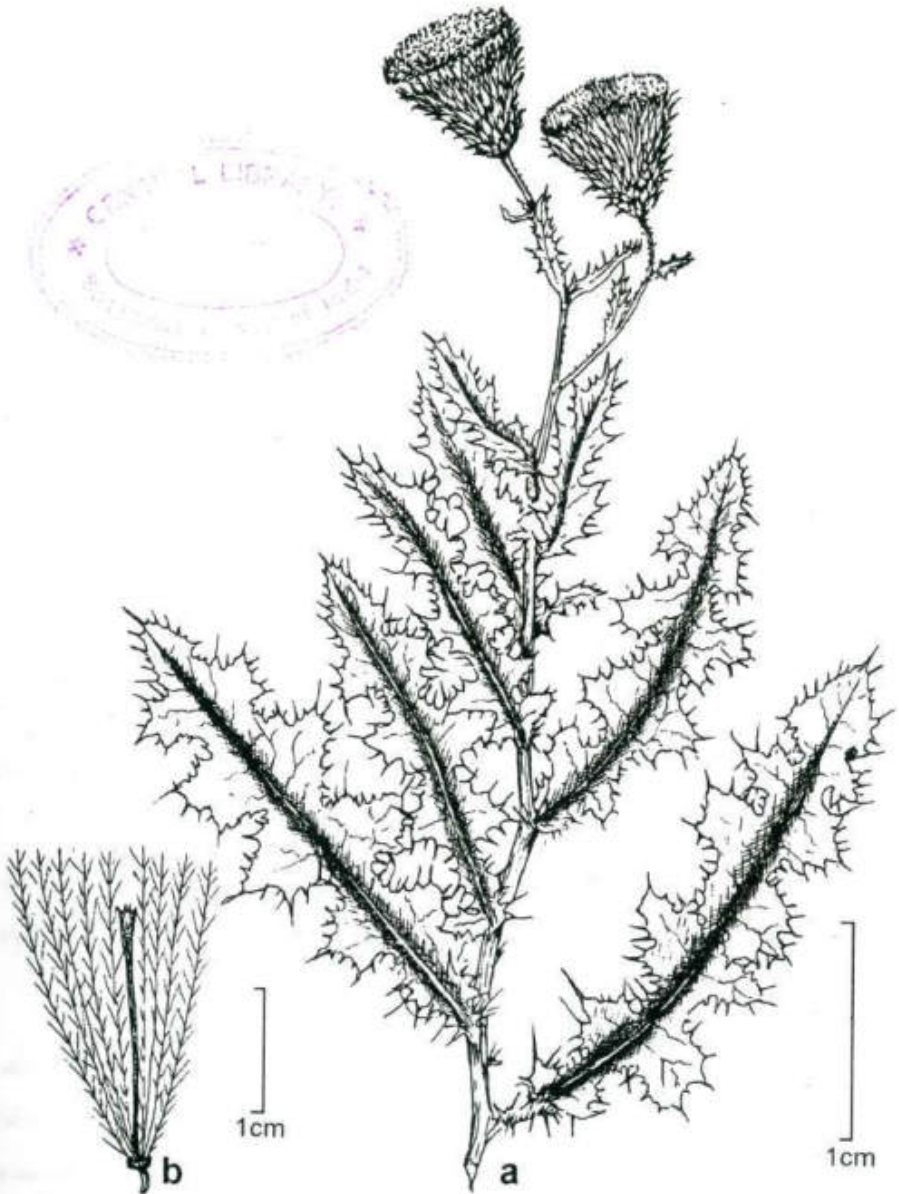


Fig. 46. *Breaa arvensis* (L.) Less. : a. Habit. b. Floret.

woolly beneath. Heads solitary, fascicled or corymbose, variable; male ca 1.2-2.5 cm across, globose; female much longer, campanulate. Involucral bracts glabrate or cobwebby; outermost short, ovate or triangular-ovate, ending in a short spine; inner gradually longer with undulate, often recurved tips; innermost narrow, linear-lanceolate, scarious. Corolla purplish. Achenes smooth, shining. Pappus brownish white.

*Fl. & Fr.* Feb. - May.

*Distrib.* India: Up to ca 1500 m. Jammu & Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, W. Bengal and Bihar.

Asia, Europe and introduced in N. America.

*Note.* *Breca* has been segregated from *Cirsium* on account of its unisexual florets and partial dioecy. This is a very variable species. The plant is used to coagulate milk.

### 5. *Carduus* L.

Herbs, annual or perennial, erect, usually spiny winged. Leaves alternate, pinnatifid, spinescent. Heads more or less globose, solitary, long peduncled or subsessile, scattered or crowded, homogamous. Flowers usually all bisexual and fertile, white, yellow or red; tube slender; limb equal or oblique, 5-fid. Involucre ovoid hemispheric or globose; bracts many-seriate, appressed or recurved, spinescent. Receptacle flat or convex, densely bristly. Filaments hairy or glabrous. Anther bases sagittate; auricles connate; tails slender. Style arms short, rarely filiform, obtuse. Achenes obovoid, glabrous, obtusely 4-angled, smooth or 5-10-ribbed. Pappus copious, hairs many-seriate.

European; ca 100 species, 4 in India.

*Literature.* KAZMI, S.M.A. (1964). Revision der Gattung *Carduus* (Compositae) Mitt. B. Staatssamm. Munchen 5: 275-350.

#### KEY TO THE SPECIES

- |  |                            |
|--|----------------------------|
| 1a. Heads usually 2.5-4 cm across; corolla 2 cm long                                       | 2. <i>C. edelbergii</i>    |
| b. Heads usually 1.5-2 cm across; corolla less than 2 cm long                              | 2                          |
| 2a. Involucral bracts ovate-lanceolate, glabrous, smooth; corolla ca 1 cm long             | 4. <i>C. tenuiflorus</i>   |
| b. Involucral bracts usually linear-subulate, hairy; corolla ca 1.5 cm long                | 3                          |
| 3a. Heads cylindrical; achenes ca 5 mm long; pappus ca 1.5 cm long                         | 3. <i>C. pycnocephalus</i> |
| b. Heads subglobose, usually in clusters of 2-4; achenes ca 4 mm long; pappus ca 1 cm long | 1. <i>C. crispus</i>       |

1. *Carduus crispus* L., Sp. Pl. 821. 1753.

Herbs, biennial up to ca 1 m high, sparsely hairy, winged; wings ca 5 mm wide, triangular with an apical spinula. Leaves lanceolate to oblanceolate, glabrescent above,

hairy or glabrescent beneath, lobed or crenate-dentate. Heads ca 1.5-2 cm across, subglobose, usually in clusters of 2-4; peduncles narrowly winged, up to ca 8 cm long. Involucral bracts imbricate, linear-subulate recurved at apex. Corolla ca 1.5 cm long. Achenes ca 4 mm long. Pappus ca 1 cm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir.

Europe.

2. *Carduus edelbergii* Rech. f. in K. Danske Vid. Selsk. Biol. Skr. 8(2) Symb. Afghan. 2: 175. 1955. *C. lucidus* Wallich *nom. nud.* *C. edelbergii* Rech.f. subsp. *lanatus* Kazmi in Mitt. B. Staatssamm. Munchen 5: 344. 1964. *C. nutans* (*auct. non L.*) Hook.f., *Fl. Brit. India* 3: 361. 1881. **Fig. 47.**

Biennial, 30-100 cm (-2 m) high, stout. Stems interruptedly winged; wings spinulous. Leaves very variable pinnatifid, entire, wavy spinous, 5-30 x 1.5-4.5 cm. Heads 2.5-4 cm across, solitary or fascicled. Involucre hemispheric or subcampanulate; involucral bracts subulate-lanceolate, usually spiny at tip, reflexed, 1-1.8 cm long. Flowers ca 2 cm long, pink or dark purple. Achenes pale-brown, ca 5 mm long, glabrous, granulate. Pappus ca 1.5 cm long, dull white.

*Fl. & Fr.* June - Aug.

*Distrib.* India: W. Himalayas. Jammu & Kashmir and Himachal Pradesh.

Pakistan and Afghanistan.

*Note.* According to some authors the Himalayan species is intermediate between *C. nutans* and *C. crispus* (*C. acanthoides* Sm.).

3. *Carduus pycnocephalus* L., *Sp. Pl.* 1151. 1753.

Herbs, annual up to 1 m high. Stems simple or branched, white greyish tomentose above, winged; wings dentate, lobed, spiny. Basal leaves obovate; lobes rounded; cauline lanceolate or oblanceolate, lyrate-pinnatifid, decurrent at base ca 14 x 7 cm, sparsely hairy above, whitish tomentose beneath; lobes spinuous. Heads ca 1.5-2 cm across, cylindrical. Involucral bracts imbricate, hairy, 5-7-seriate. Receptacular bristles ca 1 cm long. Corolla ca 1.5 cm long, purple or white. Achenes ca 5 mm long. Pappus ca 1.5 cm long.

*Fl. & Fr.* Feb. - May.

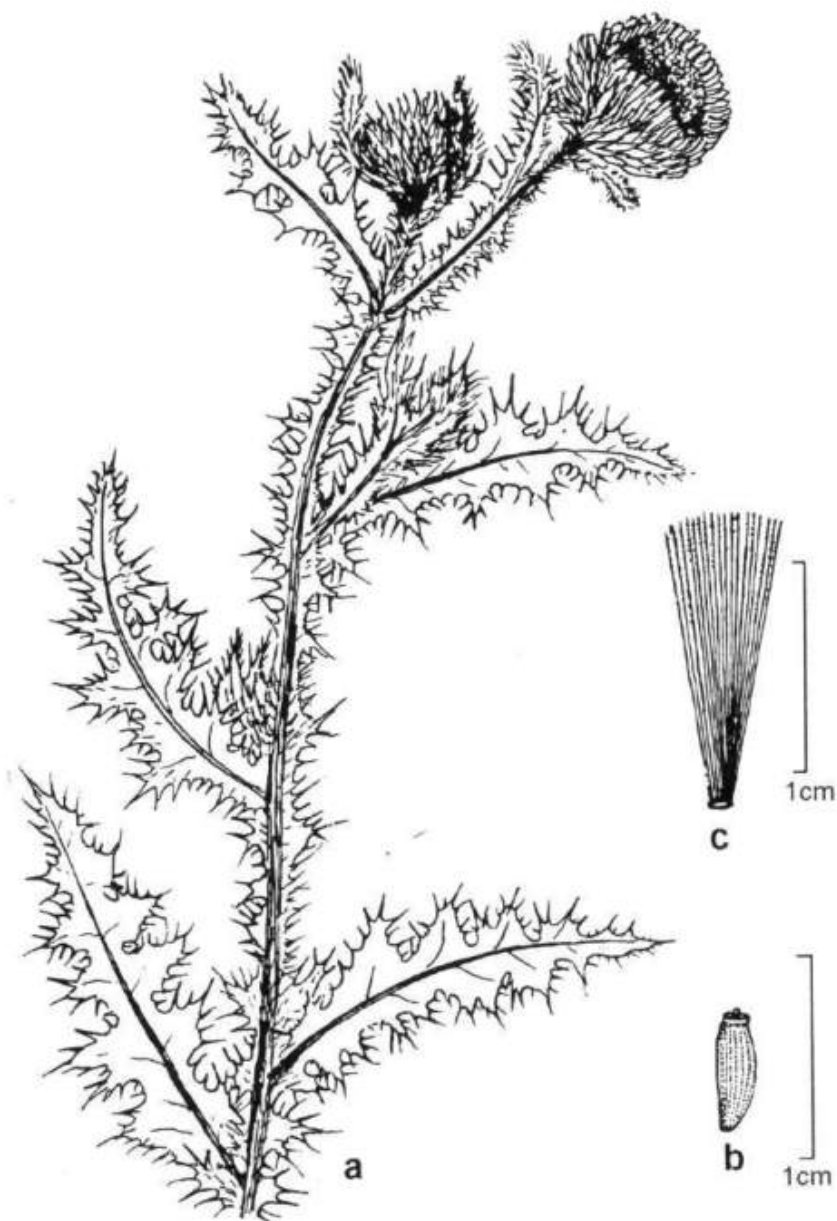


Fig. 47. *Carduus edelbergii* Rech.f. : a. Habit; b. Achene; c. Pappus.



*Distrib.* India: Jammu & Kashmir.

Afghanistan, Pakistan, Sri Lanka, Middle to S. Europe, and S.W. Asia.

4. *Carduus tenuiflorus* Curtis, Fl. Lond. 'Fasc'. 6: Pl. 55. 1790-98; Azad & Javeid in J. Bombay Nat. Hist. Soc. 75(1): 249. 1978.

Herbs, annual or biennial, ca 50 cm high, stems hairy, winged; wings up to ca 1 cm broad, spiny at tip. Leaves oblanceolate-lanceolate, sparsely hairy above, hairy beneath. Heads ca 1.5 cm across, cylindrical, sessile, in compact clusters of 4-8. Involucral bracts ovate-lanceolate, glabrous, smooth, with scarious margins. Corolla ca 1 cm long. Achenes ca 4 mm long, smooth. Pappus ca 1 cm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir.

Europe and China.

#### EXCLUDED SPECIES

*Carduus kumaonensis* (J. Ar.) Kazmi in Mitt. Bot. Staats. Munchen Band 5: 364. 1964. (Dec.). *C. crispus* subsp. *kumaonensis* J. Ar. in Mem. Mus. Nat. Hist. Nouv. ser. 24: 189. 1849.

*Distrib.* India: Jammu & Kashmir, Uttar Pradesh.

*Note.* There is no specimen available in Indian herbaria.

#### 6. *Carthamus* L.

Annual, rarely perennial, usually spiny. Leaves alternate, entire or pinnatifid, spinescent. Heads usually homogamous, solitary, ovoid or subglobose. Involucral bracts in many rows, imbricate, spiny, outer leaf like; inner dry, entire or with a short, fimbriate appendage. Receptacle flat. Florets all hermaphrodite. Corolla yellow, white or purplish; tube slender; limb oblong, dilated at base, 5-cleft. Filaments usually densely hairy; anther bases sagittate; auricles connate; tails short, fimbriate. Style arms short or long. Achenes obovoid, 4-angled or compressed, glabrous; outer without pappus, coarsely rugose; inner more or less smooth, usually with pappus.

In mediterranean region, Africa, Asia; ca 13 species, 3 in India.

*Literature.* HANELT, M.P. (1962). Monographische Übersicht der Gattung *Carthamus* L. (Compositae) *Feddes Rep.* 67: 41-180. PATHAK, M. & T.B. SABNIS, (1935). A note on the classification of Indian safflower. *Indian J. Agric. Sci.* 5: 705-714.

## KEY TO THE SPECIES

- |   |                         |
|---|-------------------------|
| 1a. Basal and cauline leaves not divided          | 3. <i>C. tinctorius</i> |
| b. Basal leaves usually pinnatifid or pinnatisect | 2                       |
| 2a. Pappus absent                                 | 2. <i>C. oxyacantha</i> |
| b. Pappus of narrow ciliate scales                | 1. <i>C. lanatus</i>    |

**1. *Carthamus lanatus* L., Sp. Pl. 830. 1753; Hook.f., Fl. Brit. India 3: 386. 1881.**

Annuals, erect, rigid, cobwebby cottony or glabrate, glandular, 15-45 cm high. Radical leaves lyrate-pinnatifid, spinose dentate; 7-14 cm long, hispid or scaberulous, cauline ovate, spinescent, 2.5-3.5 cm long, half-amplexicaul, strongly 3-nerved. Heads 2.5-3.5 cm across. Outer involucre bracts large, lanceolate, lanceolate, 2.5-5 cm long, spreading, lanceolate, leafy, spinescent; inner oblong-lanceolate to linear, entire, scarious. Receptacle bristles very long. Flowers pale yellow. Achenes pale yellowish or grey, ca 6 mm long, very hard, obtusely 4-angled. Pappus pale, silvery or bronze coloured narrowly sword shaped, ca 1 cm long, unequal.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, in waste lands, 1500-2300 m. Jammu & Kashmir and Uttar Pradesh.

Pakistan, W. Asia, Europe, and Westward to Atlantic.

*Note.* Seeds yield an oil and plant is used in France as sudorific, febrifuge and anthelmintic. (Chopra et al. 1956).

**2. *Carthamus oxyacantha* M.Bieb. Fl. Taur. Cauc. 2: 283. 1808; Hook.f., Fl. Brit. India 3: 386. 1881.**

Hindi: *Kantiari*, *Poli*.

Herb, puberulous, branched, 30-40 cm high; branches white. Leaves oblong or oblong-lanceolate, 1.5-4.5 cm long; lower shortly spinulose-toothed; upper half amplexicaul, spinous. Heads 1.5-2.5 cm across. Outer involucre bracts leafy, ca 2.5 cm long, spiny. Receptacle bristles long. Flowers orange yellow. Achenes obovoid, 4-angled, smooth, shining, truncate at top. Pappus absent.

*Fl. & Fr.* April - Sept.

*Distrib.* India: 300-1600 m. Jammu & Kashmir, Uttar Pradesh, Punjab, Haryana, Rajasthan and Madhya Pradesh.

Pakistan.

*Note.* Very common in cultivated fields after harvest. Oil extracted from seeds is used medicinally, for dressing bad ulcers and as remedy for itch. Seeds are sometimes eaten also.

3. *Carthamus tinctorius* L., Sp. Pl. 830. 1753; Hook.f., Fl. Brit. India 3: 386. 1881.

Eng.: *Safflower*; Hindi: *Kusum*; Tamil.: *Sendurkem*; Tel.: *Kusamba*.

Herbs, erect, glabrous, ca 45 cm high, thistle like. Leaves lanceolate, spinous toothed, 4-12 x 1-3 cm, stiff, sessile. Heads 1.2-2.5 cm across, discoid, terminal. Involucral bracts many, spinous, erect; outer ones leaflike; inner narrow. Receptacle flat, densely bristly. Flowers orange red. Corolla tube slender, deeply 5-lobed. Achenes 4-angled, glabrous.

*Fl. & Fr.* Feb. - April.

*Distrib.* India: Cultivated almost throughout India and sometimes found as an escape.

*Note.* The plant is cultivated for its valuable oil. It also yields a dye. Seeds are used in rheumatism, as purgative, diuretic, etc.

### 7. *Centaurea* L.

Herbs, usually rigid. Leaves alternate, entire, toothed or pinnatifid. Heads usually heterogamous, corymbose or paniced, solitary, ovoid or globose. Florets purple, violet, blue, white or yellow. Outer florets 1-seriate, neuter. Disc florets female, fertile; tube slender; limb straight or oblique, 5-fid to middle or lower. Involucral bracts many-seriate, imbricate, appressed, margins scarios or coriaceous or ending in a simple or palmately divided spine or pectinate appendage. Receptacle flat, densely bristly. Anther bases sagittate; auricles connate; tails long or short, entire or lacerate. Style arms with a thickened hairy basal ring. Achenes oblong or obovoid, compressed or obtusely 4-angled. Pappus many-seriate, various or absent.

Europe, N. Africa, N. China, America, Australia; ca 600 species, 6 in India.

*Note.* Mostly cultivated as an ornamental.

*Literature.* WAGENITZ, G. (1955). Pollen morphologie und systematik in der Gattung *Centaurea* L. *Flora* 142: 213-279.

## KEY TO THE SPECIES

- |   |                           |
|---|---------------------------|
| 1a. Branches white; outer involucre bracts ending in pectinate appendage    | 1. <i>C. bruguieriana</i> |
| b. Branches green; outer involucre bracts not ending in pectinate appendage | 2                         |
| 2a. Involucre bracts not spiny  | 3                         |
| b. Involucre bracts spiny   | 4                         |
| 3a. Involucre bracts cottony; pappus ca 4 mm long                           | 3. <i>C. cyanus</i>       |
| b. Involucre bracts glabrous; pappus ca 7 mm long                           | 4. <i>C. depressa</i>     |
| 4a. Flowers yellow  | 6. <i>C. melitensis</i>   |
| b. Flowers usually purple   | 5                         |
| 5a. Young leaves lanate; involucre 6-8 mm in diam.                          | 2. <i>C. calcitrapa</i>   |
| b. Young leaves green, hispidulous; involucre 9-14 mm in diam.              | 5. <i>C. iberica</i>      |

1. *Centaurea bruguieriana* (DC.) Hand.-Mazz. in Ann. Nat. Hofmus. Wien. 27: 451. 1913. *Tetramorphaea bruguieriana* DC., Prodr. 6: 604. 1838. *Centaurea phyllocephala* Boiss., Fl. Orient. 3: 684. 1875; Hook.f., Fl. Brit. India 3: 385. 1881.

Herbs, glabrous or hispid, branched; branches white wide spreading, cylindric. Lower leaves lanceolate, small, entire or pinnatifid, scabrid, spinulose toothed sessile; cauline amplexicaul, cordate at base. Heads small, terminal. Outer involucre bracts ending in oblong pectinately ciliate leaves; inner white, entire, white, ending in long strong spine; innermost acuminate. Achenes minute, longer than paleaceous pappus.

*Fl. & Fr.* June - July.

*Distrib.* India: Punjab.

Pakistan, Afghanistan and Westwards to Asia minor.

*Note.* There is no specimen in India herbaria from Punjab.

2. *Centaurea calcitrapa* L., Sp. Pl. 917. 1753; Hook.f., Fl. Brit. India 3: 385. 1881.

Herbs, 25-80 cm high, erect or spreading, divaricately branched from base, cottony or glabrous. Basal leaves pinnatifid or pinnate, pubescent, spreading; lobes linear, acute, toothed; cauline sessile; uppermost lanceolate. Heads ca 7 mm across, surrounded by upper leaves, ovoid, lateral and terminal, sessile or peduncled. Involucre bracts ovate, with scarious margins, coriaceous, terminating in long spreading spine with short lateral ones at base. Florets pale purple, glandular, equal. Achenes white, ca 2 mm long. Pappus absent.

*Fl. & Fr.* June - Oct.

*Distrib.* India: ca 1800-2000 m. Jammu & Kashmir and Karnataka.

Europe, W. Asia and China.

*Note.* Introduced in most parts of the world.

**3. *Centaurea cyanus* L., Sp. Pl. 911. 1753. *C. lanata* Roxb., Fl. Ind. 3: 644. 1832; Hook.f., Fl. Brit. India 3: 384. 1881.**

Annuals or biennials, erect, 15-75 cm high, branched. Lower leaves lanceolate, entire or lyrate-pinnatifid, acute, petiolate; upper linear-lanceolate, entire. Heads ca 1 cm across, ovoid. Involucral bracts oblong, obtuse, cottony, tip broad with brown scarious toothed margins. Outer florets blue; inner bluish violet. Achenes grey, silky, ca 4 mm long. Pappus ca 4 mm long.

*Fl. & Fr.* March - June.

*Distrib.* India: Uttar Pradesh and Tamil Nadu.

Native of Mediterranean region and Europe.

*Note.* Usually cultivated; often met with as an escape in waste places and roadsides.

**4. *Centaurea depressa* M.Bieb. Fl. Taur. Cauc. 2: 346. 1803; Hook.f., Fl. Brit. India 3: 385. 1881.**

Annual, rarely biennial; stems 15-50 cm, branched or simple. Lower leaves oblong, usually entire, rarely pinnatifid, grey tomentose, short petiolate; upper linear-lanceolate, acute, entire or spinulose mucronulate. Heads ca 1.2 cm across, ovoid. Involucral bracts glabrous, margins scarious, white or brown, toothed; teeth white lanceolate. Outer florets dark blue, spreading; inner violet. Achenes shining, puberulous, equalling or shorter than the middle row of pappus hairs. Basal areole bearded. Pappus ca 7 mm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Jammu & Kashmir.

Pakistan, Afghanistan and Westwards to Asia minor.

**5. *Centaurea iberica* Trev. ex Spreng., Syst. 3: 406. 1826; Hook.f., Fl. Brit. India 3: 385. 1881.**



Fig. 48. *Centaurea iberica* Trev. ex Spreng. : a. Habit; b. Achene.

Herbs, much branched; stems 15-50 cm or more, erect or spreading, divaricately branched. Lower leaves runcinate to lyrate-pinnatisect; lobes ovate to linear-lanceolate, hispidulous, denticulate at margins; upper lanceolate. Heads ca 1 cm across, ovoid, surrounded by upper leaves, sessile. Involucral bracts with scarious margins; apical spines stout, sulcate, usually with 1-3 basal spines. Florets purple, glandular. Achenes ca 3 mm long. Pappus ca 2 mm long.

*Fl. & Fr.* July - Aug.

*Distrib.* India: Common along the roadsides 300-2300 m. Jammu & Kashmir.

W. Asia, S.E. Europe and Pakistan.

6. *Centaurea melitensis* L., Sp. Pl. 912. 1753; Hook.f., Fl. Brit. India 3: 385. 1881.

Herbs, annual or biennial, 20-70 cm high, pubescent or glabrous; stems winged above, sparingly branched from middle. Lower leaves lanceolate, lyrate-pinnatifid to sinuately lobed; upper cauline leaves linear, decurrent. Heads ca 1 cm across, ovoid-globose, solitary or in groups of 2-3. Involucral bracts glabrous or puberulous, ending in a spreading and recurved spine, margins spinulose or with short lateral spines on each side. Florets yellow, glandular. Achenes ca 2 mm long, puberulous. Pappus ca 2 mm long.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Tamil Nadu.

Westwards to Atlantic.

*Note.* Usually cultivated, sometimes found as an escape.

#### EXCLUDED SPECIES

*Centaurea pulchra* DC., Prodr. 6: 578. 1838.

The occurrence of this species in India is doubtful. Stewart (1972) in Nasir *et alii*. Ann. Cat. Vas. Pl. W. Pakistan has given the distribution as Jammu & Kashmir. But there is no specimen in Indian herbaria.

#### 8. *Cirsium* P. Mill. (*Cnicus* L.)

Herbs with spinous leaves. Leaves decurrent at base or sessile. Heads many flowered. Involucral bracts imbricate, apex more or less spinous. Receptacle fimbriate.

Flowers purple or yellowish, equal, bisexual, rarely dioecious corolla equal; tube short, throat oblong; limb 5-fid or 5-partite. Filaments free, papillose or glabrous; anthers with tail-like appendages or not. Achenes oblong, compressed, glabrous. Pappus multiseriate, bristles plumose.

North temperate zone; ca 150 species, 7 in India.

*Literature.* KITAMURA, S. (1934). Les Cirses de l'Asie Orientale; leur Classification et leur distribution. *Acta Phytotax. Geobot.* 3: 1-14. (A critical treatment in Japanese). SCHTEPA, T.S. (1965). Materies at studium Pollinis Characterum generis *Cirsium* Mill. (en russe). *Not. Syst. Georg. Inst. Bot. Thbil.* 26: 57-62.

*Note.* Most of the species of this genus are extremely variable and Biosystematic study is required to draw correct delimitations of the species.

#### KEY TO THE SPECIES

- |   |                            |
|---|----------------------------|
| 1a. Inner involucrel bracts with dilated tips   | 7. <i>C. wallichii</i>     |
| b. Inner involucrel bracts not dilated at tips  | 2                          |
| 2a. Heads usually ca 2.5 cm across  | 3                          |
| b. Heads usually 3.5-7.5 cm across  | 4                          |
| 3a. Leaves always glabrous above; heads densely fascicled   | 1. <i>C. argyracanthum</i> |
| b. Leaves ciliate smooth or scaberulous above; heads usually solitary   | 5. <i>C. shansiense</i>    |
| 4a. Involucrel bracts quite glabrous, none really spinescent, the points of the outermost being merely needle-like; pappus ca 2.5 cm long | 4. <i>C. interpositum</i>  |
| b. Involucrel bracts not quite glabrous, ending usually in spines; pappus ca 1.5 cm long  | 5                          |
| 5a. Corolla usually ca 6 cm long  | 2. <i>C. eriophoroides</i> |
| b. Corolla usually ca 2.5 cm long   | 6                          |
| 6a. Heads densely woolly, subsolitary, drooping   | 3. <i>C. falconeri</i>     |
| b. Heads not densely woolly, usually glabrate, solitary or fascicled, inclined  | 6. <i>C. verutum</i>       |

1. *Cirsium argyracanthum* DC., Prodr. 6: 640. 1838. *Cnicus argyracanthus* (DC.) C.B. Clarke, Comp. Ind. 218. 1876; *C. wallichii* DC. var. *wightii* Hook.f., Fl. Brit. India 3: 364. 1881.

Herbs, robust, 90-180 cm tall, branched. Radical leaves irregularly pinnately lobed, 25-60 x 2.5-3.7 cm, nearly glabrous on both surfaces, densely spiny at margins, stalked; cauline leaves shorter, sessile. Heads globose, many, usually crowded in terminal clusters 1.8-2.5 cm across, sessile or stalked. Outer involucrel bracts ending in long, rigid spines; innermost linear, long pointed. Flowers pale yellow or white. Achenes ca 3 mm long. Pappus nearly white, 1.2 cm long, nearly white.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Temperate Himalayas, 2000-3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.



Nepal, Bhutan and Pakistan.

*Note.* A very variable species.

2. *Cirsium eriophoroides* (Hook.f.) Petrak in Bail. Bot. 78: 9. 1912. *Cnicus eriophoroides* Hook.f., Fl. Brit. India 3: 363. 1881.

Herbs, tall, stout; stems sparsely villous or cottony. Radical leaves pinnatifid, lobes broad, lobulate, petioled; cauline broad, ovate or ovate-lanceolate, sinuate-lobed, membranous, glabrous, cobwebby or setulose above, cottony or glabrate beneath. Heads solitary or clustered, 5.0-7.5 cm across, densely woolly. Involucral bracts lanceolate, ending in soft long spines; inner numerous, linear acuminate. Corolla ca 6.2 cm long. Achenes obovoid-oblong ca 5 mm long. Pappus brown ca 1.5 cm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: E. Himalayas, Sikkim.

China.

3. *Cirsium falconeri* (Hook.f.) Petrak in Feddes, Repert. 9: 198. 1911. *Cnicus falconeri* Hook.f., Fl. Brit. Ind. 3: 363. 1881. *Cirsium verutum* [auct. non (D. Don) Spreng.] Kitam. in Fl. E. Himal. 330. 1966. *C. involucratum* (auct. non DC.) Kitam. in F. & Fl. Nepal Himal. 250. 1955 *Cnicus involucratum* [auct. non (DC.)] Hook.f., Fl. Brit. India 3: 362. 1881.

Herbs, very stout, tall, villous. Leaves membranous, setose and spinescent above, appressed cottony beneath; teeth and lobes spinescent; cauline large, broad, ovate or ovate-lanceolate, sinuate-lobed or subpinnatifid. Heads 6-7.5 cm across, globose, subsolitary drooping, densely woolly. Involucral bracts lanceolate, all ending in a long slender, flexuous spine. Corolla 2.5 cm long. Achenes ca 5 mm long. Pappus ca 1.5 cm long.

*Fl. & Fr.* June - Oct.

*Distrib.* India: Himalayas, 3000-4500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan, Myanmar and S. Tibet.

*Note.* Kitamura & Gould [in Hara (ed.) *Enum. Fl. Pl. Nepal* 3: 146. 1982] observe "*Cirsium falconeri* as recognised here is a very variable species. Plants from Kashmir have leaves which are strongly spinescent above, tomentose beneath, with lobes

terminating in spines 1.5-2.5 cm long. The involucre are woolly and densely covered in long yellow spines. Plants from the eastern Himalayas have leaves which are often sparsely spinescent above and with shorter spines on the lobes. Tomentum is sometimes absent from leaves and involucre, and involucre spines vary in length and density. The amount of variation suggests that several species may be involved and further study is required".

4. *Cirsium interpositum* Petrak in Feddes, Rep. 43: 283. 1838. *Cnicus griffithii* Hook.f., Fl. Brit. India 3: 363. 1881. *Cirsium lepsyki* Petrak in Feddes, Repert. 9: 197. 1911.

Khasi: *Soh-chila*; Nep.: *Sumori-kaura*.

Herbs, robust; stems cottony. Cauline leaves pinnatifid; lobes lanceolate, acute, spinescent, setulose above, white appressed tomentose beneath. Heads crowded, ca 5 cm across, glabrous. Outermost involucre bracts short with acicular points; the rest linear, wavy, aristate or acuminate, quite glabrous. Corolla ca 3 cm long. Achenes 5 mm long. Pappus ca 2.5 cm long.

Fl. & Fr. June - Sept.

Distrib. India: 1800 m. Arunachal Pradesh and Manipur.

Tender shoots and the aromatic seeds are eaten.

5. *Cirsium shansiense* Petrak in Mitt. Thuring. Bot. Ver. n.f. 1: 176. 1943. *Cnicus sinensis* (chinense) (Gard. et Champ.) C.B. Clarke, Comp. Ind. 219. 1876; Hook.f., Fl. Brit. India 3: 364. 1881.

Herbs, 1-2 m tall, stiff, glabrous or slightly pubescent, fastigiate branched above; branches slender, erect. Leaves many, linear oblong or lanceolate, 5-12.5 cm long, narrow, sinuate lobed; lobes bearing 2-3 spines spinulose at sinus, ciliate and spinescent, smooth or scaberulous above, of smaller leaves recurved at margins, sessile. Heads solitary, ca 2.5 cm across, glabrous or cottony. Involucre bracts very numerous, appressed; outer oblong, obtuse or tips spinulose; inner linear with inflexed, acute tips. Corolla purple ca 1.6 cm long. Achenes ca 4 mm long. Pappus ca 8 mm long.

Fl. & Fr. June - Aug.

Distrib. India: Meghalaya.

Myanmar and China.

6. *Cirsium verutum* (D. Don) Spreng., Syst. Veg. 3: 370. 1826. *Cnicus verutus* D. Don, Prodr. Fl. Nepal. 167. 1825. *Cirsium involucratum* ex DC., Prodr. 6: 639. 1838. *C. involucratum* DC. var. *horridum* (Hook.f.) Balakr., Fl. Jowai 1: 256. 1981. *Cnicus involucratu*s (DC.) Hook.f. var. *horrida* Hook.f., Fl. Brit. India 3: 362. 1881.

Herbs, erect, 0.3-1.8 m tall, stout, branched above. Radical leaves pinnatifid to middle or deeper, ca 30 cm long setulose above, white tomentose beneath, teeth and lobes spinescent; cauline broader, ovate or lanceolate, cordate-amplexicaul, pinnatifid. Heads solitary or fascicled, 3.5-6.0 cm across, inclined, involucrate. Involucral bracts glabrate, ending in slender, erect or subrecurved spines, or a few innermost linear acuminate. Corolla ca 2.5 cm long, glabrous. Achenes, obovoid-oblong, ca 5 mm long. Pappus brown ca 1.5 cm long.

Fl. & Fr. Aug. - Dec.

*Distrib.* India: Himalayas, in pine forests, open wastelands and grasslands, 1200-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Meghalaya.

*Note.* Hook.f. (1881) described the variety *horrida* on the basis of densely setulose and strong spines on leaves.

7. *Cirsium wallichii* DC., Prodr. 6: 643. 1838. *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 argyranthus* var. *nepalensis* (DC.) C.B. Clarke, Comp. Ind. 218. 1876. *Cnicus wallichii* (DC.) C.B. Clarke Comp. Ind. 219. 1876. *C. wallichii* var. *nepalensis* (DC.) Hook.f., Fl. Brit. India 3: 364. 1881. *C. wallichii* var. *cernua* Hook.f., Fl. Brit. India 3: 364. 1881. *C. wallichii* var. *fasciculata* Hook.f., Fl. Brit. India 3: 364. 1881. *C. wallichii* var. *platylepis* Hook.f., Fl. Brit. India. 3: 364. 1881.

Herbs with spreading branches, 1-3.5 m tall, pubescent. Leaves sinuate pinnatifid; lobes spinescent, lobulate, spines very long and strong, glabrous or cottony or tomentose beneath, sessile. Heads 1.8-3.8 cm across, solitary, on naked, peduncled or sessile, fascicled, involucrate. Outer involucral bracts lanceolate, ending in spreading erect or recurved spines; inner with spreading or recurved, more or less dilated, lanceolate or ovate, scarious serrulate, acute or spinescent tips. Corolla ca 1.6 cm long, white, yellow or red.

#### KEY TO THE VARIETIES

- 1a. Leaves usually cottony or tomentose beneath  
b. Leaves usually quite or nearly glabrous beneath

- 7.2. var. *wallichii*  
7.1. var. *glabratum*

7.1. var. *glabratum* (Hook.f.) Wendelbo in Nytt Mag. B. 1: 67. 1952. *Cnicus wallichii* DC. var. *glabrata* Hook.f., Fl. Brit. India. 3: 364. 1881.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Himalayas, 1200-3500 m. Jammu & Kashmir.

Afghanistan, China and Nepal.

*Note.* Extremely variable species with as many as six varieties (Hook.f. 1881). However, the main distinguishing characters of some varieties being the spiny nature of the plants and density of tomentum on leaves, both these traits are influenced by the habitats in which they grow. Further no types could be procured for critical studies of these varieties. Under these circumstances some of the varieties are merged.

7.2. var. *wallichii*

Fig. 49.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Himalayas, up to ca 2200 m. Jammu & Kashmir, Himachal Pradesh and Sikkim,

Nepal and Bhutan.

#### EXCLUDED SPECIES

*Cirsium tibeticum* Kitam. in Acta Phyt. Geobot. 15: 43.f.5.1953.

*Distrib.* India: Himalayas. Sikkim.

Nepal, Bhutan and Tibet.

*Note.* There is no specimen in Indian Herbaria.

#### 9. *Cousinia* Cass.

Herbs, thistle-like. Leaves alternate, toothed, lobed or pinnatisect, spinescent. Heads homogamous, globose, ovoid or oblong, solitary or crowded, rarely corymbose. Flowers white or purple, all similar, usually bisexual, tubular; limb cylindric, slender, usually unequal, 5-fid. Involucral bracts many-seriate, appressed with long, erect, spreading or recurved, spinous tips; inner erect, slender, scarious. Receptacle flat, densely bristly. Filaments glabrous; anther bases sagittate; auricles connate; tails branched or villous. Style arms narrow, short or long. Achenes, usually obovate or oblong, compressed, glabrous, 5-many ribbed. Pappus hairs 1-seriate, slender or flattened, simple, free, caducous, rarely absent.

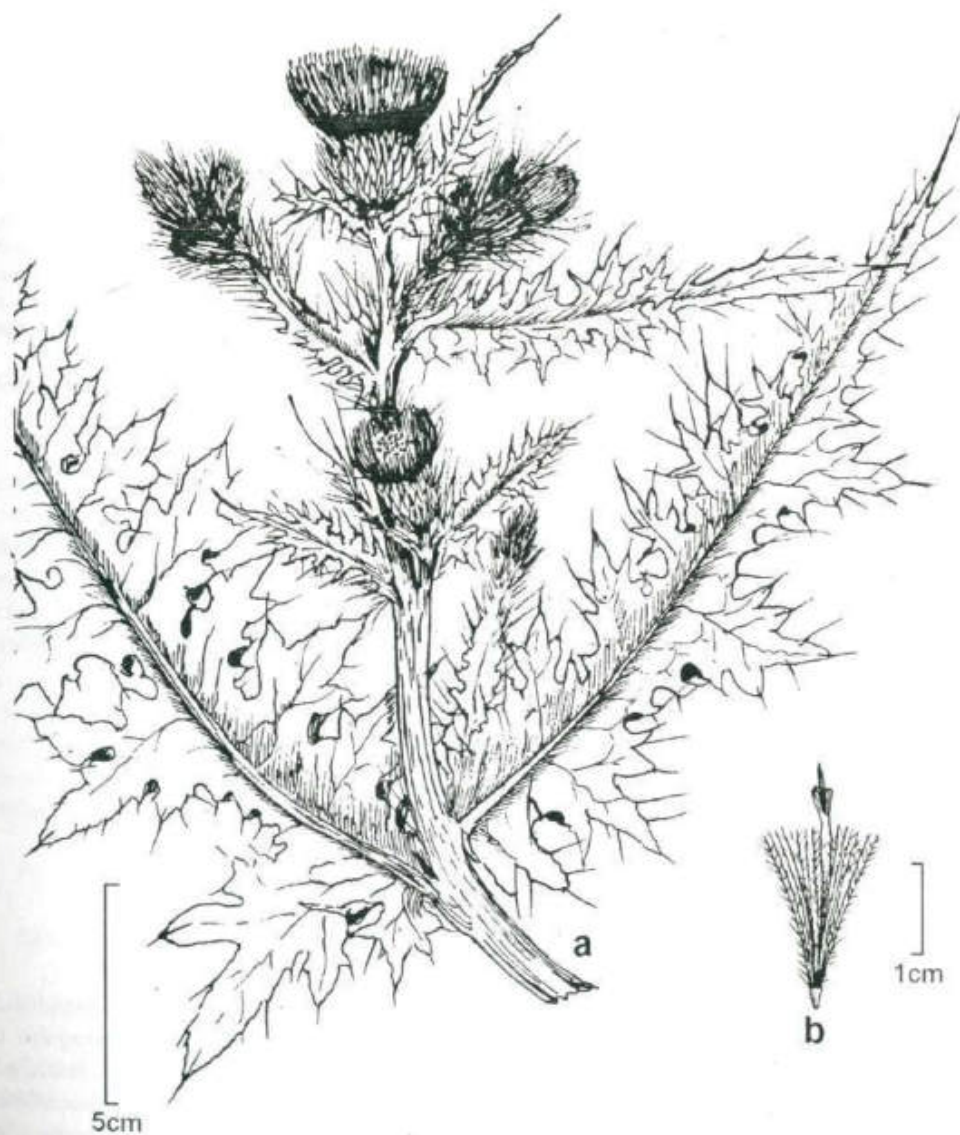


Fig. 49. *Cirsium wallichii* DC. var. *wallichii* : a. Habit; b. Floret.

E. Mediterranean to C. Asia; ca 400 species, 5 in India.

*Literature.* RECHINGER, K.H. (1972) *Flora Iranica* 90 (1,5): 1-329. SCHTEPA, I.S. (1962). Palynological data for the Systematics of the genus *Cousinia* Cass. *Pollen et Spores* 4(2):375.

#### KEY TO THE SPECIES

- |  |                         |
|--|-------------------------|
| 1a. Bristles of receptacle quite smooth                        | 4. <i>C. prolifera</i>  |
| b. Bristles of receptacle more or less rough                   | 2                       |
| 2a. Pappus present, scabrid                                    | 3                       |
| b. Pappus absent or very short                                 | 4                       |
| 3a. Heads fascicled; involucre bracts straight                 | 2. <i>C. falconeri</i>  |
| b. Heads not fascicled; involucre bracts spreading or recurved | 5. <i>C. thomsonii</i>  |
| 4a. Branches spinous winged                                    | 3. <i>C. microcarpa</i> |
| b. Branches not winged   | 1. <i>C. auriculata</i> |

1. *Cousinia auriculata* Boiss., *Fl. Diagn. Ser. 2, 3: 58. 1856*; Hook.f., *Fl. Brit. India* 3: 360. 1881.

Herbs, perennial, corymbosely branched, 10-30 cm high; stems cottony. Radical leaves oblong-ovate, obtuse, serrulate at margins; cauline ovate or ovate-lanceolate, sinuate or pinnatifid, tip and lobes strongly spinescent. Heads solitary, 2.5-5.0 cm across, peduncled. Involucre bracts 1.8-3.8 cm long; spines very long, stout, spreading and recurved, keeled, deeply channelled above; inner narrowly oblanceolate, aristate, scarious, erect, shining, serrulate above at margins. Receptacular bristles slender, scabrid above, twisted below.

*Fl. & Fr.* June - Aug.

*Distrib.* India: W. Himalayas. Jammu & Kashmir.

Afghanistan and Pakistan.

2. *Cousinia falconeri* Hook.f., *Fl. Brit. India* 3: 360. 1881.

Herbs, stout, erect, cottony, branched. Basal leaves pinnatifid or half-pinnatifid, cobwebby above, densely white tomentose beneath; segments horizontal, triangular or lanceolate, simple or lobulate, spinescent at tip and lobes. Heads solitary or fascicled, 1.2-6.2 cm across, sessile or subsessile. Involucre bracts numerous, subulate-lanceolate, 2.5-3.5 cm long, woolly, spiny; inner linear, aristate, scarious, shining. Receptacular hairs scabrid above.

*Fl. & Fr.* June - Aug.

*Distrib.* India: W. Himalayas, ca 3600 m. Jammu & Kashmir.

3. *Cousinia microcarpa* Boiss., *Diagn. Pl. Or. Ser. 2, 3: 59. 1856; Hook.f., Fl. Brit. India 3: 360. 1881.*

Herbs, biennial, slender, 15-50 cm high; stems dichotomously, corymbosely branched; branches spinuous winged. Radical leaves runcinate or lyrate runcinate-pinnatifid, glabrate above, cottony beneath; segments toothed; cauline linear-oblong, irregularly pinnatifid and toothed sessile; lobes and teeth spinescent. Heads globose, ca 2.5 cm across, peduncled. Involucral bracts triangular-lanceolate, ca 1.2 cm long, cobwebby, ending in very stout, spreading, flat, keeled spines; innermost narrowly spathulate, scarious, shining, apiculate, serrate above. Receptacular bristles scabrid. Corolla purple, ca 1.5 cm long. Achenes oblong-ovate, ca 3 mm long. Pappus absent.

*Fl. & Fr.* June - Aug.

*Distrib.* India: Jammu & Kashmir.

Afghanistan and Persia.

4. *Cousinia prolifera* Jaub. & Spach., *Ill. Pl. Or. 2: 75. t. 157. 1845. C. minuta* Boiss., *Diagn. Ser. 1, 6: 119. 1845; Hook.f., Fl. Brit. India 3: 359. 1881.*

Annuals, small, rigid with spreading or decumbent, dichotomous branches. Basal leaves oblong or lanceolate, sinuate-pinnatifid, 8-10 x 2-4 cm, membranous, hoary, cobwebby on both surfaces, sessile. Heads globose, many ca 2 cm across, terminal and in forks. Involucral bracts 15-20, triangular-lanceolate, stout, stellately spreading, recurved. Receptacular bristles smooth. Flowers yellow, ca 7 mm long. Achenes obovoid, compressed, 5-7-angled, ca 2 mm long, truncate with a crenulate ring; angles subrenate. Pappus deciduous; hairs scabrid.

*Fl. & Fr.* June - Aug.

*Distrib.* India: Jammu & Kashmir and Rajasthan.

Afghanistan, Pakistan, Iran and C. Asia.

5. *Cousinia thomsonii* C.B. Clarke, *Comp. Ind. 213. 1876; Hook.f., Fl. Brit. India 3: 360. 1881.*

Fig. 50.

Herbs, perennial, ca 30 cm high, stout, erect, cottony, branched. Radical leaves deeply interruptedly pinnatifid, 12.5-25.0 x 1.8-3.0 cm, cobwebby above, densely white tomentose beneath; segments horizontal, triangular, with a stout nerve and long spine, sometimes forked or 3-sect at base; lobes divaricating; midrib stout, glossy; cauline ovate-lanceolate, with spiny tips and lobes, sessile or auricled. Heads 2.5-5.0 cm across,



Fig. 50. *Cousinia thomsonii* C.B. Clarke : a. & b. (a. Portion of a plant; b. Portion of a plant with inflorescence); c. Involucral bracts. d. Floret.



peduncled, suberect or nodding. Involucral bracts many triangular-lanceolate, 1.0-3.5 cm long, woolly, spiny at tip; outer recurved. Receptacular bristles ca 1.5 cm long, scabrid above. Corolla purplish, glabrous, 1.2-1.6 cm long. Achenes obovoid, glabrous. Pappus scabrid.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas, 3000-4200 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan, Pakistan and Nepal.

### 10. *Crupina* (Pers.) DC.

Herbs, annual, erect, corymbosely branched above. Leaves alternate; basal simple; cauline pinnatisect. Heads heterogamous. Involucral bracts imbricate, oblong-lanceolate, acute. Receptacular scales linear-subulate. Ray florets sterile. Disk florets hermaphrodite. Filaments glabrous. Achenes obovate, distally more villous; outer epappose; inner with 2 rows of pappus hairs.

S. Europe to Iran; 4 species, 1 in India.

*Crupina vulgaris* Cass., *Dict. Sc. Nat.* 12: 68. 1818; Kaul in *Bull. Bot. Surv. India* 18: 224. 1976.

Herbs, 50-80 cm high; stems slender, branched, narrowly grooved. Leaves pinnately cut into linear segments, sessile. Heads in apical, branched, leafless cymes, narrowly cylindrical, upto 3 cm long. Involucral bracts many-seriate; outermost 0.4-1.7 cm long, fine tipped, papery; middle distinctly veined. Stamens syngenesious forming a tube round the style. Achenes deep brown, 3-4 mm long. Pappus hairs brown, equalling or exceeding the achenes.

*Fl. & Fr.* May - July.

*Distrib.* India: Jammu & Kashmir and Gujarat.

Europe.

### 11. *Echinops* L.

Herbs, with white tomentum, thistle-like. Leaves alternate, pinnatifid, spinous. Heads blue or white, globose, sessile or short peduncled, 1-flowered. Flowers bisexual, all fertile; tube slender; limb with 5, slender segments. Involucral bracts many-seriate, rigid,

pungent; innermost lanceolate or linear, sometimes all connate into a tube with one rigid spine on outer side. Receptacle minute. Filaments glabrous; anther bases sagittate; auricles connate; tails short, entire or fimbriate. Style arms thick, with a thick basal ring. Achenes usually villous. Pappus crown of many short, free or connate bristles.

Europe, Africa, Asia; ca 100 species, 3 in India.

*Note.* Several species of *Echinops* are cultivated and are known as "Globe Thistles".

*Literature.* BUNGE, A. (1863). Ueber die Gattung *Echinops*. *Bull. Acad. St. Peterb.* 6: 390-412.

#### KEY TO THE SPECIES

- |   |                         |
|---|-------------------------|
| 1a. Heads usually 2.5-3.5 cm across   | 2. <i>E. echinatus</i>  |
| b. Heads usually 6-7.5 cm across  | 2                       |
| 2a. Leaves very narrow, much divided; lobes narrow; inner involucre bracts ca 2.5 cm long when mature; outer involucre bracts few | 3. <i>E. niveus</i>     |
| b. Leaves ovate-oblong, broad; lobes broad; inner involucre bracts ca 1.6 cm long when mature; outer involucre bracts numerous    | 1. <i>E. cornigerus</i> |

1. *Echinops cornigerus* DC., *Prodr.* 6: 525. 1838; Hook.f., *Fl. Brit. India* 3: 358. 1881. Fig. 51.

Annuals, erect, simple, stout; stems very leafy. Leaves ovate-oblong or oblong, pinnatifid or pinnate, 10-20 cm long, cobwebby above, densely cottony beneath; segments deeply lobulate; lobules spinescent. Heads ca 6-7.5 cm across with or without projecting spines; peduncles stout. Outer involucre bracts narrowly oblanceolate, glabrous, surrounded by ca 2.5 cm long bristles; inner connate, ca 1.6 cm long when mature. Achenes narrowly obconic, ca 8 mm long, villous.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, on open shady slopes, 2400-3300 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Nepal and Afghanistan.

2. *Echinops echinatus* Roxb., *Fl. Ind.* 3: 447. 1832; Hook.f., *Fl. Brit. India* 3: 358. 1881.

Hindi: *Utakanta, Gokru*; Mar.: *Utanti*; Sans.: *Kantalu, Utati*.

Annuals, 30-60 cm high, branched from base; branches wide spreading. Leaves oblong, pinnatifid, 7.5-20 cm long sessile; lobes triangular or oblong, sinuate, spinescent,

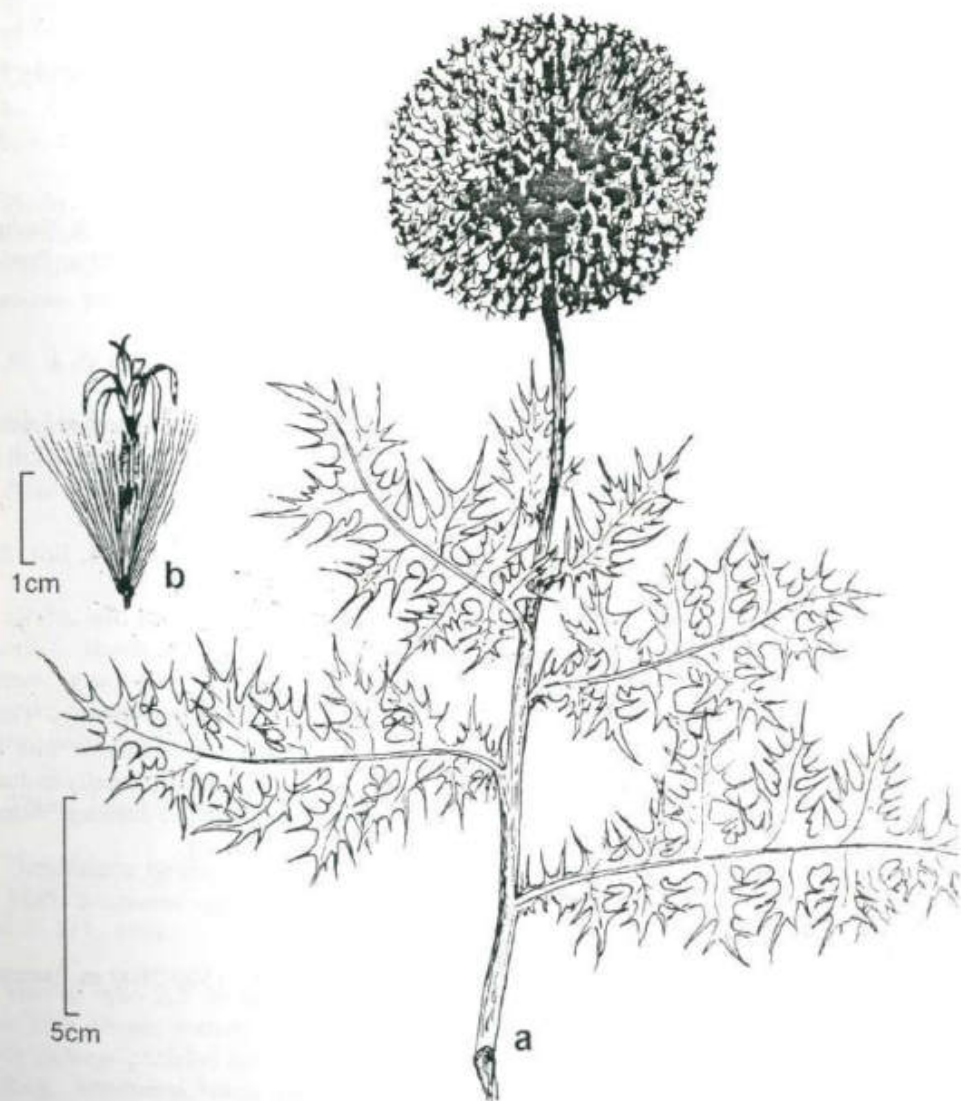


Fig. 51. *Echinops cornigerus* DC. : a. Habit; b. Floret.

spines often ca 4 cm long. Heads white 2.5-3.5 cm across, with many stout spines; spines 1.5-3.5 cm long. Involucre surrounded by strong, white bristles; outer involucre bracts 6-8, oblanceolate, glabrous; inner ca 8 mm long. Achenes obconic, ca 4 mm long, silky villous.

*Fl. & Fr.* March - Sept.

*Distrib.* India: Almost throughout, ascending to ca 1600 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Rajasthan, Bihar, W. Bengal, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra.

Afghanistan, Pakistan and Myanmar.

*Note.* Common weed of open waste places and cultivated fields. Plants are used in hoarse cough and hysteria; powdered roots mixed with acacia gum, is applied to kill hair lice.

3. *Echinops niveus* Wallich ex DC., Prodr. 6. 526. 1838; Hook.f. Fl. Brit. India 3: 359. 1881.

Hindi: *Brham Danda*.

Herbs, erect; stems simple or branched; branches densely cottony. Leaves bipinnatifid, 7.5-20.5 cm long, densely cottony beneath; segments narrow with long spines, revolute. spinulose at margins. Heads 3.5-7.5 cm across; spines usually included. Outer involucre bracts oblanceolate, spinescent; inner connate, ca 2.5 cm long. Achenes ca 3 mm long, hairy, crowded with pappus. Pappus ca 1 cm long.

*Fl. & Fr.* Sept. - Feb.

*Distrib.* India: W. Himalayas, on open dry sunny slopes, 1300-2800 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

## 12. *Goniocaulon* Cass.

Annual, erect, glabrous, branched; stems 4-8-angled. Leaves alternate, narrow, toothed. Heads homogamous, oblong, fascicled, corymbose. Flowers all bisexual, fertile, similar tube slender; limb longer, cylindric, 5-fid almost to middle. Involucre bracts pale, many-seriate, narrow, rigid, acute, erect, not spinescent; outer gradually shorter. Receptacle very narrow, paleaceous. Filaments hairy; anther bases sagittate, connate; tails short. Style arms filiform. Achenes oblong, many-ribbed, glabrous. Pappus scales many-seriate, very unequal.

Indo Malayan; One species.

✓ *Goniocaulon glabrum* Cass. in Bull. Soc. Philom. 34. 1817. *G. indicum* C.B. Clarke, Comp. Ind. 236. 1876. *Amberboa indica* DC., Prodr. 6: 558. 1838; Hook.f., Fl. Brit. India 3: 377. 1881.

Herbs, 30-90 cm high, erect; branches ribbed, simple below, corymbose above. Leaves linear-obovate or subspathulate, toothed at margins, narrowed at base, 5-10 cm long, halfamplexicaul, sessile. Heads narrow, fascicled in compound corymbs, 1.2-1.6 cm across, pedicelled. Corolla rose-purple, ca 5 mm long.

*Fl. & Fr.* Jan. - March.

*Distrib.* India: Uttar Pradesh, Bihar, W. Bengal, Madhya Pradesh and Maharashtra.

*Note.* Occasionally found in cultivated lands, often gregarious on black soil.

### 13. *Hemistepta* Bunge ex Fischer et Mey

Herbs, tall, leafy, simple below, corymbosely branched above. Basal leaves lyrate-pinnatifid. Heads in large open paniced corymbs, long peduncled. Involucral bracts glabrate, many-seriate. Receptacle densely bristly, flat or convex. Filaments free, glabrous; anther bases sagittate. Style arms linear. Achenes smooth. Pappus hairs 1-2-seriate; inner feathery.

China, Japan, Nepal and Bangladesh; One in India.

✓ *Hemistepta lyrata* Bunge ex Fischer et Mey. in Index Sem. Hort. Bot. Petrop. 2: 38. 1835. *Saussurea affinis* Spreng. ex DC., Prodr. 6: 540. 1838; Hook.f., Fl. Brit. India 3: 373. 1881.

Herbs, upto 2.5 m tall. Basal leaves lyrate-pinnatifid, 10-20 cm, glabrous or puberulous above, cottony beneath, petioled; cauline sinuate lobed or entire, sessile. Heads in large paniced corymbs, ca 1-2.5 cm across, long peduncled; peduncles 5-11 cm long. Involucral bracts glabrate; outer ovate, obtuse or acute; inner lanceolate, acuminate, pale, rarely cottony. Corolla pale red, very slender, ca 8 mm long. Anther tails short, fimbriate. Receptacle bristles long. Achenes obovoid, ca 2 mm long, smooth, 10-ribbed, tip contracted. Pappus hairs white, ca 3 mm long, very slender; outer pappus absent.

*Fl. & Fr.* Feb. - May.

*Distrib.* India: Arunachal Pradesh, Assam, Manipur, Uttar Pradesh, W. Bengal and Bihar.

Nepal, Myanmar, Bangladesh, China, Japan and E. Australia.

#### 14. *Jurinea* Cass.

Herbs, annual or perennial. Leaves entire, toothed, or pinnatifid, rarely armed, more or less tomentose. Heads homogamous. Flowers purple, all bisexual; tube slender; limb elongate, 5-fid to middle or lower. Involucral bracts many-seriate, imbricate; outer shorter; innermost narrow, erect. Receptacle flat, densely bristly. Filaments free, glabrous; anther bases sagittate; auricles usually connate; tails elongate. Style arms short. Achenes 4-5-angled, glabrous, smooth or 1-3-ribbed. Pappus hairs many-seriate, simple, barbellate or feathery.

C. Europe, Mediterranean region to China, C. Asia; ca 100 species, 2 in India.

*Literature.* ILJIN, M.M. (1925). Revision of Turkistan species of the genus *Jurinea* Cass. *Trans. Sci. Soc. Turkest.* 2: 1-28. Pl. 1-10. (In Russian).

*Note.* Some of the species of *Jurinea* have been treated under *Dolomiaea* DC. and *Diplazoptilon* Liang. As the author could not examine the type/authentic material of these genera the species treated under *Dolomiaea* and *Diplazoptilon* by different authors are treated here under *Jurinea* only.

#### KEY TO THE SPECIES

- |   |                               |
|---|-------------------------------|
| 1a. Leaves cottony above; pappus brown  | <b>2. <i>J. dolomiaea</i></b> |
| b. Leaves scabrid above; pappus whitish | <b>1. <i>J. cooperi</i></b>   |

**1. *Jurinea cooperi*** Anthony in Notes Roy. Bot. Gard. Edinb. 18: 21. 1933.

Herbs, perennial, stemless; roots long, woody, branched. Radical leaves rosulate, lanceolate or oblanceolate, runcinate-pinnatifid, 9-15 x 4-7 cm; lobes, irregular, denticulate, shortly mucronate, upper surface green, scabrid, white tomentose beneath; petiole 1-3 cm long hispid. Heads many (4-10), sessile, crowded ca 2 cm across. Involucral bracts ca 5-seriate, margins of upper halves hispid; outer lanceolate, acute, 1-2 cm long, 4 mm broad; inner narrowly lanceolate, ca 2 cm long, 2 mm broad, obtuse. Receptacular bristles subulate, 3-5 mm long. Florets purple, ca 2 cm long; corolla tube 1.5 cm long; limb 5 mm long. Achenes (immature) quadrangular, ca 4 mm long. Pappus multiseriate, almost plumose, white, ca 2 cm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: E. Himalayas, ca 4,3000 m, amongst rocky boulders. Sikkim.

China and Tibet.

*Note.* Some authors treat this species as *Diplazoptilon cooperi* (Anth.) Shih.

2. *Jurinea dolomiaea* Boiss., Fl. Or. Suppl. 311. 1888. *Carduus macrocephalus* Wallich, Cat. 100 n. 2904. 1831 (nom. nud.). *Dolomiaea macrocephala* Royle, Ill. Bot. Himal. 251. t. 57. 1835. *Jurinea macrocephala* (Royle) C.B. Clarke, Comp. Ind. 237. 1876, (non DC.); Hook.f., Fl. Brit. India 3: 378. 1881. Fig. 52.

Stemless perennials; root woody. Leaves oblong-lanceolate, pinnate or pinnatifid, 15-45 x 3.5-17.5 cm, cottony or cobwebby above, thickly white tomentose beneath; lobes broad, lobulate or pinnatifid, denticulate; teeth acute or mucronate. Heads many (3-30), 1.5-2.5 cm across, sessile or short peduncled; peduncles stout, tomentose, often cottony at base. Involucral bracts 1.8-3.5 cm long; outer ovate-lanceolate; inner elliptic-lanceolate, long acuminate, scabrid or smooth, erect, scarious. Receptacular bristles united into lacinate cup, bristles much shorter than achenes. Corolla 2.5-3 cm long. Anther tails lacerate. Achenes cuneate-obovate, ca 6-8 mm long, curved, compressed, unequally 4-5-angled, truncate, tubercled. Pappus brown, ca 2.5 cm long, copious, brown, cohering at base.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas, Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal and China.

*Note.* According to Hara *et al.* (1982) *J. macrocephala* DC., Prodr. 6: 674. 1838 is based on a plant from Iran. The style branches of *J. dolomiaea* are long. Some authors treat this species as *Dolomiaea macrocephala* DC. Aswal & Goel (*Indian J. For.* 11(4): 339. 1988) have proposed a transfer of this species under *Jurinea macrocephala* (Royle) Aswal et Goel.

#### EXCLUDED SPECIES

*Jurinea gnaphalioides* Klatt. in Sitzungshb. Munch. Akad. 96. 1878.

*Jurinea himalaica* Stewart in Nasir et Ali, Ann. Cat. Vas. Pl. W. Pak. 757. 1972.

*Jurinea modesta* Boiss., Diagn. Ser. 2, 3: 50. 1856.

*Jurinea rosulata* Klatt. in Sitzungsb. Munch. Akad. 96. 1878.

There are no specimens available in Indian herbaria, for the above mentioned species.

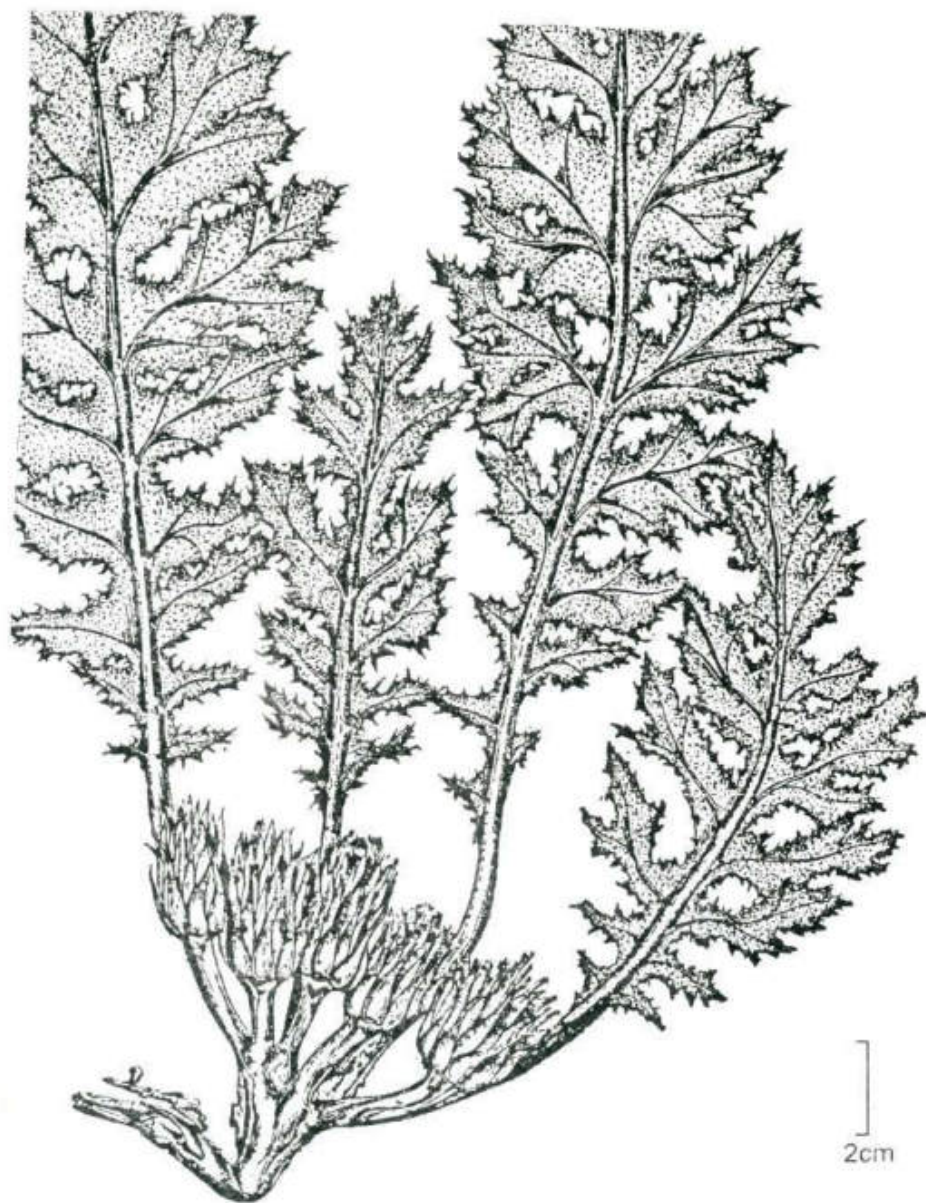


Fig. 52. *Jurinea dolomiaea* Boiss.: a. Habit.



### 15. *Olgaea* Iljin.

Herbs, robust. Leaves alternate, often decurrent, pinnatifid, spinescent. Heads homogamous solitary or crowded. Flowers all bisexual and usually fertile. Involucre ovoid-hemispheric or globose; bracts many-seriate, appressed. Receptacle flat or convex, densely bristly. Anther bases sagittate; tails slender. Style arms short. Achenes glabrous. Pappus copious, many-seriate.

C. Asia; ca 18 species, 1 in India.

*Olgaea thomsonii* (Hook.f.) Iljin in Not. Syst. Herb. Hort. Petrop. 2: 142. 1922.  
*Carduus thomsonii* Hook.f., Fl. Brit. India 3: 361. 1881.

Herbs, robust, 30-45 cm high; stems simple, strongly ribbed. Leaves linear-oblong or lanceolate, subpinnatifidly lobed, 15-20 cm long, strongly spinous, very coriaceous, shining, broadly auricled at base. Heads few, fascicled or subcorymbose, 7-7.5 cm across, inclined, densely woolly. Involucral bracts ca 2.5 cm long, with long, strong, spreading or recurved spine. Receptacular bristles very dense, ca 6 mm long. Corolla very slender, ca 3 cm long, glabrous. Filaments quite glabrous; anther bases very long, lacinate. Achenes ca 6 mm long, glabrous. Pappus hairs up to 3 cm long, stiff, very unequal.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas, 2800-4000 m. Jammu & Kashmir.

Endemic.

### 16. *Onopordum* L.

Herbs, stout; stems often spinose winged. Leaves spinose-dentate, pinnatifid-pinnatisect, rarely subentire. Heads globose-ovoid. Involucral bracts many-seriate, spinescent. Receptacle with deep pits having dentate margins. Florets pink or reddish purple or white. Anthers with subulate, apical appendages; filaments pilose. Achenes elliptic, compressed or subtetragonal, glabrous. Pappus hairs many-seriate, scabrid or plumose, united into a ring at base.

Europe, N. Africa. W. Asia; ca 40 species, 1 in India.

*Onopordum acanthium* L., Sp. Pl. 827. 1753; Rau & Rao in Bull. Bot. Surv. India 2: 425. 1960.

*Eng.*: Cotton thistle, Scotch thistle.

Herbs upto 3 m tall; stems striate, winged; wings triangular, floccose, spiny; spines yellow tipped. Leaves oblong-ovate, broadly lanceolate or ovate, sinuate-dentate or with broadly triangular teeth ending in spine, 30 x 25 cm, greenish green and sparsely lanate above. Heads solitary or upto 3. Involucral bracts spinescent, antrorsely scabrid on the margins. Achenes elliptic, subcompressed, variegated, transversely rugose. Pappus hairs 7-9 mm long plumose, deciduous.

*Fl.* June

*Distrib.* India: Jammu & Kashmir.

Europe.

### 17. *Saussurea* DC.

Herbs, annual, biennial or perennial, glabrous or tomentose. Leaves radical and cauline, alternate, unarmed, entire, toothed, pinnatifid or pinnatisect. Heads homogamous, solitary, corymbose or paniced, sessile or peduncled. Involucre ovoid, oblong, globose or hemispheric; bracts many-seriate, erect, not spiny, tips usually rigid and sharp; inner ones narrower and longer than the outer. Receptacle flat or convex, usually densely bristly, rarely naked. Flowers usually bluish or purple, all bisexual and similar; tube slender; limb narrow, 5-fid. Filaments free, glabrous; anther bases sagittate; auricles connate; tails usually long, entire, ciliate or woolly. Style arms linear. Achenes oblong, 4-10-ribbed, glabrous, smooth or rugose, top truncate, cupular or crowned with thickened disc and persistent base of style. Pappus hairs 1-2-seriate or many seriate; outer usually of rigid scabrid bristles, rarely feathery or absent; inner feathery, base thickened and connate into a deciduous ring.

Temperate Asia, Australia, Europe and W. and N. America; ca 403 species, 61 in India.

*Note.* J.D. Hooker (1881) placed the genus under the tribe Cynaroideae, subtribe Carduineae, and treated the species under two subgenera, viz., *Eusaussurea* and *Eriocoryne*. *Eusaussurea* has been further grouped into 6 sections. Lipschitz (1979) has treated the Indian species under 5 subgenera and each subgenus has been further grouped into different sections. In the present treatment the genus has been dealt as such, without any subdivisions.

*Literature.* HAJRA, P.K. (1988). Brahmakamal & its allies in India. Dehra Dun. LIPSCHITZ, S.J. (1979). *Rod Saussurea* DC. (Asteraceae). Leningrad.

#### KEY TO THE SPECIES

- 1a. Achenes shortly prickly in upper part; pappus hairs many-seriate  
b. Achenes smooth or rugose; pappus hairs 1-2-seriate

11. *S. ceratocarpa*

- 2a. Herbs usually densely woolly 3  
 b. Herbs usually not densely woolly 12  
 3a. Receptacle naked 4  
 b. Receptacle with bristles 5  
 4a. Leaves linear-lanceolate, acute at apex; pappus white 40. *S. nishiokae*  
 b. Leaves broadly rounded at apex; pappus nut brown 19. *S. depsangensis*  
 5a. Herbs, dwarf, densely tufted 6  
 b. Stem distinct, 10.5-30 cm high 8  
 6a. Leaves linear-spathulate, entire at margins 5. *S. aster*  
 b. Leaves oblong-obovate or obovate-lanceolate or linear-lanceolate, toothed at margins 7  
 7a. Leaves oblong-obovate or obovate-lanceolate; pappus white or dull white 23. *S. glacialis*  
 b. Leaves linear-lanceolate; pappus pale brown or dull blue 25. *S. gnaphalodes*  
 8a. Heads solitary 27. *S. graminifolia*  
 b. Heads in dense clusters 9  
 9a. Heads deeply embedded in woolly hairs 26. *S. gossypiphora*  
 b. Heads exposed or partially exposed outside the woolly hairs 10  
 10a. Leaves linear-oblong, pinnatifid or rarely denticulate-sinuate 49. *S. simpsoniana*  
 b. Leaves narrow, obovate, spatulate or rhomboid, subentire or dentate 11  
 11a. Leaves subentire, sometimes minutely lobulate at apex 58. *S. tridactyla*  
 b. Leaves in upper half dentate, broadly obovate at apex 35. *S. medusa*  
 12a. Heads enclosed in floral, boat shaped, papery bracts or bracteate by broad, obtuse, appressed leaves 13  
 b. Heads not enclosed in floral, boat shaped papery bracts 17  
 13a. Dwarf, generally 2-6 cm high herbs. 37. *S. nana*  
 b. Stems always well developed, erect, 8-70 cm high 14  
 14a. Leaves linear, grass like, 0.2-0.3 cm broad; heads bracteate by broad, obtuse, appressed leaves 30. *S. hookeri*  
 b. Leaves broad, not grass like; heads enclosed in boat shaped bracts 15  
 15a. Heads solitary, large, 2.5-5 cm (3-5 in *S. uniflora* var. *conica*) 59. *S. uniflora*  
 b. Heads many, (rarely solitary), comparatively small, 1.2-2.5 cm in diam. 16  
 16a. Floral bracts pale yellow; heads glabrous 42. *S. obvallata*  
 b. Floral bracts pale-pinkish; heads villous 8. *S. bracteata*  
 17a. Stems stout, 0.3-3.5 m high 18  
 b. Stems 2.5-30 cm high or dwarf, stemless 36  
 18a. Terminal lobes of leaves large, deltoid 18. *S. deltoidea*  
 b. Terminal lobes of leaves not as above 19  
 19a. Heads sessile, in clusters 20  
 b. Heads panicled, solitary or in corymbs 21  
 20a. Herbs 1-2.5 m tall; leaves glabrate beneath 16. *S. costus*  
 b. Herbs 0.6-0.9 m high; leaves woolly beneath 32. *S. laneana*  
 21a. Heads in terminal panicles, lateral branches racemose 22  
 b. Heads solitary or in corymbs 23  
 22a. Leaves pinnatisect; lobes apiculate 36. *S. nagensis*  
 b. Leaves sinuate dentate or lyrate pinnatifid 17. *S. crispa*  
 23a. Heads in corymbs 24  
 b. Heads solitary and terminal 35  
 24a. Stems winged by decurrent leaf bases 25  
 b. Stems not winged by decurrent leaf bases 26  
 25a. Outer pappus bristles short, scabrid 10. *S. candolleana*  
 b. Outer pappus bristles absent 12. *S. chenopodifolia*  
 26a. Stems usually 2-3 m tall; involucral bracts glabrous, rarely cottony 27  
 b. Stem up to 1.5 m high 28  
 27a. Inflorescence not diffuse; capitula many 2. *S. albescens*

- b. Inflorescence diffuse; capitula few 20. *S. diffusa*  
29
- 28a. Outer pappus absent 29  
b. Outer pappus present 33
- 29a. Achenes muriccate, 5-angled 28. *S. heteromalla*  
30  
b. Achenes smooth or somewhat tubercled 30
- 30a. Leaves entire 31  
b. Leaves lyrate-pinnatifid 32
- 31a. Cauline leaves ca 15 cm long 22. *S. gilesii*  
b. Cauline leaves 1-5 cm long 34. *S. leptophylla*
- 32a. Achenes 10-ribbed 13. *S. chitralica*  
b. Achenes 4-angled 52. *S. stracheyana*
- 33a. Pappus bristles short, scabrid 3. *S. jacea*  
b. Pappus bristles all feathery 34
- 34a. Leaves linear-lanceolate, almost entire; corymbs lax 45. *S. pantlingiana*  
b. Leaves ovate-oblong or oblong, sharply toothed; corymbs dense 46. *S. piptathera*
- 35a. Leaves lyrate or lyrate-pinnatifid; pappus single; achenes tubercled. 7. *S. auriculata*  
b. Leaves oblong or oblong-lanceolate; pappus double; achenes not tubercled 21. *S. fastuosa*
- 36a. Dwarf, stemless or with scape like stem 37  
b. Stems distinct, 2.5-30 cm high 53
- 37a. Anther tails short, entire 38  
b. Anther tails woolly or laciniate or fimbriate 39
- 38a. Inflorescence usually 3-5 cm in diam.; heads usually many; pappus white 50. *S. stella*  
b. Inflorescence 1-2 cm in diam.; heads usually a few; pappus grey to light brown 57. *S. thomsonii*
- 39a. Anther tails woolly or laciniate or fimbriate 40  
b. Anther tails woolly 41
- 40a. Leaves pinnate or pinnatifid; achenes muriccate 61. *S. yakla*  
b. Leaves broadly obovate or elliptic, toothed; achenes glabrous 6. *S. atkinsonii*
- 41a. Leaves pinnatifid or pinnate 42  
b. Leaves not pinnatifid 50
- 42a. Achenes glabrous 43  
b. Achenes transversely rugose or muriccate 46
- 43a. Leaves obovate-oblong or oblanceolate, lyrate or sinuate-pinnatifid or subruncinate 44  
b. Leaves linear-elongate, runcinate-pinnatifid 45
- 44a. Heads 0.6-0.8 cm across, short peduncled 39. *S. nimborum*  
b. Heads 1-2.5 cm across, sessile 51. *S. stoliczkai*
- 45a. Scapiflorous stems many or absent 9. *S. caespitosa*  
b. Scapiflorous stems many 56. *S. taraxacifolia*
- 46a. Achenes transversely rugose 44. *S. pachyneura*  
b. Achenes muriccate 47
- 47a. Involucral bracts tipped with dark purple 55. *S. sughoo*  
b. Involucral bracts not tipped with dark purple 48
- 48a. Heads 0.5-1 cm across; involucral bracts ovate 41. *S. obscura*  
b. Heads 1.2-3.7 cm across; involucral bracts lanceolate 49
- 49a. Receptacle without bristles 47. *S. polystichoides*  
b. Receptacle bristly 33. *S. leontodontoides*
- 50a. Pappus double, both feathery 60. *S. werneroides*  
b. Outer pappus of scabrid bristles or absent 51
- 51a. Involucral bracts densely hairy at tips 54. *S. sudhanshui*  
b. Involucral bracts not densely hairy at tips 52
- 52a. Heads 0.5-1 cm long; heads ca 1.2 cm x 0.5-0.7 cm 53. *S. subulata*  
b. Heads 2.0-7.0 cm long; heads 1.5-2 x 1.5-2 cm 15. *S. columnaris*
- 53a. Heads in terminal corymbs 54  
b. Heads usually solitary 55

54a. Receptacle naked	43. <i>S. ovata</i>
b. Receptacle bristly	14. <i>S. clarkei</i>
55a. Leaves pinnatifid or with very short, distant lobes	56
b. Leaves entire or nearly so	61
56a. Leaves glabrous on both surfaces	57
b. Leaves white tomentose or cottony beneath	58
57a. Achenes smooth, 4-angled	38. <i>S. nepalensis</i>
b. Achenes muricate	3. <i>S. andersonii</i>
58a. Achenes muricate	54. <i>S. sughoo</i>
b. Achenes smooth	59
59a. Leaves cottony above and beneath	56. <i>S. taraxicifolia</i>
b. Leaves glabrous above and white tomentose beneath	60
60a. Leaves linear-elongate, sinuate-pinnatifid	4. <i>S. andryaloides</i>
b. Leaves obovate-oblong or lanceolate-oblong, lyrate pinnatifid	1. <i>S. abnormis</i>
61a. Leaves glandular pubescent or puberulous	24. <i>S. glanduligera</i>
b. Leaves not glandular pubescent	62
62a. Cauline leaves half amplexicaul	48. <i>S. roylei</i>
b. Cauline leaves linear-oblong	29. <i>S. hieracioides</i>

1. *Saussurea abnormis*, Lipschitz in B.J. URSS. 56: 826. 1971 & Rod Saussurea 136. 1979. *S. neglecta* Ludlow in Bull. Brit. Mus. (Nat. Hist.) B. 5: 279. t. 23A. f. 4. 1976.

Herbs, erect, ca 30 cm high. Basal leaves obovate-oblong or lanceolate-oblong, lyrate-pinnatifid, 12.18 x 1.5-4 cm; lateral lobes irregularly sinuate-dentate, cottony or woolly above, densely white tomentose beneath; cauline leaves sessile. Heads solitary, 2-4 cm across, long peduncled; peduncles 15-17 cm long. Involucral bracts 4-5-seriate, narrowly lanceolate, or linear, acuminate; outer 6-8 x 0.75 mm; intermediate 8-11 x 1-1.25 mm; inner 12-13 x 1 mm, ciliate at margins. Flowers white, ca 1 cm long. Anthers 4-4.5 mm long. Achenes 3.5 mm long, smooth. Pappus ca 1 cm long, feathery.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, subalpine regions, in open places, 3000-3600 m. Uttar Pradesh.

Nepal.

*Note.* This species is allied to *S. deltoidea* and *S. auriculata* but differs being much smaller than either of these species.

2. *Saussurea albescens* (DC.) Sch.-Bip. in Linnaea 19: 330. 1846. *Aplotaxis albescens* DC., Prodr. 6: 540. 1838; Hook.f., Fl. Brit. India 3: 374. 1881.

Herbs, 2-3 m tall, erect, slender. Leaves acute or acuminate, entire or sinuate lobed or sub-pinnatifid, (very variable), 10-30 cm; teeth apiculate; lower leaves, narrowly oblong, glabrous, scabrid or cobwebby above with slender branching nerves, petioled;

upper ovate or linear or oblong-ovate, sessile. Heads ca 1.2 cm across, terminal and axillary, flat topped, long peduncled, corymbs narrow, erect. Involucral bracts purplish, erect, cottony or rarely glabrous, rigid; outer ovate-acute; inner lanceolate. Receptacle very narrow, bristles longer than the achenes. Corolla 1.2 cm long. Anther tails fimbriate. Achenes ca 2.5 mm long, top much cupped, muricate. Pappus white, 0.8-1.2 cm long.

*Fl. & Fr.* June - Oct.

*Distrib.* India: W. Himalayas, in dry wastelands, 1700 - 3600 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Pakistan and Afghanistan.

3. *Saussurea andersonii* C.B. Clarke, Comp. Ind. 226. 1876; Hook.f., Fl. Brit. India 3: 370. 1881.

Herbs, 7.5-15 cm high, glabrous. Leaves linear-elongate, runcinate-pinnatifid, ca 6-20 cm; lobes distant, small, ovate and acute or subulate, membranous, pale beneath, sessile or petioled. Heads solitary 1.2-2.5 cm across. Involucral bracts ovate or ovate-lanceolate with dark borders. Receptacle bristles few. Anther tails woolly. Achenes muricate. Pappus dark brown; outer absent.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: E. Himalayas, in alpine regions, 3500-4000 m. Sikkim and West Bengal.

Endemic.

*Note.* This species closely resembles *S. taraxacifolia* but is perfectly glabrous. The achenes and pappus are also very different.

4. *Saussurea andryaloides* (DC.) Sch.- Bip. in Linnaea 19: 331. 1846. *Aplotaxis andryaloides* DC., Prodr. 6: 543. 1838. *S. falconeri* Hook.f., Fl. Brit. India 3: 369. 1881. *S. crassicaulis* C.B. Clarke ex Pamp., Fl. Carac. 218. 1930.

Stem 2.5-25 cm, very stout, cottony or woolly. Leaves linear-elongate, irregularly sinuate-pinnatifid or toothed, 7.5-15 x 1.2-0.6 cm, cottony above, more so beneath, petioled. Heads 2.5-5 cm across. Involucral bracts pale, linear-lanceolate, cottony, erect. Receptacle bristles shorter than achenes. Corolla ca 1.8 cm long. Anther tails short, woolly. Achenes smooth. Pappus double or single.

*Fl. & Fr.* Sept.

*Distrib.* India: W. Himalayas, 3600-4800 m. Jammu & Kashmir and Uttar Pradesh.

Pakistan.

*Note.* There are only 2 sheets in DD, one from Kashmir and the other from Kumaon.

**5. *Saussurea aster* Hemsl. in J. Linn. Soc. 30: 115. 1894.**

Monocarpous herbs(?); stems absent. Roots fusiform. Leaves linear-spathulate or linear, ca 2.5 cm long, membranous, hairy or at length lacking and somewhat decayed, sessile. Heads crowded, ca 3.5 cm across, ca 40-flowered. Involucral bracts few-seriate, as long as or shorter than flowers, ovate-oblong or linear, membranaceous, scarious, acute, minutely hairy. Receptacle bristles short. Flowers purple. Achenes short, glabrous. Pappus ca 10-12, biseriate; outer smaller, scabrid; inner long, hairy.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: W. Himalayas, in sandy gravelley soil, 4800-5800 m. Jammu & Kashmir and Himachal Pradsh.

Tibet.

*Note.* This species is allied to *S. gnaphalodes* but differs from it by leaves being linear spathulate and heads sessile.

**6. *Saussurea atkinsonii* C.B. Clarke, Comp. Ind. 224. 1876; Hook.f., Fl. Brit. India 3: 367. 1881.**

Herbs, stemless. Leaves spreading from the root, broadly obovate or elliptic, 5-10 x 2-5 cm, membranous, toothed, sessile or shortly petioled; petiole up to 3 cm long. Heads blue, solitary, 1.8-2.5 cm across, sessile. Involucral bracts variable; outer ovate-lanceolate inner linear-oblong, scarious. Corolla 1.2 cm long. Receptacle naked or entire. Anther tails shortly fimbriate. Achenes glabrous. Pappus 1.2 cm long; outer pappus bristles few, scabrid.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, amidst boulders, ca 3000-4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Endemic.

7. *Saussurea auriculata* (Spreng. ex DC.) Sch.-Bip. in *Linnaea* 19: 331. 1846. *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; Hook.f., Fl. Brit. India 3: 374. 1881.

Herbs, 0.6-1.6 m high, glabrous or puberulous, usually simple. Leaves variable in breadth, lyrate or lyrate-pinnatifid, sinuate-toothed, 7.5-20 cm long, terminal lobe large, deltoid, glabrous above, cottony or white beneath, membranous. Heads solitary, 1.5-4 cm across, nodding, long peduncled; peduncle 5-20 cm long. Involucral bracts dark purplish, many, lanceolate, linear, acuminate papery, often recurved. Receptacle bristles long. Corolla ca 8 mm long. Anther tails long, subulate, entire or split near the tip. Achenes ca 4 mm long, 4-angled, tubercled. Pappus brown, ca 8 mm long, brown, single.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: Himalayas, on open slopes and amidst shrubs, 2000-4300 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal and Bhutan.

8. *Saussurea bracteata* Decne. in Jacq., *Voy. Inde* 94. t. 102. 1843. *S. schultzei* Hook.f., Fl. Brit. India 3: 366. 1881.

Herbs, 7.5-35 cm high, very stout, scaberulous, simple. Basal leaves linear-lanceolate or narrowly elliptic, acute, coarsely toothed, 7-10 x 1.5-2.5 cm, narrowed into a short petiole; upper half amplexicaul, acuminate, sessile. Floral bracts, purplish, cymbiform, 2.5-5 cm long, often as broad enclosing solitary, large, sessile subsilky head. Heads 1.5-2 cm across; peduncles short, stout, densely woolly. Involucral bracts blackish, lanceolate, acuminate. Corolla ca 1.2 cm long. Anther tails short, woolly. Achenes glabrous. Pappus white; outer bristles scabrid.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas, on open slopes, alpine meadows, amidst boulders with *Gentiana* sp., *Primula* sp. etc., 3500-5600 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Central Asia and Pakistan.

9. *Saussurea caespitosa* (DC.) Wallich ex Sch.-Bip. in *Linnaea* 19: 330. 1846. *Aplotaxis caespitosa* DC., Prodr. 6: 539. 1838 (p.p.). *Saussurea caespitosa* Wallich, Cat. n. 2913. 1831. *S. taraxacifolia* auct.; Hook.f., Fl. Brit. India 3: 368. 1881. p.p.



Herbs, densely tufted; scapiflorous stems 2.5-15 cm long absent or several, slender, occasionally upper branches 2-3-headed, base generally densely clothed with fibrous remains of withered petioles. Leaves sinuate, dentate to pinnatisect, 0.7-1 cm broad, segments minute, narrow, 3.5-5 mm broad; basal leaves usually overtopping the stem. Heads solitary, medium sized. Receptacle densely bristly. Anther tails short, woolly. Achenes glabrous. Outer pappus hairy, few, scabrid.

## KEY TO THE VARIETIES

- 1a. Stems 2.5-15 cm long  
b. Stemless herbs

- 9.1. var. *caespitosa*  
9.2. var. *depressa*

**9.1. var. *caespitosa***

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal.

**9.2. var. *depressa*** (Hook.f.) Lipschitz, *Rod Saussurea* 161. 1979. *S. taraxacifolia* var. *depressa* Hook.f., *Fl. Brit. India* 3: 368. 1881.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas, on south facing dry slopes, along river bed, 4500-4600 m. Jammu & Kashmir, Uttar Pradesh and Sikkim.

Nepal

**10. *Saussurea candolleana*** Wallich ex DC., *Prodr.* 6: 541. 1838, pro syn. *S. candolleana* Wallich ex Sch.-Bip. in *Linnaea* 19: 331. 1846 *Aplotaxis candolleana* DC., *Prodr.* 6: 541. 1838; Hook.f., *Fl. Brit. India* 3: 372. 1881.

Herbs, erect, 30-90 cm high, more or less winged by decurrent petioles. Leaves oblong or ovate-lanceolate, acute or acuminate, denticulate, 7.5-15 x 1.5-8.5 cm, glabrous above, cottony beneath, abruptly narrowed below the middle. Heads cylindrical, 1.2-1.8 cm across, 12-15 mm long in dense terminal corymbs. Involucral bracts ovate, obtuse or acute, glabrous or silky. Receptacular bristles longer than achenes. Corolla 6-8 mm long. Anther tails fimbriate. Achenes narrow, ca 5 mm long, 4-5 angled, smooth. Outer pappus bristles short, scabrid.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: Himalayas, on open places, 2100-5000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Pakistan, Nepal and Bhutan.

11. *Saussurea ceratocarpa* Decne. in Jacq. Voy. Inde 4: 93, t. 101. 1843 et in Walpers, Repert. Bot. Syst. 2: 668. 1843. *Jurinea ceratocarpa* (Decne.) Benth. in Benth. & Hook.f., Gen. Pl. 2: 474. 1873; Hook.f., Fl. Brit. India 3: 378. 1881.

Stems absent or up to 60 cm high, much branched, scaberulous. Leaves (radical and lower cauline usually runcinate) linear-oblong or lanceolate, entire or pinnatifid, 5-12.5 cm long, green on both surfaces or white tomentose beneath, base auricled; lower petioled upper sessile. Heads 2.5-3.5 cm in diam., sessile or stout peduncled, bracteate by linear leaves. Involucral bracts lanceolate-acuminate; outer linear; inner very slender, erect or recurved. Receptacular bristles longer than achenes. Corolla 1.2 cm long. Anther tails long, laciniate. Achenes brown, 4-5-angled, angles thickened ending in erect spines, rough. Outer pappus bristles few, scabrid.

#### KEY TO THE VARIETIES

- 1a. Stem well developed, up to 60 cm high  
b. Stemless or nearly so

- 11.1. var. *ceratocarpa*  
11.2. var. *depressa*

#### 11.1. var. *ceratocarpa*

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, 3000-5000 m. Jammu & Kashmir and Himachal Pradesh.

11.2. var. *depressa* (C.B. Clarke ex Hook.f.) Lipschitz, Rod Saussurea 42. 1979. *Jurinea ceratocarpa* Benth. var. *depressa* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 378. 1881.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, 4300-5000 m. Jammu & Kashmir and Uttar Pradesh.

Tibet.

12. *Saussurea chenopodifolia* Klatt, Sitzungsber. Math. Physik. Kl. Akad. Wiss.

Munchen 8, 1: 92. 1878; Hook.f., Fl. Brit. India 3: 374. 1881. (as synonym) *S. decurrens* Hemsl. in Hook. Icones 18: t. 1735. 1888.

Stems 60-90 cm high, erect, simple, striate. Leaves few oblong-lanceolate, sinuate-lobate 5-15 x 0.8-12 cm, lobes acute or mucronate, glabrescent, sessile. Heads cylindrical, narrow, laxly corymbose, ca 1 mm across, ca 1.5-2 cm long, 12-15-flowered. Involucral bracts 7-8-seriate, glabrous or minutely puberulous, rigid, acuminate. Receptacular bristles soft, slender, much longer than achenes. Pappus white, shorter than flowers, long hairy; outer absent.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, 2500-3500 m. Jammu & Kashmir.

Pakistan.

13. *Saussurea chitralica* Duthie in Ann. Bot. Gard. Calc. 9. pt. 7, 45. 1901.

Herbs, 60-65 cm high, simple below; branches sulcate. Leaves mostly towards base of stems, dark green and somewhat scabrous above, clothed beneath with white cottony pubescence; lower lyrate-pinnatifid, 10-12 x 3-5 cm; upper smaller, lanceolate, acute, dentate. Heads in terminal corymbs or solitary in the axils of much reduced upper leaves, 1-2.5 cm across, erect or somewhat inclined, tapering at base. Involucral bracts tinged with purple, glabrous; outer ovate, acute; inner lanceolate, acuminate. Receptacle densely bristly. Corolla pale purple, 15 mm long, slender. Anther tails lacerate. Achenes 3 mm long, 10-ribbed. Pappus white, shorter than corolla; outer bristles absent.

*Fl. & Fr.* May - Aug.

*Distrib.* India: W. Himalayas, ca 2500 m. Jammu & Kashmir.

Pakistan and Afghanistan.

*Note.* Allied to *S. heteromalla* but for broader and glabrous involucral bracts. According to R.R. Stewart (1972) this species is known from a solitary sheet deposited at Kew and may be part of the *S. albescens* complex. In DD there are two sheets collected by Harsukh from Ziarat.

14. *Saussurea clarkei* Hook.f., Fl. Brit. India 3: 372. 1881.

Herbs, 10-15 cm high, stout, pubescent. Leaves obovate, acute, sharply toothed, 10-12.5 cm, membranous, puberulous above, cottony or glabrate beneath, sessile or with winged petiole. Heads in a dense terminal cluster, ca 8 mm across. Involucral bracts

glabrous or cottony; outer ovate, acute; inner lanceolate, acuminate. Receptacle bristles longer than achenes. Pappus brown.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, on open hill slopes, ca 4500 m. Jammu & Kashmir.

Endemic.

**15. *Saussurea columnaris*** Hand.-Mazz. in Notizbl. Bot. Gart. Berl. 13:652. 1937. *S. subulata* auct. non C.B. Clarke, Diels in Notes Roy. Bot. Gard. Edinb. 7: 179. 1912.

Herbs, tufted 2.5-7.5 cm high. Leaves rosulate, linear-subulate, 2-7 cm long, acuminate, revolute, white-tomentose beneath. Heads deep blue, crimson or rose purple, 1.5-2 cm in diam.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, in alpine regions, open rocky pastures, 4500-5500 m. Jammu & Kashmir.

China.

**16. *Saussurea costus*** (Falc.) Lipschitz in Bot. J. URSS 49: 131. 1964 et Rod Saussurea 92. 1979. *Aucklandia costus* Falc. in Annual. Magaz. Natur. Hist 6: 34: 475. 1841. *Saussurea lappa* (Decne.) Sch.-Bip. in Linnaea 19: 331. 1846; Hook.f., Fl. Brit. India 3: 376. 1881. *Aplotaxis lappa* Decne. in Jacq. Voy. Bot. 96.t. 104. 1853.

Eng.: *Costus*; Hindi: *Kuth*; Sans.: *Kashmirja*.

Herbs, 1-2.5 m tall, simple, pubescent. Basal leaves with petiole 60-90 cm long; terminal lobe sometimes ca 30 cm across, irregularly toothed, membranous, scaberulous above, glabrate beneath; petiole lobately winged; cauline half amplexicaul at base, 15-30 cm long, sessile or with shorter petiole. Heads subglobose, axillary or in terminal clusters of 2-5, 2.5-3.7 cm across. Involucral bracts purple, ovate-lanceolate. Receptacle bristles very long. Corolla dark purple. Anther tails fimbriate. Achenes curved, compressed, ca 8 mm. Pappus hairs brown, double, all feathery.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas, in subalpine regions, 3200-3800 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan.

*Note.* This plant is cultivated for the roots which are used in perfume industry, incense, and medicine.

✓17. *Saussurea crispa* Vaniot in Bull. Geogr. B. Le Mans. 12: 21. 1903. *Cnicus niveus* Wallich *nom. nud.* *Aplotaxis nivea* DC., Prodr. 6: 541. 1838. *Saussurea deltoidea* var. *polycephala* C.B. Clarke, Comp. Ind. 236. 1876. *Saussurea deltoidea* var. *nivea* (DC.) Hook.f., Fl. Brit. India 3: 375. 1881. *S. microdeltoidea* Kitam. in Acta Phyt. Geobot. 19: 14. 1961.

Herbs, 1-3 m tall, simple, corymbosely branched above. Leaves ovate or deltoid-lanceolate, sinuate-dentate or lyrate-pinnatifid, cuneate at base, acute, or obtuse, 5-35 x 2-13 cm, scaberulous above, white tomentose beneath. Heads subglobose, in terminal panicles, clustered, 10-15 mm across, sessile or shortly peduncled. Involucral bracts purplish red at margins, ovate, obtuse. Corolla pale purple, ca 6 mm. Anther tails subulate, nearly entire. Achenes very variable. Pappus ca 6 mm long.

*Fl. & Fr.* Sept. - Feb.

*Distrib.* India: Open forests and scrubs, 1000-2000 m. Arunachal Pradesh, Sikkim, Manipur, Meghalaya and Nagaland.

Nepal, Myanmar, S.W. China, Indo-China and Thailand.

*Note.* Very variable plant.

✓18. *Saussurea deltoidea* (DC.) Sch.-Bip. in Linnaea 19: 331. 1846. *Aplotaxis deltoidea* DC., Prodr 6: 541. 1838. *Cnicus deltoideus* Wallich, Cat. 100, n. 2994. 1831; Hook.f., Fl. Brit. India 3: 374. 1881.

Stems 1.2-2.6 m tall, grooved, glabrous, pubescent or cottony, simple below, branched above. Basal leaves 22-25 x 8.15 cm or more; cauline 12-26 x 3.5-10 cm; white tomentose or cottony beneath, glabrous or scaberulous above, lower lyrate-pinnatifid; terminal lobe large, deltoid; lateral variable. Heads extremely variable, scattered or fascicled, 1.2-3.7 cm across, sessile or peduncled. Involucral bracts purple at margins and tips, hoary, short, ovate or lanceolate, obtuse. Receptacular bristles shorter than pappus. Corolla 1.2-1.6 cm long. Anther tails subulate, nearly entire. Achenes 3-5 mm, smooth or tubercled. Pappus white, single, equalling the corolla.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas and N.E. India; 1600-3400 m, Jammu & Kashmir, Uttar Pradesh, W. Bengal, Arunachal Pradesh, Meghalaya, Nagaland and Manipur.

Nepal, Bhutan, Myanmar, Indo-China, S. China, Taiwan and Thailand.

**19. *Saussurea depsangensis*** Pamp., Aggiunte Fl. Caracorum (Lav. Inst. Bot. Univ. Cagliari 22): 176-177, t. 9.f. 4. 1934.

Leaves rosulate, large below, 2-2.5 cm long, otherwise short, apex broad, rotundate, base attenuate to petiole; petiole 0.5-1.0 cm long; upper leaves bract like, white tomentose. Heads relatively large, 1.5-2 cm high and 0.8-0.9 cm in diam. Receptacle naked. Pappus pale.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, 5000 m. Jammu & Kashmir.

China.

**20. *Saussurea diffusa*** Lipschitz, *Rod Saussurea* 141-142. 1979. *S. albescens* var. *brachycephala* Hook.f., *Fl. Brit. India* 3: 374. 1881. *S. platycephala* C.B. Clarke, *nom. nud.*

Herbs, erect, 1.5-2 m tall. Leaves entire or sinuate-lobed, very scabrid above. Inflorescence generally diffused. Heads ca 1.2 cm long on shorter branches, rounded at base. Involucral bracts ovate. Corolla 8 mm long. Anther tails fimbriate. Achenes ca 2 cm long. Pappus hairs 8 mm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas. Jammu & Kashmir.

Pakistan.

*Note.* This species differs from *S. albescens* by its diffuse inflorescence, fewer and broader capitula, and longer peduncles.

**21. *Saussurea fastuosa*** (Decne.) Sch.-Bip. in *Linnaea* 19: 331. 1846. *Aplotaxis fastuosa* Decne. in *Walpers Repert. B. Syst.* 669. 1843; *Saussurea denticulata* Wallich ex C.B. Clarke, *Comp. Ind.* 234. 1876, non Ledeb.; Hook.f., *Fl. Brit. India* 3: 375. 1881.

Stems 0.3-1.25 m, simple below, branched above, glabrous or cottony. Leaves oblong or oblong-lanceolate, acute or acuminate, finely toothed, 14-18 x 2.5-4.8 cm, glabrous or cottony beneath, sessile or short petioled. Heads solitary, terminal, 2-6 cm across, usually subtended by small leaf. Involucral bracts glabrous, rigid, obtuse; outer ovate; inner purple, linear-oblong. Receptacular bristles flattened, exceeding the involucre. Corolla ca 1.2 cm long. Achenes compressed to narrowly obovoid, ca 5 mm

long, strongly many-ribbed. Pappus pale brown, ca 1.2 cm long, double, hairs all feathery.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: Himalayas, in *Acer-Aesculus* forest or in open places, 2500-3500 m. Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, S. Tibet, N. Myanmar and S.W. China.

**22. Saussurea gilesii** Hemsl. in Hook. *Icones* 18: t. 1736. 1888.

Herbs, erect; branches 45-75 cm high, striate. Cauline leaves slender, narrowly lanceolate, acute or subobtusate, ca 15 cm long. Involucral yellowish green, bracts many, few-seriate, linear lanceolate, acute, hispid. Receptacular bristles narrowly acute, longer than achenes. Pappus white, long hairy.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, 3000-4600 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan.

**23. Saussurea glacialis** Herd. in Bull. Soc. Nat. Mosc. 40, 3: 144. 1867. *S. sorocephala* auct. non Shrenk. *S. chthonocephala* Bornm. in Fedde. *Repert. Beih.* 108. 1. 59. 1938.

Plants polycarpic; rhizome thick, long. Leaves radiating from a common centre, not regularly arranged, densely white tomentose or sparingly tomentose or subglabrous, green or turning red. Inflorescence hemispheric. Involucral bracts often red, scarious. Pappus white or dull white.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, ca 5500 m. Jammu & Kashmir and Uttar Pradesh.

C. Asia, W. Siberia and China.

**24. Saussurea glanduligera** Sch.-Bip. ex Hook.f., *Fl. Brit. India* 3: 371. 1881. *S. glanduligera* var. *major* Hook.f., *Fl. Brit. India* 3: 371. 1881.

Stems 10-20 cm. Leaves pale green, narrowly linear-lanceolate, irregularly sinuate-toothed, 5-12 x 0.4-0.7 cm, glandular-pubescent or puberulous on both surfaces; petiole

dilated into a narrow, glabrous sheath with often woolly base and margins. Heads solitary 2-3.7 cm across, usually bracteate by linear leaves. Involucral bracts green, lanceolate, erect, pubescent or woolly. Receptacular bristles long. Corolla ca 1.2 cm long. Anther tails short, woolly. Achenes 4-angled, ca 3 mm long, scaberulous. Pappus hairs pale brown or bluish, 1.2 cm; outer pappus bristles short, scabrid.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, on open hill slopes, with *Caragana*, *Rheum*, *Corydalis*, etc. 3900-5700 m. Jammu & Kashmir and Himachal Pradesh.

Tibet.

**25. *Saussurea gnaphalodes*** (Royle ex DC.) Sch.-Bip. in *Linnaea* 19: 331. 1846. *Aplotaxis gnaphalodes* Royle ex DC., *Prodr.* 6: 542. 1838. *Saussurea sorocephala* (Schrenk) Sch.-Bip. in *Linnaea* 19: 331. 1846. *S. sorocephala* Hook.f. et Thomson. in C.B. Clarke, *Comp. Ind.* 226. 1876; Hook.f., *Fl. Brit. India* 3: 377. 1881, p.p. excl syn.

Herbs, dwarf; densely tufted; stems absent or very short, thickly woolly or cottony; rootstock much branched. Leaves variable, obovate-lanceolate or oblong obovate, obscurely toothed, 1.2-2.5 cm, densely woolly on both surfaces. Heads cylindrical, ca 1.3 cm across. Florets often ca 1.2 cm long, embedded in dense woolly hairs. Involucral bracts lanceolate, silky. Achenes narrow, 5-angled. Pappus pale brown or dull blue; outer pappus hairs scabrid, scanty or absent.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, in moist open places with *Primula* sp., *Gentiana* sp., etc. 4000-5000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Pakistan, C. Asia, W. & S. Tibet and S.W. China.

**26. *Saussurea gossypiphora*** D. Don in *Mem. Wern. Nat. Hist. Soc.* 3: 414. 1821. *S. gossypina* Wallich *nom. illegit.*; Hook.f., *Fl. Brit. India* 3: 376. 1881.

Stem 10-30 cm high, densely covered with long white or grey woolly hairs, simple, clavate, hollow, leafy. Leaves linear, embedded in very dense woolly hairs, remotely toothed or runcinate-pinnatifid, 2.5-15 x 1.5-0.6 cm, usually glabrous above, glabrous or woolly beneath, sessile. Heads cylindrical, few or many, 1.3-2 cm long, deeply embedded in woolly hairs. Involucral bracts linear-oblong, short, erect, pubescent or woolly. Receptacle pitted; bristles equalling achenes. Corolla purple, 0.8-1.2 cm long. Anther tails slender, nearly entire. Achenes narrowly obovoid, ca 4 mm long. Pappus hairs few, many, scabrid, or absent.



## KEY TO THE VARIETIES

- 1a. Inflorescence of a few heads  
 b. Inflorescence of many heads  
 2a. Inflorescence 3-6 cm in diam.  
 b. Inflorescence 10-12 cm in diam.

26.2. var. *lilliputa*

2

26.1. var. *gossypiphora*26.3. var. *luxuriosa***26.1. var. *gossypiphora****Fl. & Fr.* July - Sept.

*Distrib.* India: Himalayas, in open places, amidst boulders, 3500-5700 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan, S. Tibet and S.W. China.

**26.2. var. *lilliputa*** Lipschitz in Novit Syst. Pl. Vasc. Acad. Sci. URSS 1966: 223. 1966.

*Fl. & Fr.* July - Aug.*Distrib.* India: E. Himalayas, 4300-5000 m. Sikkim.

Endemic.

**26.3. var. *luxuriosa*** Lipschitz in Novit, Syst. Pl. Vasc. Acad. Sci. URSS 1966: 222. 1966.

*Fl. & Fr.* July - Aug.*Distrib.* India: E. Himalayas 4300-5500 m. Sikkim.

Nepal.

**27. *Saussurea graminifolia*** Wallich ex DC., Prodr. 6: 536. 1838; Hook.f., Fl. Brit. India 3: 370. 1881.

Stems 6-25 cm, very stout, much thickened upwards, leafy, densely woolly and shining, rarely glabrate. Leaves narrowly linear from a dilated shining scarious base, quite entire, recurved, flexuous, 5-17 x 0.2-0.4 cm, tomentose beneath. Heads solitary 2.5-3.5 cm across, densely woolly, bracteate by many reflexed or spreading linear leaves. Involucral bracts narrow, lanceolate. Receptacular bristles short. Corolla ca 1 cm long. Anther tails fimbriate. Achenes ca 2.5 mm long. Pappus pale brown; outer pappus bristles many, short, scabrid.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Himalayas, on open grassy slopes, 3600-5600 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan and S. Tibet.

**28. *Saussurea heteromalla*** (D. Don) Hand.-Mazz. *Symb. Sin.* 7: 1152. 1936. *Cnicus heteromallus* D. Don., *Prodr. Fl. Nepal.* 166. 1825. *C. candicans* Wallich, *Cat.* 99. n. 2893 A. 1831. (*nom. nud.*). *Saussurea candicans* (DC.) Sch.-Bip. *Linnaea* 19: 330. 1846; Hook.f., *Fl. Brit. India* 3: 373. 1881. *Aplotaxis candicans* DC., *Prodr.* 6: 540. 1838. **Fig. 53.**

Stems 0.6-1.6 m, simple below, corymbosely branched above, often many from the base. Basal leaves in a rosette, obovate, lyrate-pinnatifid; upper ones lanceolate-oblong, entire or dentate, glabrous or cottony above, white tomentose beneath. Heads in corymbiform panicles, 2.5-3.7 cm across on 3-15 cm long peduncles. Involucral bracts 3-5 seriate, lanceolate, acuminate, 0.5-1.2 cm long, cottony or pubescent. Receptacular bristles long. Corolla 1.3-1.5 cm long, purple. Anther tails lacerate. Achenes 3 mm long, 4-5-angular, muricate. Pappus hairs white, ca 1.2 cm.

*Fl. & Fr.* March - Aug.

*Distrib.* India: In wastelands, dry hill slopes, 550-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Bihar and Sikkim.

W. Afghanistan, Pakistan, Nepal, Bhutan and S.W. China.

*Note.* A very variable species.

**29. *Saussurea hieracioides*** Hook.f., *Fl. Brit. India* 3: 371. 1881.

Stems 10-20 cm, slender, uniformly villous with soft spreading hairs. Basal leaves elliptic, acute, quite entire or obscurely toothed, 3.7-6.7 x 1.8-3 cm, villous on both surfaces; petiole slender; cauline linear-oblong. Heads solitary, 2.5-3.7 cm across, woolly at base. Involucral bracts usually purple margined, ovate-lanceolate. Receptacular bristles short. Corolla ca 3 cm. Anther tails short, very woolly. Achenes very short, smooth. Pappus pale, ca 1.2 cm long; outer pappus bristles scabrid.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: E. Himalayas, 3700-4950 m. Sikkim.

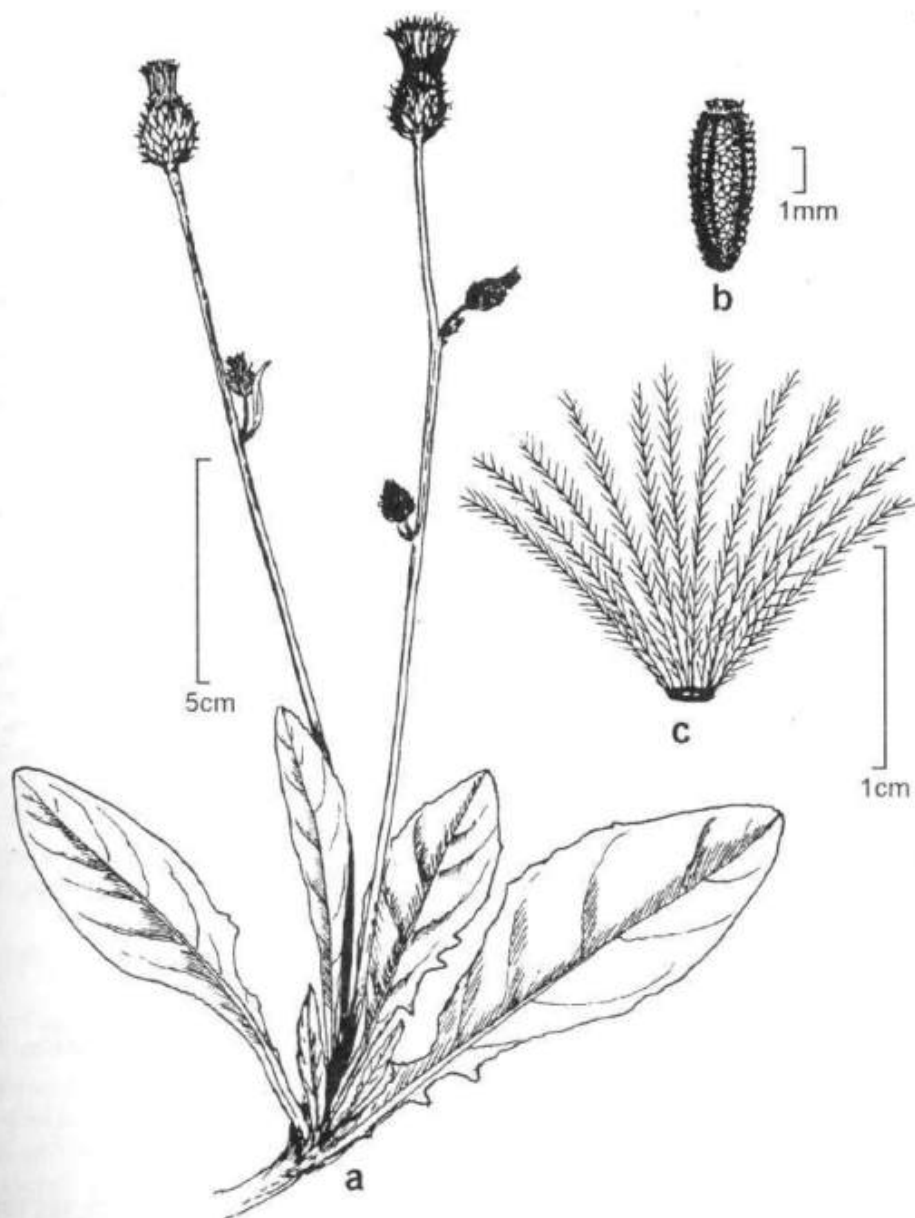


Fig. 53. *Saussurea heteromalla* (D. Don) Hand.-Mazz. : a. Habit; b. Achene; c. Pappus.

Nepal, Bhutan and S. China.

**30. *Saussurea hookeri*** C.B. Clarke, Comp. Ind. 230. 1876; Hook.f., Fl. Brit. India 3: 371. 1881.

Stems 10-15 cm, stout, hollow, woolly upwards. Leaves narrowly linear from a dilated scarious base, quite entire, recurved, 5-10 x 0.2-0.3 cm, at margins tomentose beneath. Heads solitary, 2.5-3.5 cm across, bracteate by leaves. Involucral bracts broadly lanceolate or ovate. Corolla ca 1.2 cm. Receptacle with long dense bristles. Achenes short. Pappus ca 8 mm long; outer pappus bristles short, scabrid.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas, 4600-4850 m. Uttar Pradesh and Sikkim.

Nepal, Bhutan, S. Tibet and S.W. China.

**31. *Saussurea jacea*** (Klotzsch) C.B. Clarke, Comp. Ind. 233. 1876. *Aplotaxis jacea* Klotzsch, Bot. Ergebn. Reise Pr. Waldem. 1845. 46: 79-80. 1862; Hook.f., Fl. Brit. India 3: 375. 1881.

Stems 0.25-1.2 m tall, simple below, branched above, rigid, puberulous, terete. Leaves ovate or oblong, obtuse or acute, quite entire, 5-10 x 2.5-6 cm, scaberulous on both surfaces, sessile, half amplexicaul. Heads solitary, 1-2 cm across, on slender peduncles. Outer involucral bracts ovate, obtuse or acute; inner lanceolate, with purple margins. Receptacle narrow, bristles curved, exceeding the involucre. Corolla ca 1.6 cm long. Anther tails subulate, entire. Achenes smooth. Pappus brown, ca 1.2 cm or more long, with double hairs, all feathery.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas from temperate to alpine region, 2900-4900 m. Jammu & Kashmir and Himachal Pradesh.

Afghanistan.

**32. *Saussurea laneana*** W.W. Sm. in J. Asiat. Soc. Bengal n.s., 7: 74. 1911.

Herbs, perennial; roots thick, clothed with remanants of many sheaths. Stems 60-90 cm high, simple, 5-10-capitate at apex, more or less two winged. Basal leaves 1-3, triangular, 5-7-lobed, runcinate-pinnatifid, 20-30 x 6-8 cm; terminal lobe triangular, 5-7 cm long, denticular, mucronate, upper surface sparsely scabrid puberulous; densely woolly underneath. Heads subtended by leaf like bracts. Receptacular bristles ca 7 mm

long, many, linear, white, exceeding achenes. Anther tails long, woolly. Achenes 3-4 mm long, narrow, glabrous, apex marked with rings. Pappus dark brown, ca 1 cm long, feathery, uniseriate.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: E. Himalayas, ca 4000 m. Sikkim.

Endemic.

**33. *Saussurea leontodontoides* (DC.) Sch.-Bip.** in *Linnaea* 19: 330. 1846. *Aplotaxis leontodontoides* DC., *Prodr.* 6: 539. 1838. *Saussurea kunthiana* C.B. Clarke, *Comp. Ind.* 226. 1876; Hook.f., *Fl. Brit. India* 3: 369. 1881. *S. leontodontoides* var. *filicifolia* (Hook.f.) Hand.-Mazz., *Symb. Sin.* 7: 1155. 1936. *Saussurea stoliczkai* (auct. non C.B. Clarke) Kitam. in *Acta Phyt. Geobot.* 24: 8. 1969.

Herbs, dwarf, stemless. Leaves spreading, linear-elongate, pinnatifid or runcinate, 5.5-12.5 cm long, glabrous or pubescent above, white tomentose beneath, petioled, lobes quadrate, semi circular or oblong, entire or lobulate and toothed, tip, teeth and lobes apiculate or mucronate. Heads deep purple, solitary, 2.5-3.7 cm across, sessile. Receptacle bristly. Involucral bracts lanceolate. Anther tails short, woolly. Achenes mucricate. Outer pappus hairs few, scabrid.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: Himalayas, in subalpine and alpine regions, 3200-5100 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, S.W. China and Tibet.

**34. *Saussurea leptophylla* Hemsl.** in Hook., *Icones* 18: t. 1734. 1888.

Subwoody, glabrous; branches slender, green, striate. Leaves linear, 1-5 cm long, entire or with a few narrow lobes, rolled inwards. Heads terminal, solitary; peduncle leaf bearing. Involucral bracts 7-8-seriate, rigid, straight. Receptacular bristles narrow, many times longer than achenes. Achenes glabrous. Pappus white, shorter than flowers, feathery; outer absent.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas in moist places, ca 3200 m. Jammu & Kashmir.

Pakistan and Afghanistan.

35. *Saussurea medusa* Maxim. in Bull. Acad. Sci. Petersb. 27: 488. 1881. *S. dainellii* Pamp. in Bull. Soc. Bot. Ital. 46: 32. 1915. *S. trullifolia* W.W. Smith in Notes Roy. Bot. Gard. Edinb. 12: 220. 1920. *S. namikawae* Kitam. in Acta Phyt. Geobot. 24: 5-6. 1969.

Plants strongly woolly. Basal and lower cauline leaves obovate or rhomboid, apex rotundate; upper leaves many frequently dentate at margin, sometimes long, blade 2.5 cm broad, nerves inconspicuously pubescent; petiole 2.5-3 cm long. Inner involucre bracts oblanceolate or obovate, 2-3 mm broad. Achenes black, large, 5-6 mm long, black.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, ca 4000 m. Jammu & Kashmir.

Nepal and China.

36. *Saussurea nagensis* C.E.C. Fisher in Kew Bull. 1940: 36. 1940.

Stems more or less woody below, terete, thinly cottony. Leaves ovate, pinnatisect often very near to midrib, 20-23 x 13-16 cm, membranous; lobes apiculate, 3-4 pairs. Inflorescence paniced, ca 30 mm long, lateral branches racemose, up to 10 cm long, 1-4-capitate. Heads 1.5-2 cm across.

*Fl. & Fr.* Sept.

*Distrib.* India: N.E. India, On grassy slopes, ca 2150 m. Nagaland.

Endemic.

37. *Saussurea nana* (Pamp.) Pamp. in Aggiunte Fl. Caracorum 176. 1934 (excl. syn. *S. humilis* Ostenf.). *S. schultzei* var. *nana* Pamp. in Bull. Soc. Bot. Ital. 46: 33. 1915. *S. bracteata* ( auct. non Decne.) C.B. Clarke, Comp. Ind. 224. 1876 (p.p.); Hook.f., Fl. Brit. India 3: 366. 1881.

Stems short, 2-6(8) cm high, occasionally almost stemless. Leaves thick, sometimes subcartilaginous, nerves in middle prominently straw coloured; basal leaves narrowly lanceolate, acute, deeply and strongly toothed at margins, rough. Heads solitary, ca 2-2.5 cm in diam. Involucre bracts dark, almost black, apex acute or villose at length.

*Fl. & Fr.* June - Aug.

*Distrib.* India: W. Himalayas, in alpine meadows, 4500-6000 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan and China.

**38. *Saussurea nepalensis*** Spreng., Syst. Veg. 3: 380. 1826. *S. eriostemon* Wallich ex C.B. Clarke, Comp. Ind. 229. 1876; Hook.f., Fl. Brit. India 3: 370. 1881. *Aplotaxis nepalensis* (Spreng.) DC., Prodr. 6: 539. 1838. *Saussurea chapmanii* C.E.C. Fischer. in Kew Bull. 287. 1938.

Stems 15-30 cm high, stout, nearly glabrous, 1-leaved. Radical leaves linear, pinnatifidly lobed and toothed; lobes and teeth short, broad, acute and aristate. Heads solitary, ca 2.5-3.5 cm across. Involucral bracts lanceolate, subsquarrose. Receptacular bristles long. Anther tails fimbriate. Achenes smooth, 4-angled. Outer pappus absent.

*Fl. & Fr.* July - Aug.

*Distrib.* India: E. Himalayas, subalpine and alpine regions, 3200-4900 m. Sikkim.

Nepal, Bhutan and S. Tibet.

**39. *Saussurea nimborum*** W.W. Smith in J. et Proc. Asiat. Soc. Bengal n.s. 7, 3: 73-74. 1911. *S. sughoo auct. non* C.B. Clarke.

Herbs, dwarf, more or less stemless. Leaves subbruncinate, 1-4, 2-9 x 0.5-3.0 cm; subbruncinate; basal leaves elliptic or oblanceolate, irregularly dentate at margins, minutely scabrid above, white tomentose beneath. Heads 1-5, small, (0.6) 1-(0.8) 1.4 cm in diam.; peduncle short, near to apex crowded, scarcely diffused. Involucral bracts yellow green, ovate-lanceolate, apex narrowed. Achenes smooth, oblong, obscurely angled.

*Distrib.* India: E. Himalayas, 4000-5300 m. Sikkim.

Endemic.

*Note.* Occasionally the plants are just 1-2 cm high and leaves 1-3, arising from rootstock.

**40. *Saussurea nishiokae*** Kitam. in Acta Phyt. Geobot. 24 (1-2): 6-7. 1969.

Plants more or less densely woolly or tomentose. Leaves linear-lanceolate, sinuate denticulate at margins or lower entire, upper dentate, 0.5-1.2 cm broad. Inflorescence usually cauline or sometimes amidst leaves, densely pubescent or white to reddish woolly. Heads 2.5-6 cm across. Receptacle naked. Achenes black, narrow, minutely glandular-pilose. Pappus white.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: E. Himalayas, 4800 m. Sikkim.

Nepal and Bhutan.

**41. *Saussurea obscura*** Lipschitz in Novit, Syst. Pl. vas. Acad. Sci. URSS. 8. 250. 1971. *S. inconspicua* Lipschitz in Novit, Syst. Pl. Vasc. Acad. Sci. URSS, 211. 1968, non Hand.-Mazz. 1939.

Herbs, dwarf, desely tufted; rhizomes thick, longitudinally fibrous. Basal leaves subrosulate, sinuate-dentate or subentire, thick, coriaceous, upper surface with many, rigid hairs. Heads in pairs, sometimes solitary, 0.5-1 cm across. Involucral bracts thick or coriaceous.

*Fl. & Fr.* July - Aug.

*Distrib.* India: Sikkim.

Endemic.

**42. *Saussurea obvallata*** (DC.) Edgew. in Trans. Linn. Soc. 20: 76. 1846. Hook. f., Fl. Brit. India 3: 365. 1881. *Aplotaxis obvallata* DC., Prodr. 6: 541. 1838. *Carduus obvallatus* Wallich, Cat. 100 n. 2905. 1831 *nom. nud.*

Stem 15-45 cm high, simple, pubescent or glabrate. Basal leaves elongate-obovate, obtuse toothed, 10-22 x 2.5-5 cm, glabrous, stalked; cauline half amplexicaul, oblong, concave. Heads 2-6, hemispheric ca 1-1.8 cm across, enclosed by boat shaped, papery bracts. Involucral bracts often margined with black, lanceolate, 10-12 x 5-6 cm. Corolla pale brown, ca 8 mm. Outer bristles scabrid or absent.

*Fl. & Fr.* July - Oct.

*Distrib.* India: Himalayas, in morain on rocky slopes, amidst boulders, 3800-4600 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Arunachal Pradesh.

Nepal, Bhutan, N. Myanmar, S.W. China and Pakistan.

**43. *Saussurea ovata*** Benth. in Henders. and Hume, Lahore to Yarkand 325 t. colour. 1873. *S. elliptica* C.B. Clarke ex Hook. f., Fl. Brit. India 3: 372. 1881.



Stems 10-15 cm high, slender, curved. Leaves elliptic-oblong or lanceolate, acute, irregularly toothed, 7.5-10 cm, thinly cottony on both surfaces, flaccid, narrowed into a very slender, cottony, petiole. Heads in small, rather lax terminal corymbs, ca 8 mm across. Involucral bracts lanceolate-acuminate, villous. Receptacle naked. Corolla ca 1.2 cm long. Anther tails lacinate, hardly woolly. Outer pappus bristles numerous, scabrid.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, ca 4600 m. Jammu & Kashmir.

C. Asia.

**44.** *Saussurea pachyneura* Franch. in J. Bot. Paris B. 8: 354. 1894. *S. kunthiana* Wallich ex C.B. Clarke var. *major* Hook.f., Fl. Brit. India 3: 369. 1881. *S. bodinieri* Levl. in Bull. Geogr. B. Le Mans 25: 19. 1915. *S. leontodontoides* (DC.) Hand.-Mazz., Symb., Sin. 7: 1155. 1936.

Herbs, dwarf, stemless. Basal leaves pinnatisect; lobes broadly oblong or ovate, 8-12 mm, sinuate or subpinnatifid, scabrid above. Heads solitary, large, 2-3 cm across. Involucral bracts ovate, glabrous, coriaceous, reflexed in dry state. Anther tails conspicuously woolly. Achenes transversely rugose. Outer pappus hairs scabrid.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: E. Himalayas, 4300-5300 m. Sikkim.

Nepal, Bhutan and China.

**45.** *Saussurea pantlingiana* W.W. Smith in J. et Pro. Asiat. Soc. Bengal n.s. 7, 3: 73. 1911.

Stems 20-30 cm high, simple below. Basal and lower cauline leaves linear-lanceolate, 5-10 x 0.8-1.2 cm, attenuate at base, obtuse or rarely acuminate at apex, petiole 2-3 cm long, middle cauline leaves subamplexicaul. Heads 2-10, 2 cm long, 7-8 mm broad, minutely pubescent. Involucral bracts ovate-lanceolate, acuminate. Receptacular bristles long. Anther tails woolly. Achenes oblong, glabrous. Outer pappus short, sparingly setose.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: E. Himalayas, ca 4000 m. Sikkim.

Endemic.

**46. *Saussurea piptathera*** Edgew. in Trans. Linn. Soc. 20; 76. 1846; Hook.f., Fl. Brit. India 3: 372. 1881. *Aplotaxis discolor* DC., Prodr. 6: 541. 1838.

Stems 30-100 cm high, not winged. Leaves oblong or ovate-oblong, sharply toothed, 9-16 x 5-6 cm, glabrous above, cottony, rarely glabrate beneath, with a contracted or dilated, half amplexicaul, auricled base. Heads in crowded dense corymbs, 0.8-1.2 cm across. Involucral bracts glabrate or silky; outer ovate, obtuse; inner lanceolate, acute. Receptacular bristles longer than the achenes. Outer pappus bristles short, scabrid.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Himalayas, on moist exposed slopes, 3500-4600 m. Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal.

**47. *Saussurea polystichoides*** Hook.f., Fl. Brit. India 3: 369. 1881.

Herbs, dwarf, stemless. Leaves linear-elongate, pinnatisect, petioled; segments rounded, ovate or subquadrate, spinous toothed, glabrous above, white tomentose beneath. Heads usually 2-2.5 cm across, sessile or peduncled, glabrous. Involucral bracts lanceolate acuminate, erect or subsquarrosely recurved. Receptacle without bristles. Anther tails short, woolly. Achenes muriccate. Outer pappus hairs few, scabrid.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas, in alpine and subalpine zones ca 4400 m. Uttar Pradesh and Sikkim.

Nepal.

*Note.* Very closely allied to *S. kunthiana* but the leaves are pinnate, the receptacle without bristles and leaf segments horizontal.

**48. *Saussurea roylei*** (DC.) Sch.-Bip. in Linnaea 19: 330. 1846. *Aplotaxis roylei* DC., Prodr. 6: 538. 1838; Hook.f., Fl. Brit. India 3: 370. 1881.

Stems 15-50 cm, stout and thickened below the head. Leaves erect, lanceolate-acuminate, quite entire or sinuate or pinnatifid towards the base only, 7.5-25 x 0.5-2 cm; cauline few, sessile, half amplexicaul, sometimes snow white beneath. Heads 3-4 cm across. Involucral bracts lanceolate, long, straight. Receptacular bristles equalling achenes. Corolla ca 1.2 cm long. Anther tails woolly. Achenes ca 6 mm long, smooth. Pappus pale brown, ca 8 mm long, outer pappus bristles many,

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, subalpine and alpine regions, 3000-4900 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal.

49. *Saussurea simpsoniana* (Field. & Gard.) Lipschitz, Nov. Syst. Pl. Vasc. 1964: 319. 1966. *Aplotaxis simpsoniana* Field. & Gard. Sert. Pl. t. 26. 1844. *Saussurea sacra* Edgew. in Trans. Linn Soc. 20: 76. 1846; Hook.f., Fl. Brit. India 3: 376. 1881.

Kash.: *Yogipadshah.*; Eng.: *Sacred Saussurea*.

Stems 5-15 cm high, densely woolly, simple, clavate. Leaves linear, ca 5-10 cm long, pinnatifid, sessile. Heads many, exposed, woolly, outside. Involucral bracts lanceolate. Achenes 4-5 angled, 2.5-3.5 mm, smooth or warted. Outer pappus hairs scabrid, few, numerous or absent.

*Fl. & Fr.* July - Oct.

*Distrib.* India: Himalayas, in the alpine regions, amidst boulders, 4400-5600 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal and Tibet.

50. *Saussurea stella* Maxim. in Bull. Acad. Sci. Petersb. 27: 490. 1881.

Herbs, dwarf, stemless. Leaves mainly purplish, gradually linear-elongate, dilated at base, subulate-acuminate at apex, entire or inconspicuously dentate. Inflorescence 3-5 cm in diam., usually hemispheric, crowded. Heads sessile, frequently numerous (30). Receptacle bristly, bristles 2-3 mm long. Achenes at apex coronuled; coronules short, 1-1.5 mm long, scarious. Pappus white, biseriate.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: E. Himalayas. Sikkim.

Bhutan and China.

51. *Saussurea stoliczkae* C.B. Clarke, Comp. Ind. 225. 1876; Hook.f., Fl. Brit. India 3: 368. 1881.

Herbs, densely tufted, stemless or with short stem, ca 8 cm high. Leaves obovate-oblong or oblanceolate, lyrate or sinuate-pinnatifid, 2.5-5 cm, cottony beneath or on both

surfaces; lobes acute or obtuse, short, very irregular; terminal ovate. Heads 0.8-3 cm across, sessile. Involucral bracts linear-lanceolate, ca 1.6 cm long; outer with broad bases; inner narrower, membranous, with dark tips. Receptacle densely bristly. Anther tails short, woolly. Achenes glabrous, ca 4 mm long. Pappus brown, 1.2 cm.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, in alpine regions, 4-5000 m. Jammu & Kashmir and Himachal Pradesh.

Nepal and Tibet.

**52. *Saussurea stracheyana*** (Kuntze) Lipschitz in Sist. Zam. Gerb. Tomsk. Univ. 84: 26. 1967. *Theodorea stracheyana* Kuntze, Rev. Gen. Pl. 1: 368. 1891. *Aplotaxis foliosa* Edgew. in Trans. Linn. Soc. 20: 77. 1846. *Saussurea edgeworthii* Kitam. in Acta Phyt. Geobot. 24: 4. 1969. *S. foliosa* (Edgew.) Hook.f., Fl. Brit. India 3: 373. 1881.

Herbs, 30-60 cm high, profusely branched. Leaves lyrate-pinnatifid, 7.5-10 cm, puberulous above, cottony beneath; lobes rounded. Heads on slender, long, axillary and terminal peduncles, ca 1.2 cm across. Involucral bracts very slender with acicular points. Receptacular bristles long. Achenes obtusely 4-angled, smooth or somewhat tubercled. Outer pappus absent.

*Fl. & Fr.* Apr. - July.

*Distrib.* India: W. Himalayas, 2300-2600 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal.

*Note.* This species is quite distinct from *S. candicans* in habit and in having smaller heads with subulate bracts, smaller corolla and short pappus.

**53. *Saussurea subulata*** C.B. Clarke, Comp. Ind. 226. 1876; Hook.f., Fl. Brit. India 3: 367. 1881.

Herbs, dwarf, densely tufted. Leaves linear-lanceolate subulate at tip, quite entire at margins, revolute to the middle, 1.2-3.5 cm, laxly hairy or glabrate, sparsely woolly towards the base, narrowed into sheathing petiole. Heads solitary, 1.2-2.5 cm across, amongst leaves, sessile. Involucral bracts oblong-lanceolate, acuminate, rigid. Receptacle fimbriate. Anther tails short and bearded. Achenes smoothly oblong, acutely 5-angled. Outer pappus bristles scabrid.

*Fl. & Fr.* Sept.

*Distrib.* India: W. Himalayas, in alpine regions, amidst boulders, 4800-5800 m. Jammu & Kashmir.

Afghanistan.

54. *Saussurea sudhanshui* Hajra in Indian For. 109(2): 77. 1983.

Densely tufted, sometimes forming hemispherical cushions, 3-6 cm high. Leaves linear-lanceolate, revolute, subulate at apex, entire at margin, 5-7 cm, glabrous above, laxly hairy beneath, narrowed into a sheathing petiole. Heads homogamous, solitary amongst leaves, 1-2 cm across. Involucral bracts variable, lanceolate-acuminate to ovate-acuminate, 10-15 x 3-4 mm, glabrous or sparingly hairy, densely hairy at tip; outer bracts gradually replaced by short concave sheaths of uppermost leaves; inner narrower. Receptacle flat, strigose. Corolla purple, 10-12 mm long. Anthers 5-6 mm long, tails woolly. Achenes 2-3 mm long, glabrous. Pappus brownish, feathery, ca 1 cm long.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: W. Himalayas, in alpine regions, amidst boulders, in open places, 4500-4800 m. Uttar Pradesh.

Endemic.

55. *Saussurea sughoo* C.B. Clarke, Comp. Ind. 225. 1876; Hook.f., Fl. Brit. India 3: 368. 1881.

Stems absent or 10-15 cm high. Leaves oblong-obovate or oblanceolate, 7.5 cm long, coarsely toothed or runcinately pinnatifid, coriaceous, scaberulous above, white tomentose beneath; teeth and lobes apiculate; petiole slender, 2.5-3.7 cm. Heads solitary or 2-3, 1.5 cm across, sessile, or short peduncled, glabrous or puberulous. Involucral bracts margined and tipped with dark purple, lanceolate from an ovate base; inner linear-acuminate, scarios. Receptacle bristly. Corolla ca 1.5 cm long, Anther tails short, woolly. Achenes muricate and sparsely villous. Pappus pale brown, 1.2 cm long, outer pappus bristles scabrid or absent.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: E. Himalayas, on open places in alpine regions, amidst boulders, 3800-4800 m. Arunachal Pradesh and Sikkim.

Nepal.

**56. *Saussurea taraxacifolia*** Wallich ex DC., Prodr. 6: 532. 1838; Hook.f., Fl. Brit. India 3: 368. 1881. (*taraxicifolia*) *S. caespitosa* Wallich, Cat. 2913. 1831; *Aplotaxis caespitosa* DC., Prodr. 6: 539. 1838 (p.p.) *Cyathidium taraxacifolium* Lindl. in Royle III. Bot. Himal. 251. t. 56. f. 2. 1835.

Stems absent or 2.5-15 cm high, glabrous or cottony at base, covered with withered remains of old leaf stalks. Leaves 10-20 x 1-2.5 cm, mostly radical, spreading, runcinate-pinnatifid, green and glabrous above, white tomentose beneath; lobes, triangular, acute, all pointing downwards, tips mucronate; shortly stalked. Heads solitary, 1.2-3.7 cm across, glabrous or sparsely cottony, solitary. Involucral bracts lanceolate. Receptacle densely bristly. Corolla ca 1.2 cm long, purple. Anther tails short, woolly. Achenes glabrous. Outer pappus hairs pale brown, few, scabrid.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: Himalayas, 3500-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Arunachal Pradesh.

Nepal, Bhutan, S. China and Tibet.

**57. *Saussurea thomsonii*** C.B. Clarke, Comp. Ind. 227. 1876; Hook.f., Fl. Brit. India 3: 366. 1881.

Herbs, dwarf, stemless, with fusiform roots, crown very short. Leaves obovate or oblong, coriaceous, obtuse at apex, entire or obtusely toothed at margin, 1.2-3.7 cm, sessile or narrowed into a short, thick petiole. Heads subglobose, densely clustered, ca 1.2 cm across, sheathed by rounded floral leaves which are much shorter than the involucre. Involucral bracts purplish, obovate-oblong, obtuse, glabrous. Receptacle fimbriate. Corolla ca 6 mm long. Anther tails short, entire. Achenes ca 3 mm long, glabrous. Pappus brown double, both feathery, ca 6 mm.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas in alpine regions, amidst boulders, 5600-6000 m. Jammu & Kashmir.

China.

**58. *Saussurea tridactyla*** Sch.-Bip. ex Hook.f., Fl. Brit. India 3: 377. 1881.

Herbs, 7.5-15 cm high, densely clothed with matted wool, simple, clavate, leafy. Leaves linear or linear-obovate or spatulate, obtuse, entire or obtusely 3-6-lobed at

apex, 1-3 cm, densely woolly on both surfaces. Heads deep purple, partially exposed, 2.5-4.5 cm across. Involucral bracts linear-oblong, acute, shining. Corolla ca 5 cm. long. Achenes narrow, 5-angled. Pappus pale brown, almost invariably single; outer pappus absent or of a very few scabrid bristles.

*Fl. & Fr.* July - Aug.

*Distrib.* India: E. Himalayas, in alpine meadows, 4600-5600 m. Sikkim.

Nepal, Bhutan and S.E. Tibet.

✓ **59. *Saussurea uniflora*** (DC.) Wallich. ex Sch.-Bip. in *Linnaea* 19: 330. 1846; Hook.f., *Fl. Brit. India* 3: 366. 1881. *Aplotaxis uniflora* DC., *Prodr.* 6: 539. 1838.

Herbs, laxly villous, 30-60 cm high. Basal leaves linear-oblong or obovate, 10-20 cm, long petioled; cauline 8.5-13.5 x 3.5-4 cm, acute-acuminate, toothed, half amplexicaul, sessile. Heads purple, campanulate, solitary or upto 5, ca 3.5 cm across, subsilky; peduncle stout. Involucral bracts purple, ovate-lanceolate, with long narrow tips. Corolla ca 1.3 cm long. Anther tails lacinate. Achenes ca 4 mm, glabrous. Pappus brown; outer bristles scabrid.

#### KEY TO THE VARIETIES

- 1a. Heads solitary or rarely two  
b. Heads 3-5

59.2. var. *uniflora*  
59.1. var. *conica*

✓ **59.1. var. *conica*** (C.B. Clarke) Hook.f., *Fl. Brit. India* 3: 366. 1881. *S. conica* C.B. Clarke, *Comp. Ind.* 224. 1876.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: E. Himalayas, 3300 m. Sikkim and W. Bengal.

Bhutan.

**59.2. var. *uniflora***

*Fl. & Fr.* July - Oct.

*Distrib.* India: E. Himalayas, on open slopes and amidst shrubs, 3000-4700 m. Sikkim.

Nepal, Bhutan and S.W. China.

**60. *Saussurea werneroides*** Sch.-Bip. ex Hook.f., Fl. Brit. India 3: 367. 1881.  
*Saussurea subulata* C.B. Clarke, Comp. Ind. 226. 1876. p.p.

Herbs, dwarf, densely tufted, with ca 30 cm long root, crown with many tufted branches, 1.5-2.5 cm long, together forming cushions. Leaves erect or spreading, lanceolate, subulate at tip, toothed at margins, 0.6-1.3 cm, coriaceous, glabrous and glossy above, densely tomentose beneath, narrowed into densely imbricating sheathing petioles. Heads solitary, amongst the leaves, 1-1.5 cm across, sessile. Involucral bracts lanceolate-acuminate, rigid or broad, concave. Receptacular bristles rigid, scabrous. Corolla ca 6 mm. Anther tails long, woolly. Achenes very small. Pappus double, both feathery.

*Fl. & Fr.* Sept.

*Distrib.* India: Himalayas, in alpine regions on open slopes, amidst boulders, 3800-5300 m. Jammu & Kashmir and Sikkim.

Nepal, Bhutan, S. Tibet and S.W. China.

**61. *Saussurea yakla*** C.B. Clarke, Comp. Ind. 227. 1876; Hook.f., Fl. Brit. India 3: 368. 1881.

Herbs, dwarf, stemless, with woody rootstock. Leaves linear-oblong, 25.0-38.0 x 5.5-6.5 cm (9.5-10.0 x 5.5-7.5 cm), pinnate or pinnatifid, membranous, (flaccid), puberulous above, white tomentose beneath, sessile or petioled, lobes or segments broadly ovate or subtriangular, sinuate-toothed, tips and teeth mucronate. Heads 1-3, 2.5-7.5 cm across, pubescent or glabrate, sessile. Involucral bracts pale, narrowly lanceolate, acuminate, membranous. Receptacular bristles long. Corolla ca 2.5 cm long. Anther tails lacinate. Achenes tetragonous, ca 4 mm, muricate, crown strongly cupular. Pappus brown, ca 1.9 cm; outer pappus hairs absent.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: E. Himalayas, on open hill slopes, subalpine to alpine regions, 3500-5300 m. Sikkim.

Nepal, Bhutan and Tibet.

### 18. *Serratula* L.

Herbs, perennial. Leaves alternate. Heads homogamous, corymbose. Flowers purple, violet or white, all bisexual, similar. Involucral bracts many-seriate; outer shorter, broader, usually acute or awned; inner narrow, elongate. Receptacle bristly. Filaments



glabrous; anther bases sagittate. Styles hairy. Achenes glabrous, oblong. Pappus bristles many-seriate, rigid, serrulate.

Europe, Japan; ca 70 species, 1 in India.

*Serratula pallida* DC., Prodr 6: 670. 1838; Hook.f., Fl. Brit. India 3: 379. 1881.

Herbs, 0.3-1 m high, glabrous or scaberulous. Stems simple, sparingly branched, stout or slender; branches ending in long leafless 1-headed peduncles. Leaves very variable in size, broadly ovate or oblong, acute or obtuse at apex, cut into short lobes at base, entire or toothed or deeply runcinate pinnatifid at margins 11-30 x 10-15 cm, glabrous or pubescent when young. Heads 2.5-3.5 cm across; peduncles often ca 45 cm long. Involucral bracts appressed, glabrous; outer ovate, acute; inner linear-oblong with scarious, obtuse tips. Receptacular bristles longer than achenes. Corolla ca 1.8 cm long. Anther tails short. Achenes obovoid-oblong, ca 5 mm long, obscurely ribbed. Pappus hairs brownish, rigid, ca 8 mm long.

Fl. & Fr. May - June.

Distrib. India: 1500-3100 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal

Note. Leaves very variable, entire to pinnatifid.

### 19. *Silybum* Vaill. ex Adans.

Herbs, erect, glabrous. Leaves alternate, sinuate-lobed, spinescent. Heads homogamous, large, subglobose, solitary, terminal, nodding. Flowers purple, bisexual, similar, fertile. Involucral bracts many-seriate, broad, fimbriated with spines below, terminating in spreading, rigid spines above. Receptacle flat, densely bristly. Filaments glabrous, united into a sheath below; anther bases sagittate. Style subentire. Achenes obovoid-oblong, compressed, glabrous. Pappus hairs many-seriate, unequal, subpaleaceous, united at base into a deciduous ring.

Mediterranean region; 2 species, 1 in India.

*Silybum marianum* (L.) Gaertn., Fruct. & Sem. 2: 374. t. 168. 1791; Hook.f., Fl. Brit. India 3: 363. 1881. *Carduus marianus* L., Sp. Pl. 823. 1753. Fig. 54.

Eng.: Milk Thistle, Holy thistle.

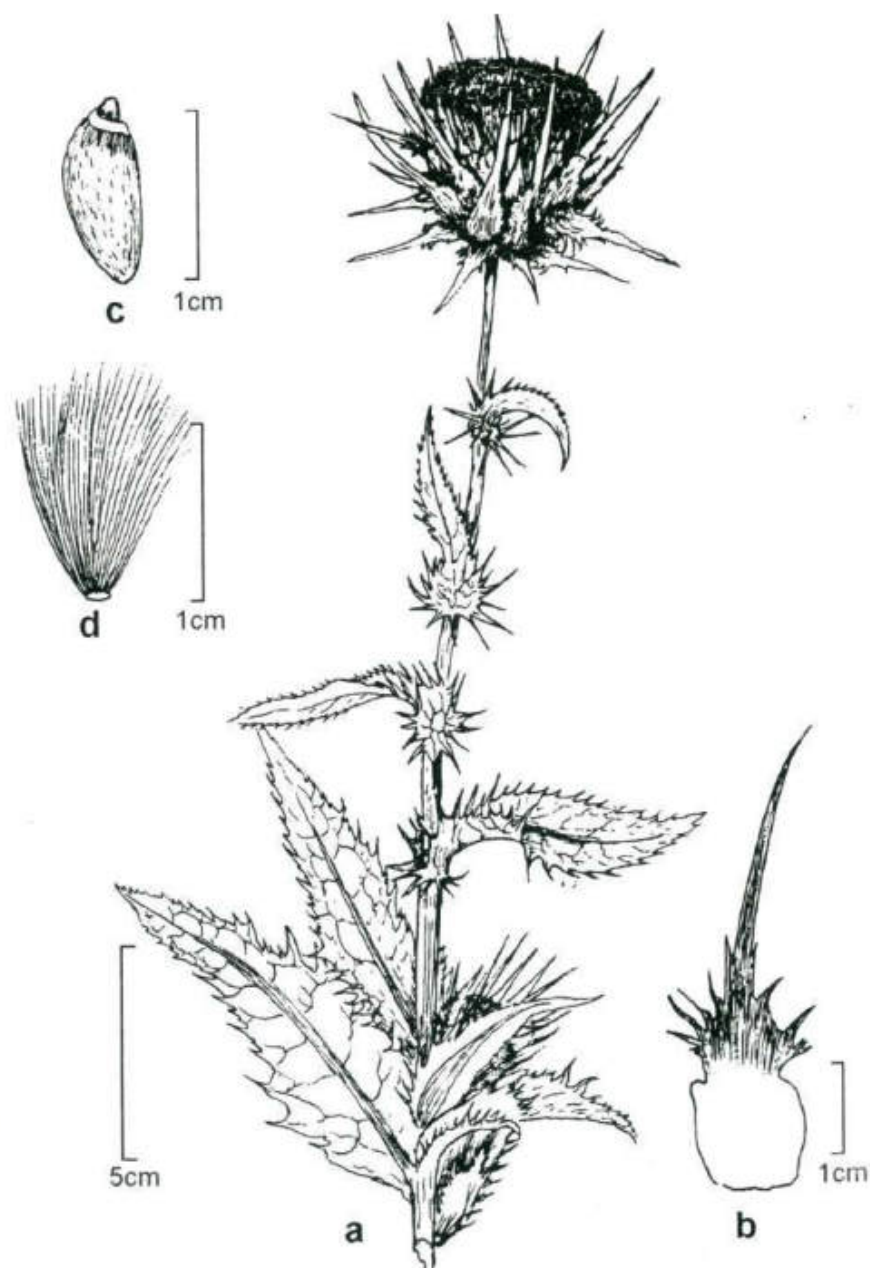


Fig. 54. *Silybum marianum* (L.) Gaertn. : a. Habit; b. Involucral bract; c. Achene; d. Pappus.

Annuals or biennials 0.3-1.2 m tall. Leaves white veined, large, with strong spines; basal leaves 28-70 x 14-30 cm; cauline 7-18 x 2-7 cm. Heads 2.5-6.5 cm across. Involucral bracts coriaceous, spiny; spines 1.2-1.8 cm long. Receptacle fleshy. Flowers rose purple. Achenes black or grey, ca 6-8 mm long, transversely wrinkled. Pappus white, 1.5-2 cm long.

*Fl. & Fr.* May - Sept.

*Distrib.* India: 300-1700 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Tamil Nadu.

Pakistan, N. Africa and Europe.

*Note.* Young shoots are boiled and eaten during spring. Seeds are roasted and used as substitute for coffee.

## 20. *Tricholepis* DC.

Herbs, unarmed annual or perennial. Leaves entire, toothed or lower pinnatifid. Heads homogamous, usually ovoid, solitary, terminal, peduncled. Flowers yellow, red or purple. all bisexual, similar, fertile. Involucral bracts many-seriate, very narrow, usually with long recurved hair points or mucronate; outer shorter. Receptacle densely bristly. Filaments papillose; anther bases sagittate, auricles connate, tails slender, lacerate. Style arms slender. Achenes oblong or obovoid, glabrous, smooth, ribbed. Pappus bristles many-seriate, very unequal, serrulate, barbellate or feathery, long, slender or short and paleaceous or absent.

C. Asia, Myanmar; ca 15 species, 10 in India.

### KEY TO THE SPECIES

- |   |                            |
|---|----------------------------|
| 1a. Pappus usually absent   | 2                          |
| b. Pappus usually present   | 3                          |
| 2a. Herbs, 0.9-1.5 m heads 1.8-2.5 cm across                                      | 1. <i>T. amplexicaulis</i> |
| b. Herbs, 15-50 cm high; heads 0.8-1.2 cm across                                  | 2. <i>T. angustifolia</i>  |
| 3a. Corolla yellow; pappus hairs connate at base                                  | 4                          |
| b. Corolla red or lilac; pappus hairs not connate at base                         | 7                          |
| 4a. Receptacular bristles equalling the feathery pappus                           | 6. <i>T. karenium</i>      |
| b. Receptacular bristles usually shorter than feathery pappus                     | 5                          |
| 5a. Pappus very slender, inner ca 2.5 cm long                                     | 4. <i>T. furcata</i>       |
| b. Pappus 6-8 mm long   | 6                          |
| 6a. Leaves quite glabrous   | 8. <i>T. stewartii</i>     |
| b. Upper surface of leaves covered with raised points or scaberulous or pubescent | 3. <i>T. elongata</i>      |
| 7a. Achenes twice as long as pappus hairs   | 8                          |
| b. Achenes equalling or shorter than pappus hairs                                 | 9                          |

- |   |                            |
|---|----------------------------|
| 8a. Receptacular bristles longer than achenes                       | 7. <i>T. radicans</i>      |
| b. Receptacular bristles shorter than achenes                       | 5. <i>T. glaberrima</i>    |
| 9a. Pappus a brush of compressed bristles, twice as long as achenes | 10. <i>T. tibetica</i>     |
| b. Pappus of slender feathery hairs, equalling achenes              | 9. <i>T. stictophyllum</i> |

1. *Tricholepis amplexicaulis* C.B. Clarke, Comp. Ind. 240. 1876; Hook.f., Fl. Brit. India 3: 381. 1881.

Herbs, erect, stout, glabrous, 0.9-1.5 m tall; stems rigid; branches angled, ribbed, quite smooth, shining. Leaves linear-oblong, 7.5-12.5 x 1.2-5.7 cm, quite glabrous, pale when dry, half amplexicaul at base. Heads 1.8-2.5 cm across; peduncles short, stout, angular, bracteate by linear leaves. Involucral bracts acicular, recurved, often tipped with black. Receptacular scales longer than achenes. Corolla 1.2-1.6 cm long. Achenes pale brown, compressed, ca 5 mm long, perfectly smooth, glossy. Pappus absent or of a few bristles.

*Fl. & Fr.* Oct. - Feb.

*Distrib.* India: Maharashtra, Karnataka and Kerala.

2. *Tricholepis angustifolia* DC., Prodr. 6: 564. 1838; Hook.f., Fl. Brit. India 3: 382. 1881.

Herbs, 15-50 cm high, very slender, quite glabrous; branches spreading, angled, quite smooth. Lower leaves lower obovate; upper linear-oblong, entire or subserrate at margins, sessile. Heads ovoid, ca 0.8-1.2 cm across, peduncles slender. Involucral bracts acicular, recurved, glabrous. Receptacular bristles longer than achenes. Achenes oblong, ca 3 mm long, smooth, faintly ribbed. Pappus absent.

*Fl. & Fr.* Oct. - Dec.

*Distrib.* India: Karnataka and Kerala.

3. *Tricholepis elongata* DC., Prodr. 6: 563. 1838; Hook.f., Fl. Brit. India 3: 380. 1881.

Fig. 55.

Herbs, perennial, 60-150 cm tall, pubescent or scaberulous, sparingly branched. Leaves very variable in shape and size, linear, oblong-lanceolate, elliptic or obovate, acute or obtuse at apex, toothed, serrate or distantly runcinate, 5-10 x 1.5-4.5 cm, covered with raised points on the surface or scaberulous or pubescent, sessile. Heads 1.2-5.0 cm across. Involucral bracts acicular, tips ciliate. Receptacular bristles longer than achenes. Corolla yellow, 1.2-1.6 cm long. Achenes narrowly oblong, ca 5 mm long, acutely 5-angled, slightly broader upwards, truncate, smooth. Pappus hairs pale brown, ca 6 mm long, in many rows, pale brown, shining.

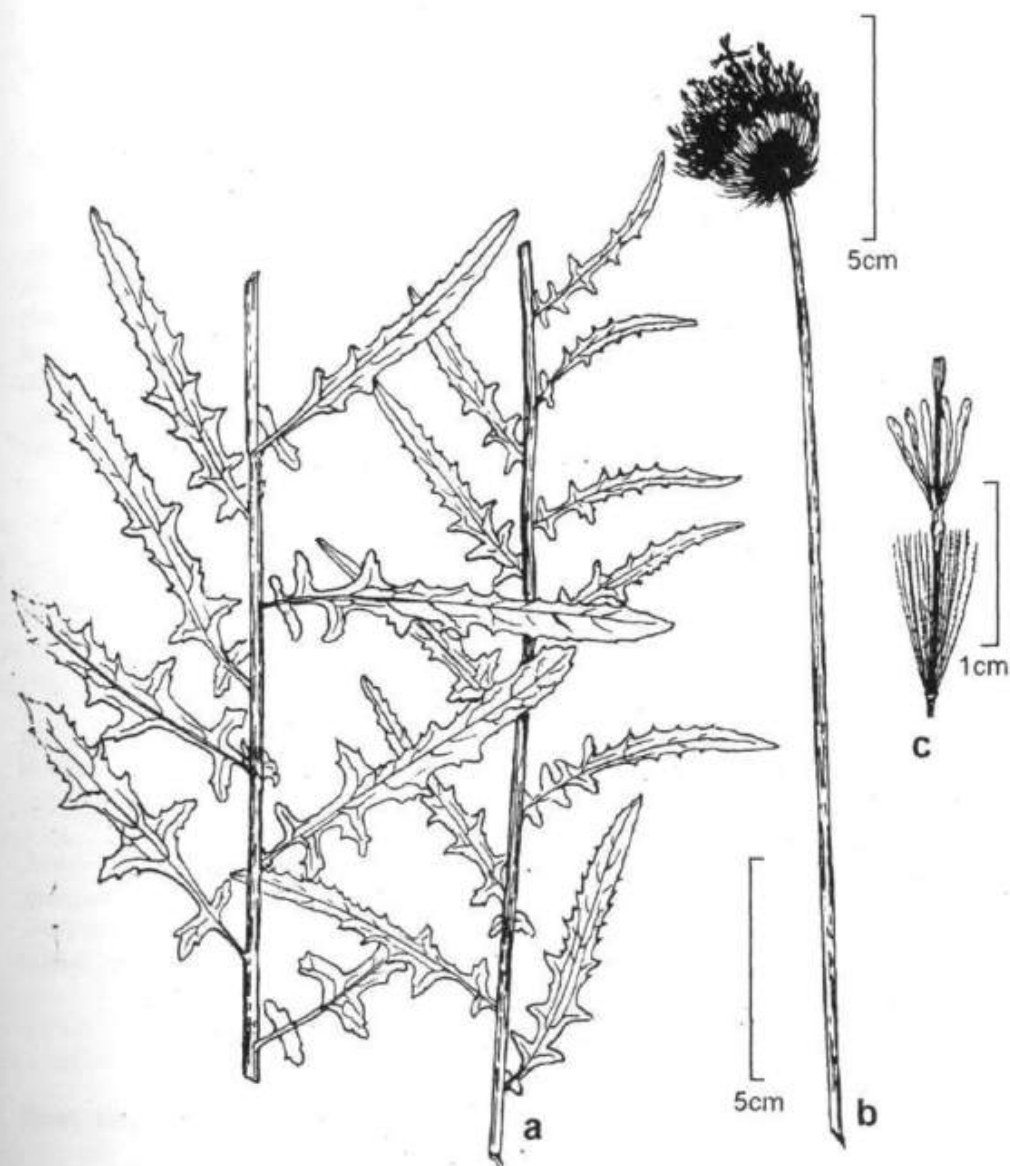


Fig. 55. *Tricholepis elongata* DC. : a. Habit; (Portion of a plant; b. Inflorescence; c. Floret.

*Fl. & Fr.* May - Sept.

*Distrib.* India: W. Himalayas, 1300-2800 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

**4. *Tricholepis furcata* DC.**, Prodr. 6: 563. 1838; Hook.f., Fl. Brit. India 3: 380. 1881.

Herbs, 0.6-1.8 m tall, slender, glabrous or puberulous, branched; branches from the base, elongate. Leaves elliptic or lanceolate, acute or acuminate at apex, denticulate at margin; 5.0-15.0 x 3.5-6.0 cm, smooth or scaberulous above, pubescent beneath. Heads ca 3.5 cm across, nodding, ebracteate; peduncles long. Involucral bracts acicular or filiform, recurved, ciliate tips black, spreading in fruit. Receptacular bristles shorter than achenes. Corolla yellow, 1.8-2.5 cm long. Anther tails subentire. Achenes pale, compressed, ca 5 mm long, ribbed, smooth. Pappus hairs white; very slender, soft, inner ca 2.5 cm long, scabrid, connate at base.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Himalayas, in temperate to subalpine regions, 1600-3300 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan and Pakistan.

**5. *Tricholepis glaberrima* DC.**, Prodr. 6: 754. 1837; Hook.f., Fl. Brit. India 3: 381. 1881.

Herbs, ca 1 m high, erect, rigid, quite glabrous; branches slender, angled, ribbed, quite smooth. Leaves linear-oblong or lanceolate, quite entire or serrate at margins, scaberulous, simple or auricled at base. Heads 6-8 mm across. Involucral bracts subulate. Receptacular bristles exceeding pappus. Achenes oblong, twice as long as pappus, faintly distantly ribbed. Pappus short, conspicuous.

*Fl. & Fr.* Oct. - Jan.

*Distrib.* India: Madhya Pradesh, Rajasthan, Maharashtra, Karnataka and Tamil Nadu.

**6. *Tricholepis karensium* Kurz** in J. Asiat. Soc. Bengal 41(2): 318. 1872; Hook.f., Fl. Brit. India 3: 380. 1881.

Herbs, tall, erect, woody, villous. Upper leaves lanceolate, entire or denticulate at margins, 7.5-10.0 cm long, pubescent or cottony beneath. Heads ca 6 cm across, bracteate by upper leaves. Involucral white many bracts quite acicular, elongate-subulate,

spreading, incurved, rigid; outermost ca 4 mm long, rigid, densely ciliate with spreading hairs inner gradually larger; innermost ca 3.5 cm long. Receptacular bristles linear, equalling pappus. Achenes 4-5-ribbed, smooth. Pappus hairs barbellate, connate at base; outer short.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

Myanmar.

7. *Tricholepis radicans* (Roxb.) DC., Prodr. 6: 584. 1838; Hook.f., Fl. Brit. India 3: 381. 1881. *Carduus radicans* Roxb., Fl. Ind. 3: 408. 1832.

Kan.: *Kusube gida*.

Annuals, much branched, 15-50 cm high, slender, glabrous smooth or scaberulous; branches decumbent or erect, angular, stout. Leaves linear, obovate, oblong or spatulate, remotely irregularly toothed or pinnatifid, 2.5-8 x 1.5-2.5 cm, membranous; teeth mucronate or with pointed bristles. Heads 1.2-1.6 cm across; peduncles slender. Outer involucre bracts acicular; inner more lanceolate. Receptacular bristles longer than achenes. Corolla lilac, ca 8 mm long. Achenes pale or shining, ovoid or oblong, compressed, ca 5 mm long, smooth, truncate. Pappus hairs pale brown, scabrid.

*Fl. & Fr.* Sept. - Jan.

*Distrib.* India: On rocky ground, usually on mountain slopes or as weed of cultivated fields. Rajasthan, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu.

8. *Tricholepis stewarti* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 380. 1881.

Branches rigid, leafy. Leaves lanceolate, acuminate at apex, minutely toothed at margins, ca 3.5 cm long, coriaceous, quite glabrous. Heads ca 2.5-3 cm across, peduncled. Involucre bracts acicular; inner ca 1.8 cm long. Receptacular bristles longer than achenes. Pappus rigid.

*Fl. & Fr.* Sept. - Oct.

*Distrib.* India: W. Himalayas, 1200 - 2700 m. Jammu & Kashmir.

Pakistan.

9. *Tricholepis stictophyllum* C.B. Clarke, Comp. Ind. 241. 1876; Hook.f., Fl. Brit. India 3: 382. 1881.

Herbs, perennial, subscapigerous, quite glabrous. Stems absent or 15-30 cm long, sparingly branched from base; branches angular, grooved, leafy below. Leaves linear or ligulate, quite smooth, quite entire or obscurely toothed at margins, 7.5-12.5 x 0.6-1.2 cm, half amplexicaul, sessile; nerves parallel. Heads rarely 2 together, 2.5-3.5 cm across, glabrous. Involucral bracts 1.2-1.6 cm long, appressed, glabrous; outer ovate acuminate; inner linear-lanceolate with erect flexuous tips. Receptacular bristles longer than achenes. Corolla ca 1.5 cm long, straight. Achenes pale, linear-oblong, ca 8 mm long, rounded at margins, many-ribbed, truncate. Pappus silvery brown, ca 8 mm long, soft.

*Fl. & Fr.* March - April.

*Distrib.* India: on grassy slopes. Uttar Pradesh and Madhya Pradesh.

Myanmar.

10. *Tricholepis tibetica* Hook.f. & Thomson in C.B. Clarke, Comp. Ind. 241. 1876; Hook.f., Fl. Brit. India 3: 382. 1881.

Annuals, ca 30 cm high, corymbosely branched, quite glabrous, woody below; branches slender, erect, cylindric, quite smooth. Leaves very narrow, obtuse at apex, 2.5-7.5 cm long, coriaceous, sessile; lower leaves distantly pinnatifid; upper ovate, linear, entire. Heads 1.2-1.6 cm across, scaberulous. Involucral bracts appressed, minutely scabrid; outer ovate-subulate; inner subulate-lanceolate, ca 1.2 cm long, rigid, suberect. Receptacular bristles longer than achenes. Corolla red, ca 1.5 cm long. Achenes silvery, linear-oblong, ca 4 mm long, obscurely ribbed. Pappus hairs nearly white, ca 8 mm long.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, in rock crevices, ca 2,500-3,000 m. Jammu & Kashmir.

Pakistan and Afghanistan.

#### EXCLUDED SPECIES

*Tricholepis chaetolepis* (Boiss.) Rech. f. in Öesterr. Bot. Zeitschr. 97: 251. 1950. *Jurinea chaetolepis* Boiss., Diagn. ser. 23: 50: 1856. *Tricholepis spartoides* C.B. Clarke, Comp. Ind. 241. 1876.

*Distrib.* India: Jammu & Kashmir.



Pakistan and Afghanistan.

*Note.* There is no specimen available in Indian herbaria.

**Tricholepis montana** Dalz. & Gibs. Bombay Fl. 131.

*Distrib.* India: Maharashtra.

*Note.* Hook.f. (1881) has included as doubtful and imperfectly known species.

**Tricholepis nakaoui** Kitam. in Acta Phyto. Geobot. 19: 105. 1963. f. 59. 1964.

*Distrib.* India: Jammu & Kashmir.

**Tricholopis roylei** Hook.f., Fl. Brit. India 3: 383. 1881.

*Note.* There is no specimen available in Indian herbaria.

## 21. *Zoegia* L.

Herbs, erect. Radical leaves pinnatifid; cauline entire. Heads heterogamous, long peduncled. Outer florets 1-seriate, neuter. Disc florets bisexual, fertile; tube slender, limb 5-fid to or below the middle. Involucre globose or ovoid; bracts membranous, many-seriate; outer shorter, pectinately ciliate; violet inner entire, tips ciliate. Receptacle densely bristly. Filaments glabrous; anther bases sagittate. Style entire or emarginate. Achenes obovoid, compressed, shining, obscurely ribbed. Pappus double or triple; outermost of short chaffy scales; middle with long bristles; inner of short bristles.

S.W. & C. Asia; ca 6 species; 1 in India.

***Zoegia purpurea*** Fresen. in Mus. Senckenb. 86. 1833; Hook.f., Fl. Brit. India 3: 384. 1881.

Herbs, 20-30 cm high, slender, glabrous or puberulous. Involucral bracts with bright purple tips. Achenes with concentric ridges below the tip.

*Distrib.* India: W. Himalayas, ca 1600 m. Jammu & Kashmir.

Pakistan, Afghanistan, Iran, Saudi Arabia and Egypt.

*Note.* Very rare; there is no collection in Indian herbaria.

## EXCLUDED SPECIES

**Dolomiaea baltalensis** Dar & Naqshi in J. Bombay Nat. Hist. Soc. 87: 279. 1990.

*Note.* The species is described on minor variation in vegetative characters (i.e. shape and lobation of leaves, nature of woolliness, size of peduncle and darker heads. Therefore it could be just variant of *Jurinea macrocephala*. As the author could not examine the type specimen it is presently excluded from the main treatment.

## Tribe 5. C I C H O R I E A E Dumortier

(S.K. Mamgain & R.R. Rao)

Herbs, or undershrubs, annual, biennial or perennial with white or yellow latex; roots simple or with a stout rootstock; stems very variable, erect or ascending, glabrous or hispid or even glandular hairy, sometimes grooved, simple or branched. Leaves very variable, radical as well as cauline, sometimes rosulate, spatulate; entire or dentate, variously toothed, lobed, pinnate, pinnatifid or runcinate-pinnatifid, sessile or petioled, ovate, oblong, linear, linear-lanceolate, oblanceolate or linear-oblong, hastate, sometimes base sagittate or stem clasping; petiole simple or winged or auricled. Heads homogamous, in axillary or in paniced cymes or umbels, terminal, erect or drooping, variously shaped. Involucral bracts 1-many seriate; outer bracts usually ovate or ovate-lanceolate, linear-lanceolate, oblong-lanceolate or linear-oblong, glabrous or hairy, sometimes with scarious margins. Florets all ligulate, hermaphrodite, all fertile; corolla various in colours, 5-toothed, rarely 4-toothed. Stamens 5, appendaged, slender; anthers acute or acuminate, base sagittate. Style branches slender, acute or obtuse stigma bifid, equal, shorter or longer than corolla. Achenes variable, rugose or tuberculate, usually ribbed, truncate or beaked. Pappus simple or feathery, 1-few seriate.

Considerable confusion prevails over the terminology of the tribe as used by different workers. They are a natural group, most distinctive and easily recognizable subdivision of the family Asteraceae. The treatment of the tribe as a separate family Cichorioideae as has been done by some authors is not justified. Although the Cichorieae cannot be closely allied to any other single tribe of Asteraceae, the basic characters such as, the head inflorescence, the nature of the achenes, the presence of pappus etc. advocate the inclusion of Cichorieae as a tribe of the family Asteraceae.

The tribe Lactuceae as recognised by Cassini (1819) should have had priority over the tribe Cichorieae (Dumortier, 1829) but when the subfamily Cichorioideae is recognised, the tribe Cichorieae based on the type genus *Cichorium* L. automatically becomes valid.

The sub-divisions of the tribe Cichorieae is also not unanimous. Most authors recognise eight distinct subtribes but again the terminology applied to these subtribes also

vary from author to author. George Bentham who is considered to be one of the outstanding workers on the Asteraceae of the 19th century, has not attempted any subdivisions of the tribe Cichorieae. Hoffmann (1891) recognises only five subtribes as also Jussieu (1789). However in the present work we have just followed Hooker's (1881) treatment.

*Literature.* BENTHAM, G. (1873). Notes on the Classification, History and Geographical Distribution of Compositae. in *Linn. J. Bot.* 19: 335-577. BOISSIER E. (1875). Compositae- Liguliflorae in *Flora Orientalis* 3: 711-883. CANDOLLE, A. DE (1838). *Prodromus systematis naturalis regni vegetabilis* 7: 74-252. CLARKE, C.B. (1876). *Compositae Indicae*. CRONQUIST, A. (1955). Phylogeny and Taxonomy of the Compositae in *Amer. Mid. Nat.* 53(2): 478-511. HOFFMANN, O. (1891). Liguliflorae-Cichorieae in ENGLER, A. & PRANTL, K. *Die naturalischen Pflanzen-familien* 4, 5: 350-387. HOOKER, J.D. (1881). *Flora of British India*, Vol. 3. JEFFREY, C. (1966). Notes on Compositae I. The Cichorieae in East Tropical Africa in *Kew Bull.* 18: 427-486. LESSING, C.F. (1832). *Synopsis generum Compositarum* 2: 219-223 et 504-533. SOLBRIG, O.T. (1936b). The tribes of Compositae in the Southeastern United States. *J. Arn. Arb.* 44: 436-461. STEBBINS, G.L. Jr. (1953). A new classification of the tribe Cichorieae, family Compositae in *Madrono* 12: 33-64, 65-81. STEBBINS, G.L. Jr., JENKINS, J.A.L. & WALTER, M.S. (1953). Chromosomes and phylogeny in the Compositae, tribe Cichorieae in *Univ. Calif. Publ. Bot.* 26: 401-430. 13. TOMB, A.S. (1972). The systematic significance of pollen morphology in the family compositae, tribe Cichorieae. *Brittonia* 24(2): 129.

## KEY TO THE SUBTRIBES

- |   |                   |   |
|---|-------------------|---|
| 1a. Scapigerous herbs.  | 4. Hypochoerideae | 2 |
| b. Non scapigerous or rarely scapigerous  |                   | 2 |
| 2a. Pappus absent or with alternating hairs   |                   | 3 |
| b. Pappus present, simple or feathery   |                   | 5 |
| 3a. Achenes truncate; heads terminal, axillary, sessile   | 3. Hyoserideae    |   |
| b. Achenes beaked or narrowed upwards; heads paniced, peduncled   |                   | 4 |
| 4a. Achenes incurved or elongate, spinous or smooth   | 7. Rhagadioleae   |   |
| b. Achenes obtuse, not incurved or rarely curved, strongly ribbed   | 6. Lapsaneae      |   |
| 5a. Leaves usually with broad, rounded sheathing bases; achenes very long, usually strongly muricate; pappus feathery         | 8. Scorzonereae   |   |
| b. Leaves without sheathing base; achenes rather short; smooth or scabrous or rarely muricate; pappus simple, rarely feathery |                   | 6 |
| 6a. Perennial herbs, more or less stellately hairy; achenes truncate  | 2. Hieraceae      |   |
| b. Annual, or perennial herbs, without stellate hairs; achenes beaked or truncate   |                   | 7 |
| 7a. Plants mostly with radical leaves; achenes usually contracted at both ends, 10-many ribbed                                | 1. Crepideae      |   |
| b. Plants with radical as well as cauline leaves; achenes distinctly beaked or truncate, 3-20 ribbed                          | 5. Lactuceae      |   |

## Subtribe 1. CREPIDAEAE Less.

Herbs, annual, biennial or perennial with white latex; stems glabrous or pubescent with straight or hooked hairs. Leaves mostly radical, very variable in shape, size and lobation, sometimes lowermost leaves replaced by bladeless, petiolar cataphylls, sessile or petioled. Heads variously shaped, few to many flowered, glabrous or pubescent. Involucral bracts usually 2-3 seriate; outer and inner bracts differing, herbaceous,

glabrous or sparsely hairy, unequal. Receptacle flat, or convex, areolate and naked. Ligules yellow, white, orange-pink or reddish, 5-toothed. Stamens 5, appendaged; anther base sagittate. Style slender; stigma bifid. Achenes very variable, monomorphic, dimorphic or even trimorphic, compressed or obcompressed or terete, beakless or beaked, few to many ribbed. Pappus 1-many seriate, of various, simple or of feathery hairs.

Comprises of 3 genera in India.

#### KEY TO THE GENERA

- |   |                     |
|---|---------------------|
| 1a. Stems very short, usually subterranean                                      | 3. <i>Sorosaris</i> |
| b. Stems tall, erect  | 2                   |
| 2a. Coarse, hispid herbs with straight or hooked hairs; pappus usually feathery | 2. <i>Picris</i>    |
| b. Glabrous or hairy herbs without spines; pappus simple                        | 1. <i>Crepis</i>    |

#### 1. *Crepis* L.

Herbs, annual, biennial or perennial; stems pubescent or glabrous, rhizomatous or with woody roots, leafy. Radical leaves usually rosulate, many or few, oblanceolate, obtuse or acute, mucronate, dentate or runcinate-pinnatifid; cauline leaves numerous or few; lower similar to radical leaves. Heads large, medium or small, many or few flowered. Involucral bracts 2-3 seriate, glabrous or pubescent, setose or hirsute; outer bracts ovate-lanceolate; inner bracts lanceolate. Ligules yellow, orange, pink or tinged reddish, 5-toothed. Stamens 5, appendaged; anther tube yellow, greenish, white or pink, base sagittate. Style branches filiform, yellow or green stigma bifid. Achenes monomorphic, beakless or beaked or dimorphic with marginal compressed and the inner terete, 10-35 ribbed or striate. Pappus dull white or yellowish, 1-many seriate.

Distributed in Asia, S. Europe, M. Europe, America and Australia, confined to tropical, subtropical, temperate to alpine regions; ca 200 species, 9 in India.

*Literature.* BABCOCK, E.B. & CAMERON, D. (1934). Chromosomes Phylogeny in *Crepis* II. *Univ. Calif. Publ. Agr. Sci.* 6: 287-324. BABCOCK, E.B. (1947). The genus *Crepis* part. 1. *Univ. Calif. Publ. Bot.* 21: 1-199. BABCOCK, E.B. (1947). the genus *Crepis* Part. 2. *Univ. Calif. Publ. Bot.* 22: 199-1030.

#### KEY TO THE SPECIES

- |   |                            |
|---|----------------------------|
| 1a. Perennial, rhizomatous herbs; stems usually 1-2; leaves blade-like                                    | 3. <i>C. kashmirica</i>    |
| b. Annual, biennial or perennial, non rhizomatous or rhizomatous herbs; stems 1-many; leaves not as above | 2                          |
| 2a. Achenes mostly trimorphic, rarely monomorphic, somewhat winged  | 3                          |
| b. Achenes monomorphic or dimorphic, not winged   | 4                          |
| 3a. Radical leaves usually entire or sparsely toothed at margins, oblanceolate or lanceolate              | 2. <i>C. dachigamensis</i> |
| b. Radical leaves usually runcinate-pinnatifid or lyrate, spatulate, rarely oblanceolate                  | 7. <i>C. sancta</i>        |

- |  |                          |
|--|--------------------------|
| 4a. Achenes monomorphic; corolla 4-10 mm long  | 5                        |
| b. Achenes dimorphic; corolla 5-12 mm long   | 8                        |
| 5a. Annual or biennial herbs; achenes 2-4 mm long  | 1. <i>C. capillaris</i>  |
| b. Perennial herbs; achenes 4-8 mm long  | 6                        |
| 6a. Plants glabrous with elongated taproot; heads 5-15 flowered; pappus yellowish or white     | 5. <i>C. naniforma</i>   |
| b. Plants pubescent with rhizomatous rootstock; heads 20-45 flowered; pappus white             | 7                        |
| 7a. Outer involucre bracts 5-10; florets upto 30; heads 8-11 x 2.5-3 mm                        | 9. <i>C. tibetica</i>    |
| b. Outer involucre bracts 5-7; florets more than 30; heads 7-9 x 2-3 mm                        | 4. <i>C. multicaulis</i> |
| 8a. Stems few; marginal achenes 5-6 mm long, attenuate at apex; pappus 3-5 mm long             | 6. <i>C. pulchra</i>     |
| b. Stems many; marginal achenes 5-8 mm long, compressed with a coarse beak; pappus 5-6 mm long | 8. <i>C. thomsonii</i>   |

1. *Crepis capillaris* (L.) Wallr. in *Linnaea* 14: 657. 1841. *Lapsana capillaris* L., *Sp. Pl.* 812. 1753.

Herbs, annual or biennial; stems erect, branched, often profusely from base upwards. Radical leaves rosulate, numerous, lanceolate or oblanceolate, obtuse or acute, mucronate, dentate or runcinate-pinnatifid, 25-30 x 2-4-5 cm, narrowed into a winged petiole. Heads 5-8 x 3-6 mm, erect, numerous or few in reduced forms. Outer involucre bracts ca 8, linear or linear-ovate; inner 8-16, lanceolate, membranous towards margins, tomentose. Ligules yellow. Achenes yellowish brown, pale brown or dark brown, fusiform or oblong 1.5-2.5 mm long, terete or subterete, abruptly narrowed at both ends. Pappus white, 3-4 mm long, soft.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas in meadows, pastures and waste places, 3000-4000 m. Himachal Pradesh and Jammu & Kashmir.

S. Europe, M. Europe, C. Europe, N. America, S. America and Australia.

2. *Crepis dachigamensis* Singh, *For. Fl. Srinagar* 127. 1976.

Herbs, annual; stems simple, branched or sparsely branched. Radical leaves 2-4, oblanceolate or lanceolate, hairy, margins with few sharp teeth, petioled; cauline leaves few, lanceolate, acute, 4-10 cm long, auricled at the base. Heads 10-15 mm across, on long, naked peduncles. Involucre bracts 2-seriate; outer ovate; 2-3 mm long; inner ones lanceolate, 8-14 mm long, elongating in fruiting, with a raised prominent midrib. Receptacle naked. Ligules yellow. Stamens 5, appendaged; anthers slender, sagittate at base. Achenes narrowly cylindrical, 7-10 mm long, narrowed above, rigid. Pappus white, 5-8 mm long, soft, simple.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas, in exposed dry or moist situation, 1500-2000 m. Jammu & Kashmir, Endemic.

*Notes.* This is a close relative of *C. sancta* with which it differs in having less divided radical leaves, presence of distinct cauline leaves, stouter, longer achenes and rigid longer involucre bracts.

3. *Crepis kashmirica* Babcock in Uni. Calif. Publ. 14. no. 13: 328. 1928. *C. blattarioides* Hook.f., Fl. Brit. India 3: 394. 1881, (non Vill.).

Herbs, perennial with woody rhizome. Stems robust,  $\pm$  curved, glabrous or tomentose below, striate, 3-4 branched at top. Radical leaves slender, simple; cauline leaves oblanceolate, obtuse, denticulate, ca 12 x 2.5 cm, often with winged petiole and clasping base. Heads broadly campanulate, 10-15 x 8-12 mm, erect, 50 flowered, densely villous. Outer involucre bracts 6-8, unequal, ovate-lanceolate or deltoid, acute; inner 14-20, lanceolate, acuminate, ciliate at apex. Ligules yellow. Achenes dark brown or black, pale yellow at apex, fusiform, slightly attenuate at both ends, 6-7 mm long, 10-12 ribbed. Pappus 7-8 mm long, persistent.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas in alpine meadows, 3500-4300 m. India: Jammu & Kashmir and Himachal Pradesh.

Tibet.

4. *Crepis multicaulis* Ledeb., Fl. Alt. 4: 125. 1833. *C. multicaulis* subsp. *genuina* (Regl.) Babcock in Univ. Calif. Publ. 19: 401. 1941.

Herbs, perennial; rhizome short with fibrous roots; stems slender, erect, striate, glabrous or glandular pubescent. Radical leaves few, oblanceolate or elliptic, pinnatifid, obtuse or acute, denticulate, 3-10 x 1-2 cm, narrowed into a short petiole; cauline leaves short, usually bract-like. Heads 7-9 x 2-3 mm, erect with many florets; peduncle slender, sparsely or densely glandular hispid. Outer involucre bracts minute, ovate or ovate-lanceolate; inner linear or linear-lanceolate. Ligules yellow. Achenes reddish brown, subterete, narrowly fusiform, ca 4 mm long, 10-12 ribbed. Pappus white, ca 4 mm long, persistent.

#### KEY TO THE SUBSPECIES

1a. Stems glabrous or sparsely hairy; inflorescence lax

b. Stems densely glandular pubescent; inflorescence congested

4.2. subsp. *multicaulis*

4.1. subsp. *congesta*

4.1. subsp. *congesta* (Regl.) Babcock in Univ. Calif. Publ. 19: 401. 1941. *C. stoliczkae* C.B. Clarke, Comp. Ind. 255. 1876.

*Fl. & Fr.* May - Sept.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

China and Pakistan.

4.2. subsp. *multicaulis*

Fig. 56.

*Fl. & Fr.* April - Sept.

*Distrib.* India: W. Himalayas on moist slopes and sandy river beds, 3000-4500 m. Jammu & Kashmir and Himachal Pradesh.

China, Tibet, Turkey and Norway.

5. *Crepis naniforma* Babcock in Univ. Calif. Publ. 22: 536. 1947.

Herbs, perennial; stems simple, very slender, glabrous, 2 headed or dichotomously branched, leafy. Cauline leaves all long petioled, except of the inflorescence, which are sessile; lower cauline leaves, spatulate, elliptic, ovate or obovate, obtuse, sinuate-denticulate, 4-9 x 0.6-1.6 cm. Heads cylindrical, 10-15.5 x 2-4 mm, erect, small, 5-15 flowered; peduncle slender. Outer involucral bracts 3-5, ovate to linear, acute, short; inner 7-8, oblong or oblong-lanceolate, acute or obtuse. Ligules yellow. Stigma bifid, shorter than corolla. Achenes light brown, fusiform 5.5-6.5 mm long, subterete, slightly constricted, 10-ribbed. Pappus pale, 2-4 seriate, ca 6 mm long, copious, persistent.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas on rocky slopes and sandy beds. 3000-5000 m. Jammu & Kashmir and Himachal Pradesh.

*Note.* Very rare, there are no specimens at DD or BSD.

6. *Crepis pulchra* L., Sp. Pl. 806. 1753. *Phaeacasium lampsanoides* Cass. in Dict. Sci. Nat. 39: 387. 1841; Hook.f., Fl. Brit. India 3: 398. 1881.

Herbs, annual with slender roots; stems erect, striate, fistulose, corymbosely branched. Radical leaves rosulate, oblanceolate, acute or obtuse with triangular, acute lobes, denticulate or pinnatifid or runcinate-pinnatifid, 3-15 or 24 x 1-3 cm, narrowed to a winged petiole; cauline leaves lanceolate, acute or acuminate, denticulate. Heads



Fig. 56. *Crepis multicaulis* Ledeb. subsp. *multicaulis*.: a. Habit; b. Achene.



cylindric, small, 8-11 x 3-5 mm, erect, 15-30 flowered; peduncle slender, glabrous. Outer involucral bracts 5-7, minute, ovate or ovate-lanceolate, acute; inner 12-14, lanceolate, acute, glabrous. Ligules yellow; corolla tube densely pubescent. Style branches greenish or yellow. Achenes homomorphic or dimorphic; marginal achenes obcompressed, 5-6 mm long, attenuate; inner achenes 4-4.5 mm long, terete. Pappus pure white, 4-5 seriate, 3-5 mm long, fine, persistent.

## KEY TO THE SUBSPECIES

- |  |                                 |
|--|---------------------------------|
| 1a. Florets mostly smaller; corolla 5-9 mm long  | 6.1. subsp. <i>pulchra</i>      |
| b. Florets mostly larger; corolla 10-12 mm long. | 6.2. subsp. <i>turkestanica</i> |

**6.1. subsp. *pulchra***

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas on open shady or dry situations, ascending up to 3000 m. Jammu & Kashmir.

Pakistan and Europe.

**6.2. subsp. *turkestanica*** Babcock in Univ. Calif. Publ. 19: 402. 1941.

*Fl. & Fr.* July - Oct.

*Distrib.* India: Jammu & Kashmir.

Afghanistan, S. Turkestan and Iran.

**7. *Crepis sancta* (L.) Babcock in Univ. Calif. Publ. 19: 403. 1941. *Hieracium sanctum* L., Cent. Pl. 2: 30. 1756. *Pterotheca falconeri* Hook.f., Fl. Brit. India 3: 399. 1881.**

Herbs, annual with slender roots; stems swollen, semidecumbent, strict or erect, slender to robust, pubescent or glabrous, simple and 1-headed or dichotomously or cymosely branched above the middle. Radical leaves obovate, runcinate-pinnatifid or lyrate, 2-20 x 0.5-4 cm, pubescent or glabrous, short or long petioled; cauline few, reduced, linear, mostly bract like. Heads few-many 6-11 mm long, erect; peduncle slender. Outer involucral bracts 5-9, ovate or linear; inner 10-13, lanceolate, acute with broad white margins. Ligules yellow, sometimes tinged red on outer faces. Achenes trimorphic; outermost strong to merely obcompressed or subterete, usually 3-angled; intermediate terete, slender, coarsely or finely spiculate; innermost achenes terete, slender, smooth. Pappus white, very fine and soft.

*Fl. & Fr.* March - July.

*Distrib.* India: W. Himalayas on exposed slopes, ascending up to 3000 m., Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan, Pakistan, C.I.S. Turkey, Syria, Arabia and Palestine.

8. *Crepis thomsonii* Babcock in Bot. 76: 208-209. 1938. *C. foetida* Ssensu Hook.f., Fl. Brit. India 3: 393. 1881, non L.

Herbs, annual with a woody taproot; stems many from the enlarged caudex, erect or half prostrate in reduced form, cymosely few branched. Radical leaves oblanceolate, acute or obtuse, runcinate-pinnatifid or dentate, 18 x 3 cm, or sometimes very small in reduced forms tapering into a short, winged petiole; cauline lanceolate, acute or acuminate, dentate or entire. Heads broadly campanulate, 9-11 x 7-11 mm, nodding, many flowered; peduncle 1-15 cm long. Outer involucre bracts 10-12, unequal, linear-lanceolate, obtuse, with narrow scarious margins; inner 12-16, nearly oblong with broad scarious margins. Ligules yellow.

9. *Crepis tibetica* Babcock in Univ. Calif. Publ. 14: 330. 1928.

Herbs, perennial with horizontal or oblique rhizome, sometimes branched with strong fibrous roots; stems erect, rather stout, glabrous, striate, simple or 2-5 branched. Radical leaves lanceolate or oblanceolate, acute or obtuse, dentate or runcinate-pinnatifid, 18-20 x 2-2.4 cm, tapering into a narrowly winged petiole with broad clasping base; cauline leaves few. Heads cylindric, 8-11 x 2.5-3 mm, erect, with about 30 florets; peduncle 0.4-5 cm long with 1 or 2 small bracts. Outer involucre bracts 5-10, unequal, ovate-lanceolate, acute; inner 12-14, lanceolate, scarious margined. Ligules yellow, 5-toothed. Achenes narrowly fusiform, subcompressed, 4-5 mm long, pubescent, narrowed at apex, 10-ribbed. Pappus white, 4 mm long, white, 1-seriate, persistent.

*Fl. & Fr.* July - Aug.

*Distrib.* India: E. Himalayas on shady or dry situations, 2500-4000 m. Sikkim. Rare.

Tibet, Nepal, Bhutan and Yunan.

## 2. *Picris* L.

Herbs, tall, erect, branched; stems hairy with straight or hooked hairs, usually corymbosely branched. Leaves radical as well as cauline; radical leaves usually oblanceolate, sinuate-toothed, petioled; cauline leaves lanceolate, cordate, sessile. Heads

homogamous, terminal, cylindrical, peduncled; peduncle erect, slender, hairy. Involucral bracts many seriate; outer ovate, ovate-lanceolate or cordate, herbaceous or foliaceous; inner linear-lanceolate, hairy, subequal. Receptacle flat. Ligules usually yellow, 5-toothed. Stamens 5, appendaged; anthers slender, base sagittate, acute or shortly setaceous. Style branches very slender; stigma bifid, branches slender. Achenes subterete, compressed or angled, narrowed at both ends, incurved; ribs transversely rugose; beak short or long. Pappus 1-seriate, copious, of soft feathery hairs.

In Europe, North Africa, N. Asia and W. Asia from subtropical to temperate regions. ca 60 species, 1 in India.

**Picris hieracioides** L., Sp. Pl. 792. 1753; Hook.f., Fl. Brit. India 3: 393. 1881.

Herbs, tall; stems 30-120 cm tall, hairy with straight or hooked hairs, corymbosely branched. Radical leaves oblanceolate, sinuate toothed, 10-25 x 2-5 cm, rugose, densely hairy, toothed or denticulate at margins, narrowed to a fleshy petiole at base; cauline lanceolate, cordate, sessile. Heads terminal, cylindrical; peduncle slender, erect, hairy. Outer involucral bracts ovate or ovate-lanceolate, 2-4 x 1-1.5 mm, densely hairy; inner linear-lanceolate, 10-13 x 1-2 mm, hairy. Stamens 5; anthers acute, base sagittate. Achenes ellipsoid, compressed, 4.5 mm long, narrowed at both ends, slightly curved, shortly beaked. Pappus white, 5-6 mm long, white, feathery.

#### KEY TO THE SUBSPECIES

- |   |                                 |
|---|---------------------------------|
| 1a. Stems 30-120 cm high with straight or hooked hairs        | 1.1. subsp. <b>hieracioides</b> |
| b. Stems 20-80 cm high, without hooked or rarely hooked hairs | 2                               |
| 2a. Leaves broadly oblanceolate, densely hairy                | 1.3. subsp. <b>nuristanica</b>  |
| b. Leaves narrowly oblanceolate, glabrous or sparsely hairy   | 1.2. subsp. <b>kaimaensis</b>   |

#### 1.1. subsp. **hieracioides**

*Fl. & Fr.* June - Oct.

*Distrib.* India: W. Himalayas on slopes and shady walls ascending up to 3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Europe, Asia, Australia and New Zealand.

#### 1.2. subsp. **kaimaensis** Kitam. in Acta. Phyto. Geobot. 27: 37. 1957.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Meghalaya.

Nepal, Bhutan and Pakistan.

1.3. subsp. *nuristanica* Kitamura in Acta Phyto. Geobot. 27: 37. 1957.

Fl. & Fr. July - Sept.

Distrib. India: Jammu & Kashmir.

### 3. *Sorosseris* Stebbins

Herbs, perennial, dwarf, with milky latex; stems usually short, thick, hollow, partly or wholly subterranean. Leaves various; lowermost leaves usually replaced by bladeless, petiolar cataphylls. Heads numerous and crowded, cymose or somewhat racemose, 4-25 flowered. Involucral bracts 2-3 seriate; outermost narrowly elliptic. Ligules yellow or white, often blackish at the base. Stamens 5, appendaged; anthers yellowish, greenish or blackish, flattened. Achenes oblong, somewhat attenuate at the base, abruptly contracted at apex, slightly obcompressed. Pappus multiseriate, setose, simple, setae very numerous, deciduous.

The genus is endemic to the Sino-Himalayan region ca 8 species, 5 in India.

*Literature.* STEBBINS, G.L. Jr. (1940). Studies in the Cichorieae *Dubyaea* and *Sorosseris*, Endemics of the Sino-Himalayan Region. *Mem. Torr. Bot. Club.* 19(3): 1-77.

#### KEY TO THE SPECIES

- |  |                         |
|--|-------------------------|
| 1a. Leaf blades elliptic or spatulate; ligules mostly equalling or shorter than the corolla tube   | 2                       |
| b. Leaf blades lanceolate or oblanceolate; ligules exceeding the tube of the corolla               | 4                       |
| 2a. Inner involucral bracts 5, equal, with scarios margins; florets 5                              | 3. <i>S. glomerata</i>  |
| b. Inner involucral bracts 4, in 2 unequal pairs, without scarios margins; florets 4               | 3                       |
| 3a. Leaves entire or remotely denticulate; involucre 10-13 mm long; anthers 4-5 mm long, yellowish | 1. <i>S. deasyi</i>     |
| b. Leaves coarsely dentate; involucre 7-9 mm long; anthers 2-4 mm long, blackish or greenish       | 5. <i>S. pumila</i>     |
| 4a. Involucres 10-16 mm long; pappus setae 10-16 mm long   | 2. <i>S. gillii</i>     |
| b. Involucres 7-12 mm long; pappus setae 6.5-11 mm long  | 4. <i>S. hookeriana</i> |

1. *Sorosseris deasyi* (S. Moore) Stebbins in Mem. Torr. Bot. Club 19(3): 36. 1940.  
*Lactuca deasyi* S. Moore in J. Bot. 38: 424. 1900. *Crepis glomerata* Hook. f., Fl. Brit. India 3: 398. 1881, p.p. (*non Prenanthes glomerata* Decne).

Herbs, dwarf, 5-6 cm high; stems chiefly subterranean and rhizomatous. Leaves spatulate, elliptic, obovate, entire or dentate, 1.5-2 x 0.5-1.5 cm, rounded at apex, 3-nerved; petioles slender. Inflorescence flat, cymose. Heads 10-13 mm long; peduncle 5-7

mm long. Ligule 5-toothed; corolla yellow. Outer involucre bracts 2, linear, shorter than or exceeding the inner; inner 4, hirsute, acute or obtuse at apex. Anther tube dark yellow or somewhat reddish, 3.5-5 mm long. Style greenish or blackish; stigma bifid; branches 2-3 mm long. Achenes 5-6 mm long, attenuate at the base, contracted at the apex. Pappus pale or dirty white, 9-11 mm long.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas on rocky or gravelly slopes and roadsides, 4000-5000 m. Jammu & Kashmir.

Pakistan and China.

2. *Sorosseris gillii* (S. Moore) Stebbins in Mem. Torr. Bot. Club 19(3): 41. 1940.

Herbs; stems usually short, 2-12 cm high. Leaves lanceolate, runcinate-pinnatifid or dentate, 3-8 x 0.7-1.8 cm. Inflorescence flat, cymose, often very broad. Heads 10-16 mm long. Outer involucre bracts ovate-lanceolate; inner glabrous or hirsute, acute or obtuse, without scarious margins. Ligules 5-toothed; corolla yellow. Anthers 4-6 mm long, blackish. Stigma bifid; branches 2-3 mm long. Achenes blackish, obovoid, 3-6 mm long, obcompressed, subterete. Pappus rubous, stramineous, 10-16 mm long.

#### KEY TO THE SUBSPECIES

- |   |                                 |
|---|---------------------------------|
| 1a. Inner involucre bracts obtuse or rounded; pappus rugfous or stramineous | 2.1. subsp. <i>gillii</i>       |
| b. Inner involucre bracts acute; pappus greyish                             | 2.2. subsp. <i>occidentalis</i> |

2.1. subsp. *gillii*

*Fl. & Fr.* June - Oct.

*Distrib.* India: W. Himalayas in alpine meadows and open gravelly places, 3500-5000 m. Uttar Pradesh and Himachal Pradesh.

Tibet and W. China.

2.2. subsp. *occidentalis* Stebbins in Mem. Torr. Bot. Club 19(3): 44. 1940.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas on rocky places and meadows, 3000-5000 m. Uttar Pradesh.

Tibet.

3. *Soroseris glomerata* (Decne.) Stebbins in Mem. Torr. Bot. Club. 19(3): 33. 1940. *Prenanthes glomerata* Decne. in Jacquem., Voy. 4 (Bot.). 99. t. 107. 1844. *Crepis glomerata* Benth. & Hook.f., Fl. Brit. India 3: 398. 1881, p.p.

Herbs, perennial; stems short, chiefly subterranean and rhizomatous, 3-6 cm long. Leaves mostly spatulate or obovate, 6-10 x 4-7 mm, 3-nerved, glabrous or slightly hirsute; petiole broadly winged. Heads 10-12 mm long; peduncle 0.5-6 mm long. Outer involucre bracts 2, linear, hirsute; inner 4 or 5, obtuse or acute; hirsute; margins scabrous. Ligules white or sometimes yellow. Achenes greyish brown, 5-6.5 mm long, narrow at base, contracted at apex. Pappus silvery grey or pale towards base, 6-8 mm long.

Fl. & Fr. June - Sept.

Distrib. India: W. Himalayas, on rocky situations, 3800-5500 m. Uttar Pradesh.

Tibet and Nepal.

4. *Soroseris hookeriana* (C.B. Clarke) Stebbins in Mem. Torr. Bot. Club 19(3): 45. 1940. *Crepis hookeriana* C.B. Clarke, Comp. Ind. 255. 1876. *Crepis glomerata* Hook.f., Fl. Brit. India 3: 398. 1881, p.p. (*non prenanthes glomerata* Decne.).

Herbs; stems 4-20 cm high, hollow, well developed. Leaves lanceolate or oblanceolate, runcinate pinnatifid, entire or dentate, 2-7 x 0.3-1.5 cm; lobes acute. Bracts on inflorescence densely hirsute. Heads 7-12 mm long. Outer involucre bracts densely hirsute with long yellowish trichomes; inner 4, blackish green or paler below, acute, obtuse, or sometimes rounded at the apex, glabrous, hirsute towards base or rarely hirsute throughout, often with broad scarious margins. Achenes columnar, obovoid or occasionally fusiform, 3.5-6.5 mm long, all nearly terete. Pappus 6.5-11 mm setae grey.

#### KEY TO THE SUBSPECIES

- |  |                                |
|--|--------------------------------|
| 1a. Leaves usually pinnatifid, acute; upper leaves strongly pubescent                    | 4.2. subsp. <i>hookeriana</i>  |
| b. Leaves usually entire or dentate, obtuse; upper leaves glabrous or sparsely pubescent | 4.1. subsp. <i>erysimoides</i> |

4.1. subsp. *erysimoides* (Hand.-Mazz.) Stebbins in Mem. Torr. Bot. Club, 19(3); 46. 1940. *Crepis gillii* var. *erysimoides* Hand.-Mazz. in Acta Hort. Goth. 12: 355. 1938.

Fl. & Fr. July - Oct.

Distrib. India: E. Himalayas on alpine meadows, 3000-5000 m. Sikkim.

Tibet and W. China.

4.2. subsp. *hookeriana*

*Fl. & Fr.* June - Oct.

*Distrib.* India: E. Himalayas on alpine meadows and stony pastures, 3000-5500 m. Sikkim.

Tibet.

5. *Sorozeris pumila* Stebbins in Mem. Torr. Bot. Club 19(3): 38. 1940. *Crepis glomerata* Hook. f., Fl. Brit. India 3: 398. 1881, p.p. (*non prenanthes glomerata* Decne).

Herbs; rootstock slender, thick at apex; stems 3-10 cm long, slender, subterranean and rhizomatous, thick at middle, expanded at the apex into inflorescence. Leaves spatulate or oblanceolate, obtuse, coarsely and closely dentate or subpinnatifid at the base, 5-20 x 3-9 mm; petioles 1-5 cm, slender. Inflorescence flat, corymbose. Heads 7-9 mm long, numerous; peduncles 2-5 mm long. Outer involucre bracts 2, linear, 9-12 mm long, hirsute; inner in two pairs, outer pair obtuse, acute without scarious margins; inner pair elliptic, with broad scarious margins. Ligules 5-toothed. Anthers blackish. Stigma bifid. Achenes 4-4.5 mm long, narrowed at base, contracted at apex. Pappus silvery grey or yellowish, 7-8 mm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: E. Himalayas on dry rocky slopes, 4000-5100 m. India: Sikkim.

Tibet.

*Note.* Rare; there are no specimens either at DD or BSD.

Subtribe 2. HIERACTIEAE Less.

Herbs, biennial or perennial with white latex; stems usually erect, leafy, glabrous or hairy with simple or stellate hairs. Leaves very variable, entire or toothed, rarely pinnatifid. Heads homogamous, erect, slender, cylindrical, often with black, glandular hairs, panicled; peduncle slender, bracteate. Involucre bracts 2-3 seriate, differentiated into outer and inner bracts, herbaceous. Receptacle flat, naked. Ligules usually yellow, rarely orange or red, 5-toothed. Stamens 5, appendaged; anther base sagittate. Achenes black or blackish-brown, oblong, cylindrical, terete or angled. Pappus white or brown, 1-2 seriate, copious, simple. Receptacle flat, naked.

Only one genus with 6 species in India.

### Hieracium L.

Herbs, biennial or perennial, rarely scapigerous; stems usually erect, leafy, glabrous or hairy with simple and stellate hairs. Leaves variable, entire or toothed. Inflorescence corymbose or narrow paniced. Heads cylindrical or broadly cylindrical, erect, few to many, often with black glandular hairs; peduncle slender, erect, sometimes nodding, bracteate. Involucral bracts 2-3 seriate; outer ovate or ovate-lanceolate, narrow herbaceous; inner linear-lanceolate, subequal, obtuse. Ligules usually yellow, rarely orange or red; corolla 5-toothed. Stamens 5, appendaged; anthers slender, base sagittate. Style slender, stigma bifid, branches slender, yellowish. Achenes blackish or blackish brown, oblong-cylindrical, compressed, 10-15 ribbed, terete or angled. Pappus dirty white or brown, 1-2 seriate, copious, simple, rigid.

Chiefly in Europe, Asia, N. America and South Africa from tropical, temperate to alpine regions; ca 1000 species, 6 in India. (majority of them pomicts).

*Literature.* ROBINSON, B.L. & J.M. GREENMAN. (1904) Revision of the Mexican and Central American species of *Hieracium* in *Proc. Amer. Acad. Arts.* 40: 14-24. ZAHN, K.H. (1923). *Compositae Hieracium* in A. Engler (ed.) *Das Pflanzenreich* IV. 280: 1100-1108, 1115-1124.

#### KEY TO THE SPECIES

- |  |                            |
|--|----------------------------|
| 1a. Stems usually pubescent, sometimes glabrous, solitary or rarely branched; leaves 5-30 x 0.8-3.5 cm, radical as well as cauline | 2                          |
| b. Stems glabrous or pubescent, usually branched; leaves 3-15 x 1-2 cm; usually cauline  | 3                          |
| 2a. Radical leaves ca 30 cm long, rosulate, oblanceolate; achenes 2-3 mm long  | 2. <i>H. echioides</i>     |
| b. Radical leaves ca 15 cm long, usually very few, oblong-oblanceolate; achenes 4-5 mm long  | 6. <i>H. vulgatum</i>      |
| 3a. Achenes 3-4 mm long, usually red-brown   | 4                          |
| b. Achenes 4-6 mm long, usually blackish   | 5                          |
| 4a. Stems very stout, glabrous; leaves usually sparse upwards  | 5. <i>H. virosum</i>       |
| b. Stems rather tall, usually glandular pubescent; leaves crowded upwards  | 3. <i>H. prenanthoides</i> |
| 5a. Leaves 2.5-15 x 0.8-2 cm, usually with ciliate margins, lanceolate or elliptic-lanceolate                                      | 1. <i>H. crocatum</i>      |
| b. Leaves 4-10 x 1-1.5 cm, without ciliate margins, linear oblong or oblong-lanceolate   | 4. <i>H. umbellatum</i>    |

1. *Hieracium crocatum* Fries, symb. Hierac. 183. 1864; Hook.f., Fl. Brit. India 3: 400. 1881. Fig. 57.

Herbs, perennial; stems 30-70 cm high, glabrous or sparsely hairy, simple or branched. Radical leaves usually absent; cauline leaves very variable, elliptic, lanceolate, linear-lanceolate or linear-oblong, usually rounded at the base, entire or toothed, 2.5-15 x 0.8-2 cm, truncate or cordate, glaucous beneath, ciliate towards margins, sessile or shortly petioled. Heads 1-2 x 0.5-0.8 cm, few to many, erect; peduncle nodding, usually glabrous or sparsely hirsute. Outer involucral bracts ovate or ovate-lanceolate, 4-6 x 1-



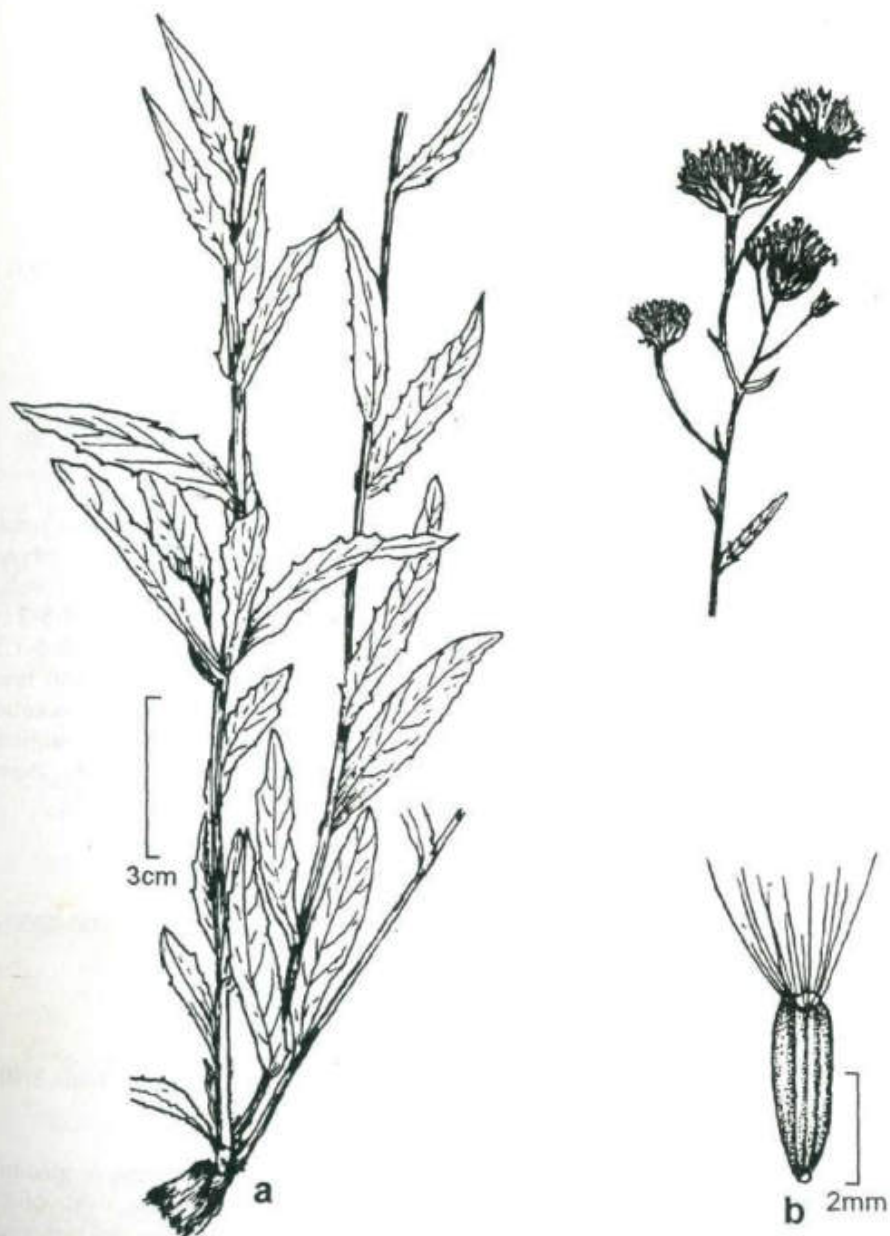


Fig. 57. *Hieracium crocatum* Fries.: a. Habit; b. Achene.

1.5 mm, obtuse, often recurved, glabrous; inner linear or linear-lanceolate, 9-12 x 1-1.5 mm, glabrous. Ligules 5-toothed. Achenes black or blackish brown, compressed or subcompressed, 4-5 mm long, shining, faintly ribbed. Pappus whitish or yellowish, 5-6 mm, long soft.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: W. Himalayas on open irrigated meadows and slopes, 2000-4000 m. Jammu & Kashmir and Himachal Pradesh.

M. and N. Europe.

**2. *Hieracium echioides*** Lumnitz., Fl. Poson. 348. 1791. R.R. Rao et al. Fl. Indicae Enumer. Asteraceae 44. 1988.

Herbs, biennial or perennial; stems 15-100 cm high, erect, slender, simple, usually solitary or rarely branched from base, densely pubescent at the base, corymbosely branched at top. Leaves radical as well as cauline; radical leaves many rosulate, oblanceolate, densely hairy or ciliate along the margins, usually entire 7-25 x 0.8-3 cm, narrowed at the base into a foliar petiole; uppermost sessile. Heads cylindrical, 0.6-1.5 x 0.5-0.8 cm, erect; peduncle slender, densely hairy or ciliate. Outer involucre bracts ovate or ovate lanceolate, 2-3 x 0.5-1 mm, hairy; inner lanceolate or linear-lanceolate, 5-6 x 0.5-1.2 mm, densely hairy. Ligules yellow. Stamens 5. Style slender; stigmatic branches very slender. Achenes blackish, subcompressed, 2-3 mm long, minute. Pappus 2-3 mm long, soft, white.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas in grassy meadows and open slopes, 2000-4000 m. Jammu & Kashmir.

China and Europe.

**3. *Hieracium prenanthoides*** Vill., Prosp. 35. 1779; Hook.f., Fl. Brit. India 3: 400. 1881.

Herbs, perennial; stems ca 80 cm high; branches spreading, glabrous or glandular hirsute above, leafy. Radical leaves usually absent; cauline, linear-ovate, ovate-oblong or linear-oblong, denticulate or rarely entire, 3-10 x 0.7-2 cm, sessile; uppermost cordate. Heads cylindrical, 1-1.5 x 0.5-1 cm, in branched, leafy panicle; peduncle slender. Outer involucre bracts ovate or ovate-lanceolate, 4-5 x 1-1.2 mm, pubescent; inner linear or linear-lanceolate, 8-11 x 1-1.5 mm, pubescent. Ligules yellow. Stamens 5. Achenes blackish or reddish brown, 3-4 mm long, compressed or subcompressed. Pappus whitish or whitish yellowish, ca 5-6 mm long, soft.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas, on open, exposed hill slopes, 2000-4000 m. Jammu & Kashmir.

China, W. Asia, N. Europe and M. Europe.

**4. *Hieracium umbellatum* L., Sp. Pl. 804. 1753; Hook.f., Fl. Brit. India 3: 400. 1881.**

Herbs, biennial or perennial; stems ca 30-70 cm high, glabrous or rarely hirsute, grooved, branched, leafy. Radical leaves absent; cauline many, alternate, crowded, linear or linear-oblong, narrowed at base or often with rounded base, usually serrate-toothed, rarely entire, 4-10 x 1-1.5 cm, sessile; uppermost linear-lanceolate. Heads broadly cylindrical; 1-2 x 1-1.5 cm; peduncle slender, bracteate. Outer involucre bracts ovate or ovate lanceolate, 4-6 x 1-1.5 mm, blackish when dry; inner blackish, linear-lanceolate, 8-12 x 1-1.5 mm. Ligules yellow, stamens 5. Achenes blackish, oblong or oblong-lanceolate, 3-4.5 mm long, subcompressed, faintly ribbed. Pappus yellowish, 5-8 mm long, soft.

A variable species with 2 recognised varieties.

#### KEY TO THE VARIETIES

- |  |                              |
|--|------------------------------|
| 1a. Stems comparatively tall and thick | 4.2. var. <i>umbellatum</i>  |
| b. Stems short, slender                | 4.1. var. <i>lanceolatum</i> |

**4.1. var. *lanceolatum* Hook.f., Fl. Brit. India 3: 400. 1881.**

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: Jammu & Kashmir, Endemic.

**4.2. var. *umbellatum***

Fig. 58.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: W. Himalayas on open hill slopes, 2000-4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

China.

**5. *Hieracium virosum* Pallas, Reise 1: 501. 1771; Hook.f., Fl. Brit. India 3: 400. 1881.**



Fig. 58. *Hieracium umbellatum* L. var. *umbellatum*. : a. Habit; b. Achene.

Herbs, biennial or perennial; stems glabrous, rarely sparsely hirsute, very stout, leafy. Leaves crowded, gradually sparse upwards, oblong or oblong-ovate, cordate at base, denticulate, rarely entire, 5-8 cm long, coriaceous, glaucous beneath, ciliate on the margins and beneath. Heads numerous, in umbellate corymbs; peduncle slender, bracteate, stout. Outer involucral bracts ovate or ovate-oblong; inner linear-lanceolate. Ligules yellow. Achenes red brown, 3-4 mm long, compressed. Pappus whitish, 4-6 mm long, soft.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas on hill slopes, 2000-4000 m. Jammu & Kashmir.

China, N. Asia and M. Europe.

**6. *Hieracium vulgatum*** Fries, Nov. Fl. Suec. ed. 2. 258. 1828; Hook. f., Fl. Brit. India 3: 399. 1881. Fig. 59.

Herbs, biennial or perennial; stems 30-70 cm high, Stout, glabrous or hirsute, paniculately or corymbosely branched, sometimes solitary. Radical leaves oblanceolate or oblong-oblanceolate, coarsely toothed or denticulate, 5-10 x 1-3 cm, often densely hairy at margins, beneath and base of petiole, narrowed at both the ends; lower cauline petioled; uppermost sessile. Heads 1-1.5 or 2 x 0.5-1 cm, erect; peduncle erect, glandular hairy. Outer involucral bracts, ovate or ovate-lanceolate, 2-5 x 0.1-1.5 mm; inner linear or linear-lanceolate, 8-12 x 1-2 mm. Ligules yellow. Achenes blackish, 4-4.5 mm long, subcompressed. Pappus whitish yellow, 5-6 mm long, soft.

*Fl. & Fr.* April - Sept.

*Distrib.* India: W. Himalayas on slopes and bunds of cultivated fields, 1500-4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

N. Asia, Europe and America.

Subtribe 3. HYOSERIDEAE Less.

Herbs, annual or perennial with white latex; stems erect, glabrous or hispid with divaricate or spinescent branches, angled or grooved. Leaves variable in shape and size, petioled or sessile; upper leaves often amplexicaul. Heads cylindrical, erect, in terminal and axillary clusters or sessile on the branches or on thickened peduncle. Involucral bracts differentiated into outer and inner unequal, few seriate. Receptacle flat, usually naked. Ligules bluish, 5-toothed. Stamens 5, appendaged; anthers slender, base sagittate. Style slender; stigma bifid. Achenes subcompressed or angled, many ribbed or striate, base contracted. Pappus pale 2-3 seriate, soft.

A monotypic subtribe.

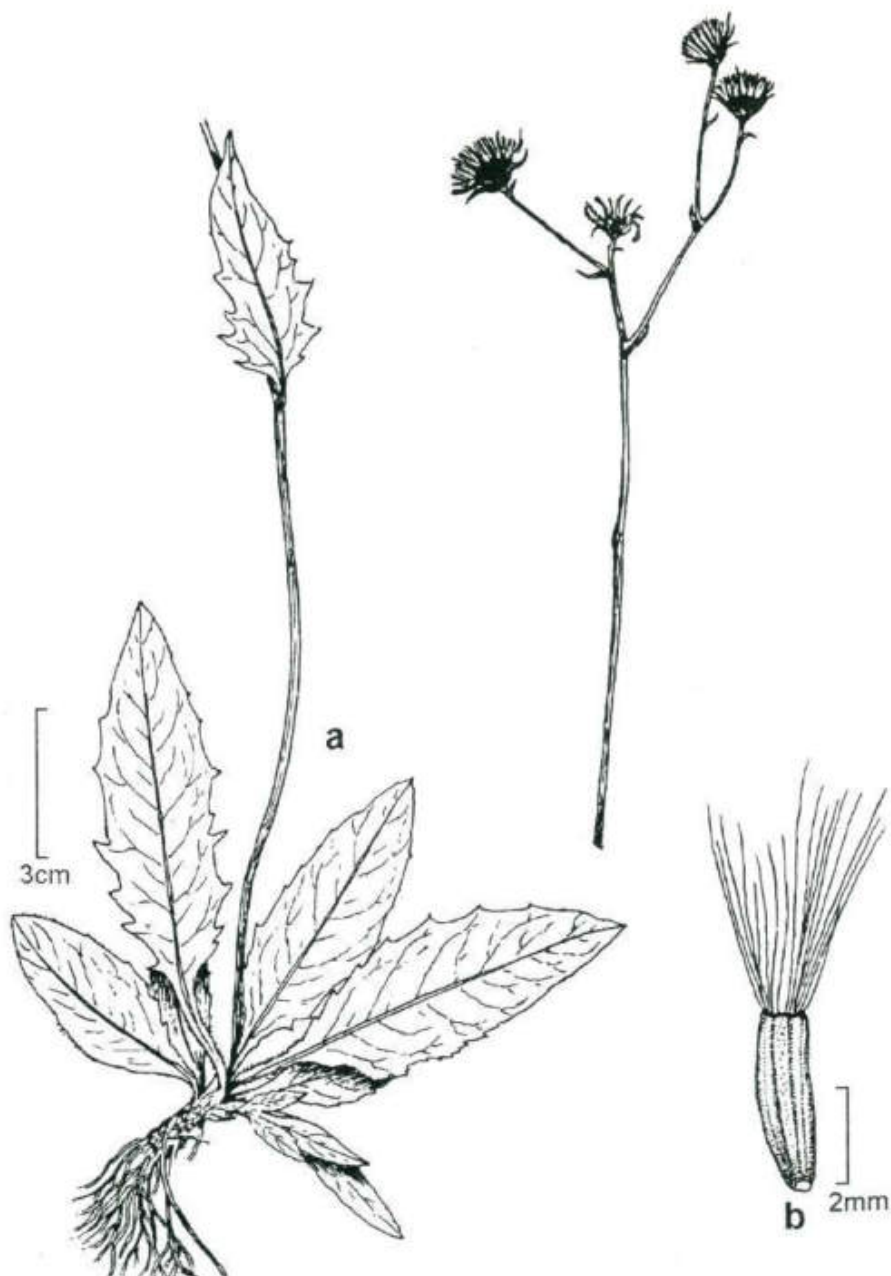


Fig. 59. *Hieracium vulgatum* Fries.: a. Habit; b. Achene.

## Cichorium L.

Herbs, annual or perennial; stems glabrous or hispid with divaricate, sometimes spinescent branches, angled or grooved, rigid. Leaves variable, pinnatifid, runcinate-pinnatifid or denticulate, oblong, oblong-lanceolate-oblongate; petioled or sessile; upper leaves cordate-amplexicaul. Heads cylindric, erect, terminal and axillary, clustered; peduncle thickened. Involucral bracts unequal; outer ovate or ovate-lanceolate, usually hispid; inner linear-lanceolate, hispid. Ligules blue, 5-toothed. Stamens 5, appendaged; anthers introrse, slender, base sagittate. Style slender, with two stigmatic branches. Achenes glabrous, subcompressed, angled, many ribbed or striate, base contracted, truncate at the tip. Pappus pale 2-3 seriate, soft, pale, short. Receptacle flat, usually naked.

In tropical, subtropical to temperate regions of the old world; ca 10 species, 2 in India.

*Literature.* SCHICHEVA, L.B. (1935). *Cichorium* in *Bull. Spl. Bot. & Pl. Breed. Ser.* XI, 2: 63: 120. STEBBINS, G.L. Jr. (1933). New classification of the Cichorieae, family Compositae. *Madrono* 12: 65-81.

## KEY TO THE SPECIES

- 1a. Peduncle of terminal head not or slightly thickened at apex; pappus scales 4-5 mm long 2. *C. intybus*  
 b. Peduncle of terminal head conspicuously thickened; pappus scales 5-20 mm long 1. *C. endivia*

1. *Cichorium endivia* L., Sp. Pl. 813. 1753.

Beng.: *Kassin*; Eng.: *Garden Endive*; Hindi.: *Kasini*; Mar.: *Kasini*; Tam.: *Kashini*.

Herbs, annual, decumbent; stems up to 1 m tall. Leaves, lanceolate or narrowly-lanceolate, runcinate or pinnatifid, semiamplexicaul, acute or obtuse, mucronate, 5-7 x 1.5-2 cm, sessile. Heads clustered in axillary and terminal, compound heads. Outer involucral bracts ovate or ovate-cordate, somewhat hairy; inner lanceolate, hispid. Ligules pale blue. Achenes obcompressed, 2.5-3.5 mm long. Pappus pale, 0.5-2.0 cm long, soft.

*Fl. & Fr.* Feb. - May.

*Distrib.* India: Indo-gangetic plains and plains of western ghats, ascending upto 2500 m. Uttar Pradesh, Maharashtra, Rajasthan, Kerala and Tamil Nadu.

*Note.* A native of the Mediterranean region. Rarely found as a weed in cultivated fields. Often cultivated as an ornamental in some parts of India. Supposed to be a cultivated form of *C. intybus*, with which it has got strong similarities.

2. *Cichorium intybus* L., Sp. Pl. 813. 1753; Hook.f., Fl. Brit. India 3: 391. 1881.

Fig. 60.

Eng.: *Bunk Chicory*, *Wild Cicory*; Hindi.: *Kasni*.

Herbs, perennial with fleshy, tapering roots; stems 30-100 cm high, glabrous or hairy, angled or somewhat grooved; branches cylindric, rigid, spreading. Lower leaves variable, oblong, oblong-lanceolate or oblanceolate, pinatifid, runcinate-pinnatifid or dentate toward margins, 5-25 x 1-5 glabrous or sparsely hairy, narrowed into a foliar petiole; upper leaves cordate-amplexicaul at base. Heads usually solitary or clustered, 1-1.5 x 0.5-0.8 cm, terminal and axillary; peduncle slender, thickened in the middle. Outer involucre bracts ovate, ovate-lanceolate; inner ones linear-lanceolate, 12-14 x 1-2 mm. Ligules bright blue, rarely white or pink. Achenes pale, 2-2.5 mm long, sub-compressed, angled, smooth, many ribbed, base contracted, angled. Pappus pale, very short.

*Fl. & Fr.* March - Sept.

*Distrib.* India: W. Himalayas, Indo-gangetic plains, in fields and wastelands, ascending up to 2500 m. Jammu & Kashmir, Himachal Pradesh, Punjab and Madhya Pradesh.

China, W. Asia and Europe.

*Notes.* Native of Europe. cultivated as a fodder crop. The whole plant has got medicinal properties too. Roots sun dried and ground into powder is often mixed with coffee.

#### Subtribe 4. HYPOCHOERIDEAE Less.

Herbs, annual or perennial, with white latex; scape solitary, glabrous or sparsely hairy or sometimes woolly, simple or sparingly branched, usually leafless. Leaves usually rosulate, variable, entire, toothed, pinnatifid or runcinate-pinnatifid or variously divided. Heads homogamous, solitary, yellow; peduncle slender, naked, often long. Involucre bracts few to many seriate, herbaceous, differentiated into outer and inner bracts; outer shorter than inner. Ligules yellow, 5-toothed. Stamens-5, appendaged, anthers slender, base sagittate. Style slender with two stigmatic branches. Achenes linear or oblong, obovoid or narrow, terete, compressed or angled, usually many ribbed, beaked or not; ribs scabrous or ciliolate or muricate, sometimes smooth. Pappus simple or feathery, copious, slender.

Comprises 2 genera and ca 92 species in India.





Fig. 60. *Cichorium intybus* Linn.: a. Habit; b. Achene.

*Literature.* SCHULTZ, C.H.B. (1845). Hypochoerideae in *Nova Acta Acad. Leop. Cand.* 21: 85-172.

#### KEY TO THE GENERA

- 1a. Receptacle paleaceous; achenes linear or oblong, beaked or not; pappus usually feathery 1. *Hypochoeris*  
 b. Receptacle naked; achenes oblong-obovoid or narrow; pappus simple 2. *Taraxacum*

#### 1. *Hypochoeris* L.

Herbs, annual or perennial, scapigerous often glabrous or hispid with simple hairs; scapes simple or sparingly branched, usually leafless, bracteate above. Leaves radical, rosulate, ovate to oblong-spathulate, entire to dentate or sinuate-pinnatifid or runcinate-pinnatifid. Heads homogamous, solitary, usually campanulate, solitary, long peduncled. Involucral bracts 2-5 seriate, imbricate. Receptacle flat, paleaceous. Ligules usually yellow, 5-toothed. Style branches thin, obtuse. Achenes monomorphic or dimorphic, angular, cylindrical, oblong-linear, compressed or terete, 10-15 ribbed, glabrous, muricate, truncate or beaked at apex. Pappus 1-2 seriate, hairs plumose.

Throughout Europe, Asia and N. Africa, from tropical to temperate regions; ca 100 species, 2 in India, both introduced.

*Literature.* CABRERA, A.L. (1963). Estudios sobre et genera *Hypochoeris* in *Bull. Soc. Bot.* 10: 166-195. KAMMATHY R.V. (1963). 1964. On the occurrence of two species of *Hypochoeris* L. in Nilgiris, South India in *Bull. Bot. Surv. India* 5: 247-249. LACK, H.W. (1979). The subtribe Hypochoeridinae (Asteraceae-Lactuceae) in the tropics and the southern hemisphere. *Tropical Botany*, (eds. K. Larsen & L.B. Holm-Nielson). Academic Press 265-275.

#### KEY TO THE SPECIES

- 1a. Perennial herbs; stems robust; achenes monomorphic, beaked 2. *H. radicata*  
 b. Annual herbs; stems slender achenes dimorphic, inner distinctly beaked 1. *H. glabra*

1. *Hypochoeris glabra* L., Sp. Pl. 810. 1753; Hook.f., Fl. Brit. India 3: 401. 1881.

Herbs, annual; stems (scapes) 5-40 cm high, slender, leafless, occasionally branched, grooved. Leaves entire or minutely dentate, 10-50 x 5-15 cm. glabrous or sparsely hispid, with hairs especially on margins and upper surface, subsessile. Heads 10-20 mm long; peduncle bracteate. Involucral bracts glabrous, obtuse or acute; outer ovate-lanceolate; inner linear-lanceolate. Stigmatic arms slender. Outer achenes, beaked or truncate at apex or all rostrate; inner beaked. Pappus white or dirty white, 2-seriate, scanty.

*Fl. & Fr.* April - Dec.

*Distrib.* India: W. ghats in open shady places. Tamil Nadu (Nilgiris).

Europe, N.W. Africa and Lebanon.

## 2. *Hypochoeris radicata* L., Sp. Pl. 810. 1753.

Herbs, perennial; stems 15-60 cm or more high, simple or branched, glabrous, with scattered scales. Leaves oblanceolate, sinuate-dentate or runcinate-pinnatifid, 5-12 x 0.5-1.5 cm, with lateral segments, pubescent. Heads campanulate, solitary, 5-6 mm broad. Involucral bracts 3-5 seriate, imbricate; outer ovate-lanceolate, 3-4 mm long; inner lanceolate, 10-12 mm long, glabrous or pilose along the midrib. Style slender; stigmatic branches slender. Achenes brown, oblong-linear, 3-4 mm long. Pappus creamy or dirty-white, 2-seriate, 8 mm long.

*Fl. & Fr.* Dec. - July

*Distrib.* India: Himalayas, E. & W. ghats, in moist grassy slopes and meadows. 1500-4000 m. Uttar Pradesh, Meghalaya, Sikkim and Tamil Nadu.

Sri Lanka, Europe, N.W. Africa and Turkey.

*Notes.* Perhaps of European origin but now occurs in temperate and cool regions.

## 2. *Taraxacum* Weber

Herbs, perennial, scapigerous with white latex and rhizomatous rootstock; scapes glabrous or sparsely hairy or woolly. Leaves all radical, extremely varied in shape, size and lobation, entire, sinuate or runcinate-pinnatifid, glabrous or pubescent. Heads homogamous, broadly cylindrical or campanulate, solitary on leafless scapes. Ligules yellow or yellowish white. Involucral bracts many seriate, differentiated into outer and inner bracts, herbaceous, subequal, sometimes connate below. Receptacle flat, naked. Stamens 5, appendaged; anthers slender, base sagittate. Style slender; stigma bifid. Achenes oblong-lanceolate or oblong obovoid or narrow, angled or outer dorsally compressed with often a very long or short, slender beak, glabrous or muricate on ribs. Pappus slender, unequal, copious, simple.

*Taraxacum* is a highly polymorphic genus with over 1000 species, mainly in the cold temperate regions. Hooker (1881) reported 2 species and 4 varieties from India while van Soest (1963), based on his two month's survey in the Himalayas has reported 75 species under 12 sections. It may be noted that this genus has its origin in north western Himalayas, E. Turkestan and Pamir hills, where maximum variations in one and the same

species are observed. Perhaps this prompted van Soest in establishing so many sections and species all of which reveal overlapping characters. As no types of these taxa have been seen by us and also as biosystematic study of the whole complex is felt essential, we are rather reluctant to include all these taxa established by van Soest in the present treatment. These excluded species are listed at the end of the genus.

*Literature.* CHOPRA, S. (1965). Palynological studies on Indian *Taraxacum* L. *Proc. Indian Acad. Sci. B.* 61(4): 214-221. RICHARDS, A.J. (1972). Taxonomic and nomenclatural notes on *Taraxacum* (Compositae). *Bot. J. Linn. Soc.* 65: 37-45. SOEST, J.L. VAN (1958). The phyto geography of *Taraxacum* with special reference to Europe. *Blumea* (Suppl.) 4: 60-67. SOEST J.L. VAN. (1963). *Taraxacum* species from India, Pakistan and neighbouring countries. *Wentia* 10: 1-91.

#### KEY TO THE SPECIES

- 1a. Leaves narrowly oblanceolate; scapes up to 15 cm or slightly more high; ligules white or whitish yellow 1. *T. leucanthum*  
 b. Leaves broadly oblanceolate; scapes up to 25 cm or more high; ligules perfectly yellow 2  
 2a. Scapes few; achenes yellowish; beak of achene longer than body 2. *T. officinale*  
 b. Scape numerous; achenes usually whitish; beak of achenes shorter than body 3. *T. wattii*

1. *Taraxacum leucanthum* (Ledeb.) Ledeb., Fl. Ross. 2: 815. 1844, p.p.  
*Leontodon leucanthum* Ledeb., Fl. Alt. 4: 154. 1833.

Herbs, perennial, dwarf with rhizomatous rootstock; scapes solitary or few from the base, 5-10 cm or more high, fleshy. Leaves all radical, pinnatifid or runcinate, 5-6 x 0.5-8 cm, somewhat pubescent, narrowed towards base. Heads broadly cylindrical, solitary, 1-1.3 x 0.8-1.0 cm. Outer involucral bracts ovate or ovate-oblong; 3-5 x 1-1.5 mm; inner linear-lanceolate, 10-13 x 1-1.5 mm. Ligules whitish yellow. Achenes yellowish, oblong or oblong-lanceolate, 6-9 mm long, strongly ribbed, abruptly narrowed to a long, slender beak. Pappus whitish, 5-6 mm long, soft, simple.

*Fl. & Fr.* April - Nov.

*Distrib.* India: W. Himalayas in open places; 2000-4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan, Pakistan, Tibet, Mongolia and C.I.S.

2. *Taraxacum officinale* Weber in Wiggers, Prim. Fl. Holset 56. 1780; Hook.f., Fl. Brit. Ind. 3: 401. 1881.

Eng.: *Bitterwort*, *Blowball*, *Ganker*; Punj.: *Baran*, *Dudal*, *Radam*; Sind.: *Bathur*; Tam.: *Pathri*.

Herbs, perennial with rhizomatous rootstock; scapes 5-25 cm or more high, glabrous or sparsely hairy or woolly, fleshy, ribbed. Leaves radical, oblanceolate or oblanceolate-oblong, rarely linear, entire or toothed, pinnatifid or runcinate-pinnatifid, variously lobed, 4-20 x 1-4 cm, glabrous or pubescent; lobes acute, more or less denticulate. Heads 1.5-2 x 0.8-1.5 cm or more. Outer involucre bracts ovate or ovate-lanceolate, 2.7 x 2-2.5 mm, herbaceous, glabrous or sparsely hairy; inner lanceolate or oblong-lanceolate, 10-18 x 2-3 mm or more. Ligules yellow. Achenes yellowish, oblong or oblong-lanceolate, 9-12 mm or more long, yellowish, usually angled or dorsally compressed, abruptly narrowed into a very slender, long beak. Pappus pale whitish, 6-8 mm long, unequal, simple, slender.

## KEY TO THE VARIETIES

- 1a. Beak of achenes equal to or longer than the body.  
 b. Beak of achenes shorter than the body.

- 2.1. var. *officinale*  
 2.2. var. *parvula* ✓

2.1. var. *officinale*

Fig. 61.

*Fl. & Fr.* March - Nov.

*Distrib.* India: Throughout the Himalayas on alpine meadows and slopes, 1500-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Punjab, W. ghats and Meghalaya.

✓ 2.2. var. *parvula* Wallich ex Hook.f., Fl. Brit. India 3: 401. 1881.

*Fl. & Fr.* March - Nov.

*Distrib.* India: Throughout the Himalayas.

3. *Taraxacum wattii* Hook.f., Fl. Brit. India 3: 402. 1881.

Herbs, perennial, dwarf, with rhizomatous rootstock; scapes 5-15 cm or more high, pubescent above, fleshy. Radical leaves oblanceolate or oblong-oblanceolate, pinnatifid or runcinate-pinnatifid, entire or toothed, 4-10 x 0.8-2.5 cm, variously lobed; lobes acute, entire or denticulate. Heads 1-1.5 x 1-1.8 cm. Outer involucre bracts ovate or ovate-lanceolate; inner lanceolate or oblong-lanceolate. Ligules yellow. Achenes whitish, 6-8 mm long or more, compressed, acutely ribbed. Pappus whitish, 5-7 mm long, soft, simple.

*Fl. & Fr.* March - Oct.

*Distrib.* Himalayas on alpine meadows and slopes, 1800-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.



Fig. 61. *Taraxacum officinale* Web. var. *officinale* : a. Habit; b. Achene.

Afghanistan and Pakistan.

Species of *Taraxacum* reported or described by Van Soest (1963) from Himalayas:-

*Taraxacum aereum* van Soest in Wentia 10: 36. 1963.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan.

*Taraxacum amblylepidocarpum* van Soest in Wentia 10: 12. 1963.

*Distrib.* India: Jammu & Kashmir.

*Taraxacum apargiaeforme* Dahlstedt in Acta Hort. Gothob. 2: 178. 1926.

*Distrib.* India: Jammu & Kashmir.

Bhutan.

*Taraxacum aurorum* van Soest in Wentia 10: 21. 1963.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

*Taraxacum azzizi* van Soest in Wentia 10: 59. 1963.

*Distrib.* India: Jammu & Kashmir.

Afghanistan and Pakistan.

*Taraxacum baltistanicum* van Soest in Wentia 10: 14. 1963.

*Distrib.* India: Jammu & Kashmir and Uttar Pradesh.

Afghanistan, Pakistan and Iran.

*Taraxacum banhyhalense* van Soest in Wentia 10: 37. 1963.

*Distrib.* India: Jammu & Kashmir.

*Taraxacum bicolor* (Turcz.) DC., Prodr. 7: 148. 1838.

*Distrib.* India: Jammu & Kashmir.

Afghanistan, Pakistan, Tibet, China, Turkistan, Siberia and Altai.

**Taraxacum brevirostre** Hand.-Mazz., Monogr. der Gatt. Tarax. 46. 1907.

*Distrib.* India: Jammu & Kashmir.

Afghanistan, Iraq, Iran, Turkistan and Tibet.

**Taraxacum ceratophorum** (Ledeb.) DC., Prodr. 7: 146. 1838. *Leontodon ceratophorum* Ledeb., Pl. Fl. Ross. 1: 9. t 34. 1838.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

Mountains in High Asia, Europe and America.

**Taraxacum coronatum** Hand.-Mazz., Monogr. der Gatt. Tarax. 33. 1907.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum dissectum** (Ledeb.) Ledeb., Fl. Ross. 2: 814. 1846. *Leontodon dissectum* Ledeb. in Mem. Acad. Sci. St. Petersb. 5: 1812. 555. 1814.

*Distrib.* India: Jammu & Kashmir.

Siberia.

**Taraxacum duplidens** Lindberg f., Acta. Soc. P. Fam. et Pl. Fenn. 29(9): 38. 1907.

*Distrib.* India: Himachal Pradesh.

N. Europe, N. France and Germany.

**Taraxacum elegans** van Soest in Wentia 10: 37. 1963.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

Nepal.

**Taraxacum eriocarpum** H. Hartm. in Candollea 39: 508. 1984.

*Distrib.* India: Jammu & Kashmir.



✓ **Taraxacum eriopodum** (D. Don) DC., Prodr. 7: 147. Pl. 1. 1838. *Leontodon eriopodum* D. Don in Mem. Wern. Soc. Edinb. 3: 413. 1820.

*Distrib.* India: Jammu & Kashmir, Uttar Pradesh, Sikkim and Assam.

Bhutan and Nepal.

**Taraxacum flavum** van Soest in Wentia 10: 22. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum forrestii** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2(10): 265. Pl. 23. 1961.

*Distrib.* India: Uttar Pradesh.

**Taraxacum fulvescens** van Soest in Wentia 10: 23. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum fulvo-brunneum** van Soest in Wentia 10: 24. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum gulmargense** van Soest in Wentia 10: 25. 1963.

*Distrib.* India: Jammu & Kashmir.

Pakistan.

**Taraxacum harbhajan-singhii** van Soest in Wentia 10: 26. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum harbhajan-singhii** van Soest subsp. **pahalgamense** van Soest in Wentia 10: 27. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum helianthum** van Soest in Wentia 10: 55. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum heteroloma** Hand.-Mazz., Monogr. der Gatt. Tarax. 120.t. 3.f. 12. 1907.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum heybroeckii** van Soest in Wentia 10: 44. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum himalaicum** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2(10): 267. 1961.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal and Pakistan.

**Taraxacum hoofitii** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2(10): 267-268. Pl. 25. 1961.

*Distrib.* India: Jammu & Kashmir.

Pakistan.

**Taraxacum indicum** Hand.-Mazz., Monogr. der Gatt. Tarax. 50. 1907.

*Distrib.* India: Jammu & Kashmir.

Pakistan.

**Taraxacum insigne** Ekman ex Dahlstedt, Taraxac. Scandinavica Exsiccata 111. 1913.

*Distrib.* India: W. Bengal.

**Taraxacum javanicum** van Soest in Wentia 10: 56. f. 27. 1963.

*Distrib.* India: Himachal Pradesh, Uttar Pradesh, Tamil Nadu and Maharashtra.

Indonesia and Sri Lanka.

**Taraxacum karakoricum** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2(10): 268. Pl. 26. 1961.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

Afghanistan and Pakistan.

**Taraxacum kashmirens** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2(10): 268. 1961.

*Distrib.* India: Jammu & Kashmir.

Pakistan.

**Taraxacum Kjellmaniiforme** van Soest in Wentia 10: 57. 1963.

*Distrib.* India: Jammu & Kashmir.

Pakistan.

**Taraxacum ladakense** van Soest in Wentia 10: 11. 1963.

*Distrib.* India: Jammu & Kashmir.

Pakistan.

**Taraxacum laevigatum** (Willd.) DC., Cat. Hort. Monspel. 149. 1813. *Leontodon laevigatum* Willd., Sp. Pl. 1546. 1803.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum lahulense** van Soest in Proceed. Kon. Needr. Akad. van Wetensch. Ser. C. 69(3): 375. 1966.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum latibasis** van Soest in Wentia. 10: 28. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum lobbichleri** van Soest in Proceed. Kon. Needr. Akad. Van Wetensch. Ser. C. 69(3): 374. 1966.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum longicarpum** van Soest in Wentia 10: 40. 1963.

*Distrib.* India: Jammu & Kashmir and Uttar Pradesh.

**Taraxacum luridum** Haglund in Bot. Not. 307. 1938.

*Distrib.* India: Jammu & Kashmir.

Afghanistan and Pakistan.

**Taraxacum maurocarpum** Dahlstedt, Medd. Goteb. Bot. Tradg. 2: 176.f. 12. t. 3. 1926.

*Distrib.* India: Jammu & Kashmir.

Afghanistan and China.

**Taraxacum melleum** van Soest in Wentia 10: 46. t. 20. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum mitalii** van Soest in Wentia 10: 46. t. 20. 1963.

*Distrib.* India: Uttar Pradesh and Sikkim.

Nepal, Myanmar and S. Tibet.

**Taraxacum monochlamydeum** Hand.-Mazz., Monog. der Gatt. Tarax. 44. 1907.

*Distrib.* India: Jammu & Kashmir.

China, Mongolia, and Turkistan.

**Taraxacum mucronulatum** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2 (10): 270-271. 1961.

*Distrib.* India: E. Himalayas.

**Taraxacum nagaricum** van Soest in Wentia 10: 62. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum nasiri** van Soest in Wentia 10: 48. 1963.

*Distrib.* India: Jammu & Kashmir.

Pakistan.

**Taraxacum neolobulatum** van Soest in Acta Bot. Neer. 9: 302-326. 1960.

*Distrib.* India: Himachal Pradesh,

Afghanistan, Pakistan, Turcomania and Iran.

**Taraxacum nigrum** van Soest in Wentia 10: 48. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum nivale** J. Lange in A.O. Kihlman Bot. Not. 145. 1889.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum paludosum** (Scop.) Schlech. var. **tenuifolium** (Hoppe) Hand.-Mazz., Monog. der Gatt. Tarax. 76. 1907. *Hedypnois paludosa* Scop., Fl. Carn. 2: 100. 1772.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum parvuliforme** van Soest in Proceed. Kon. Needr. Acad. van Wetensch. Ser. C. 69(3): 375. 1966.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum phoenicolepis** van Soest in Wentia 10: 29. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum Polyodon** Dahlstedt, Ark.f. Bot. 9(10): 56. 1910.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum primogenium** Hand.-Mazz., Monogr. der Gatt. Tarax. 17. 1907.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum pseudobicorne** van Soest in Proceed. Kon. Needr. Akad. van Wetensch. Ser. C. 69(3): 375. 1966.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum pseudo-eriopodum** van Soest in Wentia 10: 29 f. 13. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum pseudo-leucanthum** van Soest in Proceed. Kon. Needr. Akad. van Wetensch. Ser. C. 69(3): 365. 1966.

*Distrib.* India: Jammu & Kashmir.

Afghanistan.

**Taraxacum pseudo-stenolepium** van Soest in Wentia 10: 49. 1963.

*Distrib.* India: Jammu & Kashmir and Uttar Pradesh.

**Taraxacum pseudo-steenii** van Soest in Wentia 10: 50. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum pullocarpum** van Soest in Wentia 10: 18. 1963.

*Distrib.* India: Jammu & Kashmir.

Afghanistan and Pakistan.

**Taraxacum sherriffii** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2(10): 272. 1961.

*Distrib.* India: Himachal Pradesh.

**Taraxacum sikkimense** Hand.-Mazz., Monogr. der Gatt. Tarax. 103. 1907.

*Distrib.* India: Jammu & Kashmir and Sikkim.

Afghanistan, Pakistan.

**Taraxacum spiticum** van Soest in Wentia 10:53.t.33. 1963.

*Distrib.* India: Himachal Pradesh.

**Taraxacum squarrosiceps** van Soest in Wentia 10: 30. 1963.

*Distrib.* India: Jammu & Kashmir.

Afghanistan and Pakistan.

**Taraxacum staticifolium** van Soest in Bull. Brit. Mus. (Nat. Hist.) 2(10): 272. 1961.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum stenolepium** Hand.-Mazz., Monogr. der Gatt. Tarax. 121. 1907.

*Distrib.* India: Jammu & Kashmir.

Afghanistan and Pakistan.

**Taraxacum stereodiforme** van Soest in Wentia 10: 31. 1963.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

**Taraxacum stevenii** (Spreng.) DC., Prodr. 7: Pl. 1. 149. 1838. *Leontodon stevenii* Spreng., Syst. Veg. 3: 658. 1826.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum stewartii** van Soest in Wentia 10: 51. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum tenebristylum** van Soest. in Wentia 10:32. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum tibetanum** Hand.-Mazz., Monog. der Gatt. Tarax. 67. t. 2. f. 12. 1907.

*Distrib.* India: Sikkim.

Nepal, Bhutan and China.

**Taraxacum tricuspidatum** van Soest in Proceed. Kon. Needr. Akad. van Wentensch. Ser. C. 69(3): 382. 1966.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

**Taraxacum violaceo-maculatum** van Soest in Wentia 10: 59. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum vulpinum** van Soest in Wentia 10: 33. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum vulpinum** van Soest f. **pallido-carpum** van Soest in Wentia 10: 34. 1963.

*Distrib.* India: Jammu & Kashmir.

**Taraxacum wallichii** DC., Prodr. 7. 147. 1838.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Punjab.

Afghanistan, Pakistan, Iran, China and Tibet.

**Taraxacum xanthophyllum** Haglund in Bot. Not. 314. 1938.

*Distrib.* India: Jammu & Kashmir.

#### Subtribe 5. LACTUCEAE

Herbs, annual, biennial or perennial, rarely shrubs, with white or yellow latex; Roots simple or with a stout rootstock which is tuberous or fusiform; stems very variable, stout to very high, glabrous, hispid, pubescent, sparsely hairy or even glandular hairy, sometimes spinous, solitary or branched; branching dichotomous or paniculate; branches cylindric, slender, flaccid, stout, fistular, rarely woody, rigid or virgate, sometimes spinescent. Leaves very variable, radical or cauline, alternate, glabrous, pubescent, hispid, membranous, sometimes prickly, ovate, oblong, oblong-ovate, linear, linear-lanceolate, oblanceolate or linear-oblong, hastate, entire or dentate or variously toothed, often lobed, pinnate, pinnatifid or even runcinate-pinnatifid, often sagittate at base; petiole simple or winged, sometimes with pinnules, base auricled or stem-clasping. Inflorescence various, solitary, usually paniced or loosely paniculate, corymbose or racemose, subspicate, umbellate or fascicled. Heads or capitula homogamous, terminal, erect, nodding or drooping; peduncle glabrous or hispid, sometimes glandular hairy, naked or bracteate, erect or drooping. Involucre usually narrow, cylindric, sometimes broad and campanulate; involucreal bracts imbricate, in several rows or in one or two rows, equal or unequal, differentiated into outer and inner bracts; outer usually small, membranous or herbaceous, glabrous or hispid sometimes scarious or rigid; inner usually longer than outer, glabrous or hispid, sometimes bristly hairy. Florets all ligulate, hermaphrodite, all fertile; corolla yellow, white, blue, pinkish, pale whitish purple, bilaterally symmetric, slender and flat, 5-toothed, mostly exerted from the involucre. Stamens 5, appendaged; anther base sagittate. Ovary terete or compressed, sometimes with an apical nectary surrounding the style base; style branches slender, acute or obtuse, apically narrowed, papillose or puberulent, sometimes broader and flattened, ventrally stigmatic the whole length; stigma bifid, equal, longer or shorter than corolla. Achenes variously shaped, smooth, rugose or tuberculate, ribbed, apically truncate or beaked,



compressed or obcompressed. Pappus usually white or dirty white, simple, fine with one or more rows of simple or plumose setae.

This subtribe comprises of about 65 species in India and has been variously treated by various workers. Often it has been treated as synonym of the tribe Cichorieae.

*Literature.* MAMGAIN, S.K. & R.R. RAO (1987). Taxonomy and distribution of Lactuceae in W. Himalayas in Sharma & Gupta (Eds.) "*Recent advances in plant Sciences*" p.p. 147-162. STEBBINS, G.L. Jr. (1940). A new classification of the tribe Cichorieae family Compositae. *Madrono* 6: 65-80.

#### KEY TO THE GENERA

- |   |                      |
|---|----------------------|
| 1a. Achenes distinctly beaked; beak slender   | 2                    |
| b. Achenes not beaked, if beaked, beak very short and stout ( <i>Youngia</i> )          | 6                    |
| 2a. Achenes toothed below the beak  | 1. <i>Chondrilla</i> |
| b. Achenes not toothed below the beak   | 3                    |
| 3a. Involucral bracts black bristly   | 4                    |
| b. Involucral bracts not as above   | 5                    |
| 4a. Involucral bracts in more than 3-series; achenes rugose                             | 2. <i>Cicerbita</i>  |
| b. Involucral bracts 2-3 seriate; achenes smooth  | 3. <i>Dubyaea</i>    |
| 5a. Radical leaves long petioled  | 4. <i>Ixeris</i>     |
| b. Radical leaves sessile   | 5. <i>Lactuca</i>    |
| 6a. Peduncle thickened below the head; involucral bracts cordate, thickened at the tips | 8. <i>Reichardia</i> |
| b. Peduncle not thickened below the head; involucral bracts not as above                | 7                    |
| 7a. Ligules purple, blue or white   | 7. <i>Prenanthes</i> |
| b. Ligule yellow  | 8                    |
| 8a. Achenes compressed  | 9. <i>Sonchus</i>    |
| b. Achenes narrow, truncate at both the ends  | 9                    |
| 9a. Achenes 4-5 ribbed; inner involucral bracts scarious margined                       | 6. <i>Launaea</i>    |
| b. Achenes 10-20 ribbed; inner involucral bracts not scarious margined                  | 10. <i>Youngia</i>   |

#### 1. *Chondrilla* L

Herbs, perennial, rhizomatous with white latex; stems usually dichotomously branched from the base, woody, glabrous; branches slender. Leaves filiform; radical usually pinnatifid, glabrous or sparsely hairy, sessile. Inflorescence terminal or subcorymbose. Heads narrowly cylindrical; peduncle often long. Involucral bracts in two or three rows; outer usually very small, ovate or obovate, usually with darker centre; inner much longer than outer, linear or linear-lanceolate, sometimes with stout spinules on the midrib. Achenes oblong or oblong-lanceolate, many ribbed, usually many toothed below the long, slender beak. Pappus silvery white.

#### KEY TO THE SPECIES

- |  |                       |
|--|-----------------------|
| 1a. Cauline leaves filiform; inner involucral bracts with white, fine, membranous margins with no spinules on the midrib | 1. <i>C. graminea</i> |
| b. Cauline leaves linear; inner involucral bracts slightly membranous with stout spinules on the midrib                  | 2. <i>C. setulosa</i> |

1. *Chondrilla graminea* M. Bieb., Fl. Taur. Cauc. 2: 244, 1808; Hook.f., Fl. Brit. Ind. 3: 402. 1881. *Chondrilla graminea* M. Bieb. var. *kashmirica* Hook.f., Fl. Brit. India 3: 402. 1881.

Herbs, perennial, woody, glabrous, branched from the base. Leaves often filiform, entire, rarely spinous towards margins, 5-8 x 0.2-0.3 cm, sessile. Heads narrow, cylindrical, 1.2-1.5 x 0.2-0.3 cm, erect; peduncles very slender. Outer bracts ovate or obovate-lanceolate, 1-1.5 x 0.5-0.6 mm; inner linear or linear-lanceolate, 11-12 x 0.8-1.2 mm. Ligules yellow. Achenes pale yellow, 5-7 mm, long, with many ribs, obscurely toothed; base of beak with many tooth-like projections. Pappus glistening white, 6-8 mm long, very slender.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas on open moist slopes, 2500-3600 m. Jammu & Kashmir.

Europe.

*Notes.* Hooker (Fl. Brit. India 3: 402. 1881) described a variety var. *kashmirica* under *Chondrilla graminea* and separated it from the latter on the basis of broader leaves. The only specimen available is a collection by C.B. Clarke from Ramoo, Kashmir, type of variety *kashmirica*. The critical examination of this specimen revealed that this is very similar to *C. graminea* and does not show any strong distinguishing character, on the basis of which it can be separated. Hence the variety *Kashmirica* is merged under *C. graminea*.

2. *Chondrilla setulosa* C.B. Clarke in Hook.f., Fl. Brit. India 3: 402. 1881.

Herbs, perennial, medium sized; stems 50-70 cm high, suberect, very slender. Leaves often filiform, minutely toothed at the margins, 5-9 x 0.1-0.2 cm. Inflorescence a raceme on terminal branches. Heads cylindrical, 14-16 x 0.2-0.3 cm; peduncle small, slender. Outer involucral bracts ovate or obovate, 0.8-1.2 x 0.5-0.9 mm, glabrous; inner linear or linear-lanceolate 12-13.5 x 1.5-1.8 mm, with many stout spinules on the midrib. Ligules yellow. Achenes pale-yellow, 6-7 mm long; beak as long as the body. Pappus silvery white, 6-8 mm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas on exposed, shady slopes, 2500-3000 m. Jammu & Kashmir (Baltistan and Gilgit).

Endemic.

*Notes.* This species is very rare and known only by Type collection which was collected from Kashmir more than a hundred years ago by C.B. Clarke.

#### EXCLUDED SPECIES

Stewart (1972) has mentioned *Chondrilla pauciflora* from Baltistan. Since there is no specimen available, this species has been excluded.

### 2. *Cicerbita* Wallr.

Herbs, perennial with white latex; roots tuberous or fusiform; stems tall or stout, erect, or ascending, usually paniculately branched. Leaves very variable, hastate, deltoid or ovate, pinnate, pinnatifid or runcinate-pinnatifid, dentate or variously toothed, petioled; petiole winged or dilated, pubescent or sparsely hairy, sometimes glabrous. Inflorescence subracemose or spreading panicle. Heads subcampanulate or campanulate, erect or drooping; peduncle slender, bracteate. Involucral bracts in many series; outer ovate-lanceolate, black bristly hairy; inner linear-oblong or oblanceolate. Florets all ligulate; bluish-purple, creamy white or violet; ligules-5 toothed. Stamens 5, appendaged; anthers slender, base sagittate. Style very slender; stigma bifid. Achenes usually dark brown or blackish brown, ovate or elliptic, oblanceolate or linear-oblong, glabrous or sparsely rugose. Pappus simple, whitish or yellowish.

Asia, C. Europe, Siberia, Canada, C.I.S., N. and C. America, from temperate to alpine regions; ca 18 species, 6 in India.

#### KEY TO THE SPECIES

- |  |                          |
|--|--------------------------|
| 1a. Tall herbs; stems 0.7-3 m tall, erect, glabrous below and pubescent or hispid above  | 2                        |
| b. Small, stout herbs; stems 0.5-1 m high, usually ascending, finely glabrous or villous   | 4                        |
| 2a. Leaves sessile, with broad, toothed auricle; involucral bracts broad, densely ciliate  | 5. <i>C. macrantha</i>   |
| b. Leaves with long winged petiole, rarely uppermost sessile; involucral bracts narrow, glabrous or sparsely pubescent               | 3                        |
| 3a. Outer involucral bracts 11-17 x 1-2 mm long; achenes 8-10 mm long, obovate   | 2. <i>C. cyanea</i>      |
| b. Outer involucral bracts 3-6 x 1.5-2 mm; achenes 5-7 mm long, obovate or elliptic  | 1. <i>C. crambifolia</i> |
| 4a. Leaves deeply divided into many, long, variously shaped segments; outer involucral bracts 1.5-2 x 1-1.5 mm.                      | 2. <i>C. filicina</i>    |
| b. Leaves oblanceolate or divided into various lobes or pinnules but not divided into segments; outer involucral bracts 3-9 x 1-3 mm | 5                        |
| 5a. Stems short, stout with many erect lateral flowering branches; leaves entire or dentate or lyrate                                | 4. <i>C. lessertiana</i> |
| b. Stems ascending, with many flowering branches, sometimes reduced to 1 or few headed scapes; leaves variable                       | 6. <i>C. macrorrhiza</i> |

1. *Cicerbita crambifolia* (Bunge) Beauv. in Bull. Soc. Bot. Geneve, Ser. 2, 2: 143. 1910. *Steptorhamphus crambifolius* Bunge, Beitr. Kennt Fl. Russland V.D. Steep cent. Asian Rel. Lehm. 205. 1851.

Herbs, perennial; stems erect 70-150 cm high, thick, terete, corymbosely branched; branches many. Leaves large, polymorphous, oblong or ovate-oblong, usually dentate or pinnatifid, 8-20 x 4-8 cm, hispid or pubescent; uppermost leaves sessile, auricled. Heads subcampanulate, crowded, erect, 14-16 x 0.8-1.0 cm; peduncle with few bracts. Involucral bracts in many series; outer ovate or oblong-ovate, 3-6 x 1.5-2 mm; inner linear-lanceolate or linear-oblong, 12-15 x 1.5-2 mm. Ligules purple or pinkish-white. Achenes flattened, obovate or elliptic, 5-7 x 2.5-2 mm, finely compressed, winged towards margins; beak pale, very slender. Pappus pale white, 5-6 mm, soft.

*Fl. & Fr.* May - Oct.

*Distrib.* India: W. Himalayas on exposed slopes, 2000-4000 m. Jammu & Kashmir.

Europe and S.E. Asia.

*Notes.* A rare species represented only by 2 collections at DD herbarium from Chiral. We doubt whether this species occurs in the geographical boundaries of India.

2. *Cicerbita cyanea* (D. Don) Beauv. in Bull. Soc. Bot. Geneve, Ser 2, 2: 132. 1910. *Sonchus cyaneus* D. Don, Prodr. Fl. Nepal. 164. 1825. *Lactuca hastata* DC., Prodr. 7: 139. 1838; Hook.f., Fl. Brit. India 3: 407. 1881. *Cicerbita cyanea* (D. Don) Beauv. var. *glandulifera* (Franch.) Beauv. in Bull. Soc. Bot. Geneve, Ser. 2, 2: 133. 1910. **Fig. 62.**

Herbs, perennial; stems 1-3.5 m tall, erect, unbranched or sparingly paniculately branched. Leaves very variable, usually pinnatifid or pinnate to runcinate-pinnatifid, hastate, deltoid or ovate; petiole winged and slightly dilated at base, simple or auricled. Heads subcampanulate, 1.5-2.3 x 0.6-1.2 cm; peduncle nodding, slender. Outer involucral bracts many seriate, oblong-ovate, 6-8 x 2-2.5 mm inner linear-oblong; 12-17 x 1-2 mm. Ligules blue, purple, violet or creamy white. Achenes dark brown or blackish brown, obovate or elliptic, compressed, 8-10 mm long including slender beak, irregularly ribbed, smooth. Pappus dirty white, 5-10 mm long, simple, deciduous.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: Temperate Himalayas, N.E. region, S. India on exposed shady slopes, Jammu & Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, Sikkim, W. Bengal, Meghalaya, Nagaland, Kerala and Tamil Nadu.

Nepal, China and Tibet.

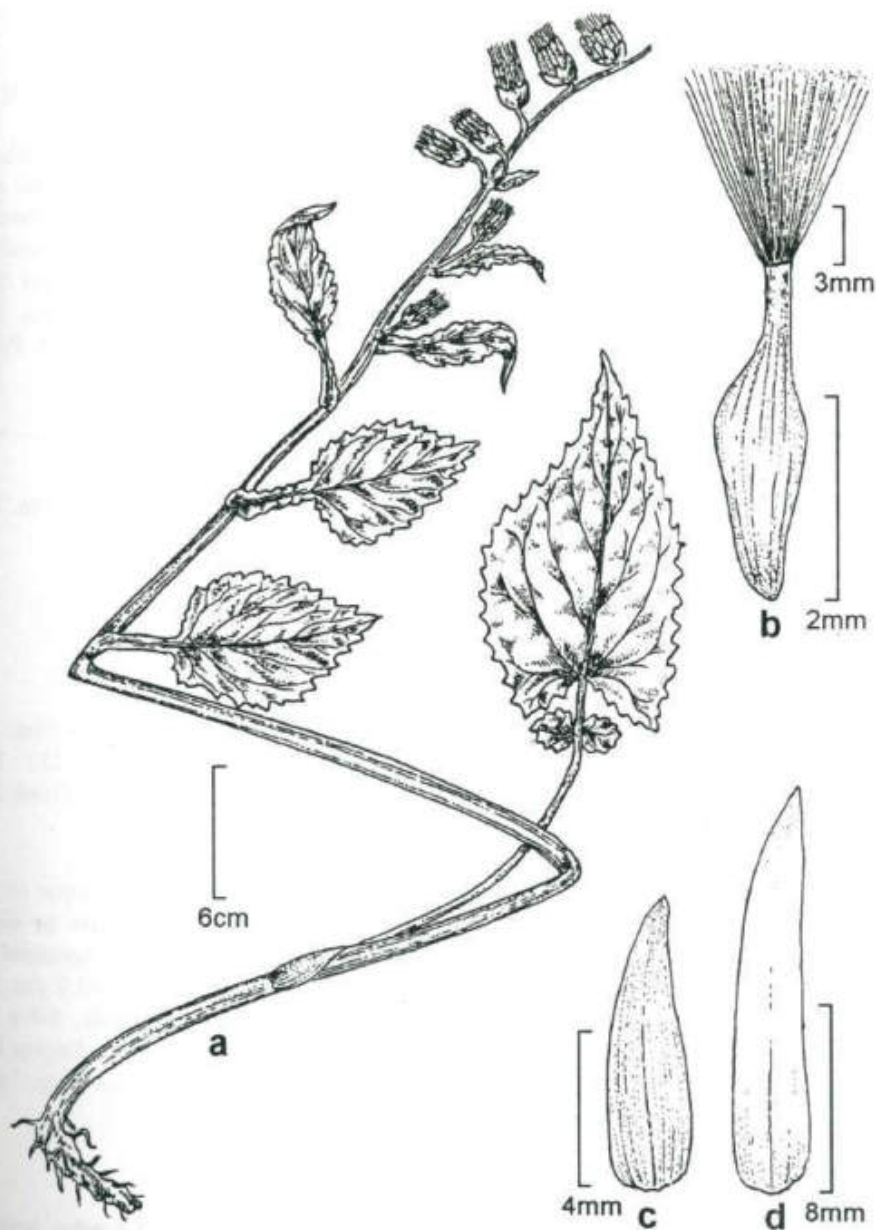


Fig. 62. *Cicerbita cyanea* (D. Don) Beauv. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

3. *Cicerbita filicina* (Duthie ex Stebbins) Mamgain & Rao in J. Bombay Nat. Hist. Soc. 86(2): 273. 1989. *Lactuca filicina* Duthie ex Stebbins in Ind. For. Rec. Bot. 1(6): 241. 1939. **Fig. 63.**

Herbs, perennial; stems 60-100 cm high, branched, suberect or drooping, glabrous, often woody; branches many. Leaves lanceolate or linear, deeply pinnatifid into many segments, often entire or rarely toothed, 15-30 cm long, membranous. Inflorescence cymose, paniculate. Heads narrowly cylindric, 1.2-1.5 x 0.2-0.3 cm, erect; peduncle slender with few minute bracts. Involucral bracts in many series, imbricate; outer ovate, or linear-lanceolate, 1.5-2 x 1-1.5 mm; inner linear-oblong or oblong-lanceolate, 11-14 x 1-2.5. Achenes blackish, oblanceolate, 5.5-6.5 x 1 mm, prominently ribbed. Pappus milky white, 5-5.6 mm long, bristly.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas on open shady slopes on rocks, 1800-2500 m. Uttar Pradesh (Kumaon).

Endemic.

*Notes.* A very rare species known only by type collection.

4. *Cicerbita lessertiana* (Wallich ex DC.) Mamgain & Rao in J. Bomb. Nat. Hist. Soc. 86(2): 273. 1989. *Mulgedium lessertianum* Wallich ex Dc., Prodr. 7: 251. 1838. *Lactuca lessertiana* (Wallich ex DC.) C.B. Clarke, Comp. Ind. 270. 1876; Hook. f. Fl. Brit. India 3; 408. 1881.

Herbs, perennial with tuberous rootstock; stems 5.5-40 cm high, glabrous or laxly villous, leafy. Leaves very variable, usually narrowly oblanceolate, entire or slightly sinuate-toothed or lyrate-pinnatifid with broad lobes, 5-15 x 1.5-2.6 cm; terminal lobe oblanceolate or elongate. Heads subcylindric or campanulate; 1-2 x 7-0.9 cm long; peduncle very long, flaccid, hispid. Outer involucral bracts ovate-lanceolate, 5-9 x 1.5-3 mm; inner linear-oblong, 10-20 x 2-3.5 mm, obtuse. Ligules blue or violet. Stigma bifid, purplish or bluish. Achenes flattened, elliptic or oblanceolate, 6-14 mm long. Pappus white or yellowish, 4.0-5.5 mm long, simple.

#### KEY TO THE SUBSPECIES

- |  |                                |
|--|--------------------------------|
| 1a. Leaves entire  | 4.2. subsp. <i>lessertiana</i> |
| b. Leaves shallowly lyrate-pinnatifid or mucronate-dentate | 2                              |
| 2a. Leaves shallowly lyrate-pinnatifid                     | 4.3. subsp. <i>lyrata</i>      |
| b. Leaves mucronate dentate                                | 4.1. subsp. <i>dentata</i>     |

4.1. subsp. *dentata* (DC.) Mamgain & Rao in J. Bombay Nat. Hist. Soc. 86(2): 273. 1989. *Mulgedium lessertianum* var. *dentata* DC., Prodr. 7: 251. 1838.

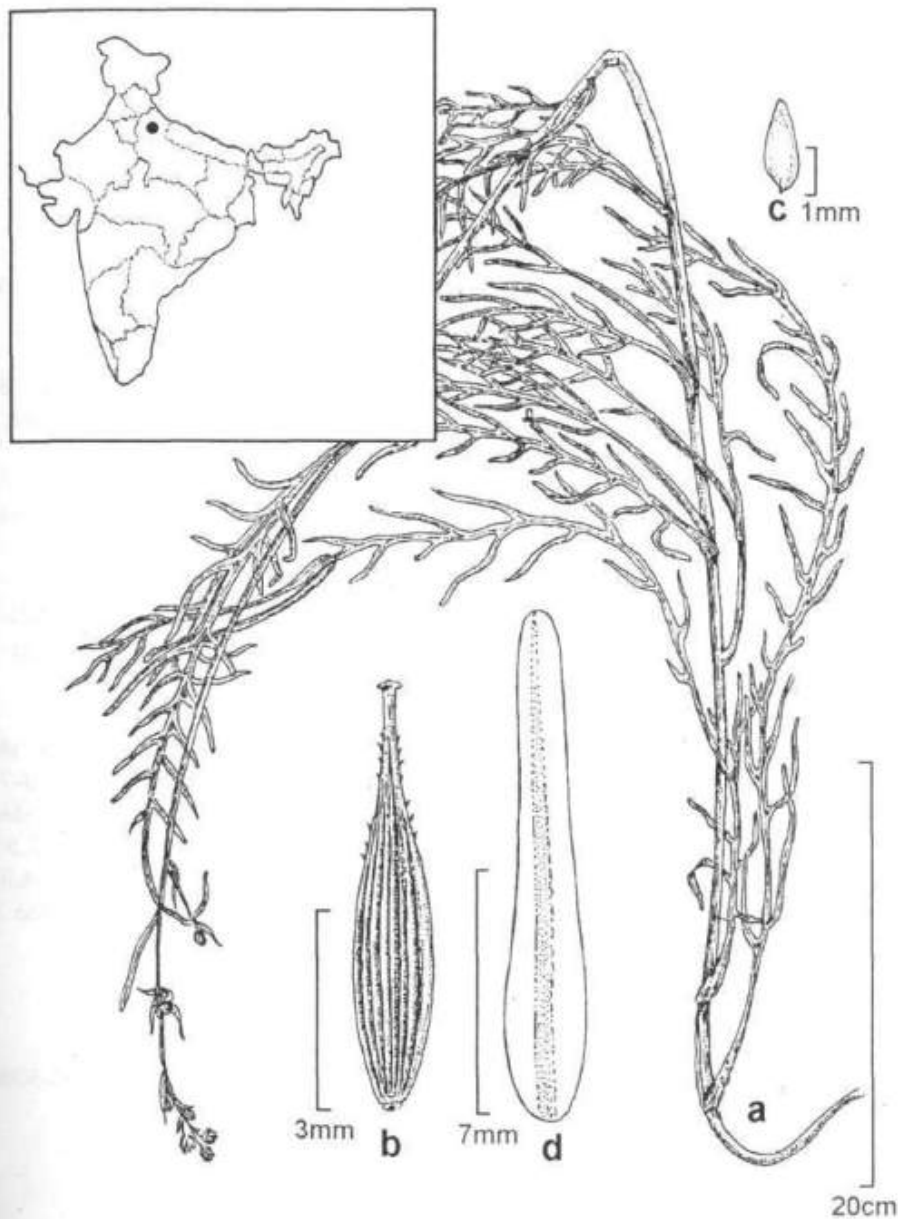


Fig. 63. *Cicerbita filicina* (Duthie ex Stebbins) Mangain & Rao : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

*Fl. & Fr.* Aug. - Nov.

*Distrib.* India: Jammu & Kashmir and Himachal Pradesh.

**4.2. subsp. lessertiana**

**Fig. 64.**

*Fl. & Fr.* Aug. - Nov.

*Distrib.* India: W. Himalayas, E. Himalayas, in alpine meadows, 2500-4200 m. Jammu & Kashmir, Himachal Pradesh, Punjab and Sikkim.

**4.3. subsp. lyrata** (Decne.) Mamgain & Rao in J Bombay Nat. Hist. soc. 86(2): 273. 1989. *Melanoseris lyrata* Decne. in Jacq. Voy. 4. (Bot.) 101. t. 109. 1844.

*Fl. & Fr.* July - Nov.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

**5. *Cicerbita macrantha*** (Hook.f. & Thomson ex C.B. Clarke) Beauv. in Bull. Soc. Bot. Geneve, Ser. 2, 2: 130. 1910. *Lactuca macrantha* Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 267. 1876; Hook.f., Fl. Brit. India 3: 409. 1881.

Herbs, perennial, erect; stems 30-100 cm high, glabrous below and pubescent above. Leaves oblong or oblanceolate, pinnatifid or runcinate-pinnatifid, 9-32 x 2.5-7 cm, sessile. Heads campanulate, 2-4 x 1.5-2.5 cm, drooping; peduncle long, slender. Involucral bracts broad, 4 seriate; outer 2-seriate with outermost 5-10 x 3.5-5.5 mm; inner also two seriate, subacute, glabrous or sparsely ciliate. Ligules bluish. Achenes oblanceolate, flattened or narrowly elliptic, 10-11 mm long, contracted at the base, smooth. Pappus yellowish white or white, 9-10 mm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: E. Himalayas on open alpine meadows, between 3000-5000 m. Sikkim and W. Bengal.

Nepal and Bhutan.

**6. *Cicerbita macrorhiza*** (Royle) Beauv. in Bull. Soc. Bot. Geneve, Ser. 2, 2: 120. 1910. *Mulgedium macrorhizum* Royle, Ill. Bot. Himal. 251. t. 61. f. 1. 1835. *Lactuca macrorhiza* (Royle) Hook.f., Fl. Brit. India 3: 408. 1881, p.p. *Cicerbita macrorhiza* (Royle) Beauv. var. *saxatilis* (Edgew.) Beauv. in Bull. Soc. Bot. Geneve, Ser. 2, 2: 135. 1910.

**Fig. 65.**





Fig. 64. *Cicerbita lessertiana* subsp. *lyrata* (Decne.) Mangan & Rao : a. Habit.

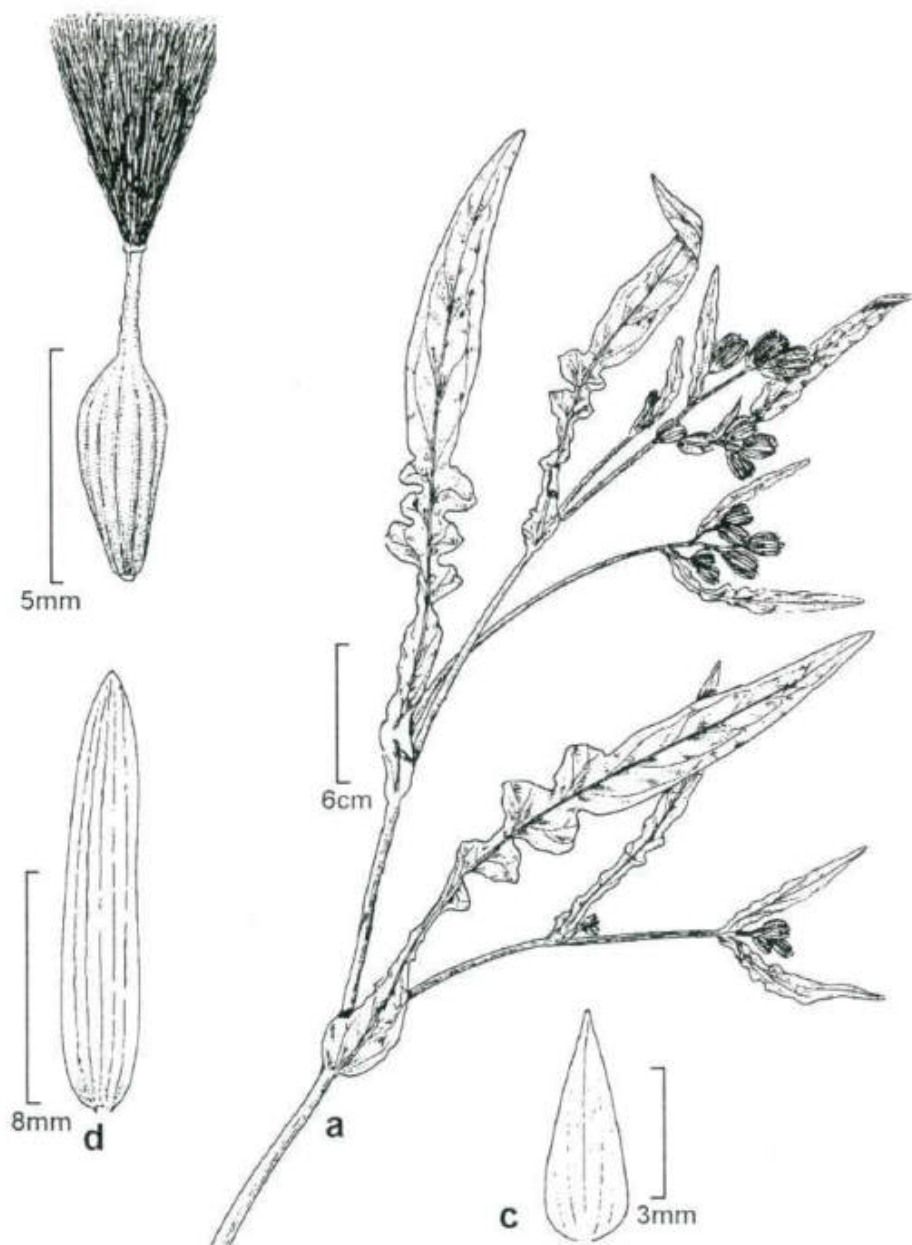


Fig. 65. *Cicerbita macrorhiza* (Royle) Beauv. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

Herbs, perennial with elongated rootstock; stems 12-45 cm high, few or many from the rootstock, branched from the base or rarely unbranched. Leaves variable, 10-30 x 1.5-4.5 cm; lower leaves entire or sometimes with toothed auricle, with dilated or winged petiole; terminal lobe; large, rounded; terminal leaves sometimes entire. Heads 1-1.8 x 0.5-0.9 cm, terminating the branches; peduncle 1.0-5.5 cm or more long, bracteate. Involucral bracts many seriate passing into the inner; outer bracts ovate or ovate-lanceolate, 3.0-5.5 x 1.0-2.0 mm; inner often blackish, linear-oblong or linear, 10-15 x 1.5-2.5 mm. Ligules violet, purple or pink. Anthers bluish. Stigma purplish. Achenes dark brown or black, flat, elliptic-lanceolate, 5-7 mm long, smooth. Pappus silvery white or pale, 4-5 mm long, simple.

*Fl. & Fr.* June - Nov.

*Distrib.* India: W. Himalayas and E. Himalayas, on rocks and slopes in moist and shady situations, 2000-4500 m. Jammu & Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, W. Bengal and Manipur.

Afghanistan, Pakistan, Nepal, Bhutan, China and Iran.

### 3. *Dubyaea* DC.

Herbs, perennial, with white latex; roots fusiform or tuberous; stems erect, simple or sparingly branched leafy. Leaves various in shape and size; lower leaves ovate-oblong or ovate-lanceolate, hastate, sinuate-toothed; upper leaves gradually reduced, oblong or cordate, base auricled or stem-clasping, sessile. Inflorescence cymose or racemose. Heads usually broadly campanulate or bell-shaped, erect or nodding, clothed with black or purple glandular hairs. Involucral bracts numerous, rather evenly imbricate; outer linear-lanceolate, acute or acuminate, densely hairy; inner linear-oblong, acute, bristly. Florets all ligulate; corolla usually yellow, large. Stamens 5, appendaged; anthers slender, base sagittate. Style slender; stigma bifid, blackish or yellowish. Achenes lanceolate, fusiform sub-rostrate, narrowed into a pale, slender beak.

Endemic to Sino-Himalayan region; 9 species, 2 in India.

*Literature.* STEBBINS, G.L. (1940) Studies in the Cichorieae *Dubyaea* and *Sorosaris*, Endemics of the Sino-Himalayan Region. *Mem. Torr. Bot. Club* 19: 5-75. Vol. 19.

#### KEY TO THE SPECIES

- 1a. Heads drooping; stems from a creeping rhizome; outer involucral bracts relatively few 1. *D. hispida*  
 b. Heads erect; stems from a tap root; outer involucral bracts numerous 2. *D. oligocephala*

1. *Dubyaea hispida* (D. Don) DC., Prodr. 7: 247. 1838. *Lactuca dubyaea* C.B. Clarke, Comp. Ind. 271. 1876; Hook. f., Fl. Brit. India 3: 409. 1881. Fig. 66.

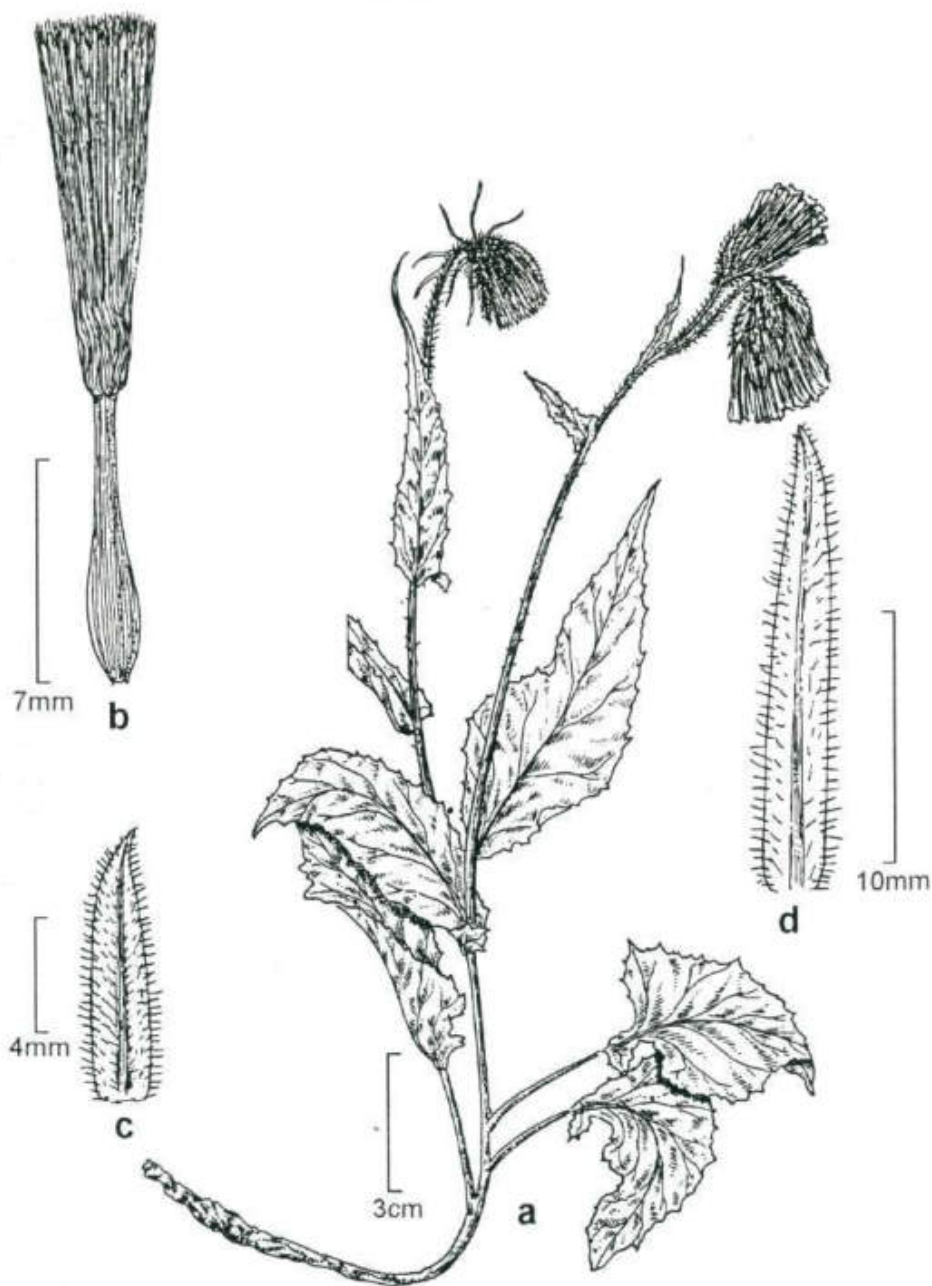


Fig. 66. *Dubyaea hispida* (D. Don) DC. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

Herbs, perennial, densely hispid; stems, from a creeping rhizome, 15-75 cm high, erect, robust, leafy, hispid or bristly hairy. Leaves 5-15 x 3-5 cm; lower leaves ovate-oblong or ovate-lanceolate, rarely lyrate, pinnately lobed at base; petiole winged; upper leaves gradually reduced. Inflorescence loosely paniced or corymbose. Heads 1.5-3 x 1.5-2.0 cm, nodding, with black or purplish glandular hairs. Involucral bracts unequal; outer acute or acuminate, linear-lanceolate 6-9.5 x 1-1.5 mm, black bristly hairy; inner linear-lanceolate or linear-oblong, 13-18.5 x 2-2.5 mm, bristly hairy. Ligules yellow. Anthers yellow. Stigmatic branches blackish, shorter than corolla. Achenes brownish or blackish, apex pale, fusiform, lanceolate, 8-9.5 mm long, slender, narrow, slightly compressed. Pappus pale whitish, 10-12 mm long, much persistent.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: W. Himalayas, E. Himalayas, on high mountain slopes or on exposed marshes, 3000-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, West Bengal, Arunachal Pradesh and Sikkim.

China, Tibet, Bhutan and Myanmar.

2. *Dubyaea oligocephala* (Sch.-Bip.) Stebbins in J. Bot. 75: 17. 1937. *Palea oligocephala* Sch.-Bip. in Pollichia 22-24: 320. 1866.

Herbs, perennial; stems 100-160 cm tall, hirsute or nearly glabrous below. Basal leaves oblanceolate to obovate, lyrate-pinnatifid or merely dentate; cauline leaves 2-6; lanceolate, the upper reduced. Heads 2-6 in a cymose inflorescence, erect. Involucral bracts in several series, imbricate; outer narrowly deltoid, strongly ciliate, glabrous or tomentulose; inner lanceolate, obtuse or somewhat acute at the apex. Ligules yellow; corolla tube shorter than the ligule. Anthers yellow. Stigmatic branches blackish. Achenes fusiform, 6.5-12 mm, somewhat obcompressed. Pappus deciduous at maturity.

#### KEY TO THE SUBSPECIES

- |  |                                 |
|--|---------------------------------|
| 1a. Basal leaves 4.5-8 cm broad; the outermost bracts squarrose        | 2.1. subsp. <i>latifolia</i>    |
| b. Basal leaves 1.5-5 cm broad; outermost bracts not usually squarrose | 2.2. subsp. <i>oligocephala</i> |

2.1. subsp. *latifolia* Stebbins in Mem. Torr. Bot. Club 19(3): 20-22. 1940.

*Fl. & Fr.* July - Nov.

*Distrib.* India: Himachal Pradesh.

Endemic.

## 2.2. subsp. *oligocephala*

*Fl. & Fr.* Aug. - Nov.

*Distrib.* India: W. Himalayas, in open rocky or gravelly places, 2000-3000 m. Jammu & Kashmir and Himachal Pradesh.

## 4. *Ixeris* Cass.

Herbs, annual or biennial with white latex; roots simple; stems usually flaccid, erect, glabrous, solitary or branched from the base. Leaves chiefly all radical, rarely cauline, variable, linear or linear-lanceolate, sagittate, acute or obtuse, entire or sinuate-toothed, petioled or sessile. Inflorescence usually subumbellate corymbs. Heads erect, cylindrical; peduncle slender, erect, bracteate. Involucral bracts in 3-3 series, equal or unequal; outer very minute, ovate or obovate; inner linear-ob lanceolate. Florets all ligulate; ligules 5-toothed; corolla usually yellow. Stamens 5, appendaged; anthers pinkish or yellow, slender, base sagittate. Style slender; stigma bifid. Achenes pale brown or dark brown, usually elliptic-lanceolate or somewhat rounded and angular. Pappus white, simple.

*Literature.* STEBBINS, G.L. (1939) Critical notes on the genus *Ixeris*. *J. Bot.* 75: 34-51.

An Asiatic genus distributed from Himalayan region to Japan; ca 50 species, 3 in India.

### KEY TO THE SPECIES

- |  |                             |
|--|-----------------------------|
| 1a. Leaves all radical; sagittate, acute or obtuse, entire or denticulate; achenes dark brown                                    | 3. <i>I. sagittarioides</i> |
| b. Leaves radical as well as cauline, linear or linear-lanceolate, sinuate toothed; achenes pale brown                           | 2                           |
| 2a. Radical leaves broadly linear-lanceolate, entire, sinuate-toothed or pinnatifid; cauline leaves with acute auricles at base. | 2. <i>I. polycephala</i>    |
| b. Radical leaves narrowly linear-lanceolate, entire; cauline leaves not auricled  | 1. <i>I. gracilis</i>       |

1. *Ixeris gracilis* (Wallich ex DC.) Stebbins in *J. Bot.* 75: 50. 1939. *Lactuca gracilis* Wallich ex DC., *Prodr.* 7: 140. 1838; Hook.f., *Fl. Brit. India* 3: 410. 1881.

Herbs, annual, erect; stems 20-70 cm high, glabrous, solitary or many, branched from the base. Leaves 5-20 x 0.5-1 cm, glabrous; radical leaves much longer, linear or linear-lanceolate, acuminate, quite entire, rarely toothed; upper sessile. Inflorescence terminal, corymbosely branched. Heads narrow, cylindrical, 6-9 x 1.5-2.5 mm, erect. Outer involucral bracts ovate, 1-1.2 x 0.5-0.6 mm, glabrous, minute; inner linear-lanceolate, 5-6 x 0.7-1 mm, glabrous. Ligule pale yellow or white. Achenes pale brown or reddish brown, elliptic-lanceolate, much compressed, 3-4.5 or 5 mm long, very slender, smooth. Pappus yellowish white, 3-4 mm long, deciduous.

## KEY TO THE VARIETIES

- 1a. Stems thick; achenes with longer beak  
 b. Stems very slender; achenes with shorter beaks

- 1.1. var. *gracilis*  
 1.2. var.  *khasiana*

✓ 1.1. var. *gracilis*

*Fl. & Fr.* July - Oct.

*Distrib.* India: E. Himalayas on open shady places, 1500-2500 m. Meghalaya, W. Bengal, Sikkim and Manipur.

1.2. var. *Khasiana* (Hook.f.) Mangain & Rao in J. Bombay Nat. Hist Soc. 86(2) 273. 1989. *Lactuca gracilis* var. *Khasiana* Hook.f., Fl. Brit. India 3: 411. 1881.

*Fl. & Fr.* July - Nov.

*Distrib.* India: Meghalaya.

✓ 2. *Ixeris polycephala* Cass. in Dict. Sci. Nat. 24: 50. 1822. *Lactuca polycephala* (Cass.) Benth. & Hook.f. Gen. Pl. 2: 526. 1873; Hook.f., Fl. Brit. India 3: 410. 1881.

Fig. 67.

Herbs, annual, flaccid; stems (flowering branches) 12-80 cm high, erect, glabrous, solitary or branched. Leaves variable, 4-27 x 0.5-2.0 cm, membranous; radical leaves linear or linear-lanceolate, entire, sinuate-toothed or half pinnatifid, petioled; cauline leaves linear, linear-oblong or lanceolate, sagittate at base, sessile. Heads 0.4-0.8 x 0.3-0.5 cm; peduncle 0.5-1.5 cm, erect. Outer involucral bracts ovate, 2.5-1 x 5-0.6 mm; inner linear-oblong or linear-oblong, 4-5 x 1-2 mm, glabrous. Ligules yellow. Anthers yellowish or pinkish. Achenes pale brown or red brown, elliptic, 4-5 mm long, smooth. Pappus white, 4-5 mm long, simple.

*Fl. & Fr.* Nov. - May

*Distrib.* India: Along streams and also as common weed in the agricultural fields, upto 2000 m. Jammu & Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, Bihar, W. Bengal, Sikkim, Assam, Manipur, Nagaland and Meghalaya.

China and Japan.

3. *Ixeris sagittarioides* (C.B. Clarke) Stebbins in J. Bot. Lond. 75: 51. 1939. *Lactuca sagittarioides* C.B. Clarke, Comp. Ind. 265. 1876; Hook.f., Fl. Brit. India 3: 410. 1881.

Fig. 68.

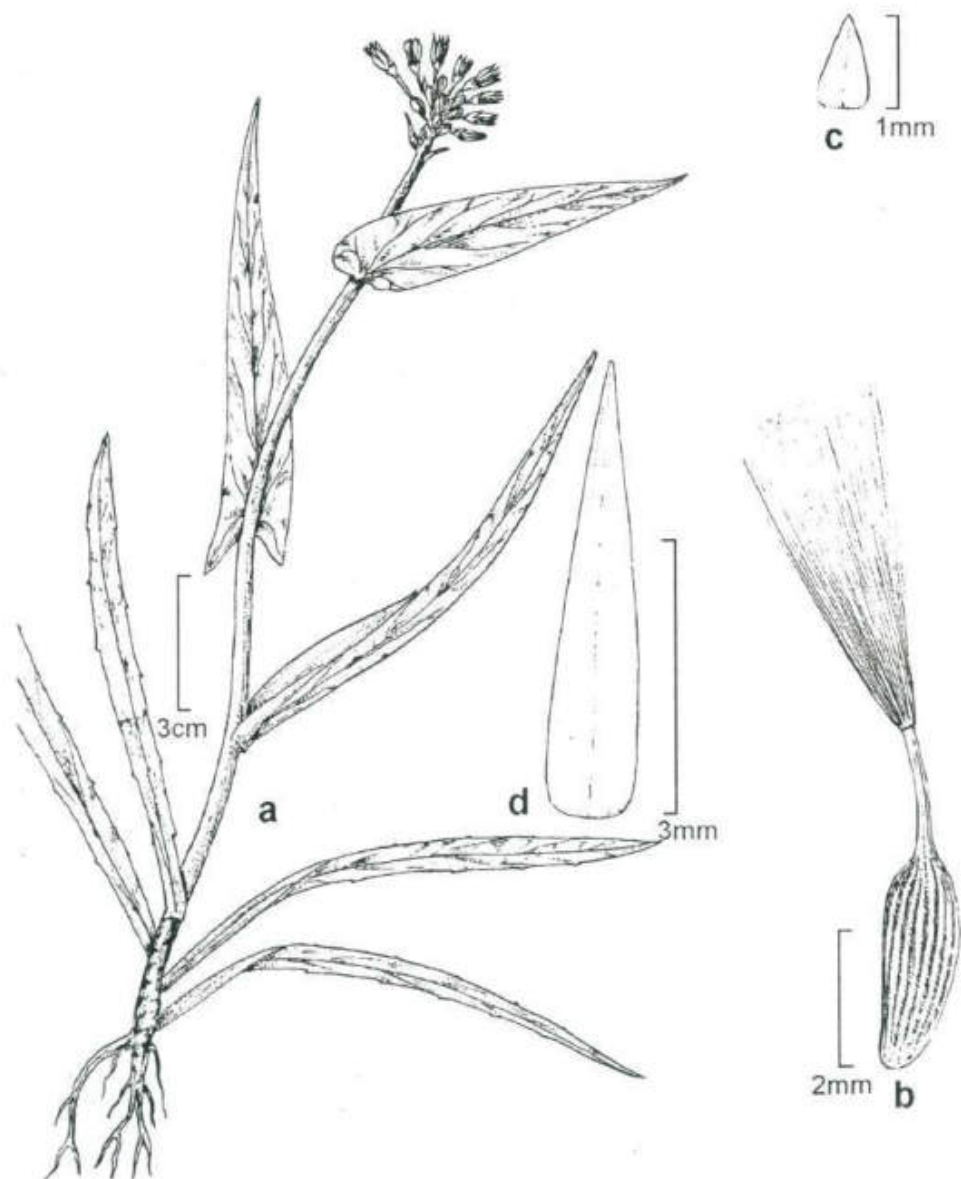


Fig. 67. *Ixeris polycephala* Cass. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.



Herbs, annual or biennial; stems 27-60 high, erect, glabrous, slender, corymbosely branched. Leaves all radical, sagittate, acute or obtuse, entire or denticulate, 3.5-9.0 x 0.7-2.8 cm; petiole with coriaceous, entire or denticulate wings. Heads 0.5-1.1 x 0.3-0.5 cm, erect; peduncle 1.1-3.0 cm, erect, slender. Outer involucre bracts slightly green 2-3 x 1.0-1.5 mm, ovate; inner pale green, linear oblong or linear-lanceolate, 6-9 x 1-1.5 mm. Ligules yellow. Achenes brown or dark brown, elliptic-lanceolate, 3-4 mm long, smooth, somewhat thickened, angular. Pappus yellowish white, 4-5 mm long, simple.

*Fl. & Fr.* April - Oct.

*Distrib.* India: In moist shady and exposed slopes, up to 2000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Arunachal Pradesh.

Japan and C. Asia.

### 5. *Lactuca* L.

Herbs annual, biennial or perennial with white latex; roots simple or with a stout rootstock; stems sometimes rhizomatous, very variable, erect, glabrous or hispid, pubescent or sparsely hairy, solitary or branched. Leaves very variable, radical or alternate, glabrous, pubescent or sparsely hairy, sometimes membranous and prickly, entire or dentate or variously toothed, often lobed, pinnate, pinnatifid or runcinate-pinnatifid, sessile or petioled. Inflorescence usually paniced, sometimes corymbose, umbelled or fascicled. Heads erect or drooping, narrowly cylindrical; peduncle slender, naked or bracteate. Involucre bracts in one, two or three rows, differentiated into outer and inner, ovate or oblanceolate or linear-oblong; inner bracts usually longer, linear, linear-lanceolate or linear-oblong, glabrous or hispid. Florets ligulate; corolla usually yellow, sometimes blue, pinkish or purple. Stamens 5, appendaged. Style very slender; stigma bifid. Achenes variously shaped, glabrous or sparsely hairy, usually ribbed, with a prominent beak. Pappus white, simple or plumose, soft.

Cosmopolitan; ca 150 species, 24 in India.

*Literature.* SHIH CHU (1988). Revision of *Lactuca* L. and two new genera of tribe Lactuceae (Compositae) on the mainland & Asia. *Act. Phytotax. Sin.* 25(5): 382-393. STEBBINS, G.L. Jr. (1937). Critical Notes on *Lactuca* and related genera. *J. Bot.* 75: 12-18. STEBBINS, G.L. Jr. (1939). Notes on some Indian species of *Lactuca*. *Ind. For. Rec.* 6: 237-246. VRIES I.M. DE, & C.E. JARVISI (1986). Typification of seven Linnaean names in the genus *Lactuca* L. (Compositae: Lactuceae). *Taxon* 36: 142-154. WHITAKER, T.W. & I.C. JAGGER (1939). Cytogenetic observation in *Lactuca*. *Agr. Res.* 58: 297-306.

The genus *Lactuca* comprises the following seven sections.

#### KEY TO THE SECTIONS

- |   |   |
|---|---|
| 1a. Annuals or biennials; leaves chiefly radical, rarely cauline          | 2 |
| b. Annual, biennial or perennial herbs; leaves radical as well as cauline | 3 |

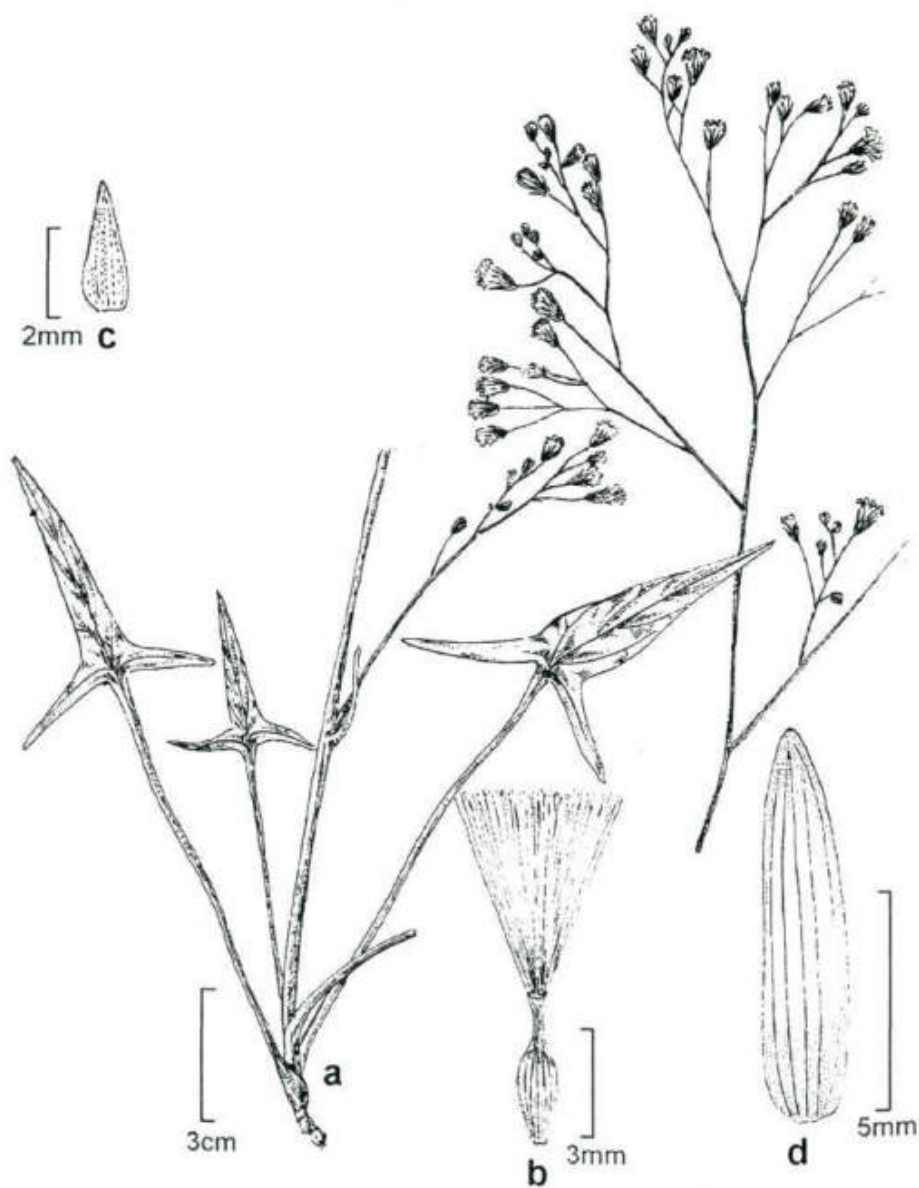


Fig. 68. *Ixeris sagittarioides* (C.B. Clarke) Stebbins : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

- 2a. Stems with long, straight flowering branches; achenes muricate, blackish; ligules pinkish  
Sect. 1. *Brachyrampus*
- b. Stems short with very stout flowering branches; achenes smooth, pale; ligules purplish  
Sect. 2. *Chorisma*
- 3a. Branches intricate, spinescent, very slender, silvery, covered by decurrent bases of leaves  
Sect. 6. *Phaenioxopus*
- b. Branches paniculate, without spines, slender; leaves petioled or sessile leaves 4
- 4a. Herbs without rootstock; heads erect, paniced; outer involucrel bracts passing into the inner 5
- b. Herbs with large tuberous or fusiform rootstock; heads drooping, in large terminal panicle or paniculate racemes; outer involucrel bracts small; inner bracts long 6
- 5a. Stems glabrous or somewhat prickly, sometimes hispid at the base; midrib prickly beneath  
(*L. serriola*); beak of achenes capillary, white Sect. 7. *Scariola*
- b. Stems glabrous, stout; leaves pungent with no prickly midrib; beak of achenes capillary, pale brown or dark brown Sect. 3. *Lactucopsis*
- 6a. Leaves with broad, winged petiole, dilated or sagittately auricled at base; heads narrowly cylindrical Sect. 5. *Mulgedium*
- b. Leaves sessile, contracted into a cordate, auricled or 1/2 amplexicaul base; heads broadly campanulate Sect. 4. *Melanoseris*

## Sect. 1. BRACHYRAMPHUS DC.

## KEY TO THE SPECIES

- 1a. Radical leaves usually obovate or orbicular, entire or rarely sparsely dentate at margins 1. *L. remotiflora*
- b. Radical leaves usually oblong or oblanceolate, pinnatifid or runcinate-pinnatifid, usually sharply serrate with spinous and white cartilaginous teeth 2. *L. runcinata*

1. *Lactuca remotiflora* DC. in Wight, Contrib. Bot. Ind. 26. 1834; Hook.f., Fl. Brit. India 403 1881.

Herbs, annual or biennial; stems 25-60 cm high, glabrous, slender, branched. Leaves mostly radical, obovate, orbicular; or oblong, pinnatifid, finely spinulose or ciliate-toothed, 5-14 x 3-5 cm, glabrous, membranous, narrowed at base. Inflorescence spicate or racemose on long flowering branches. Heads usually solitary, 1-1.3 x 0.4-0.5 cm, peduncle slender with few bracts. Outer involucrel bracts ovate, 3-3.5 x 1-1.8 mm, finely glabrous, acute, with broad scarios margins; inner linear-oblong, 10-12 x 2-2.5 mm, glabrous, subobtuse, with scarios margins, with thick and broad base. Ligules pink. Achenes blackish, 4-5 mm long, slightly compressed, muricate, ribbed, gradually contracted in to a small and very slender, pale beak, nearly as long as the pappus. Pappus milky white, 4-6 mm, persistent.

*Fl. & Fr.* Sept. - Dec.

*Distrib.* India: On dry sandy locations, 300-1200 m. Bihar, Madhya Pradesh, Rajasthan, Maharashtra and Tamil Nadu.

Pakistan, Africa and Arabia.

*Notes.* Jeffrey (1966) has treated both *Lactuca runcinata* DC. and *Lactuca remotiflora* DC. as synonyms of *Launaea inrybacea*. *L. remotiflora* is a small and more delicate plant than *L. runcinata*. It has nearly entire (rarely sparsely dentate at margin), glabrous, usually orbicular or obovate leaves and less branched flowering stems, whereas in *L. runcinata* the leaves are usually pinnatifid or runcinate-pinnatifid, large (usually sharply cut with spinous and white cartilaginous teeth), usually pubescent, oblanceolate-oblong or oblanceolate with deeply cut lobes and usually much branched flowering stems.

**2. *Lactuca runcinata* DC.** in Wight, Contrib. Bot. Ind. 26. 1834. *Lactuca heyneana* DC., Prodr. 7: 140. 1838; Hook.f., Fl. Brit. India 3: 403. 1881.

Mar.: *Undirachakan*.

Herbs, annual or biennial; stems 50-80 cm high, erect, glabrous, cylindric, hollow at base, much branched. Leaves mostly radical, runcinate-pinnatifid, finely spinulose or ciliate-toothed, 6-21 x 1.5-6 cm, sessile. Inflorescence spicate or racemose, on long flowering branches. Heads solitary or fascicled, cylindric, 0.9-1 x 0.2-0.3 cm, erect; peduncle very small, slender, with one or two bracts. Outer involucre bracts ovate, 1.5-2.5 x 0.5-1.0 mm, minute, acute; inner equal, linear-oblong, 9-11 x 1-1.5 mm, subobtusate. Corolla pinkish-white. Achenes blackish, brown, 3-3.5 mm long, compressed, prominently ribbed, muriculate, rugose, tapering into a short beak. Pappus silvery white, 5-6.5 mm, persistent.

*Fl. & Fr.* May - June.

*Distrib.* India: On rocky hill slopes, 400-1100 m. Jammu & Kashmir, Rajasthan, Maharashtra and Tamil Nadu.

Sri Lanka, Central America, Europe, S. Africa and S.E. Asia.

Sect. 2. CHORISMA D. Don

KEY TO THE SPECIES

- |   |                        |
|---|------------------------|
| 1a. Perennials; stems absent or very short; radical leaves orbicular                          | 2. <i>L. cooperi</i>   |
| b. Annuals or biennials; stems short with stout flowering branches; radical leaves spathulate | 1. <i>L. benthamii</i> |

**1. *Lactuca benthamii* C.B. Clarke**, Comp. Ind. 273. 1876; Hook.f., Fl. Brit. India 3: 411. 1881.

**Fig. 69.**

Herbs, annual or biennial; stems stout with very stout, flowering branches, 9-12 cm, glabrous, minutely puberulous. Leaves chiefly radical, spathulate, oblong 4-7 x 1-2 cm, entire or obscurely dentate, glabrous, pale above, glaucous beneath, gradually narrowed



Fig. 69. *Lactuca benthamii* C.B. Clarke

to petiole; cauline leaves linear oblong. Inflorescence corymbose. Heads blackish, narrowly cylindrical, 1-1.3 x 0.4-0.5 cm, erect, peduncled; peduncle slender with few ovate bracts. Outer involucre bracts oblong, ovate, 1-2 x 0.8-1 mm; inner oblanceolate or linear-oblong, 8-9 x 1.5-2 mm, finely membranous towards margins, with darker centre. Pappus dirty white, uniseriate, 5-7 mm, setose.

*Fl. & Fr.* July - Aug.

*Distrib.* India: W. Himalayas, on hill slopes in high elevation, 3000-5500 m. Jammu & Kashmir.

Endemic.

*Notes.* The identity of this species is doubtful as only immature achenes are available on the only available collection of Stoliczka, which is the Type. More collections are needed to correctly assign the status of the species.

## 2. *Lactuca cooperi* Anthony in Notes Roy. Bot. Gard. Edinb. 18: 198. 1934.

Herbs, perennial with long woody rhizomes; stems absent or short. Leaves all radical, versate, orbicular, entire or minutely and distantly denticulate, glabrescent; petiole somewhat broad at the base. Heads cylindrical, ca 1-5-cm long, 10-flowered; peduncle slender. Involucre bracts pale green, ca 6, linear-oblong, 15 x 2 mm, with membranous margins, glabrous inside, dorsally pilose, apex minutely white ciliate. Achenes 6 mm long, compressed, 9-ribbed, narrowed at base, hispid towards apex, distinctly contracted at beak. Pappus white-shining, ca 10 mm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: E. Himalayas in alpine and sub alpine meadows and on exposed hill slopes, 4500-5000 m. Sikkim.

Endemic.

*Notes.* This species is known only by its type collection. Type specimen is also not available. It would be rewarding to relocate this species in the type locality.

### Sect. 3. LACTUCOPSIS Schultz.

#### KEY TO THE SPECIES

- |   |                       |
|---|-----------------------|
| 1a. Leaves sessile, sharply spinous toothed with pungent apex; achenes pale brown or dark brown | 2. <i>L. tatarica</i> |
| b. Leaves petioled, pinnatifid with rounded apex; achenes black                                 | 1. <i>L. quercina</i> |

1. *Lactuca quercina* L., Sp. Pl. 795. 1753.

Herbs, annual or biennial; roots tuberous; stems 30-100 cm, erect. Leaves thin; lower lyrate pinnatifid with large, ovate, terminal segment, petiolate; upper oblong, elliptical to lanceolate, entire or pinnatifid to pinnatisect with oblong-ovate, dentate segments; all with sagittate-amplexicaul base. Inflorescence a dense, usually corymbose panicle. Heads with 7-15 (22) florets. Involucral bracts often with appendages. Achenes black, oblong-elliptical, 7-8 mm, setose at apex, 5-ribbed; beak 1/3-1/2 as long as the body. Pappus white.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: W. Himalayas, on dry exposed slopes, 1500-2500 m. Jammu & Kashmir.

S. Europe and Caucasus.

2. *Lactuca tatarica* (L.) C.A. Meyer, Enum., Fl. Cauc. 56. 1831. *Sonchus tataricus* L., Mant. 572. 1772. *Lactuca clarkei* Hook.f., Fl. Brit. Ind. 3: 406. 1881. *L. tatarica* var. *tibetica* Hook.f., Fl. Brit. India 3: 406. 1881.

Herbs, annual or biennial; stems 15-35 cm, high, erect, glabrous, leafy. Leaves sharply spinous-toothed, pungent, at apex, 5-14 x 1-2.5 cm, sessile, amplexicaul. Heads narrow or broadly paniced, 1.2-1.9 x 0.4-0.7 cm, many flowered; peduncle 0.6-1.2 cm long, erect. Outer Involucral bracts much smaller than inner, ovate or oblong-obovate, 4-6 x 2-3 mm; inner linear-oblong, 11-14 x 2-3 mm, glabrous. Ligules pale blue. Anthers bluish. Achenes pale brown or dark brown, narrowly oblong, 5-6 mm long, including the beak, glabrous, 4-6 ribbed. Pappus milky white, 9-12 mm, longer than achenes, simple.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, on exposed moist slopes in alpine meadows, 2500-5000 m. Jammu & Kashmir, Himachal Pradesh.

Tibet, Pakistan, Afghanistan, C. Asia, Mongolia, Iran and Europe.

*Notes.* *Lactuca clarkei*, *Lactuca tatarica* var. *tibetica* have been merged under *Lactuca tatarica* as all are identical.

Sect. 4. MELANOSERIS Decne.

*Lactuca bracteata* Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 270. 1876; Hook.f., Fl. Brit. India 3: 409. 1881.

Herbs, perennial; stems 30-80 cm high, erect, slender, hispid. Leaves ovate or oblong-ovate, acute, rounded, cordate, 6-12 x 3-5.5 cm, membranous, those at the base of inflorescence lanceolate, acuminate. Heads in open leafy panicles with slender branches or in leafy racemes; 1.5-2 x 0.5-0.7 cm, drooping; peduncle slender, with small leafy bracts. Outer involucre bracts broadly ovate, 10-11 x 2.5-3 mm, unequal, subacute, imbricate, reticulate; inner oblong, obtuse, 13-14 x 2-2.5 mm. Ligules blue. Achenes oblanceolate or narrowly-elliptic, compressed, 3-4 mm long, gradually narrowed into a slender white beak. Pappus white, 6-7 mm long, persistent.

*Fl. & Fr.* July - Dec.

*Distrib.* India: E. Himalayas on open shady slopes, 2500-4000 m Sikkim

Nepal, Bhutan and Tibet.

Sect. 5. MULGEDIUM Cass.

KEY TO THE SPECIES

- |   |                            |
|---|----------------------------|
| 1a. Leaves finely membranous, sessile or narrowed to a very slender petiole; achenes short, constricted into a short, stout beak        | 2. <i>L. graciliflora</i>  |
| b. Leaves with base developed into a broad, long, winged petiole which is dilated and auricled; achenes elongate, merging with the beak | 2                          |
| 2a. Lower leaves hastate, cordate or deltoid with incurved margins;   | 3                          |
| b. Lower leaves usually runcinate-pinnatifid, without incurved  | 4                          |
| 3a. Achenes 10-12 mm long, narrowed at both ends with a dark brown beak; inner bracts 15-18 mm long, with much scattered bristles       | 5. <i>L. rapunculoides</i> |
| b. Achenes 7-7.5 mm long, narrowed into a pale beak; inner bracts 12-15 mm long, glabrous or with few minute bristles                   | 4. <i>L. lahulensis</i>    |
| 4a. Outer involucre bracts 4-6.5 x 1.5-2.5 mm, unequal; achenes sparsely hairy, blackish brown or pale brown                            | 1. <i>L. decipiens</i>     |
| b. Outer involucre bracts 1-1.5 x 0.5-1 mm, all equal; achenes glabrous, yellowish brown  | 3. <i>L. kashmiriana</i>   |

1. *Lactuca decipiens* C.B. Clarke, Comp. Ind. 266. 1876; Hook.f., Fl. Brit. India 3: 407. 1881. *Cicerbita decipiens* (C.B. Clarke) Beauv. in Bull. Soc. Bot. Geneve, Ser. 2, 2: 127. 1910.

Herbs, perennial, stems 30-80 cm high, erect, paniculately branched above. Leaves entire or lobed or pinnatifid, 7-14 x 2.5-5 cm, glaucous, pubescent; lower leaves with backward pointing lobes; upper middle with long, winged, dilated and auricled petiole at base; uppermost oblanceolate. Inflorescence terminal panicle. Heads cylindrical, 1.2-1.8 x 0.3-0.4 cm; peduncle slender, glabrous, drooping. Outer involucre bracts oblong-ovate, 4-6.5 x 1.5-2.5 mm, unequal; inner linear-oblong or linear-lanceolate, 12-14 x 2.5-3 mm. Ligules whitish pink. Style slender, purplish; stigmatic branches purplish. Achenes pale brown or dark brown, 5-6.6 mm long, much compressed, hairy towards



margins, rugose, stoutly beaked with one strong median rib. Pappus dirty white, 4-5 mm long, simple.

KEY TO THE VARIETIES

- |   |                            |
|---|----------------------------|
| 1a. Leaves entire or lobed; achenes with brown and stout beak       | 1.1. var. <i>decipiens</i> |
| b. Leaves all pinnatifid; achenes with rather longer and white beak | 1.2. var. <i>multifida</i> |

1.1. var. *decipiens*

Fig. 70.

*Fl. & Fr.* July - Nov.

*Distrib.* India: W. Himalayas, on open moist shady slopes in temperate broad-leaved forests, 2500-4000 m Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan, Pakistan and Nepal.

1.2. var. *multifida* Hook.f., *Fl. Brit. India* 3: 407. 1881.

*Fl. & Fr.* July - Nov.

*Distrib.* India: Jammu & Kashmir.

Endemic.

2. *Lactuca graciliflora* DC., *Prodr.* 7: 139. 1838; Hook.f., *Fl. Brit. India* 3: 406. 1881. *Prenanthes graciliflora* Wallich *nom. nud.* Fig. 71.

Herbs, annual or biennial; stems 80-150 cm high, erect, glabrous or with very minute hairs. Leaves 5-15 x 2-5 cm, membranous, pubescent; lower leaves deltoid or triangular, pinnate or pinnatifid with one pair of pinnule; uppermost leaves minute, ovate or lanceolate, sessile. Inflorescence terminal, paniced or paniculate raceme. Heads very narrow, 1-1.3 x 0.1-0.2 cm, drooping; peduncle small, slender. Outer involucre bracts ovate, 1-1.5 x 0.5-1.0 mm, glabrous; inner linear-oblong 9-10 x 1-1.5 mm. Ligules pink or pinkish-purple. Achenes yellowish brown, oblanceolate or narrowly oblong, 3.5-4 mm long, constricted at tip into a stout beak, smooth. Pappus pale whitish, 5-6 mm long, deciduous, slightly longer than the achenes.

*Fl. & Fr.* Oct. - Dec.

*Distrib.* India: W. Himalayas, E. Himalayas, on moist shady slopes in temperate, broad leaved forests, 2000-3500 m. Uttar Pradesh, West Bengal and Sikkim.

Nepal and Malaya.

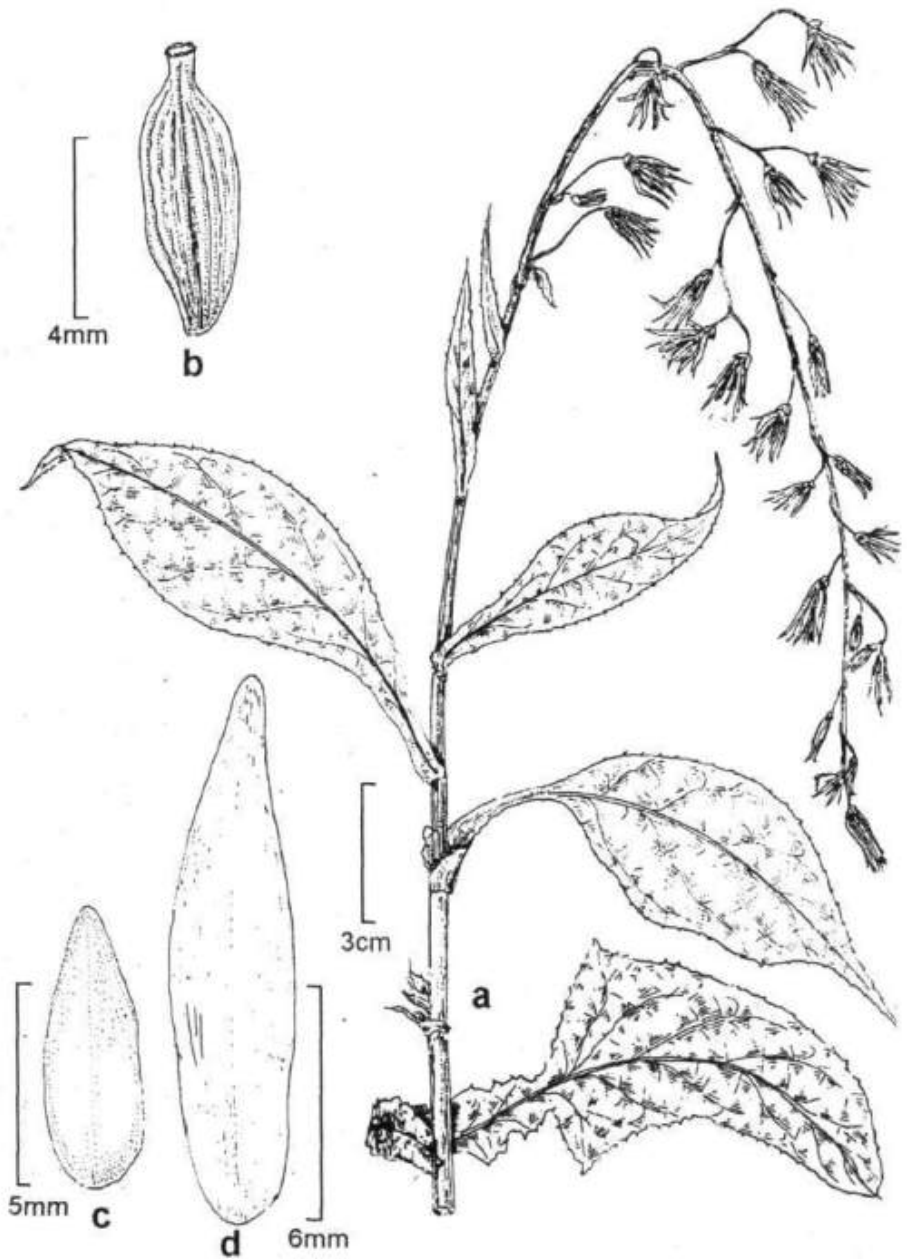


Fig. 70. *Lactuca decipiens* C.B. Clarke : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

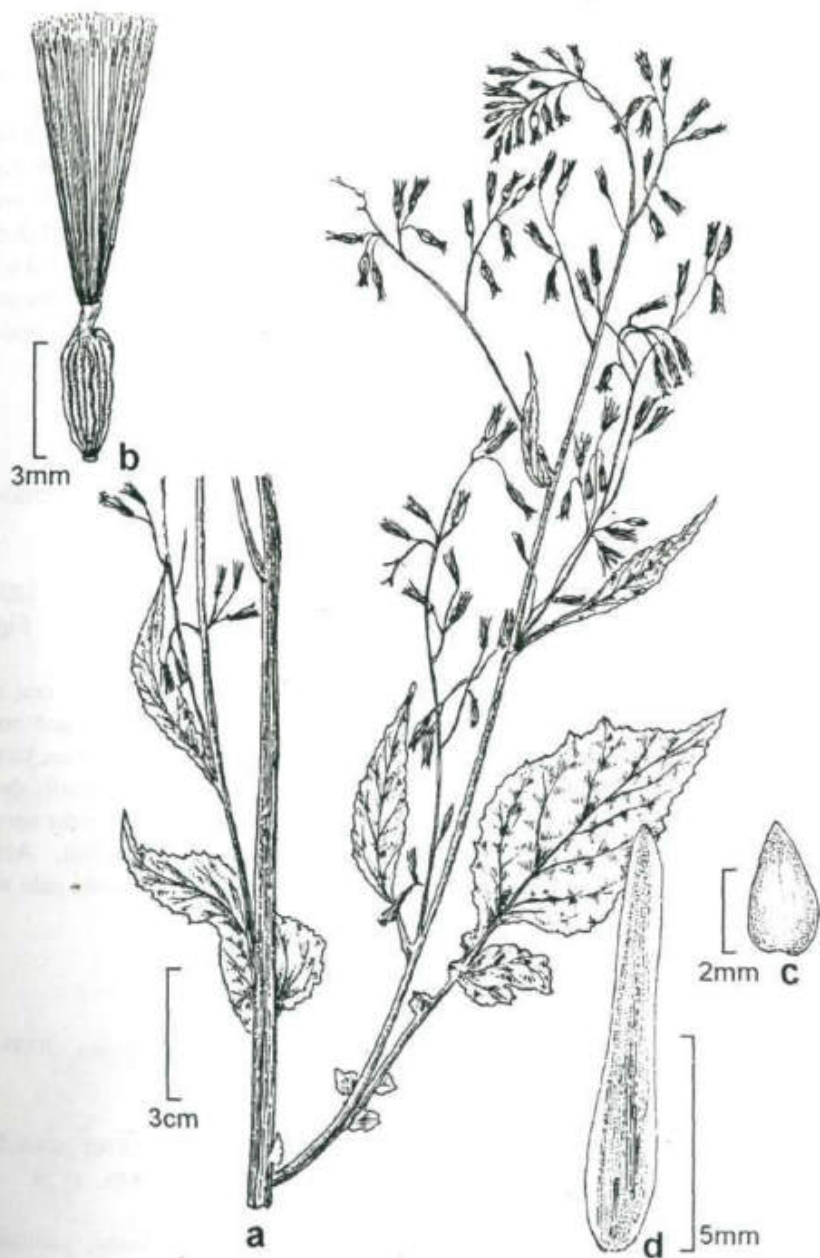


Fig. 71. *Lactuca graciliflora* DC. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

3. *Lactuca kashmiriana* Mamgain & Rao in J. Bombay Nat. Hist. Soc. 83: 406-408. 1986. Fig. 72.

Herbs, perennial; stems 60-80 cm high, erect, glabrous, paniculately branched above. Leaves many from base 4.5 x 3.5 cm; lower and upper middle leaves, cordate or deltoid, membranous, with long and winged petiole; upper most ovate or hastate, sharply serrate. Inflorescence paniculately branched. Heads on terminal branches, 13-14 x 1-2.5 mm drooping; peduncle small, slender, glabrous. Outer involucre bracts ovate, 1-1.5 x 0.5-1 mm inner, linear-lanceolate, 13-14 x 2-2.5 mm. Ligules purple, or blue. Achenes pale yellowish-brown, oblanceolate, 6-6.5 mm long, gradually narrowed to a long beak, 11-12-ribbed. Pappus pale whitish, 4-5 mm long.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: W. Himalayas, on moist shady slopes in high elevation, 2500-4000 m. Jammu & Kashmir.

4. *Lactuca lahulensis* Mamgain & Rao in Bull. Bot. Surv. Ind. 27(1-4): 120-122. 1985. Fig. 73.

Herbs, perennial; stems 50-80 cm high, erect, glabrous. Leaves 4-7 3-7 cm; upper middle leaves broadly cordate or deltoid; finely membranous with long and broadly winged petioles, auricled; uppermost leaves ovate or lanceolate. Inflorescence terminal panicle. Heads on subpaniculate branches; 1.4-1.6 x 2.5-3.0 cm peduncle small, slender. Outer involucre bracts ovate or linear-lanceolate; 2.0-2.5 x 0.5-1.0 mm; inner narrowly linear-lanceolate, 12-12.5 x 1.0-1.5 mm. Ligules white or purplish. Achenes subcylindric, yellowish brown, 7-7.5 mm long, 8-9 ribbed, downy. Pappus pale white, 5 mm long.

*Fl. & Fr.* Aug. - Sept.

*Distrib.* India: W. Himalayas, on exposed, shady, north facing slopes, 3000-4000 m. Himachal Pradesh.

5. *Lactuca rapunculoides* (DC.) C.B. Clarke, Comp. Ind. 268. 1876; Hook.f., Fl. Brit. India 3: 407. 1881. *Mulgedium rapunculoides* DC., Prodr. 7: 249. 1838.

Herbs, biennial or perennial; stems 50-100 cm high, erect, leafy, paniculately branched above. Leaves cordate or deltoid with incurved margins, hastate, 6-15 x 3-7 cm, finely membranous; upper middle with very broad, winged petiole; uppermost leaves ovate or lanceolate. Inflorescence a terminal panicle; peduncles drooping. Heads 1.5-1.7 x 0.3-0.4 cm, 8-15 flowered. Outer involucre bracts ovate or lanceolate, 3-4 x 0.5-1 mm, unequal; inner linear-oblong or linear-lanceolate, 15-18 x 1.5-2.5 mm. Ligules

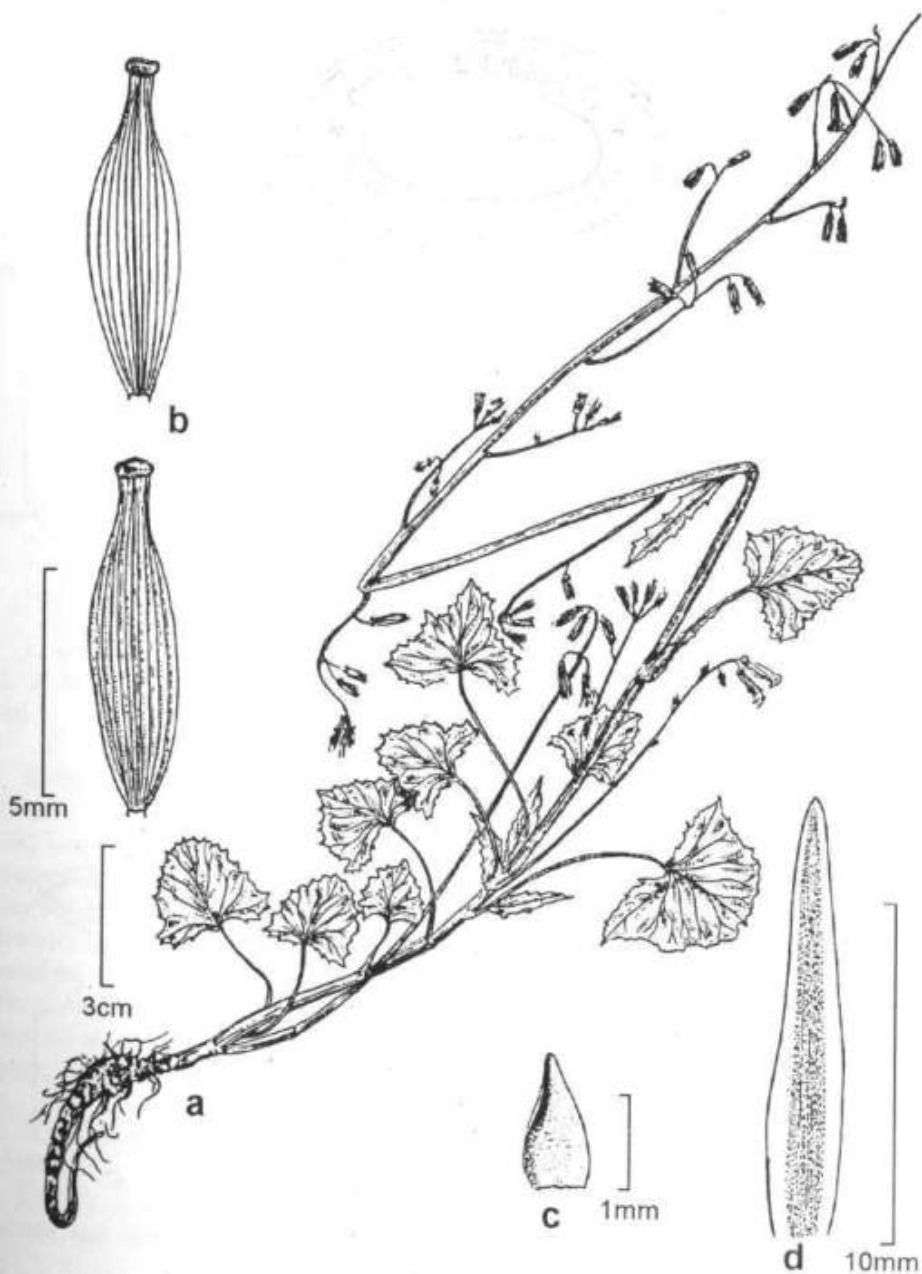


Fig. 72. *Lactuca kashmiriana* Mangain & Rao : a. Habit; b. & c. Achenes; d. Inner bract.

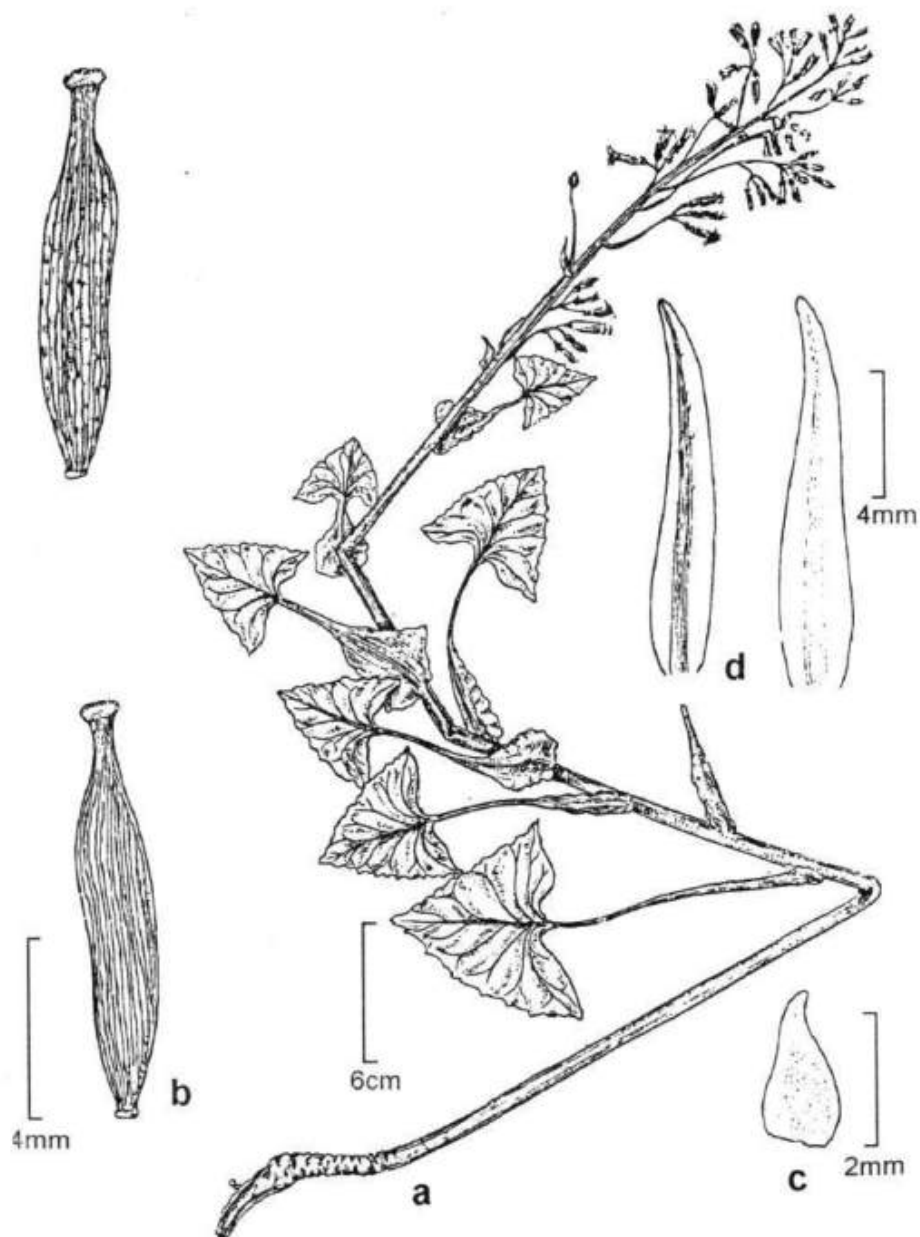


Fig. 73. *Lactuca lahulensis* Mamgain & Rao : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

white or purple. Anthers pinkish. Stigma pinkish. Achenes elongate, fusiform, 10-12 mm, slightly compressed, narrowed at both ends, smooth, with long, slender, brown beak. Pappus dirty white, 7-9 mm.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: W. Himalayas, on open shady slopes in high elevation, 3000-4500 m. Jammu & Kashmir and Himachal Pradesh.

Nepal and Pakistan.

Sect. 6. PHAENIXOPUS Cass.

KEY TO THE SPECIES

- 1a. Stems much branched, bushy, conspicuously cottony woolly in the axils of lower leaves; achenes yellowish with much shorter beak 1. *L. orientalis*  
 b. Stems feebly branched having no cottony wool in the axils of lower leaves; achenes black with a long and elongate beak 2. *L. viminea*

1. *Lactuca orientalis* (Boiss.) Boiss., *Fl. Orient.* 3: 819. 1875; Hook.f., *Fl. Brit. Ind.* 3: 404. 1881. *Phenopus orientalis* Boiss. *Voy. Bot. Med. Esp.* 2: 390: 1838 (in note). Fig. 74.

Herbs, perennial with woody rootstock; stems 12-47 cm, glabrous, intricately branched; branches often spinescent, slender, silvery, partly covered by the decurrent leaf bases. Leaves 2-5 x 0.5-1 cm, sparse, narrow; lower pinnatifid with narrowly spreading or incurved, triangular, acute, entire or slightly toothed lobes; cauline leaves decurrent; upper elliptic or oblanceolate entire. Heads solitary or 2-3 in axillary fascicles, narrowly cylindrical, 1.1-1.5 x 0.2-0.3 cm, erect, sessile. Outer involucre bracts ovate, ovate lanceolate, 2-5 x 1-2 mm; inner bracts linear-oblong, 7.5-12 x 1.5-2.5 mm. Corolla yellow. Achenes yellowish or pale brown, 5.5-7.0 mm long including beak, very smooth, narrowed at both ends, finely glabrous, strongly 6-8 ribbed on each face. Pappus pale or silvery, 4-5.5 mm long, simple.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas on exposed dry slopes, 2000-4600 m Jammu & Kashmir and Himachal Pradesh.

Afghanistan, Pakistan, Central Asia, Iraq and Syria.

2. *Lactuca viminea* (L.) Jaub. & Presl, *Fl. Coch.* 160. 1819. *Prenanthes viminea* L., *Sp. Pl.* 797. 1753.

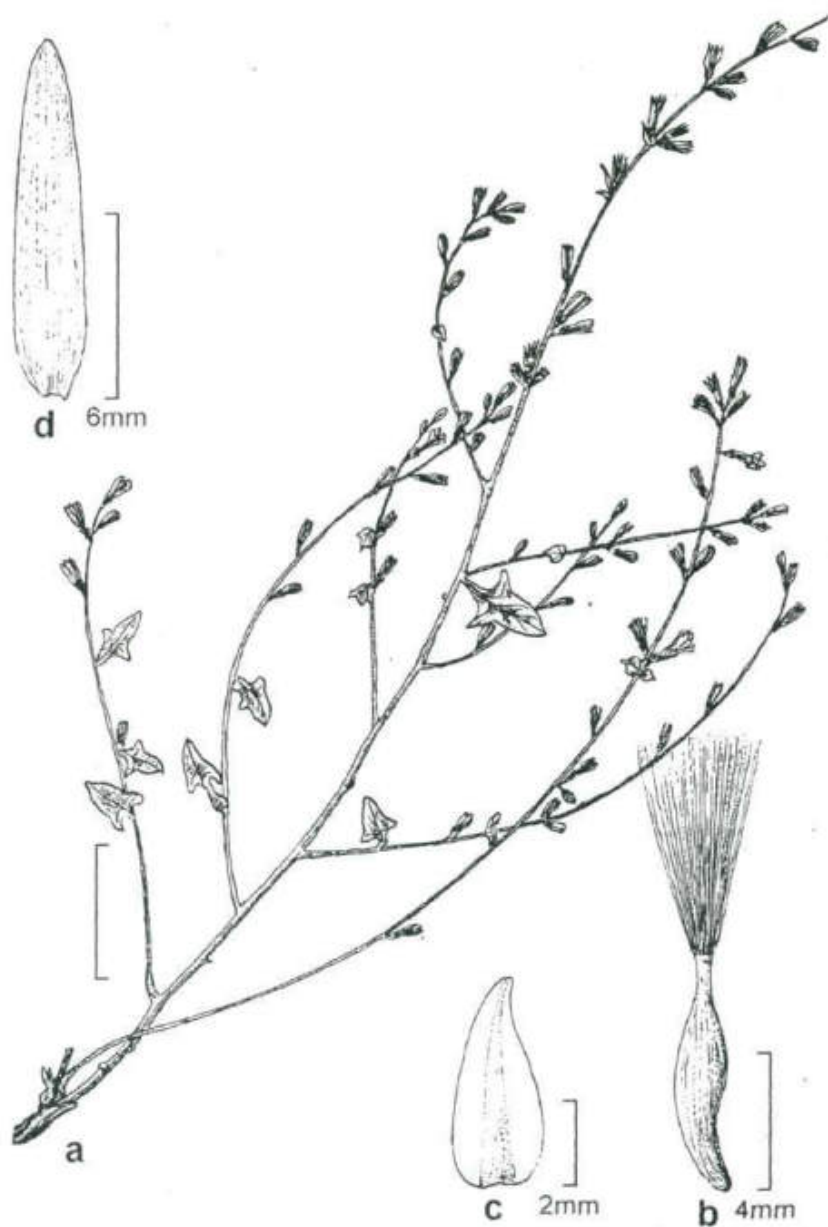


Fig. 74. *Lactuca orientalis* (Boiss.) Boiss. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.



Herbs, perennial with stout woody rootstock; stems 10-40 cm; branches shorter, stiff, many from the rootstock, intricately branched, glabrous, often slender and spinescent, whitish. Leaves 4-8 x 1-2 cm; lower leaves often triangular, or entire pinnatifid, acute; cauline leaves decurrent, obovate or oblanceolate. Inflorescence fascicled. Heads sessile, solitary or 2-3 in axillary fascicles, 1.2-1.5 x 0.2-0.3 cm, erect. Outer involucral bracts linear-oblong or linear-lanceolate, 1.5-6 x 1.2-2.5 mm. Corolla yellow. Achenes black, linear-lanceolate, flattened, 7-8.5 mm long including an elongate beak about equalling the body, smooth, narrowed with many strong ribs. Pappus pale white.

*Fl. & Fr.* June - Oct.

*Distrib.* India: W. Himalayas on exposed shady slopes, in black and sandy soil, 2000-4500 m. Himachal Pradesh.

Afghanistan, Pakistan, Europe, Australia, Iran and Iraq.

*Notes.* This European and W. Asiatic species is closely allied to the common *L. orientalis* and the two can be separated only by the nature of their achenes. These are black in *L. viminea* with an elongate beak about equalling the body while in *L. orientalis* they are yellowish or grayish, somewhat less flattened and with a much shorter beak. The two species are closely similar even in habit, the only difference being the nature of branching. *L. orientalis* is more branched and bushy than *L. viminea* with shorter and stiffer branches.

Sect. 7. SCARIOLA F.W. Schmidt

KEY TO THE SPECIES

- |     |  |                              |
|-----|--|------------------------------|
| 1a. | Annuals of biennials; stems tall, 20-250 cm tall, erect, corymbosely or paniculately branched                                      | 2                            |
| b.  | Annuals; stems short, 4-50 cm high, suberect, dichotomously branched   | 5                            |
| 2a. | Leaves usually runcinate-pinnatifid, spinulose-toothed, sharply lobed, oblong-ovate or orbicular, rarely lanceolate                | 3                            |
| b.  | Leaves usually entire or sparingly 1/2 pinnatifid or lobed, very long, lanceolate or linear-lanceolate                             | 4                            |
| 3a. | Leaves succulent, entire or minutely spinulose toothed; beak of achene twice longer than the body                                  | 4. <i>L. sativa</i> ✓        |
| b.  | Leaves non-succulent, usually runcinate-pinnatifid, finely spinulose-toothed; beak slightly longer than body or equalling the body | 5. <i>L. serriola</i>        |
| 4a. | Leaves sagittate at the base; achenes elliptic or oblanceolate   | 2. <i>L. dolichophylla</i> - |
| b.  | Leaves not sagittate at base; achenes very flat, somewhat rounded or ellipsoid   | 3. <i>L. indica</i>          |
| 5a. | Heads 1-1.2 x 0.3-0.4 cm; achenes 6-7 mm long including the capillary beak   | 1. <i>L. dissecta</i> ✓      |
| b.  | Heads 1.7-2.2 x 0.4-0.5 cm; achenes 13-14 mm long including the capillary beak   | 6. <i>L. undulata</i>        |

1. *Lactuca dissecta* D. Don, Prodr. Fl. Nepal. 164. 1825; Hook.f. Fl. Brit. India 3: 405. 1881. *Lactuca auriculata* DC., Prodr. 7: 140. 1838. Fig. 75.

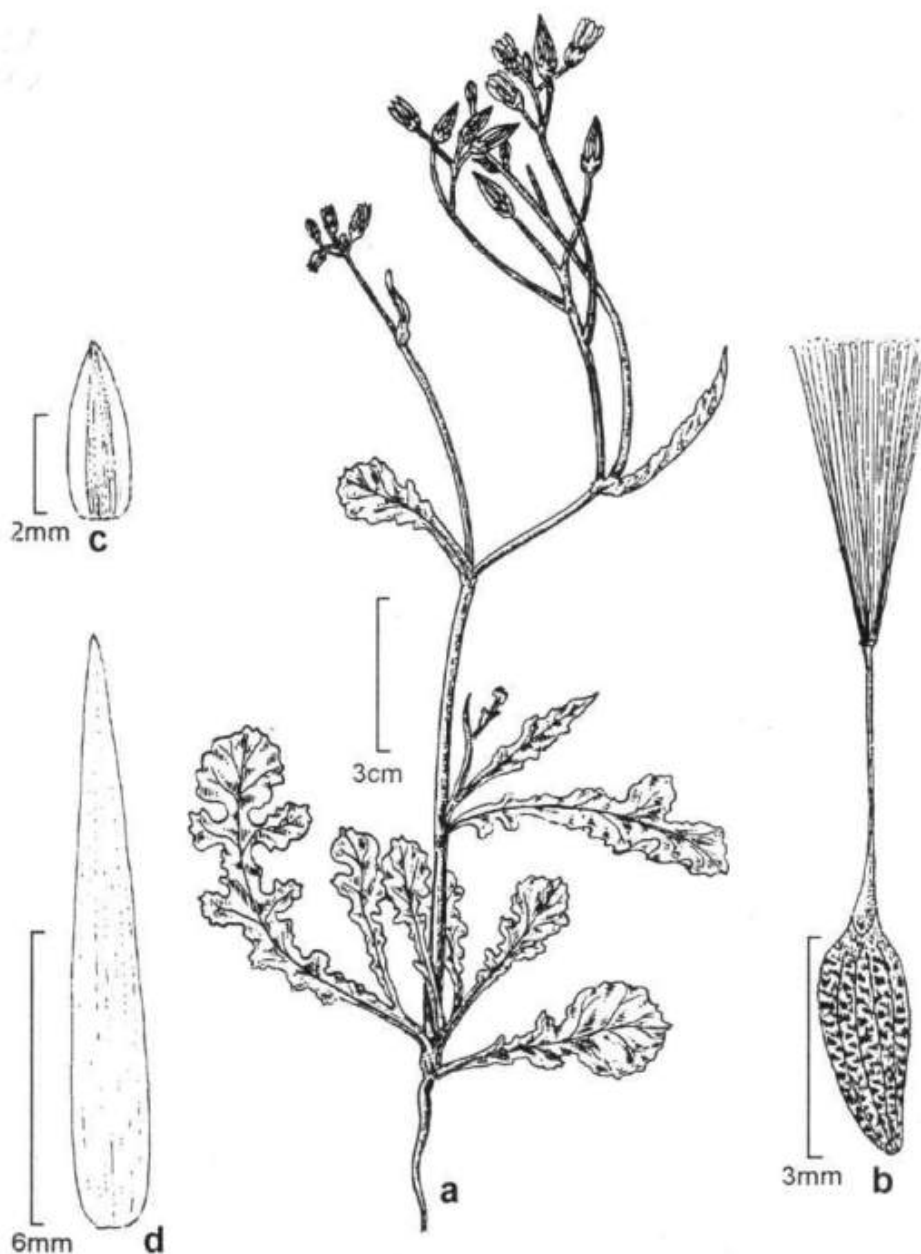


Fig. 75. *Lactuca dissecta* D. Don : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

Herbs, annual; stems 4-40 cm high, suberect or prostrate, glabrous, or sparsely scabrid, dichotomously branched from base. Leaves very variable in lobation, almost pinnatifid, to entire or lyrate or runcinate pinnatifid, 4-20 x 0.5-3.5 cm; lobes entire or sparingly toothed; uppermost leaves linear. Heads corymbose, narrowly cylindric, 1.0-1.2 x 0.3-0.4 cm, erect, 10-20 flowered; peduncle 1.1-2.5 cm, very slender with few bracts. Outer involucre bracts ovate or obovate, 2.5-3.5 x 0.5-1.0 mm; inner linear or linear-oblong, 7-12 x 1.0-1.5 mm. Achenes oblanceolate, 6.0-7.0 mm long including the white beak, much compressed, 3-ribbed on each face. Pappus white or yellowish white, 2.5-4.0 mm, simple.

*Fl. & Fr.* April - Oct.

*Distrib.* India: W. Himalayas, Gangetic plains, on fields and wastelands, 300-3500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Punjab, Haryana, Delhi and Madhya Pradesh.

Tibet, Afghanistan and Pakistan.

2. *Lactuca dolichophylla* Kitam. in Hara, Fl. E. Himal. 1: 341. 1966. *Lactuca longifolia* DC., Prodr. 7: 135. 1838; Hook.f., Fl. Brit. India 3: 405. 1881.

Herbs, annual or biennial; stems 30-200 cm tall, erect, glabrous or slightly hispid at the base, paniculately branched above. Leaves highly variable, lanceolate or linear-lanceolate, base sagittate with 2 stipule like auricles, 5-25 x 0.5-1.5 cm, sessile. Heads in broad or narrow panicle, 1-1.5 x 0.3-0.5 cm 10-25 flowered; peduncle, erect, slender. Ligules purple, pinkish bluish or whitish. Outer involucre bracts pale green, ovate, 2-3 x 1-2 mm, glabrous; inner linear-oblong or linear-lanceolate, 8-12 x 2-2.5 mm, glabrous. Achenes pale brown or dark brown, elliptic or oblanceolate, 5-7 mm long including the beak, smooth. Pappus white, 4-6 mm, simple, shorter than the achene.

*Fl. & Fr.* July - Dec.

*Distrib.* India: W. Himalayas, in dry open situations among grasses, also on shady slopes. 1300-1500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Afghanistan and Pakistan.

3. *Lactuca indica* L., Mant. 2: 278. 1771. *Lactuca brevirostris* Champ. ex Benth. in Hook., Kew J. 4: 237. 1852; Hook.f., Fl. Brit. India 3: 405. 1881.

Herbs, annual; stems 70-150 cm tall, erect, glabrous, paniculately branched above. Leaves linear or linear-lanceolate, acuminate, quite entire or rarely toothed, simple or shortly auricled at base, 9-20 x 0.5-1.0 cm. Inflorescence a terminal panicle. Heads cylindric, 1.4-1.5 x 0.5-0.7 cm, erect, 10-15 flowered; peduncle slender. Outer involucre bracts oblong-ovate, 3-6 x 1.5-2.0 mm, few, glabrous; inner linear-oblong,

13-14.5 x 2-3 mm, finely glabrous. Ligules pale yellow, dirty white or purplish. Achenes blackish, ellipsoid, 5-5.5 mm long including the small, white capillary beak, much compressed, slightly thick towards margins. Pappus white or yellowish, 6.5-7.5 mm long, slightly longer than achenes.

*Fl. & Fr.* Feb. - June

*Distrib.* India: On open wastelands, jhum fallows and marshes. 200-1200 m. Assam and Arunachal Pradesh.

Indonesia.

*Notes.* This species is treated under a new genus as *Pterocypsela* (L.) Shih (cf. Shih Chu 1988).

4. *Lactuca sativa* L., Sp. Pl. 795. 1753. *Lactuca scariola* var. *sativa* Boiss., Fl. Orient. 3: 809. 1875; Hook.f., Fl. Brit. India 3: 404. 1881.

Eng.: *Garden lettuce*; Hindi: *Salad*.

Herbs, annual or biennial, with thick, woody rootstock; stems 30-80 cm high, erect, glabrous, succulent, leafy. Leaves ovate-oblong, minutely spinulose-toothed, 3-15 x 3-7 cm, succulent, sessile with auriculate base. Heads on leafy paniculate branches, many, 0.5-1 x 0.3-0.4 cm erect, glabrous, many flowered; peduncle white, erect, slender, with many small bracts. Outer involucre bracts ovate, 3-5 x 1.5-2.5 mm; inner narrowly linear, 7-10 x 1-2.5 mm, finely membranous. Ligules yellow. Achenes blackish brown, oblanceolate, 6-7 mm long including the long white beak, 6-8 ribbed, glabrous or sparsely hairy towards margin. Pappus whitish, 3-4 mm, simple, much shorter than the achenes.

*Fl. & Fr.* March - Nov.

*Distrib.* India: In plains as well in the hills in moist localities, upto 2600 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Bihar, West Bengal, Assam, Manipur, Tripura, Meghalaya, Orissa and Punjab.

Asia, S. America and N. Europe.

*Notes.* Commonly known as garden lettuce and cultivated as a leafy vegetable, also fairly wild.

5. *Lactuca serriola* Tourner in L., Cent. Pl. 2: 29. 1756. *Lactuca scariola* L., Sp. Pl. ed. 2. 1119. 1763; Hook.f., Fl. Brit. India 3: 404. 1881.

Fig. 76.

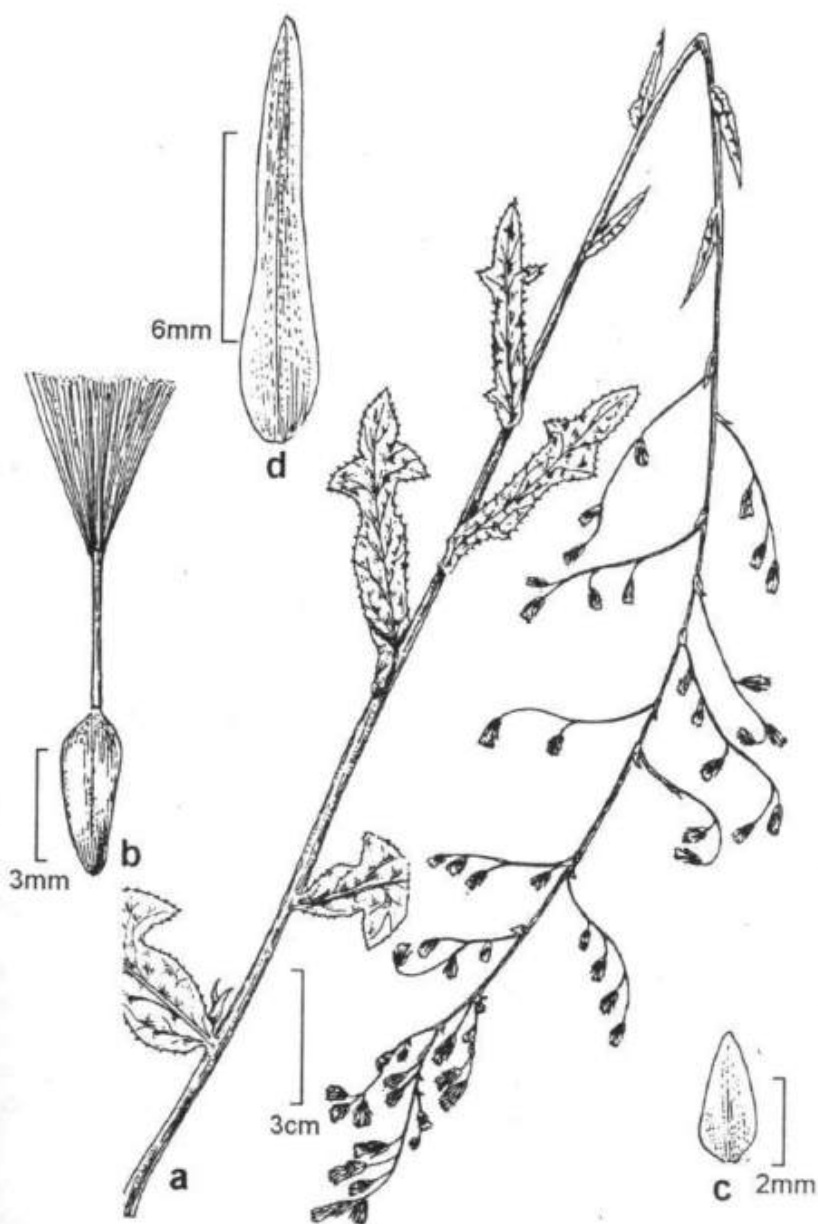


Fig. 76. *Lactuca serriola* Linn. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

Beng.: *Kahu*; Eng.: *Prickly lettuce*; Hindi: *Khas*; Punj.: *Kahu*; Tam.: *Salattu*; Tel.: *Kavn*; Urdu: *Kahu*.

Herbs, annual or biennial; stems 20-200 cm tall, erect, glabrous, shining and sparsely bristly, leafy, corymbosely or paniculately branched above. Leaves variable, suberect, runcinate-pinnatifid, finely spinulose-toothed, 6-14 x 1-4 cm, sessile; mid rib prickly white beneath; lower leaves oblong-obovate, sharply lobed; upper linear-lanceolate, base sagittate. Heads cylindric, panicled with ascending, corymbose branches, 1-1.2 x 0.3-0.4 cm, erect, glabrous; peduncle white, erect, with many appressed green, cordate bracts. Outer involucre bracts ovate, somewhat triangular, 1.5-3.0 x 0.5-1.0 mm, unequal; inner linear or linear-lanceolate, 9.12 x 1-2 mm. Ligules yellow. Achenes pale brown, oblanceolate, 6-8.5 mm including beak, flattened, slightly thick towards margins, 6-8 ribbed, smooth. Pappus silvery white, 4-5 mm, soft, simple.

*Fl. & Fr.* April - Oct.

*Distrib.* India: W. Himalayas, N.E. region, near cultivated fields, amidst grasses on exposed dry slopes. 1500-4500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Arunachal Pradesh.

Afghanistan, Pakistan, Asia, C.I.S. Tropical Africa, Iran, Australia and Iraq.

6. *Lactuca undulata* Ledeb., Fl. Alt. 4: 146. 1833; Hook.f., Fl. Brit. India 3: 404. 1881. Fig. 77.

Herbs, annual; stems 15-35 cm high, glabrous or glaucous, dichotomously branched from the base. Leaves 1-7 x 0.5-2 cm; radical leaves narrowed at base, sessile; lobes entire or sparingly toothed; cauline with dilated base or auricled, sessile. Heads narrow cylindric, 1.7-2.2 x 0.4-0.5 cm, erect; peduncle slender, bracteate. Outer involucre bracts ovate, 3-5 x 1-1.5 mm, small, glabrous, gradually passing into inner; inner oblong, 18-20 x 1.5-2.0 mm, unequal, finely glabrous, oblong, obtuse. Ligules white, pink or bluish. Anthers bluish or pinkish. Stigma purplish. Achenes brown or grayish brown, oblanceolate 13-14 mm long, much compressed, 3-4 ribbed. Pappus milky white, 4-6 mm long.

*Fl. & Fr.* July - Sept.

*Distrib.* India: W. Himalayas, on alpine hill slopes, 3000-3500 m. Jammu & Kashmir.

Afghanistan, Pakistan, Iraq and C.I.S.

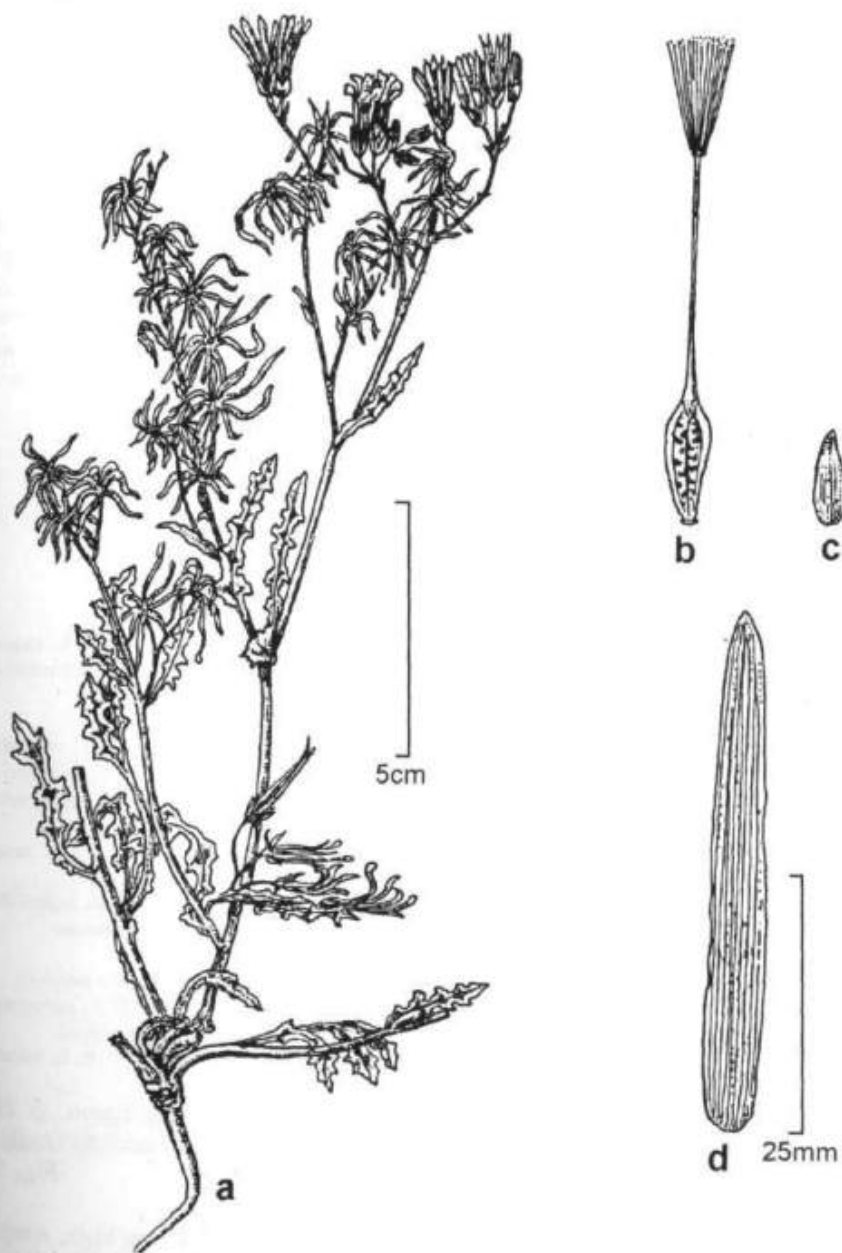


Fig. 77. *Lactuca undulata* Ledeb. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

6. *Launaea* Cass.

Herbs, biennial or perennial with yellow latex; stems usually glabrous, rarely sparsely hairy, simple or branched, often with many flowering branches, solitary or profusely branched. Leaves chiefly radical, linear or linear-lanceolate, oblanceolate, spatulate, ovate, pinnatifid or runcinate-pinnatifid. Inflorescence terminal, racemose or paniculate on the spreading branches. Heads cylindrical, sometimes solitary or fascicled, peduncled or sessile; peduncle, slender, bracteate. Involucral bracts in 2-3 series, equal or unequal, usually with scarious margins; outer small, ovate, obovate or linear-lanceolate; inner linear, linear-lanceolate or linear-oblong. Florets all ligulate; ligules 5-toothed, usually yellow. Achenes oblanceolate, ellipsoid, truncate at both ends, subcompressed, strongly ribbed, sometimes polymorphic. Pappus, whitish pale yellow, silvery white, simple, deciduous, very slender, connate at base.

S.E. Asia, C. Asia, Europe and Africa; ca 45 species, 9 in India.

## KEY TO THE SPECIES

- |  |                            |
|--|----------------------------|
| 1a. Leaves with white cartilaginous teeth  | 2                          |
| b. Leaves without white cartilaginous teeth  | 3                          |
| 2a. Achenes winged   | 3. <i>L. capitata</i>      |
| b. Achenes not winged  | 6. <i>L. procumbens</i>    |
| 3a. Leaves spinous margined; heads often solitary  | 4                          |
| b. Leaves not spinous margined; heads solitary or fascicled or in racemose   | 5                          |
| 4a. Achenes scaberulous on the ribs  | 7. <i>L. resedifolia</i>   |
| b. Achenes smooth on the ribs  | 5. <i>L. polyclada</i>     |
| 5a. Peduncle ebracteate, achenes longer than the pappus  | 4. <i>L. microcephala</i>  |
| b. Peduncle bracteolate; achenes equal to or shorter than the pappus   | 6                          |
| 6a. Plants, dwarf leaves chiefly radical   | 1. <i>L. acaulis</i>       |
| b. Leaves radical as well as cauline, plants reaching to 1 m high  | 7                          |
| 7a. Heads terminal on the paniculately branched flowering stems  | 2. <i>L. aspleniifolia</i> |
| b. Heads on sparingly forked branches, solitary or more or less fascicled or subsessile racemose or the flowering stems or it's branches | 8                          |
| 8a. Stems rooting from the nodes; flowering branches many; achenes much shorter than the pappus  | 8. <i>L. sarmentosa</i>    |
| b. Stems not rooting from the nodes, flowering branches solitary; achenes equalling the pappus   | 9. <i>L. secunda</i>       |

1. *Launaea acaulis* (Roxb.) Babcock ex Kerr. in Craib. Fl. Siam. Enum. 2: 299. 1936. *Prenanthes acaulis* Roxb., Fl. Ind. ed. 2, 3: 403. 1832. *Crepis acaulis* Hook. f., Fl. Brit. India 3: 396. 1881. Fig. 78.

Herbs, perennial with long woody, cylindrical rhizome; stems 4-18 cm high, simple, often with many flowering branches from the base, sometimes solitary. Leaves chiefly radical, linear or linear-lanceolate or sometimes oblanceolate, spatulate, very narrowly obovate, 3-16 x 4-1 cm. Heads cylindrical, subpaniculate, 1.5-2.3 x 5.6 cm, erect, on small, slender, bracteolate peduncle. Outer involucral bracts obovate or linear-lanceolate, 2-4 x 1-1.5 mm, glabrous, membranous towards margins; inner linear or linear-



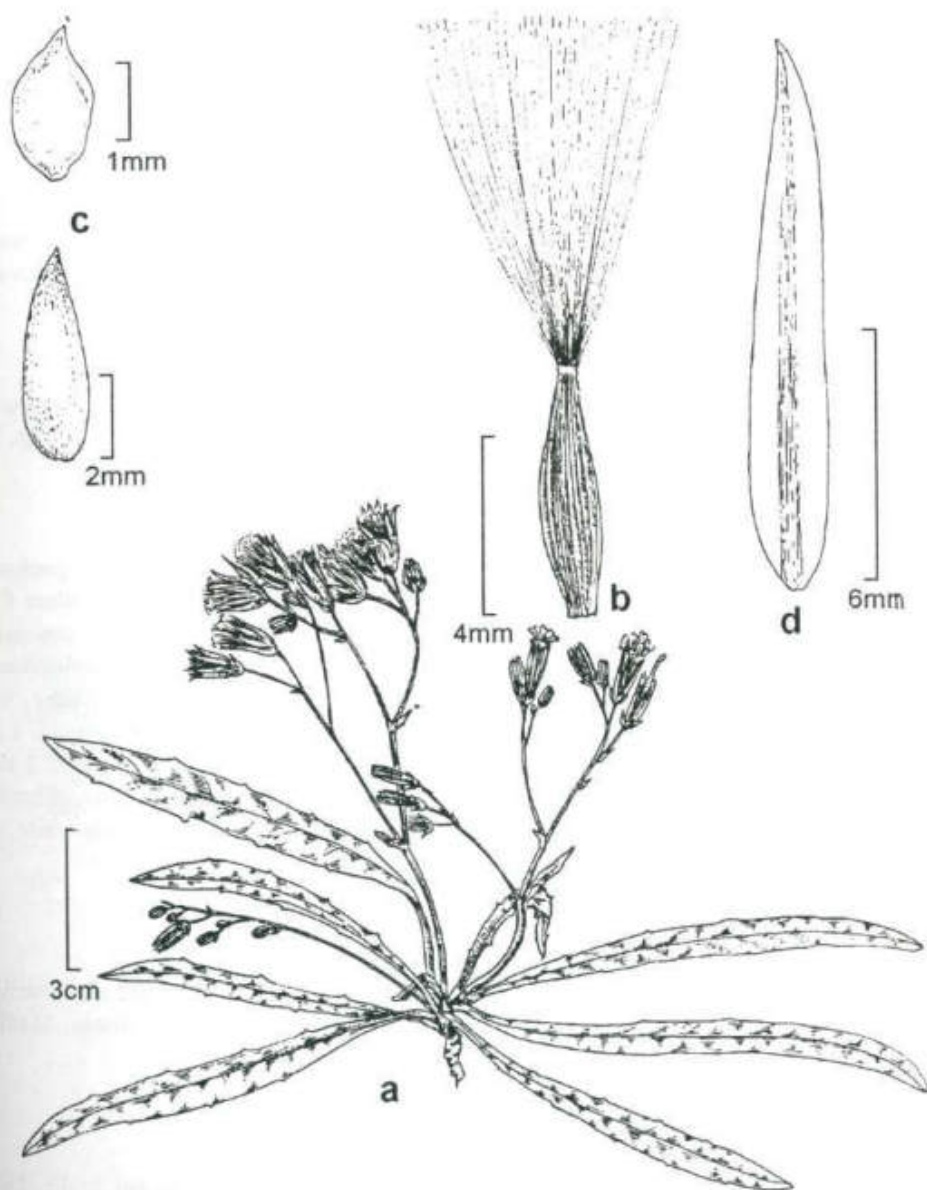


Fig. 78. *Launaea acaulis* (Roxb.) Babcock ex Kerr. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

lanceolate, 12-14 x 1.5-2.3 mm, thickened at the base, glabrous. Ligules yellow. Stigma pinkish or pale yellowish, bifid. Achenes pale yellowish, darker between the ribs, oblanceolate, ellipsoid, subcompressed, 5-5.6 mm long, contracted at both ends, strongly ribbed. Pappus silvery white, 7-9 mm long, simple, soft, longer than achenes.

*Fl. & Fr.* March - Sept.

*Distrib.* India: On open dry slopes, fields and waste lands up to 1000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, W. Bengal, Orissa and Madhya Pradesh.

Afghanistan, Pakistan, Nepal and Iran.

✓ **2. *Launaea aspleniifolia*** (Willd.) Hook.f., *Fl. Brit. Ind.* 3: 415. 1881. *Prenanthes aspleniifolia* Willd., *Sp. Pl.* 3: 1540. 1803. **Fig. 79.**

Ben.: *Tikchana*.

Herbs, biennial or perennial with thick rootstock; stems 5-30 cm high, profusely branched from the base, glabrous. Leaves mostly radical, 4-9 x 1-3.5 cm cauline few, oblanceolate narrowly obovate or pinnatifid or sinuate lobed, sometimes runcinate-pinnatifid, shortly petioled or sessile. Inflorescence terminal, paniculate on dichotomous branches. Heads 0.9-1.5 x 0.4-0.5 cm, erect, finely glabrous; peduncles slender, with few, minute bracts. Involucral bracts few seriate; outer ovate or somewhat obovate, 1.5-4 x 1-1.5 mm, quite glabrous; innermost linear or linear-oblong, 10-13 x 1.5-2.2 mm, finely glabrous. Ligules yellow. Achenes pale brown, 2-2.2 mm long, narrow, columnar or somewhat angled, smooth, much smaller than pappus. Pappus white or pale white, 8-9 mm long, equal, deciduous.

*Fl. & Fr.* March - Oct.

*Distrib.* India: On slopes as well as fields and wastelands, up to 1500 m, Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Delhi, Bihar, W. Bengal, Orissa, Madhya Pradesh, Andhra Pradesh and Andaman & Nicobar Islands.

Nepal and Pakistan.

**3. *Launaea capitata*** (Spreng.) Dandy in F.W. Andr., *Fl. Pl. Sudan* 3: 40. 1956. *Sonchus capitata* Spreng., *Syst. Veg.* 3: 650. 1826. *Launaea glomerata* (Cass.) Hook.f., *Fl. Brit. India* 3: 417. 1881.

Herbs, biennial or perennial; stems 5-25 cm high, erect or profusely branched above the ground, stout, naked, glabrous or sparsely hispid. Leaves all radical, rarely cauline, pinnatifid or runcinate, sinuate-lobed, 5-11 x 0.8-3 cm, glabrous or sparsely hairy, sessile

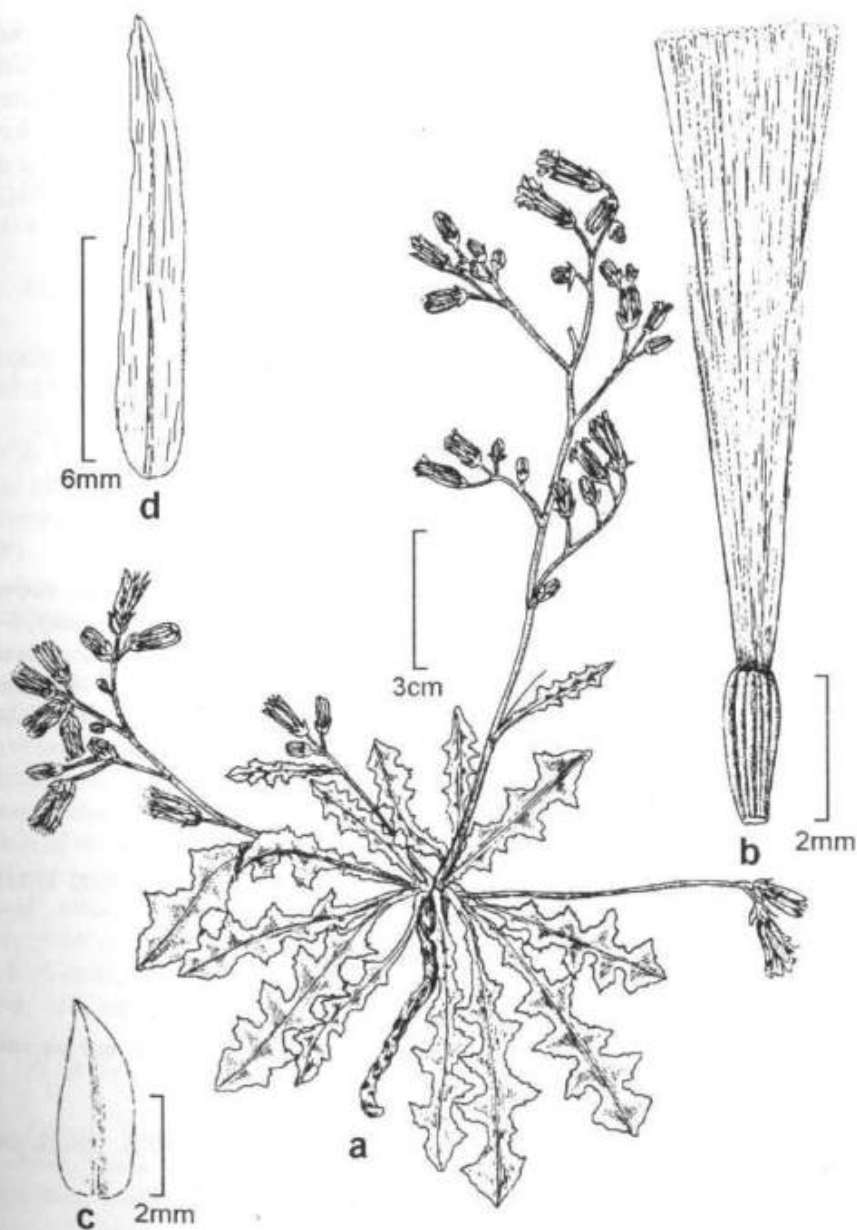


Fig. 79. *Launaea aspleniifolia* (Willd.) Hook.f.: a. Habit; b. Achene; c. Outer bract; d. Inner bract.

or subsessile. Inflorescence somewhat racemose on dichotomous branches. Heads broadly campanulate, 1-1.3 x 0.6-0.9 cm, erect, glabrous, sessile or subsessile. Involucral bracts ovate or obovate-oblong, 2-3 mm, glabrous; inner linear-lanceolate or linear-oblong, glabrous, 8-1.5 x 2-4 mm. Ligules yellow. Achenes columnar, oblong, 4-4.5 mm long, somewhat corky, sometimes slightly curved in the middle, 2-3 winged; wings and ribs shallowly rounded; inner achenes pale, sometimes narrower and imperfect. Pappus milky white, 5-6 mm long, deciduous, soft.

*Fl. & Fr.* Jan. - June

*Distrib.* India: In sandy loamy soils, wastelands and cultivated fields, 300-800 m. Punjab and Rajasthan.

Pakistan, Afghanistan, Iran, Iraq, Sudan, Egypt and Africa.

4. *Launaea microcephala* Hook.f., Fl. Brit. India 3: 415. 1881.

Herbs, annual; stems small, slender, sparsely villous. Radical leaves obovate spatulate, entire or sinuate-lobed, 11-15 cm long, petioled. Flowering stems many, 5-20 cm long, erect, filiform, dichotomously branched. Heads 6-7 cm long, involucral bracts 6-8, glabrous or puberulous, with narrow white margins; outer bracts minute; inner long, linear. Achenes dark brown when ripe, linear, 2-3 cm, slender, truncate at both ends, longer than pappus. Pappus white, very soft, persistent.

*Fl. & Fr.* Aug. - Nov.

*Distrib.* India: W. Himalayas on exposed slopes in higher elevations, 3000-3500 m. Jammu & Kashmir.

Endemic.

*Notes.* There are no specimens of this species at CAL, DD & BSD, nor we could collect this.

5. *Launaea polyclada* (Boiss.) Burkill, Fl. pl. Blaucl. 44. 1909. *Zollikoferia polyclada* Boiss., Fl. Orient. 3: 827. 1875.

Herbs, biennial or perennial; stems glabrous; branches shorter, terete, dichotomously branched, naked, elongate. Leaves spinous-toothed towards margins. Heads often solitary, ovate, erect, small, 10-20 flowered. Outer involucral bracts ovate or obovate, glabrous, white membranous towards margins; inner linear, linear-lanceolate or linear-oblong, obtuse, glabrous, finely white membranous towards margins. Ligules violet.

Achenes strongly elliptic, abruptly thin, smooth, ribbed. Pappus snowy white, slender, simple.

*Fl. & Fr.* July - Nov.

*Distrib.* India: W. Himalayas on exposed moist slopes, 1000-3000 m. Jammu & Kashmir.

Afghanistan, Pakistan, Iran and C.I.S.

*Notes.* Distribution of this species in Indian geographical boundary seems to be doubtful. There is no specimen available in any herbaria in India.

6. *Launaea procumbens* (Roxb.) Ramayya & Rajagopal in Kew Bull. 23(3): 465. t. 1. 1969. *Prenanthes procumbens* Roxb., Fl. Ind. 3: 404. 1832. *Launaea nudicaulis* sensu auct. Plur. Ind. non *L. nudicaulis* (L.) Hook.f. *sensu stricto*. Fl. Brit. India 3: 416. 1881.

Punj.: *Batthal, Dudhalak.*

Herbs, perennial, with creeping stolons; stems 10-50 cm high, erect, solitary or profusely branched, glabrous. Leaves mostly radical, 4-25 x 1-4 cm, more or less glabrous, sessile; cauline few or absent, sinuate-lobed or pinnatifid or runcinate-pinnatifid with irregular lobes; teeth white cartilaginous. Inflorescence racemose or paniculate on the spreading branches. Heads cylindric, 5-8, 1-1.8 x 0.3-0.5 cm, erect; peduncle flat, naked or with few bracts. Involucral bracts 2-3 seriate; outer ovate, 1.5-5 x 0.5-1.5 mm, glabrous; inner linear or linear-oblong, 9-14 x 1-2 mm, glabrous. Ligules yellow. Stigma bluish, bifid, longer than corolla tube. Achenes pale yellow, polymorphous, 2.5-4 mm long; outer slightly curved, truncate at base; inner columnar, very thickly ribbed, truncate at both ends, smooth or obtusely rugose, much shorter than pappus. Pappus 6.7 mm long, soft, simple.

*Fl. & Fr.* March - Sept.

*Distrib.* India: In fields, marshy places and wastelands, 1100-1800 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, West Bengal, Madhya Pradesh, Gujarat, Rajasthan, Maharashtra, Andhra Pradesh and Tamil Nadu.

Afghanistan, Pakistan, Central Asia, Egypt and Iran.

7. *Launaea resedifolia* (L.) Kuntze, Rev. Gen. Pl. 351. 1891. *Scorzonera resedifolia* L., Sp. Pl. 1198. 1753. *Launaea chondrilloides* (DC.) Hook.f., Fl. Brit. India 3: 415. 1881.

Herbs, perennial with creeping rhizomes stems 15-45 cm high, erect, glabrous, slender, dichotomously branched. Leaves very variable, 3-15 x 0.5-1.5 cm, radical leaves rosulate, runcinate-pinnatifid, acutely and deeply toothed, spinous towards margins, apex pungent; cauline leaves sessile or subsessile, auricled. Inflorescence a terminal panicle with stout, dichotomous flowering branches. Heads solitary on the branches, campanulate or conical, 1.7-2.3 x 0.6-0.8 cm, erect; peduncle erect, stout, slender, bracteate. Involucral bracts in 3-series; outer broadly ovate or ovate-lanceolate, 4-9 x 2.5-3 mm, glabrous; inner linear-lanceolate or oblanceolate, 14-19 x 3-4 mm, glabrous. Ligules yellow. Stigma bifid, longer or equal to corolla tube. Achenes pale or grayish, 5-6.5 mm long, slender, strongly ribbed, gradually narrowed at apex, truncate at the base, 5-6 ribbed, scaberulous. Pappus 11-12.5 mm, smooth, unequal.

*Fl. & Fr.* Jan. - Nov.

*Distrib.* India: Wastelands and cultivated fields between 300-1500 m. Punjab, Haryana and Rajasthan.

Pakistan.

8. *Launaea sarmentosa* (Willd.) Sch.-Bip. ex Kuntze, Rev. Gen. 1: 350. 1891. *Prenanthes sarmentosa* Willd., Phyto. 10. t. 6. f. 2. 1794. *Launaea pinnatifida* Cass. in Ann. Sci. Nat. Ser. 1, 23: 85. 1831; Hook.f., Fl. Brit. India 3: 416. 1881.

Herbs, biennial or perennial; stems procumbent, slender, glabrous. Leaves pinnatifid, runcinate-pinnatifid or sinuate-toothed or lobed, 2-7 x 0.4-1.2 cm. Flowering branches long, slender, arching from node to node and rooting at nodes. Heads 0.8-1.2 x 0.3-0.4 cm, usually at the nodes, often clustered; peduncle slender, bracteate. Involucral bracts in two to three series; outer ovate, ovate-lanceolate or ovate-oblong; 1-2 x 3-5 mm inner linear or linear-lanceolate or linear-oblong, 12-14 x 1-2 mm. Ligules yellow. Anthers yellowish. Achenes pale, 4-6 mm long, columnar, thickly ribbed. Pappus yellowish-white, 6-7 mm long, deciduous, slender.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Near sandy river banks and waste-lands between 200-800 m. Uttar Pradesh, Maharashtra, Andhra Pradesh, Karnataka, Tamil nadu, W. Bengal, Gujarat and Lakshadweep.

Pakistan.

9. *Launaea secunda* (Royle ex C.B. Clarke) Hook.f., Fl. Brit. India 3: 416. 1881. *Microrhynchus secundus* Royle ex C.B. Clarke, comp. Ind. 276. 1876. **Fig. 80.**

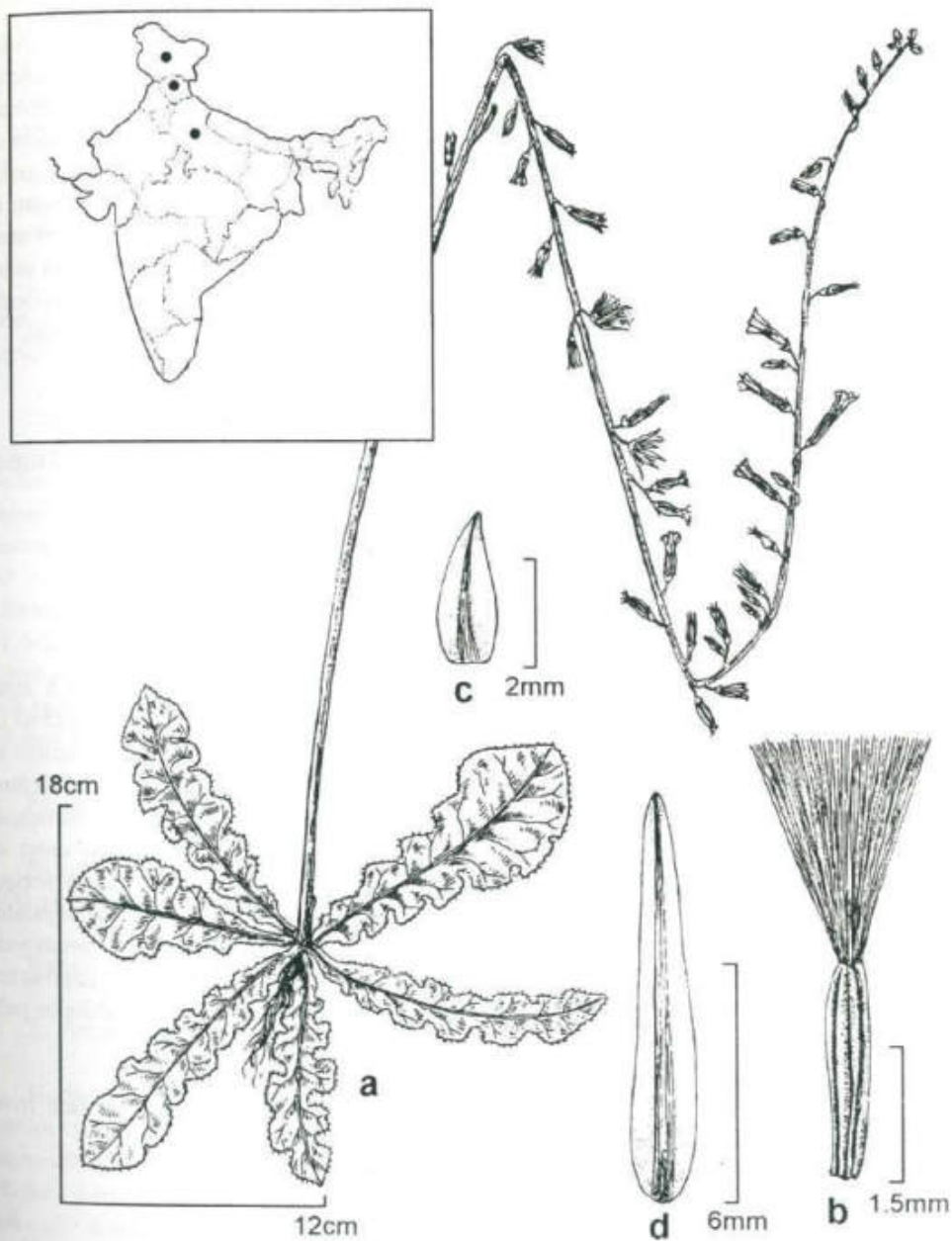


Fig. 80. *Launaea secunda* (Royle ex C.B. Clarke) Hook.f. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

Herbs, perennial with stoloniferous rhizomes; stems 25-95 cm high, erect with solitary flowering branch or more than one flexible shoots. Leaves mostly radical, runcinate or lyrate-pinnatifid, irregularly lobulate, sharply dentate, with unequal lobes, 5-23 x 1.5-4.5 cm, glabrous or sparsely hairy; cauline leaves few or rare. Inflorescence fascicled or in subsessile racemes. Heads 1-1.4 x 0.3-0.4 cm, erect, narrow, sub-sessile; peduncle with few minute bracts. Involucral bracts two or three seriate; outer ovate or obovate, 2-3 x 1-1.2 mm, glabrous; inner linear or linear-lanceolate, 9-11 x 1.5-2.0 mm, finely glabrous. Ligules yellow. Stigma bifid, equal or slightly longer than corolla tube. Achenes pale, columnar and slightly angular, somewhat oblong, 2-2.2 mm long, smooth, truncate at both ends. Pappus white or pale-white, 3-5 mm long, smooth, unequal.

*Fl. & Fr.* May - Nov.

*Distrib.* India: W. Himalayas on open dry and shady slopes 1500-3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Afghanistan and Nepal.

#### 7. *Prenanthes* L.

Herbs, annual, biennial or perennial with white latex; roots simple with a stout rootstock; stems very variable, erect, rarely ascending, glabrous or hispid, branched or solitary. Leaves very variable, alternate, ovate, oblong, sagittate or cordate, entire or obscurely sinuate toothed, pinnatifid or lyrate or variously lobed, pubescent or glabrous, usually petioled; upper leaves sessile, often stem-clasping. Inflorescence terminal, fascicled, racemose, sub paniculate, subsolitary or broadly paniced. Heads erect or drooping; peduncle slender, often bracteate. Involucral bracts in two or three series; outer ovate or ovate-lanceolate, unequal; inner linear-oblong, obtuse. Florets all ligulate; ligules 5-toothed; corolla purple, whitish, pinkish, violet or blue. Stamens 5, appendaged; anthers pinkish. Style branches slender; stigma bifid, purple or pink. Achenes contracted at both ends, without beak, slightly compressed, 3-5 angled, ribbed. Pappus white or pale whitish, brittle, simple, slender.

S. Africa, Canary Island, Mediterranean region, Europe, Asia and America from temperate to subalpine region; ca 40 species, 6 in India.

#### KEY TO THE SPECIES

- |  |                       |
|--|-----------------------|
| 1a. Rambling or climbing herbs   | 4. <i>P. scandens</i> |
| b. Erect herbs   | 2                     |
| 2a. Tall herbs; stems 20-150 cm tall, glabrous or hispid; inflorescence terminal, fascicled or broad paniced                         | 3                     |
| b. Short herbs; stems 10-100 cm high, quite glabrous, rarely with soft hairs; inflorescence racemose or subpaniculate or subsolitary | 5                     |



- 3a. Stems hispid or rarely glabrous, with long spreading hairs; leaves polymorphous; achenes narrowed downwards with rounded apex 1. *P. brunoniana*
- b. Stems quite glabrous or sparsely hairy with small soft hairs; leaves not polymorphous; achenes narrowed at both ends 4
- 4a. Leaf margins without ciliate teeth; achenes pale brown or dark brown 5. *P. sikkimensis*
- b. Leaf margins with ciliate teeth; achenes blackish 3. *P. khasiana*
- 5a. Stems 10-50 cm high; petiole 5-15 cm long; achenes broader, pale brown 6. *P. violaeifolia*
- b. Stems 20-100 cm high; petiole much shorter than above; achenes narrow, dark brown 2. *P. hookeri*

1. *Prenanthes brunoniana* Wallich ex DC., Prodr. 7: 195. 1838; Hook.f., Fl. Brit. India 3: 411. 1881. *Prenanthes raphanifolia* DC., Prodr. 7: 195. 1838. *Prenanthes hispidula* DC., Prodr. 7: 195. 1838. Fig. 81.

Herbs, annual or biennial; stems 30-150 cm high, erect, glabrous or hispid, slender, simple with many spreading branches. Leaves very variable, ovate, oblong, truncate or cordate at base, obtuse or acute, entire or often pinnatifid, 3-25 x 1.5-15 cm; lower leaves membranous or sparsely pubescent; upper leaves simple, pubescent, sessile or narrowed into short petiole, auricled or winged. Heads fascicled, narrowly cylindrical, 1.3-2.0 x 0.1-0.2 cm, erect; peduncle erect, slender. Outer involucral bracts blackish or yellowish, ovate or ovate-lanceolate, 2-5 x 1-2 mm, unequal; inner linear-oblong, 10-16 x 1.5-2.5 mm. Ligules purple white, pink, violet or blue. Stigma purplish or pinkish. Achenes pale brown or blackish brown, narrowly oblong, 5-8 mm long, compressed at both ends, contracted at the tip with rounded apices. Pappus white or pale brownish, 4.5-7.5 mm long, bristly.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: W. Himalayas on alpine meadows or moist or shady slopes, 1800-4500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Bhutan, China, Pakistan and Iran.

2. *Prenanthes hookeri* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 412. 1881.

Herbs, biennial or perennial; stems 20-100 cm high, simple or branched, glabrous, slender or stout. Leaves hastate or cordate, obtuse, entire or sinuate-dentate, 3-8 x 2-6 cm; petiole, short, usually winged, dilated or auricled; uppermost leaves ovate or oblong. Inflorescence racemose or paniced. Heads cylindrical, 12-13 x 0.2-0.3 cm, drooping; peduncle short, bracteate, slender. Outer involucral bracts ovate or ovate-lanceolate, 1.5-3 x 1-2.5 mm; inner oblanceolate or linear-oblanceolate or linear-oblong, 11-12 x 1.2 mm. Ligules blue or purplish. Achenes oblanceolate-narrowly elliptic, 5-6 mm long. Pappus pale white, 5-6 mm long.

*Fl. & Fr.* Sept. - Nov.

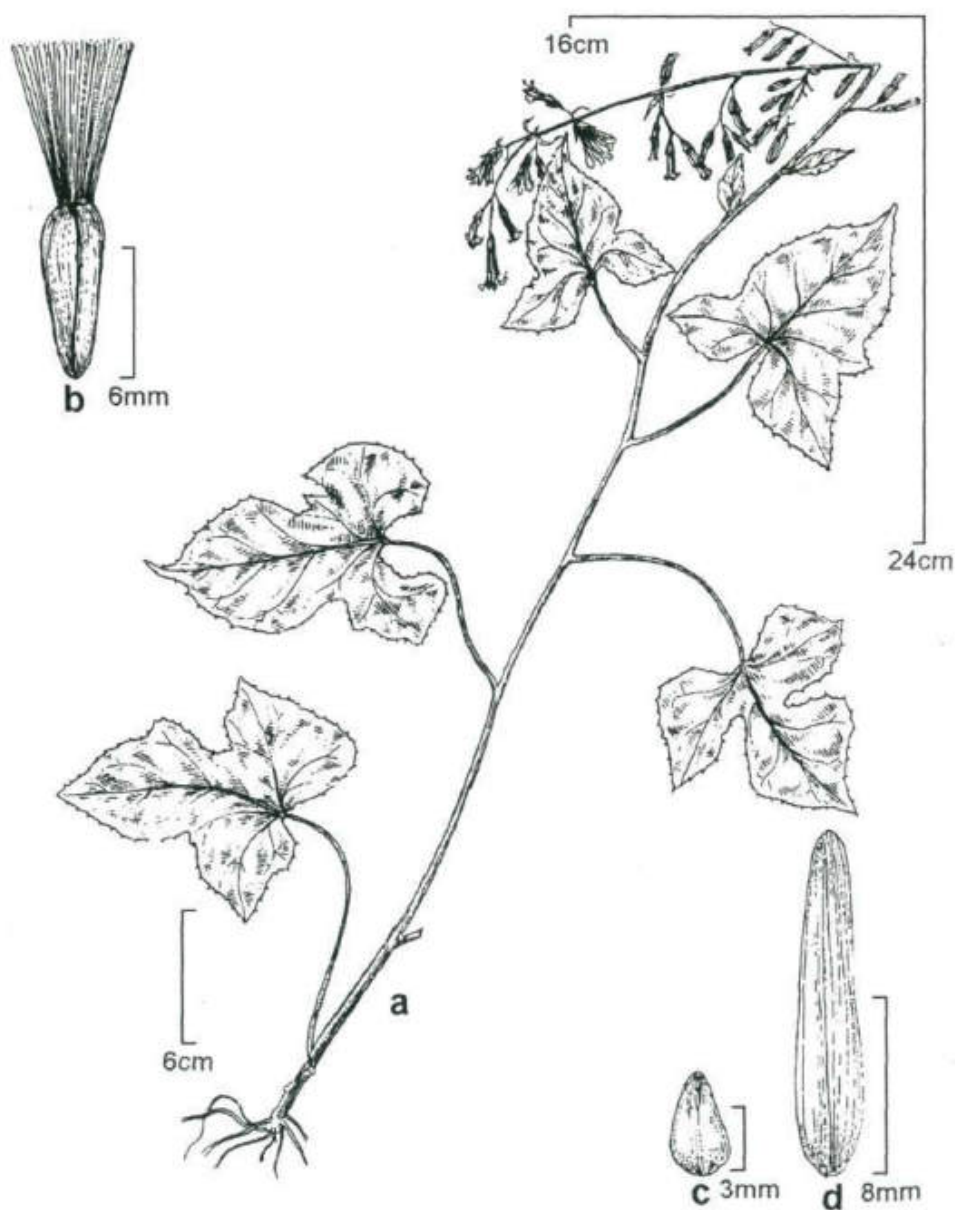


Fig. 81. *Prenanthes brunoniana* Wallich ex DC. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

*Distrib.* India: N.E. Region, on exposed shady slopes and in tropical pine forests, 1500-2500 m. Assam, Meghalaya and Arunachal Pradesh.

3. *Prenanthes khasiana* C.B. Clarke, Comp. Ind. 273. 1876.

Herbs, tall, annual or biennial; stems 50-120 cm high, slender, erect. Leaves 8-10 x 3-6 cm; lower usually with pair of pinnules, deltoid, oblong or ovate, cordate, usually 3-lobed; long petioled; upper leaves lanceolate or oblong-lanceolate, pinnatifid. Inflorescence paniced. Heads on a long paniced branch, cylindric, 1.2-1.3 x 0.1-0.2 cm drooping; peduncle stout, slender. Outer involucral bracts ovate or ovate-lanceolate, 1-1.5 x 0.5-1.0 mm; inner lanceolate or linear-lanceolate or linear, obtuse, 10-12 x 1-1.5 mm. Ligules bluish, purple. Achenes blackish brown, or blackish, oblanceolate, 5-6 mm long, highly compressed, truncate and rounded at apex. Pappus dirty white or yellowish, 4-6 mm long.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: In open exposed slopes, 1500-3000 m Meghalaya.

4. *Prenanthes scandens* Hook.f. & Thomson ex C.B. Clarke, Comp. Ind. 274. 1876; Hook.f., Fl. Brit. India 3: 413. 1881.

Herbs, tall, flaccid, rambling or climbing; stems slender, zig-zag, glabrous, puberulous. Leaves ovate or triangular-ovate, acuminate, cordate or hastate, 5-10 x 3-5 cm, ciliate or spinous towards margins, glaucous beneath; petiole slender, shorter than blade. Heads cylindric 1-2.5 x 0.3-0.4 cm, suberect or pendulous. Outer involucral bracts ovate or linear-ovate, 1-1.5 x 1-3 mm; inner linear-oblong or linear-oblanceolate, 13-14 x 1.5-2 mm. Ligules reddish purple; corolla 5-toothed. Achenes blackish brown, 4-5 mm long, slender, thickened at the base and gradually narrowed at apex. Pappus dirty white, 6-8 mm long, slender, deciduous.

*Fl. & Fr.* Sept. - Dec.

*Distrib.* India: E. Himalayas, on alpine meadows, between 3000-4000 m. Arunachal Pradesh and Sikkim.

5. *Prenanthes sikkimensis* Hook.f., Fl. Brit. India 3: 412. 1881.

Herbs, annual or biennial; stems 50-150 cm tall, erect, glabrous or rarely sparsely pubescent. Leaves deltoid entire or sinuate-toothed, with rounded lobes with a pair of pinnules, 15-20 x 3-5 cm, membranous, glabrous beneath with distinct, pale midrib. Inflorescence broad paniced. Heads 1.5-1.7 x 0.3-0.4 cm, pendulous; peduncle 1-2 cm long, slender. Outer involucral bracts ovate or ovate-lanceolate, 3.0-4.5 x 1-1.5 mm,

unequal; inner linear-oblong or linear obtuse, 15-18 x 2-2.5 mm. Ligules purple. Achenes pale brown or dark brown, fusiform, 5.5-7 mm long, narrowed at both ends; ribs smooth. Pappus milky white, 6-8 mm long, brittle.

*Fl. & Fr.* Aug. - Nov.

*Distrib.* India: W. Himalayas, and E. Himalayas on exposed moist slopes in temperate broad leaved forests, 2000-6000 m Jammu & Kashmir, Uttar Pradesh and Sikkim.

**6. *Prenanthes violaefolia*** Decne. in Jacq. Voy. 4. Bot. 100. t. 108. 1844; Hook.f. Fl. Brit. India 3: 412. 1881.

Herbs, biennial or perennial; stems 10-50 cm high, slender, glabrous or with soft hairs, erect, solitary or sparingly branched. Leaves ovate-cordate, deltoid, hastate, sinuate-toothed or entire, 2-8 x 1.5-9.5 cm, auricled; petiole long, simple, winged or dilated at the base. Heads 1.3-2.5 x 0.3-0.5 cm including the ligules, pendulous; peduncle 1.5-10 cm long, slender, drooping. Outer involucral bracts ovate or ovate-lanceolate, 1.5-4 x 1-1.5 mm, unequal; inner linear, obtuse, 11-16 x 1.5-3.0 mm. Ligules purple, blue or violet. Achenes oblanceolate, ellipsoid, pale brownish, 5-7 mm long, narrowed at both ends. Pappus milky white, 6-9 mm long, simple, brittle.

*Fl. & Fr.* Sept. - Nov.

*Distrib.* India: E. Himalayas and W. Himalayas on high elevation, 2500-4500 m Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

### 8. *Reichardia* Roth

Herbs, annual or perennial, milky; stems stout, usually glabrous. Leaves radical as well as cauline, alternate, usually obovate or obovate-elongate or spatulate, denticulate or runcinate-pinnatifid; toothed or pinnatifid; lobes often crisped and toothed or spinulose; cauline leaves linear-oblong. Heads usually campanulate or broadly cylindrical, peduncled; peduncle bracteate. Involucral bracts many seriate; outer ovate or ovate-cordate, thinly herbaceous; inner subequal, oblong or linear oblong or linear-oblanceolate. Ligules usually yellow; corolla 5-toothed. Stamens 5, appendaged; anthers slender, base sagittate. Stigmatic branches slender. Achenes oblong, truncate at both ends with rounded or raised ribs, constricted at the tip. Pappus white, many seriate, slender, simple, soft.

Europe, N. Africa, W. Asia and Canaries from tropical to subtropical regions; ca 15 species, 1 in India.

*Reichardia tingitana* (L.) Roth, Bot. Abh. 35. 1787. *Scorzonera tingitana* L., Sp. Pl. 791. 1753. *Picridium tingitanum* Desf., Fl. Atlant. 2: 220. 1799. Hook.f., Fl. Brit. India 3: 413. 1881.

Herbs, annual or biennial; stems 12-40 cm high, stout, usually glabrous or with sparse hairs. Leaves very variable, usually radical, obovate or obovate-elongate or spatulate, obtuse, entire, sinuate-toothed, pinnatifid or runcinate-pinnatifid, 2.2-10 cm long. Heads 2-2.3 x 1.5-2 cm; peduncle thick, covered with many bracts. Outer involucre bracts ovate or ovate-cordate, 7-10 x 5-6.5 mm, glabrous, with broad scarious margins; inner oblong or linear-oblong or linear-oblongate, 12-15 x 4-5.5 mm, glabrous. Ligules yellow; corolla 5-toothed. Achenes 2-2.5 mm long, truncate, strongly 4-6-angled, with rounded, raised or moniliform ribs. Pappus white, 6-7 mm long, simple.

#### KEY TO THE VARIETIES

- 1a. Stems robust; leaves usually entire or obscurely denticulate. 1.1. var. *subintegra*  
 b. Stems not robust; leaves usually with toothed margins 1.2. var. *tingitana*

1.1. var. *subintegra* (Boiss.) Mangain & Rao in J. Bombay Nat. Hist. Soc. 86(2): 273. 1989. *Picridium tingitanum* Desf. var. *subintegra* Boiss., Fl. Orient. 3: 828. 1875. Fl. & Fr. July - Nov.

*Distrib.* India: Rajasthan (Ajmir).

Afghanistan.

1.2. var. *tingitana*

Fl. & Fr. July - Oct.

*Distrib.* India: Gangetic plains on wastelands, up to an altitude 500 m. Uttar Pradesh (Fattehgarh).

#### 9. *Sonchus* L.

Herbs, annual or perennial with white latex; roots simple or with stout rootstock; stems erect, glabrous or sparsely hairy or even glandular hairy, somewhat angular and sometimes finely grooved. Leaves radical as well as cauline, very variable in shape, size and lobation; radical lanceolate or ovate-oblongate; cauline often with rounded, toothed auricles, stem-clasping, entire or spinous toothed, pinnatifid or runcinate-pinnatifid. Heads broadly campanulate, glabrous or sparsely hairy or even pilose glandular hairy, sometimes with white tomentum; peduncle slender, glabrous or hispid or glandular hairy. Involucre bracts usually in many series, herbaceous; outermost lanceolate, oblong-

oblanceolate; inner oblong or oblanceolate or linear-oblanceolate. Florets all ligulate; corolla yellow. Stamens 5, appendaged. Style slender; stigma bifid. Achenes ovoid, oblong or oblanceolate, ellipsoid, ribbed, without beak, muricate between the ribs, smooth or rugose. Pappus white bristly or bright, few to many seriate, simple.

Cosmopolitan weedy genus; ca 50 species. 5 in India.

*Literature.* BOULOS, L. (1960). Cytotaxonomic studies in the Genus *Sonchus*. *Bot. Not.* 113: 400-420. BOULOS, L. (1972). Revision systematique du Genere *Sonchus* L.S.I. 1. Introduction et classification. *Bot. Not.* 125: 287-305. BOULOS, L. (1973). Revision systematique du Genere *Sonchus* L.S.I. IV. Sous-genere 1- *Sonchus*. *Bot. Not.* 126: 155-196.

#### KEY TO THE SPECIES

- |  |                         |
|--|-------------------------|
| 1a. Basal leaves in spirals; pappus hairs heteromorphous   | 3. <i>S. jainii</i>     |
| b. Basal leaves usually rosulate; pappus hairs homomorphous  | 2                       |
| 2a. Non rhizomatous or rarely rhizomatous; annual or biennial, rarely perennial                            | 3                       |
| b. Rhizomatous with a long or stout rhizome; perennial   | 4                       |
| 3a. Leaves with acute auricles   | 4. <i>S. oleraceus</i>  |
| b. Leaves with obtuse auricles   | 1. <i>S. asper</i>      |
| 4a. Stems glabrous or glandular hairy; heads glandular hairy, or densely white tomentose; achenes elliptic | 5. <i>S. wightianus</i> |
| b. Stems glabrous; head nonglandular or with simple hairs at base; achenes oblong-oblanceolate             | 2. <i>S. brachyotus</i> |

1. *Sonchus asper* (L.) Hill. *Herb. Brit.* 1: 47. 1769; Hook.f. *Fl. Brit. India* 3: 414. 1881. *Sonchus oleraceus* var. *asper* L., *Sp. Pl.* 794. 1753. **Fig. 82.**

Eng.: *Rough sow thistle*; Hindi: *Didhi*; Mar.: *Mahatra*.

Herbs, annual; stems 14-70 cm high, erect, glabrous or sparsely glandular. Leaves variable in shape, lanceolate or ovate-oblanceolate, 5-25 x 1.5-8 cm; cauline pinnatifid or runcinate-pinnatifid spinous toothed, with rounded, toothed, auricle at base. Heads 1-1.8 cm, erect; peduncle flat, glabrous or with glandular hairs. Involucral bracts in many series; outermost lanceolate, 5-7 x 1.5-2 mm; innermost lanceolate or oblong-lanceolate, 9-12 x 2-2.5 mm. Ligules yellow. Achenes 3-4 mm long, compressed, 3-ribbed, faintly muricate between the ribs. Pappus creamy white, 7-8 mm long, few seriate.

*Fl. & Fr.* April - Sept.

*Distrib.* India: Throughout, by the road sides, wastelands and cultivated fields ascending up to 3500 m.

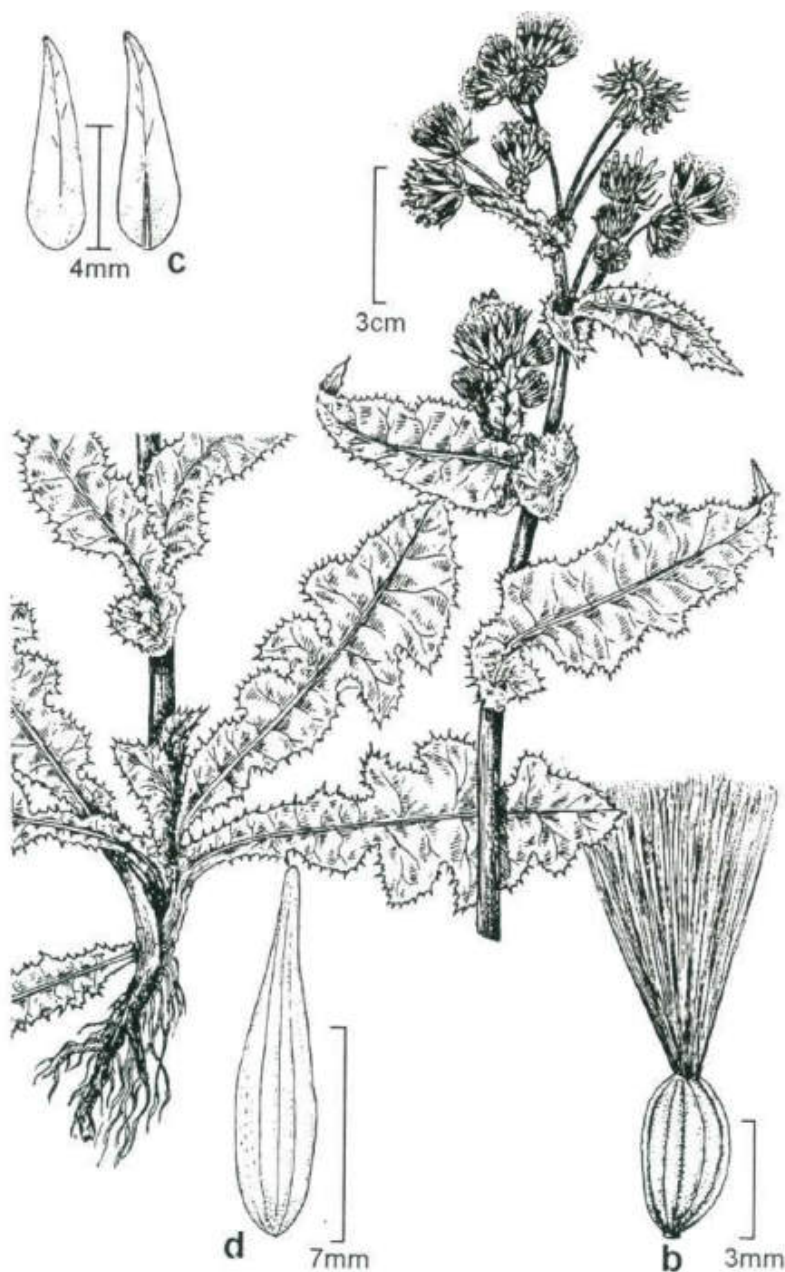


Fig. 82. *Sonchus asper* (L.) Hill. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

Pakistan, Afghanistan, Iran, Iraq, C. Asia, Syria, Morocco, Algeria, Egypt, Libya, Ethiopia, Africa, Europe, N. America and S. America.

**2. *Sonchus brachyotus* DC.**, Prodr. 7: 186. 1838. *Sonchus arvensis* L. var. *glaber* Haines, Bot. Bihar & Orissa 2: 522. 1922.

Herbs, perennial, rhizomatous; stems 20-190 cm tall, erect, slender, terete, branched from the base. Leaves often radical, 5-15 x 1-3 cm; cauline glabrous, entire or spinous-toothed, rounded or acute at apex glabrous, with short, obtuse auricles. Heads cylindrical, 1.5-2 x 1-1.5 cm, slightly tomentose at the base, erect; peduncles 2.5-8 cm long, slender, terete, glabrous or sparsely white tomentose, without glandular hairs. Involucral bracts many seriate; outer ovate or ovate-lanceolate 3-8 x 1-2.5 mm; inner linear or linear-lanceolate, 12-15 x 2-2.5 mm. Ligules yellow. Stigma yellowish. Achenes dark yellowish or pale brownish, oblong or somewhat oblong-ob lanceolate, 3-3.5 mm, compressed, smooth. Pappus white, bright, 8-9 mm long, few seriate.

*Fl. & Fr.* March - Nov.

*Distrib.* India: Along the foot tracts in tropical forests and temperate broad-leaved forests ascending upto 3500 m. Himachal Pradesh, Punjab, Madhya Pradesh and Arunachal Pradesh.

Tibet, China, Thailand, Korea, Japan & C. Asia, Mongolia and C.I.S.

**3. *Sonchus jainii* Chandrabose et al.** in J. Bombay Nat. Hist. Soc. 81: 149-151. 1984.

Herbs, erect; stems 30-75 cm high, glabrous. Leaves in spirals, close in the lower portion, distant above, 2-16 x 1-4.5 cm; lower ones narrowly oblong, sinuately lobed or pinnatifid with ovate-acute or oblong, obtuse segments, glabrous, auricled at base; upper ones simple, ovate-lanceolate, glabrous, acute or acuminate, amplexicaul at base. Heads in terminal fascicled racemes or panicles, campanulate, 1.7-2 x 1.5-2 cm. Involucral bracts many seriate, 6-15 x 2.5-4 mm, coriaceous, glabrous, except a few hairs at the tip; outer ovate or ovate-lanceolate; inner longer, oblong-lanceolate. Ligules yellow; corolla tube pubescent. Anthers linear-oblong, connate. Ovary linear-oblong, ribbed, glabrous. Achenes brown, linear-oblong 5 x 1 mm, compressed, strongly 4-ribbed with 2 faint longitudinal nerves in between, smooth, glabrous. Pappus simple.

*Fl. & Fr.* Nov. - Dec.

*Distrib.* India: W. Ghats on grassy slopes, ca 2000 m. Tamil Nadu.



*Notes.* *Sonchus jainii* is closely allied to *Sonchus wightianus* subsp. *walichianus*. Perhaps an Ecotype of the latter. Biosystematic studies are essential to understand the specific limits of this taxon.

4. *Sonchus oleraceus* L., Sp. Pl. 794. 1753; Hook.f., Fl. Brit. India 3: 414. 1881. ✓  
Fig. 83.

Eng.: *Milk weed*; Hindi: *Dudhi*; Mar.: *Pathari*; Punj.: *Dodak*; Tel.: *Ratrinata*.

Herbs, annual; stems 15-150 cm tall, erect, glabrous, slightly angular and finely grooved. Leaves very variable, 8-30 x 4-8 cm; basal leaves with long wing-like petiole; cauline often stem-clasping, auricled. Inflorescence corymbosely umbelled. Heads campanulate, crowded, 1-1.8 x 0.8-1.6 cm, erect, often glandular hispid; peduncle small, flat. Involucral bracts many seriate, imbricate; outermost somewhat oblanceolate, 4-7 x 1-2 mm; innermost oblong or oblanceolate, 9-12 x 1.5-2.5 mm. Ligules bright yellow. Achenes oblanceolate, obovoid, compressed, 3.4-4 mm, 3-5 ribbed, distantly muricate between the ribs; ribs smooth or transversely rugose. Pappus white, 6-8 mm long, copious, bristly.

*Fl. & Fr.* March - Nov.

*Distrib.* India: Throughout, on walls, moist slopes near cultivated fields in tropical, subtropical and temperate regions, ascending upto 3000 m.

Afghanistan, Pakistan, Nepal, Bhutan, China, Iraq, Iran, Europe, Australia, N. America, and S. America.

✓ 5. *Sonchus wightianus* DC., Prodr. 7; 187. 1838. *S. arvensis* auct. non L.; Hook.f. Fl. Brit. India 3: 414. 1881, p.p.

Beng.: *Banpalang*; Eng.: *Corn sow thistle*; Hindi.: *Sadhi*; Kh.: *Ki-au-Jiat*; Punj.: *Bhangra*; Tel.: *Nallatapata*; Urdu: *Sabadavi*.

Herbs, perennial, with long cylindric rhizome or rootstock; stems 20-120 cm tall, glabrous or densely pilose-glandular hairy, umbellately branched above. Leaves 6-35 x 2-5.5 cm; basal rosulate, pinnatifid or runcinate-pinnatifid; flattened or winged, auricled; cauline leaves lanceolate or narrowly oblanceolate with toothed auricle; upper most leaves lanceolate, often acutely auricled. Heads cylindric, broadly campanulate, 1.2-2 x 1-2 cm, erect, densely pilose-glandular hairy, often mixed with white woolly tomentum at the base; peduncle long, densely pilose or glandular hairy, often with white tomentum. Involucral bracts many seriate; outer ovate or ovate-lanceolate, 5-9 x 1-2 mm, densely

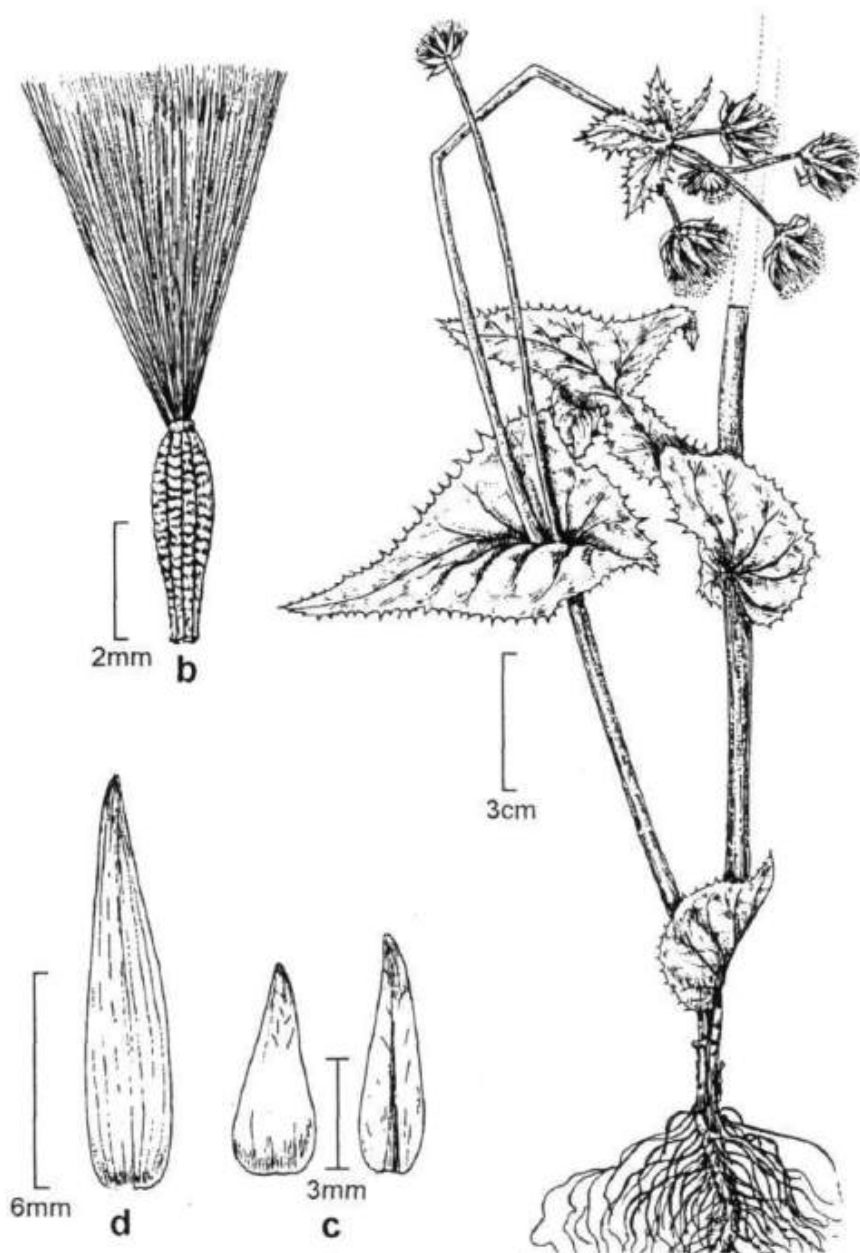


Fig. 83. *Sonchus oleraceus* Linn. : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

pubescent-glandular; innermost oblong or oblanceolate, 11-14 x 1.5-2.5 mm. Florets many in each capitula; ligules yellow. Stigma yellowish. Achenes brownish, elliptic, 3-4.5 mm long, scarcely compressed, transversely rugose, smooth. Pappus milky white, 6-10 mm, copious, many seriate.

#### KEY TO THE SUBSPECIES

- 1a. Stems glabrous; heads densely white tomentose 5.1 subsp. *Wallichianus*  
 b. Stems glandular hairy; heads glandular hairy, often mixed with white tomentum at the base 5.2. subsp. *Wightianus*

5.1. subsp. *wallichianus* (DC.) Boulos in Bot. Not. 125: 197. 1972. *Sonchus wallichianus* DC., Prodr. 7: 185. 1838.

*Fl. & Fr.* April - Nov.

*Distrib.* India: Bihar and Assam.

Nepal, Bhutan, Afghanistan and Pakistan.

5.2. subsp. *wightianus* Fig. 84.

*Fl. & Fr.* Throughout the year.

*Distrib.* India: Throughout, on old walls, roadsides, bank of rivers and streams, 300-3000 m.

Nepal, Bhutan, Myanmar, China, Pakistan, Afghanistan, Indonesia and Philippines.

#### 10. *Youngia* Cass.

Herbs, annual or perennial with white latex; roots simple or rootstock stout; stem erect, stout or sometimes dwarf, glabrous or puberulous, solitary or branched; branches corymbosely spreading. Leaves chiefly radical, rarely alternate, rosulate, oblanceolate, obovate, spatulate, sinuate-toothed, often variously lobed; cauline leaves usually few, linear or linear-lanceolate. Inflorescence corymbosely paniced or terminal. Heads cylindric, erect; peduncle slender. Involucral bracts usually 2-3 seriate; outer ovate or obovate inner linear-lanceolate or oblong-lanceolate. Ligules yellow, 5-toothed. Stamens 5, appendaged; anthers slender, base sagittate. Stigma bifid; branches slender. Achenes brown, reddish brown, compressed or angular, narrowed into a stout beak, irregularly ribbed. Pappus white or silvery or dirty white, soft, simple.

Himalayan region eastwards to Japan from tropical, subtropical, temperate to alpine regions; ca 35 species, 13 in India.

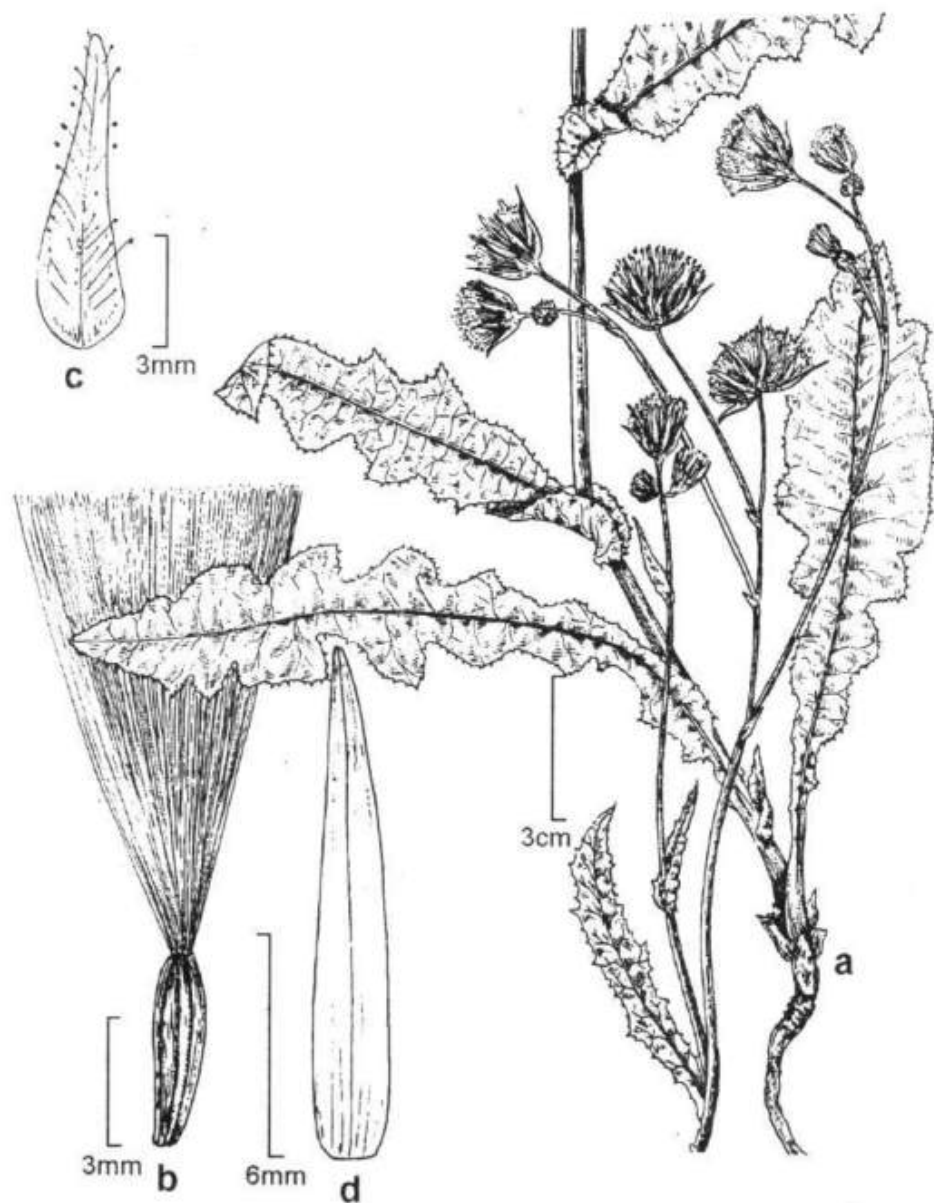


Fig. 84. *Sonchus wightianus* DC. subsp. *wightianus* : a. Habit; b. Achene; c. Outer bract; d. Inner bract.

*Literature.* BABCOCK, E.B. & G.L. Jr. STEBBINS (1937). The genus *Youngia* *Carn. Inst. Wash. Publ.* no. 484. 106.

## KEY TO THE SPECIES

- 1a. Annual or perennial herbs; flowering branches long, usually many from the root or rootstock; heads few numerous 2  
 b. Perennial herbs; stems or flowering branches very short, stout, few from the rootstock; heads few, often solitary 9  
 2a. Annuals; densely corymbosely branched above 3  
 b. Perennials; broadly or loosely corymbosely branched above 6  
 3a. Pappus greyish 3. *Y. fuscipappa*  
 b. Pappus white or yellowish 4  
 4a. Achenes longer than the pappus 4. *Y. glauca*  
 b. Achenes equal to or shorter than the pappus 5  
 5a. Heads numerous, 4-6 mm long; peduncle bracteolate 7. *Y. japonica*  
 b. Heads few, 8 mm long; peduncles ebracteolate 12. *Y. stebbinsiana*  
 6a. Stems quite glabrous, grooved; leaves usually divided into many unequal lobes or segments; involucre glabrous or sparsely pubescent 13. *Y. tenuifolia*  
 b. Stems glabrous or sparsely pubescent, not grooved; leaves thick, obovate or obovate-spathulate, with no segments; involucre densely tomentose 7  
 7a. Radical leaves not tapering; petiole usually simple, short, without wings, base simple 6. *Y. hondae*  
 b. Radical leaves tapering to a long, simple or winged petiole 8  
 8a. Achenes 5-6 mm long, pappus 2-3 seriate 8. *Y. nilgiriensis*  
 b. Achenes 4-4.5 mm long; pappus uniseriate 1. *Y. cineripappa*  
 9a. Heads broad, campanulate 10  
 b. Heads cylindrical 11  
 10a. Achenes columnar, subterete or 4-angled; pappus 10-11 mm long 11. *Y. simultarix*  
 b. Achenes compressed; narrowed at both ends, not angled; pappus 7-8.5 mm long. 5. *Y. gracilipes*  
 11a. Flowering stems absent or very short; heads few; achenes 5-6 mm long with a pale beak 2. *Y. depressa*  
 b. Flowering stems present, stout; heads few to many; achenes 3-4 mm long without a pale beak 12  
 12a. Plants quite glabrous; radical leaves narrowed into a short petiole, quite entire or obscurely toothed 10. *Y. silhetensis*  
 b. Plants glabrous or puberulous; radical leaves narrowed into a long, winged petiole, usually sinuate toothed 9. *Y. racemifera*

1. *Youngia cineripappa* (Babcock) Babcock & Stebbins, Gen. *Youngia* 484: 62. f. 13. 1937. *Crepis cineripappa* Babcock in *J. Bot. London* 76: 324. 1928. *C. fuscipappa* Hook.f., *Fl. Brit. India* 3: 395. 1881, p.p. *non* Benth.

Herbs, perennial; stems 40-90 cm high with rhizomatous rootstock, simple or rarely branched above, erect, terete. Radical leaves obovate or oblanceolate, obtuse or acute, sinuate-runcinate or dentate, 4-22 x 4-5 cm, tapering into a winged petiole; cauline leaves 4-7, the lower similar to radical ones; uppermost linear. Inflorescence a terminal corymb. Heads small, erect; peduncle slender and glandular pubescent. Outer involucre bracts ovate or ovate-lanceolate, 5-6, 1-1.5 x 0.5 mm, acute; inner 8, lanceolate, obtuse or acute with scarious margins. Ligules yellow; corolla tube narrow, sparsely pubescent. Anther tube green, appendaged, base sagittate. Style branches yellow. Achenes fusiform,

4-4.5 x 0.6-0.8 mm, attenuate at apex, marginal ones dorsiventrally compressed, 12-ribbed. Pappus pale bluish, 4-5 mm long, persistent.

*Fl. & Fr.* May - June.

*Distrib.* India: E. Himalayas, in tropical broad leaved forests, 1200-1800 m. Sikkim and Meghalaya.

China and Myanmar.

2. *Youngia depressa* (Hook.f. & Thomson) Babcock & Stebbins in Carn. Inst. Wash. Publ. 484: 33.f.2. 1937. *Crepis depressa* Hook.f. & Thomson in Hook.f., Fl. Brit. India 3: 397. 1881.

Herbs, perennial with thick rootstock; stems absent. Leaves rosulate, ovate or rounded, rather fleshy, obscurely toothed or sinuate toothed, 3-6 cm long, usually 5-nerved from base, petioled. Heads numerous, 1.2 cm long, peduncle long. Outer involucre bracts ovate or ovate-lanceolate; inner linear-lanceolate or linear-oblong, with scarios margins. Ligules 5-toothed. Achenes dark brown, fusiform, 5-6 mm long, very slender, beaked, ribbed. Pappus white, 7-10 mm long, smooth.

*Fl. & Fr.* July - April.

*Distrib.* India: E. Himalayas in alpine meadows, 4000-5500 m. Sikkim.

Tibet.

3. *Youngia fuscipappa* Thw., Enum. Pl. Zeyl. 168. 1864. *Crepis fuscipappa* (Thw.) C.B. Clarke, Comp. Ind. 254. 1876; Hook.f., Fl. Brit. India 3: 395. 1881, *p.p. non* Benth.

Herbs, annual, erect; stems 30-100 cm high, slender, simple or sparingly forked. Leaves, obovate or oblanceolate, pinnatifid or sinuate-lobed, elongate, acute or acuminate, 10-25 x 1.2-1.6 cm, petioled; cauline leaves linear or lanceolate 4-6 cm long. Heads few cylindrical 5-6 mm long; peduncle slender, naked. Outer involucre bracts small, ovate or ovate-triangular; inner linear or linear-lanceolate or linear, subacute. Corolla tube slender, 5-toothed. Anthers very slender. Achenes red brown, narrowly fusiform, compressed, 3-4 mm long, hardly beaked, minutely scabrid, about equalling the pappus. Pappus grey, soft, grey.

*Fl. & Fr.* April - Nov.

*Distrib.* India: E. Himalayas and W. Ghats on exposed slopes, ascending up to 2000 m. Sikkim, Meghalaya and Tamil Nadu.

4. *Youngia glauca* Edgew. in Trans. Linn. Soc. 20: 79. 1846. *Crepis flexuosa* (DC.) C.B. Clarke, Comp. Ind. 254. 1876, non Ledeb. *Crepis glauca* Benth. in Gen. Pl. 2: 515. 1873; Hook.f., Fl. Brit. India 3: 394. 1881.

Herbs, annual, stems 15-35 cm high, quite glabrous, corymbosely branched; branches divaricate, slender, spreading. Radical leaves few, obovate, spatulate, sinuate-toothed, pinnatifid or pinnate; lobes various, acutely cut; long petioled; cauline leaves linear, entire, sessile. Heads terminal and sublateral, narrow 1-1.3 cm, few flowered; peduncle slender, naked. Outer involucral bracts minute, ovate or obovate, glabrous. Ligules yellow. Achenes 4-5 mm long, hardly beaked, very slender, obscurely scabrid, longer than the pappus. Pappus white, simple.

*Fl. & Fr.* May - Sept.

*Distrib.* India: W. Himalayas on alpine meadows; 3000-4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

*Note.* There is no specimen of this either at BSD, DD or CAL. Evidently very rare.

5. *Youngia gracilipes* (Hook.f.) Babcock & Stebbins in Carn. Inst. Wash. Publ. 484: 40.f.6. 1937. *Crepis gracilipes* Hook.f., Fl. Brit. India 3: 396. 1881. Fig. 85.

Herbs, perennial with creeping rootstock; stems dwarf, 8-20 cm high, glabrous, with few, slender, flowering branches. Leaves mostly radical, spatulate, glabrous, variously-lobed, dentate, sinuate-lobed or pinnatifid, 4-10 x 0.7-1.3 cm, pale beneath, green above. Heads broadly blackish, cylindrical, 0.8-1.3 x 0.4-0.6 cm; peduncle very slender, short or sometimes longer. Outer involucral bracts ovate or obovate, 1-2 x 0.5-1 mm; inner broadly linear-lanceolate or linear, subacute, 10-11 x 2-2.5 mm. Ligules yellow. Stigma bifid, equal or slightly longer than corolla. Achenes dark brown or blackish, 3-4 mm long, narrowed or both ends, with stout apex, compressed. Pappus dirty-white, 7-8.5 mm long, soft, simple.

*Fl. & Fr.* July - Oct.

*Distrib.* India: On exposed alpine shady slopes, 3000-4000 m. Uttar Pradesh, Sikkim and Assam.

Nepal, Tibet and China.

6. *Youngia hondae* Kitam. in Acta. Phyto. Geobot. 19: 106. 1963.

*Distrib.* India: Jammu & Kashmir.

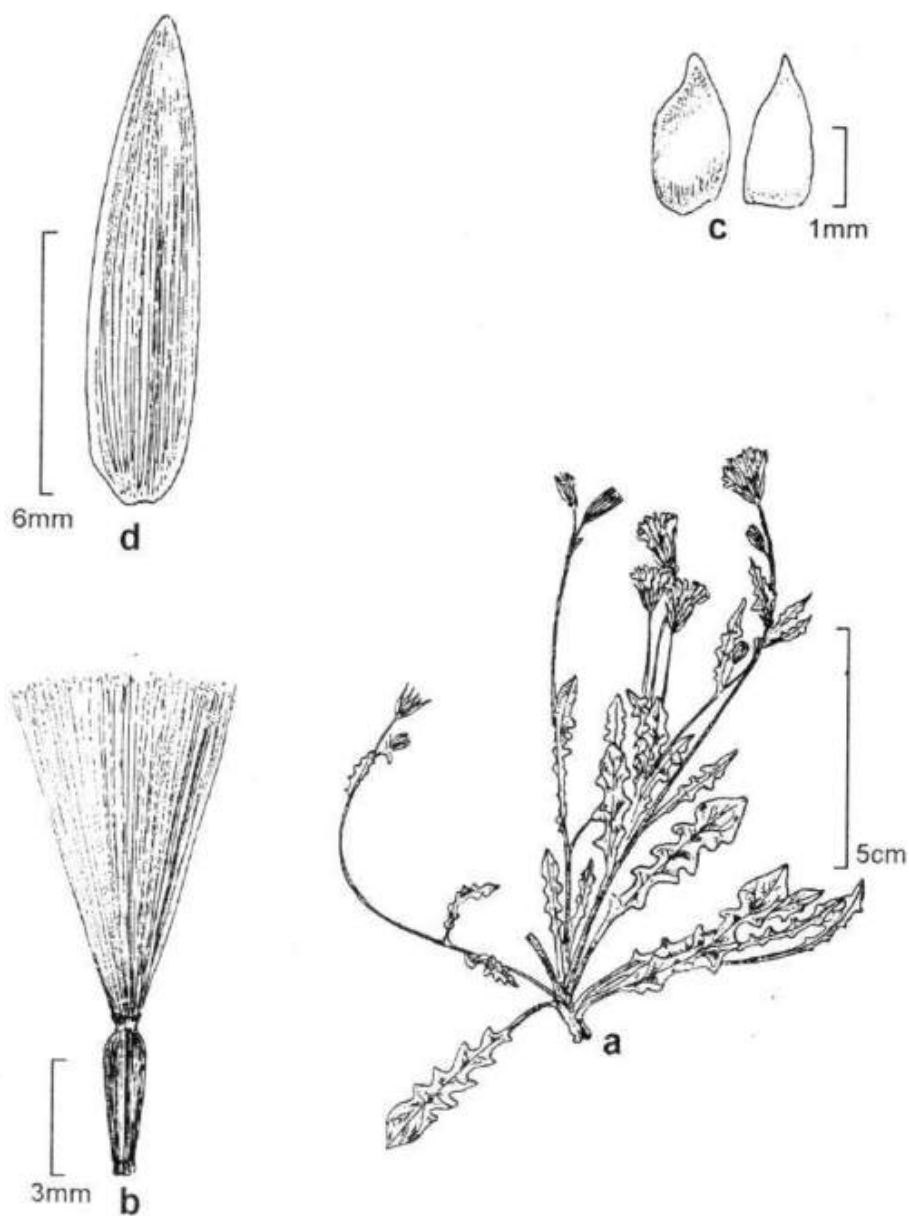


Fig. 85. *Youngia gracilipes* (Hook.f.) Babcock & Stebbins : a. Habit; b. Achene; c. Outer bracts; d. Inner bract.



*Notes.* Although this species has been reported from Kashmir, we have not been able to collect this plant nor the protologue of this species.

7. *Youngia japonica* (L.) DC., Prodr. 7: 194. 1838. *Prenanthes japonica* L., Mant. Pl. 107. 1767. *Youngia japonica* subsp. *genuina* (Hochr.) Babcock. & Stebbins in Carn. Inst. Wash. Publ. 484: 95. 1937.

Herbs, annual; stems minutely grooved, distinctly hollow, 15-75 cm high, erect with solitary or many flowering branches from the rootstock. Leaves chiefly radical, many from the base of the stem, rosulate, oblanceolate, obovate, sinuate-toothed or runcinate-pinnatifid, 5-18 x 1.5-5.5 cm; cauline leaves few, smaller, linear or somewhat lanceolate. Heads 0.5-0.8 x 0.2-0.3 cm, many flowered in cymose corymbs; peduncles slender. Outer involucre bracts ovate, 0.5-1 x 0.3-0.4 mm, glabrous; inner linear-lanceolate or oblong-lanceolate, 5-6 x 0.9-1.2 mm. Ligules yellow or orange yellow. Stigma bluish, exserted, bifid. Achenes dark reddish brown, compressed or angular, 2-3 mm long, contracted at both ends. Pappus white, 2.5-4 mm long, soft.

#### KEY TO THE SUBSPECIES

- |  |                             |
|--|-----------------------------|
| 1a. Involucre large, broadly cylindrical | 7.2. subsp. <i>japonica</i> |
| b. Involucre small, narrowly cylindrical | 7.1. subsp. <i>elstonii</i> |

7.1. subsp. *elstonii* Babcock & Stebbins in Carn. Inst. Wash. Publ. 484: 98. f. 29. 1937.

*Fl. & Fr.* Oct. - May.

*Distrib.* India: Uttar Pradesh.

7.2. subsp. *japonica*

*Fl. & Fr.* Oct. - April.

*Distrib.* India: W. Himalayas, on shady hill slopes or moist sandy soils, ascending up to 2300 m; Jammu & Kashmir, Himachal Pradesh, Punjab and Uttar Pradesh.

Afghanistan, Pakistan, Bhutan, China, Philippines, Malesia, Hawaii, Japan and Korea.

8. *Youngia nilgiriensis* Babcock in Kew Bull. 1939: 662. 1940.

Herbs, perennial; stems short, woody. Leaves 10-16 x 1.5-3 cm; basal oblanceolate, acute, lyrate-pinnatifid, with a narrow petiole, puberulous above, glabrous beneath; lower cauline leaves acuminate; upper lanceolate, acuminate, sessile. Heads 8-9 mm long,

blackish green or dark green, 12-13 flowered; peduncle glabrous. Outer involucre bracts unequal, 5-7, 2-3.5 mm long; inner 8, rounded at apex. Ligules yellow; corolla 9-10 mm long. Anthers 2 mm long. Style greenish. Achenes brownish subcompressed, 5 mm long, attenuate at apex. Pappus bluish grey, ca 5 mm long.

*Fl. & Fr.* Nov. - Dec.

*Distrib.* India: W. Ghats (Nilgiris), 2600-3500 m. Tamil Nadu.

Endemic.

**9. *Youngia racemifera*** (Hook.f.) Babcock & Stebbins in Univ. Calif. Publ. Bot. 18: 229.f. 2. 1943. *Crepis racemifera* Hook.f., Fl. Brit. India: 3: 397. 1881.

Herbs, perennial with a small rootstock; stems 12-50 cm high, very slender, glabrous or puberulous above. Leaves ovate or ovate-lanceolate, sinuate-toothed, acute 2-6 cm long, membranous, petioled; basal and middle cauline long petioled; petiole not auricled; upper leaves sessile. Heads campanulate, 10-15 x 10-12 mm long, usually drooping; peduncle erect, nodding at top, bracteate. Outer involucre bracts ovate or ovate-lanceolate; inner 6-10, usually green, blackish when dry, linear or linear-lanceolate, acute. Ligules yellow. Achenes shortly beaked, much shorter than the pappus. Pappus pale brown, brittle.

*Fl. & Fr.* July - Dec.

*Distrib.* India: E. Himalayas in temperate regions among firs and willows, 2500-4500 m. Sikkim. Rare.

Tibet.

**10. *Youngia silhetensis*** (DC.) Babcock & Stebbins in Carn. Inst. Wash. Publ. 484: 104. 1937. *Hieracium silhetense* DC., Prodr. 7: 218. 1838. *Crepis silhetensis* (DC.) Hook.f., Fl. Brit. India 3: 397. 1881.

Herbs, perennial with a stout woody rootstock; stems quite glabrous, branched; branches slender, erect. Leaves 12-30 x 0.6-1.5 cm, much narrowed at both ends; radical leaves usually linear-lanceolate, finely acuminate, entire or obscurely toothed, narrowed into a stout petiole. Inflorescence paniced. Heads numerous, cylindrical; peduncle slender, bracteate. Outer involucre bracts ovate or ovate-oblong; inner linear or linear-lanceolate, subacute. Ligules yellow. Achenes 2-3 mm long, slender, narrowed upwards from the middle, ribbed, glabrous. Pappus scanty brown or pale brown, rigid.

*Fl. & Fr.* July - Dec.

*Distrib.* India: N.E. India, on exposed slopes and fields. Meghalaya.

Myanmar.

11. *Youngia simulatrix* (Babcock) Babcock & Stebbins in Carn. Inst. Wash. Publ. No. 484: 40. 1937. *Crepis simulatrix* Babcock in Univ. Calif. Publ. 14: 329. 1928.

Herbs, perennial; stems low, stout, erect, simple or branched at the top. Leaves rosulate, oblanceolate, sinuately denticulate, obtuse or subacute, 3.5-4 x 1-1.2 cm, tapering in to a short, winged petiole. Heads broad campanulate 1.2-1.6 x 0.3-0.5 cm, erect, glabrous; peduncle stout. Outer involucre bracts 10-12, unequal, ovate-triangular or ovate-lanceolate; inner 8-12, lanceolate, acute or obtuse. Ligules yellow; corolla 5-toothed. Style slender, branches yellow. Achenes dark brown, columnar, 3.5-4 mm long, subterete or 4-angled, constricted at apex. Pappus yellowish, 10-11 mm long, persistent.

*Fl. & Fr.* Aug. - Nov.

*Distrib.* India: E. Himalayas in sandy places, 3000-5000 m, Sikkim.

Nepal and Tibet.

12. *Youngia stebbinsiana* S.Y. Hu in Quart. J. Taiwan Mus. 22 (1 & 2) : 32. 1969. *Youngia gracilis* (Hook.f. & Thomson ex C.B. Clarke) Babcock & Stebbins in Carn. Inst. Wash. Pub. 484. 67. 1937.

Plants almost glabrous; stems ca 90 cm high, erect, somewhat branched. Cauline leaves broadly lanceolate, acuminate, dentate or sinuate-subpinnatifid. Heads sparse. Involucre bracts 6-8, narrowly-oblong. Achenes terete, glabrous, apex narrow with or without a very stout beak. Pappus dirty white or yellowish brown.

*Fl. & Fr.* Feb. - Dec.

*Distrib.* India: E. Himalayas on open alpine shady slopes, between 2500-5000 m. Sikkim.

China.

*Notes.* Extremely rare. We have not been able to see any specimen of this in Indian Herbaria.

13. *Youngia tenuifolia* (Willd.) Babcock & Stebbins in Carn. Inst. Wash. Publ. 484: 46. f. 9-12. 1937. *Crepis tenuifolia* Willd., Sp. Pl. 3: 1605. 1803. *Youngia tenuifolia* subsp. *diversifolia* (Ledeb. ex Spreng.) Babcock & Stebbins in Carn. Inst. wash. pub. 484: 54. 1937.

Fig. 86.

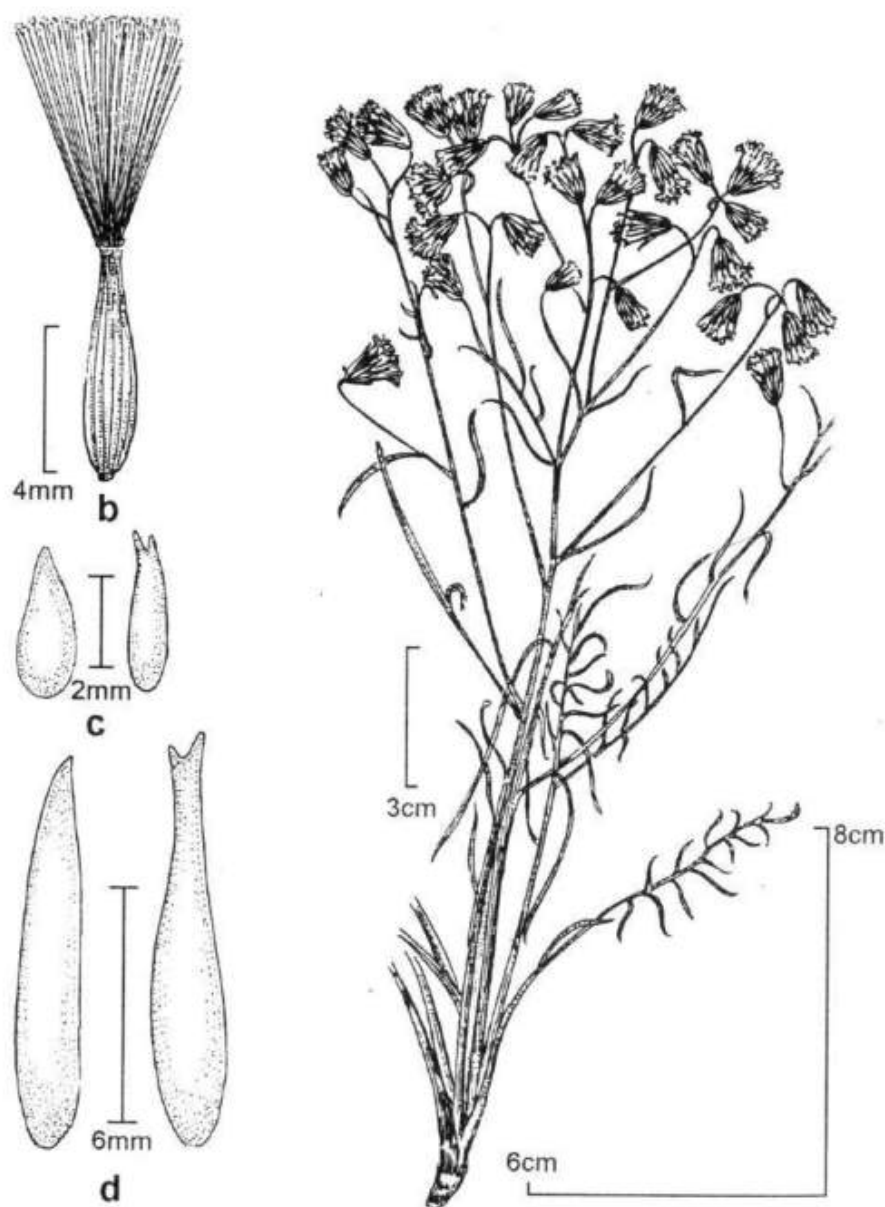


Fig. 86. *Youngia tenuifolia* (Willd.) Babcock & Stebbins : a. Habit; b. Achene; c. Outer bracts; d. Inner bract.

Herbs, perennial with woody rootstock; stems 20-40 cm high, many from the rootstock, paniculately branched, stout, stiff, grooved. Radical leaves divided into many lobes or segments, deeply pinnatifid, 5-18 cm long, with long winged petiole; cauline leaves deeply pinnatifid; uppermost leaves linear, sessile. Heads blackish, corymbose, crowded and numerous, 1-1.5 x 0.5-0.6 cm, peduncle slender with few minute bracts. Outer involucre bracts ovate or obovate-oblong, 2-3.5 x 1-1.5 mm; inner linear-oblong or linear-oblong, 9-10 x 1-5-2.5 mm. Ligules yellow. Achenes pale or red brown, oblanceolate, 5-6 mm long, stoutly beaked. Pappus silvery, 4-5.5 mm long, soft.

*Fl. & Fr.* April - Oct.

*Distrib.* India: W. Himalayas on hill slopes and on rocks, 3000-4000 m; Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

China and Nepal.

Subtribe 6. LAPSANEAE Less.

Herbs, annual or biennial with white latex; stems erect, paniculately branched. Leaves usually alternate, entire or pinnatifid, petioled. Heads homogamous, cylindrical, small, loosely corymbose or paniced, erect; peduncle short, erect. Involucre bracts unequal, differentiated into outer and inner bracts, herbaceous, strongly convex or keeled. Receptacle flat, naked. Ligules yellow, 5-toothed. Stamens 5, appendaged; anther base sagittate. Style slender; stigmatic branches slender. Achenes usually oblanceolate, curved, subterete, many ribbed; ribs slender. Pappus absent. Receptacle flat, naked.

Only one genus in India.

*Lapsana* L.

Herbs, annual or biennial erect; stems glabrous or hispid below, paniculately branched. Leaves usually alternate, ovate, linear, entire or pinnatifid or lyrate-pinnatifid, petioled. Heads small, loosely corymbose or paniced, usually many flowered; peduncle slender, short, erect. Outer involucre bracts ovate or ovate-cordate or ovate-oblong; inner linear-lanceolate or lanceolate, subequal, acute. Corolla yellow; ligules 5-toothed. Stamens 5, appendaged; anthers introse, slender, base sagittate. Achenes oblanceolate, subcompressed, curved, subterete, many ribbed; rounded at the top, narrowed at base.

From tropical, sub-tropical to temperate regions of Europe and Asia; ca 10 species, 1 in India.

*Lapsana communis* L., Sp. Pl. 811. 1753; Hook.f., Fl. Brit. India 3: 392. 1881.

Herbs, annual erect; stems 30-60 cm high, glabrous or hispid below, leafy, paniculately branched. Leaves alternate; lower pinnatifid or lyrate-pinnatifid, petioled; cauline leaves ovate; uppermost linear, entire. Heads cylindric, loosely corymbose, small, many flowered; peduncle short, slender, erect. Outer involucre bracts ovate or ovate-oblong, obtuse; inner linear-lanceolate, acute. Ligules yellow. Achenes pale, 4-5 mm long, subcompressed, shining.

*Fl. & Fr.* July - Oct.

*Distrib.* India: W. Himalayas on slopes ascending up to 2000 m. Jammu & Kashmir.

Pakistan.

#### Subtribe 7. RHAGADIOLEAE

Herbs, annual, with white latex; stems erect or decumbent, glabrous or puberulous, branched or simple. Leaves variable, radical as well as cauline, glabrous or sparsely hairy. Heads homogamous, cylindric or subcampanulate, small, erect, peduncle slender or thickened, erect. Involucre bracts 1-few seriate. Ligules yellow, 5-toothed. Stamens 5, appendaged; anthers slender, base sagittate, introrse. Style slender; stigma bifid. Achenes exceeding the bracts, terete, spreading or incurved, smooth or puberulous with terminal stellate spines. Pappus absent or 2-seriate, soft.

2 genera and 2 species in India.

#### KEY TO THE GENERA

- |  |                       |
|--|-----------------------|
| 1a. Erect herbs; achenes 6-12 mm long, smooth                                      | 1. <i>Garhadiolus</i> |
| b. Erect or decumbent herbs; achenes 13-15 mm long, with rows of glochidate spines | 2. <i>Koelpinia</i>   |

#### 1. *Garhadiolus* Jaub.

Herbs annual with white latex; stems cylindric, erect, glabrous or sparsely hairy, branched. Leaves obovate or obovate-oblong. Inflorescence terminal or axillary. Heads subcampanulate, small, erect, peduncled; peduncle thickened, erect. Involucre bracts 1-seriate, linear-lanceolate or lanceolate, keeled. Ligules yellow, 5-toothed. Stigmatic branches slender. Achenes terete, smooth, narrowed from base, incurved. Pappus 2-seriate, soft.

Westwards to Asia minor, ca 15 species, 1 in India.

*Garhadiolus minutissimus* (Bunge) Kitamura in *Acta Phyto Geobot.* 17: 35. 1957.  
*Hedypnois minutissima* Bunge in *Mem. Etr. Petersb.* 7: 372. 1847.

Herbs, annual; stems 5-50 cm high, erect, glabrous or sparsely hispid, cylindric, branched; branches all spreading from the base. Leaves obovate or obovate-oblong, pinnatifid or toothed, 2-8 cm long, narrowed into petiole. Inflorescence axillary or terminal. Involucral bracts 1-seriate, lanceolate or linear-lanceolate, keeled, embracing the outer achenes, smooth or hairy. Ligules yellow, 5-toothed. Anthers yellowish. Achenes narrow, 6-12 mm long, incurved, terete, smooth, beaked. Pappus 2-seriate, soft.

*Fl. & Fr.* India: W. Himalayas on exposed dry slopes, 1500-3000 m. Jammu & Kashmir.

Asia minor.

## 2. *Koelpinia* Pallas

Herbs, annual, weak; stems glabrous or puberulous, erect or decumbent, leafy, usually branched or simple. Leaves radical as well as cauline, chiefly radical, usually linear, entire, narrowed at both ends, pointed or rounded at apex, glabrous or sparsely hairy. Heads cylindric, small, erect; peduncle erect, slender. Outer involucral bracts usually few, subequal, ovate or ovate-lanceolate; inner linear-lanceolate, keeled. Receptacle naked. Ligules yellow, 5-toothed. Stamens 5, appendaged; anthers introrse, slender, base sagittate. Style slender; stigma bifid. Achenes narrowly linear, usually much exceeding the bracts, spreading and incurved, ribbed; ribs with a row of glochidate spines.

In temperate to alpine regions of Central Asia, W. Asia, N. Africa and Europe. ca 8 species, 1 in India.

*Koelpinia linearis* Pallas, *Reise* 3: 755. 1776; Hook. f., *Fl. Brit. India* 3: 411. 1881.

Fig. 87.

Herbs annual with slender roots; stems 12-40 cm high, erect or decumbent, leafy, usually branched from base upwards; branches slender, glabrous or sparsely hairy. Leaves radical as well as cauline, crowded at base, linear, pointed at apex or slightly rounded, quite entire, 5-10 x 0.4-0.5 cm, pale green above, glaucous beneath, usually glabrous, rarely sparsely hairy, narrowed at both the ends. Heads cylindric, 1-1.5 cm long, erect; peduncle slender. Outer involucral bracts few, ovate or ovate-lanceolate, 5-6 x 1-1.5 mm; inner linear-lanceolate, 6-9 x 1-1.5 mm, subequal, base keeled at length. Ligules yellow. Achenes narrowly linear, 14-15 mm long, much exceeding the bracts, spreading and incurved, puberulous; terminal spines stellate.

*Fl. & Fr.* July - Sept.

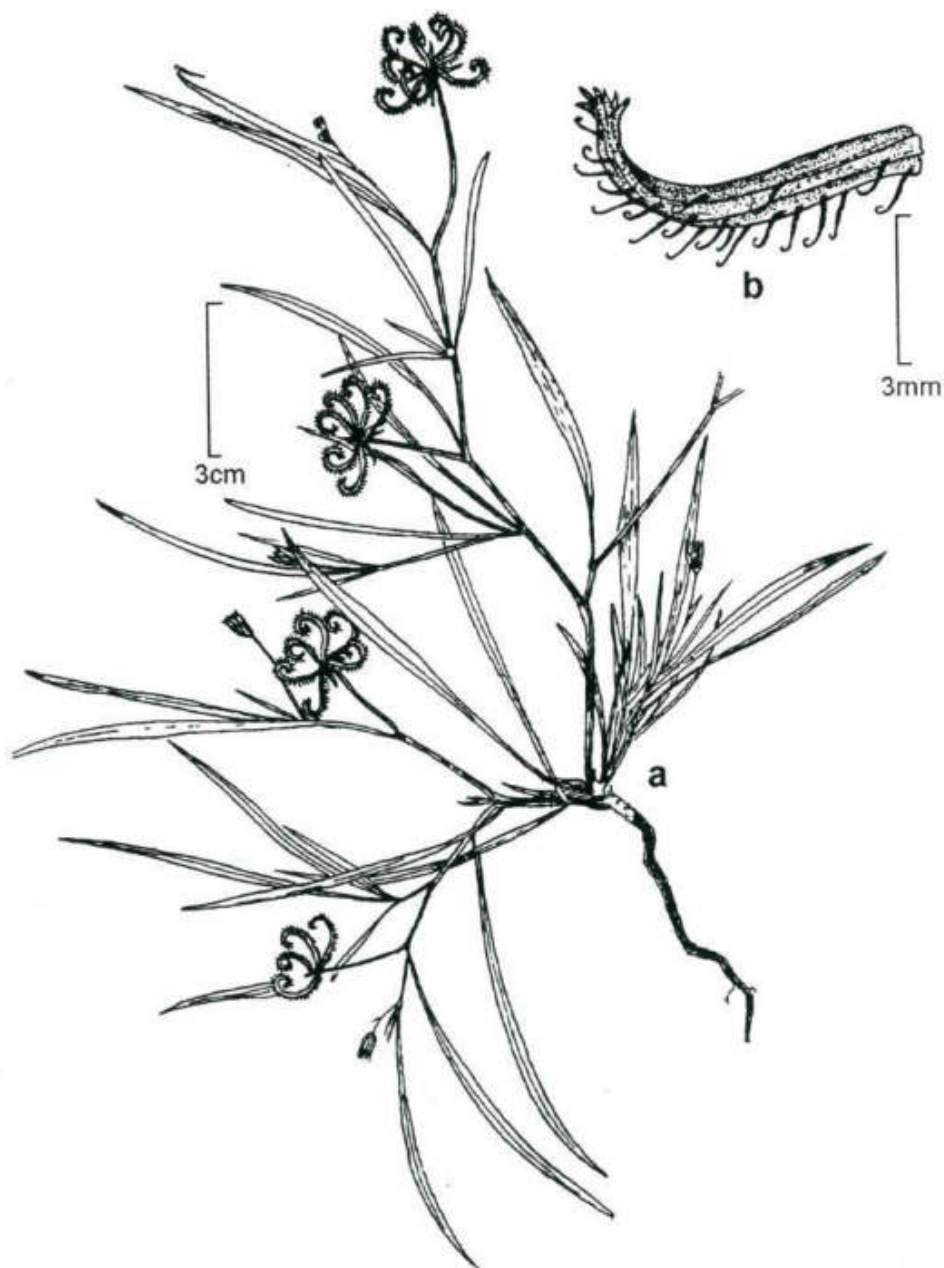


Fig. 87. *Koelipinia linearis* Pallas : a. Habit; b. Achene.



*Distrib.* India: W. Himalayas, on open sandy slopes, 3000-4500 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, W. Asia, N. Africa and C.I.S.

Subtribe 8. SCORZONEREAE Less.

Herbs, annual, biennial or perennial with white latex; stems erect, simple or branched, glabrous or appressed, sparsely hairy. Leaves variable, radical as well as cauline, often stem clasping and with, rounded sheathed bases, mostly linear or elliptic, usually entire. Heads, cylindric, campanulate or bell shaped, rather large; long peduncled. Involucral bracts 1-many seriate, thinly herbaceous, often longer or shorter than corolla, acute or acuminate. Receptacle naked. Ligules pink, white or yellow. Stamens 5, appendaged; anthers base sagittate. Style slender; stigma bifid. Achenes fusiform, cylindric slender, elongate or beaked, smooth or strongly muricate. Pappus 1-many seriate, elongate, coarse, with strongly pulmose setae.

2 genera with 9 species in India.

KEY TO THE GENERA

- 1a. Involucre narrowly cylindric or campanulate; involucral bracts more than 3-seriate; achenes not beaked 1. *Scorzonera*  
 b. Involucre broadly campanulate or bell-shaped; involucral bracts 1-seriate; achenes long beaked 2. *Tragopogon*

1. *Scorzonera* L.

Herbs, perennial with milky latex; rootstock woody, stout; stems erect, slender, simple or branched from the base, grooved; branches divaricate. Leaves radical as well as cauline, narrowly linear, usually entire or pinnatisect, grass like, keeled; cauline often amplexicaul and curved. Heads homogamous, broadly cylindric or campanulate, erect; peduncle long, thickened. Ligules 5-toothed. Involucral bracts few to many seriate, differentiated into outer and inner bracts, thinly herbaceous, acute or inner acuminate. Receptacle naked or pitted, rarely villous. Stamens 5, appendaged; anthers slender, base sagittate. Stigma bifid. Achenes cylindrical, ellipsoid or subcompressed, subterete or angled, usually many ribbed. Pappus pale, many seriate, unequal, serrulate or feathery.

Europe, N. Africa, W. and C. Asia from tropical to temperate regions; ca 150 species, 2 in India.

*Literature.* LIPSCHITZ, S.J. (1935) *Fragmenta monographiae generis Scorzonera* 1-164. (In Russian with Latin description).

## KEY TO THE SPECIES

- 1a. Heads ca 1.5-2.5 cm long; achenes ca 10-12 mm long, equal to pappus 1. *S. purpurea*  
 b. Heads ca 2-3.5 cm long; achenes ca 12-15 mm long, much longer than pappus 2. *S. virgata*

1. *Scorzonera purpurea* L., Sp. Pl. 791. 1753; Hook.f., Fl. Brit. India 3: 418. 1881.

Herbs, perennial with densely fibrous rootstock; rootstock vertical, cylindrical; stems 10-70 cm high, erect, solitary, branched above. Radical leaves grass-like, entire, 3-40 cm long; cauline similar to radical, smaller, amplexicaul, keeled. Heads cylindric, erect, peduncle erect. Outer involucre bracts ovate; inner lanceolate. Ligules pale lilac. Achenes pale brownish, cylindrical, ellipsoid, 10-12 mm long, smooth, shortly and obscurely beaked, ribbed. Pappus dirty white, 10-12 mm long, plumose, about as long as achenes.

*Fl. & Fr.* Jan. - Sept.

*Distrib.* India: W. Himalayas in dry places, 2000-2500 m. Rare. Jammu & Kashmir.

Europe and N. Asia.

2. *Scorzonera virgata* DC., Prodr. 7: 125. 1838. *S. divaricata* (DC.) Hook.f., Fl. Brit. India 3: 418. 1881, *non* Turcz. Fig. 88.

Herbs, perennial with a stout, woody rootstock; stems 10-80 cm high, rarely simple or paniculately branched, sometimes many branched from the base, slender, erect, grooved. Leaves crowded at the base of stem, long, filiform with incurved margins, 5-30 x 0.1-0.4 cm, glabrous, sessile, sheathed at the base. Heads broadly cylindric or campanulate; 2-3.5 x 0.5-0.8 cm, erect, on a long peduncle; peduncle slender, long, usually naked, rarely with few bracts. Outer involucre bracts brownish or pale green, ovate or ovate-cordate, 3-7 x 2-4 mm, unequal; inner linear-lanceolate or oblong-lanceolate, 10-20 x 4-6 mm. Ligules yellow, usually 5-toothed. Achenes pale yellow or pale brownish, lanceolate, subcompressed, 12-15 mm long, many ribbed, often with a strong median rib, smooth, striate. Pappus feathery, pale white or yellowish or pale brown, 8-12 mm long.

*Fl. & Fr.* June - Sept.

*Distrib.* W. Himalayas on dry open slopes and moist slopes amidst grasses, 2500-4500 m. Jammu & Kashmir and Himachal Pradesh.

Mongolia and W. Tibet.

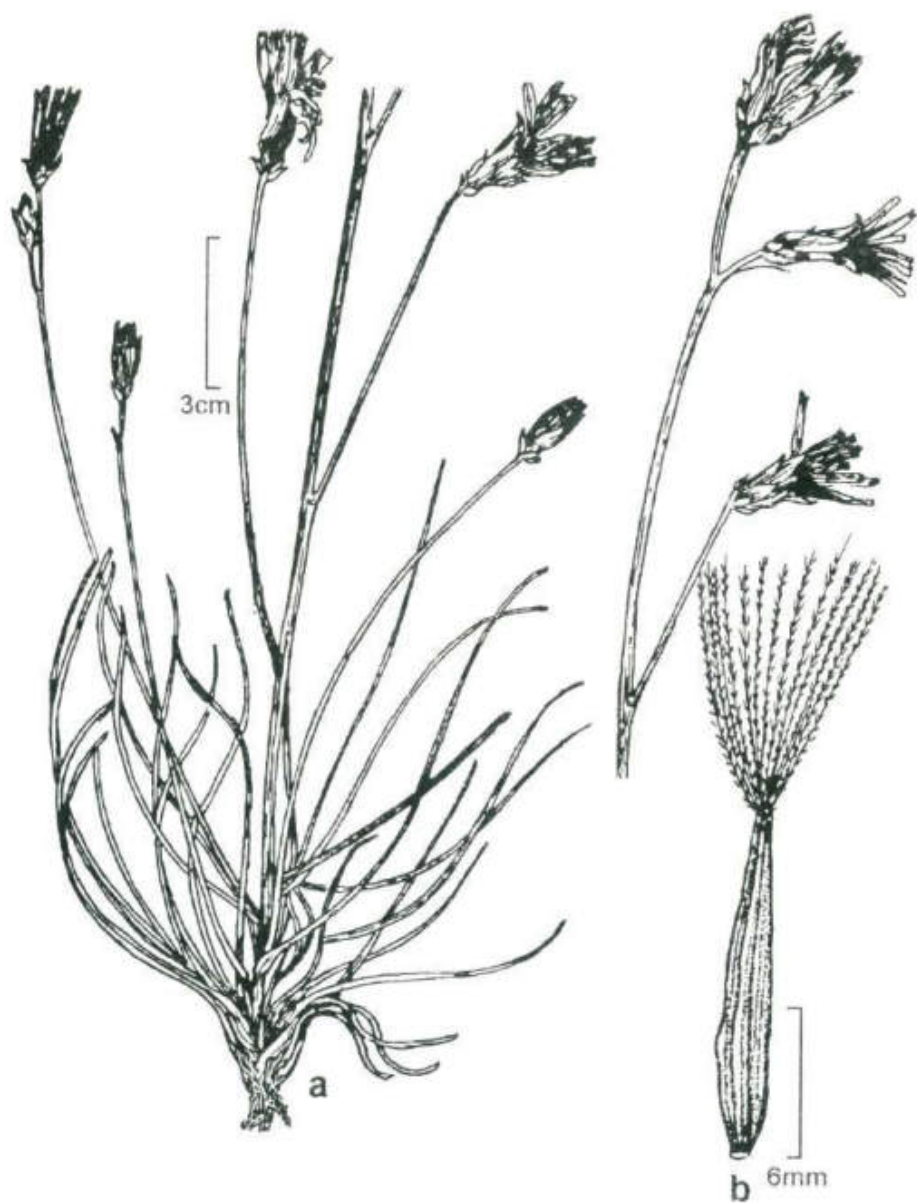


Fig. 88. *Scorzonera virgata* DC. : a. Habit; b. Achene.

## EXCLUDED SPECIES

*Scorzonera alba* Stewart in Nasir et Ali, Ann. Cat. Vas. Pl. W. Pak. 778. 1972, *nom. nud.*

As no specimens are available to us, this species is excluded.

*Scorzonera fusca* Kitam. in Acta Phyto. Geobot. 19: 134. 1963.

*Scorzonera hondae* Kitam. in Acta Phyto. Geobot. 19: 105. 1963.

The above two species are described by Kitamura from Jammu & Kashmir, but neither the specimens nor the literature is available to us.

*Scorzonera subphylla* Boiss., Diagn. ser. 1, 7:8. 1846.

Stewart (l.c.) includes this under doubtful species reported from Baltistan and Gilgit. Since no specimens are available to us this species is also excluded.

2. *Tragopogon* L.

Herbs, biennial or perennial with milky latex; stems erect, glabrous or sparsely hairy, solitary or branched, grooved, sometimes fleshy. Leaves usually alternate, linear or linear-lanceolate, often with rounded, sheathed base, finely glabrous or sparsely hairy, stem clasping. Heads broadly campanulate or bell shaped or cylindric, erect; peduncle thickened at the base of involucre, long, erect, thick. Involucral bracts 1-seriate, long, herbaceous, acute or acuminate, often connate at base. Ligules usually yellow, purple or blue, 5-toothed. Stamens 5, appendaged; anthers slender, acuminate, base sagittate. Style slender; stigma bifid. Achenes slender, strongly 5-20 ribbed, with a slender, elongate or stout beak, smooth or strongly muricate. Pappus brown, dirty white or pale yellow, 1-seriate, feathery, connate at base.

In Europe, N. Africa, temperate and subtropical Asia; ca 70 species, 5 in India.

## KEY TO THE SPECIES

- |  |                           |
|--|---------------------------|
| 1a. Biennials; stems 20-60 cm high; ligules with purple striations                                     | 3. <i>T. kashmirianus</i> |
| b. Perennials; stems 10-100 cm high; ligules without purple striations                                 | 2                         |
| 2a. Stems finely glabrous, usually with solitary scapes; leaves linear                                 | 3                         |
| b. Stems glabrous or hairy, usually branched; leaves mostly linear-lanceolate                          | 4                         |
| 3a. Achenes 1.5-2 cm long, subcompressed, beak stout; pappus 1.5-2 cm long                             | 4. <i>T. orientalis</i>   |
| b. Achenes 3-5 cm long; beak long, thickened; pappus 2.5-3.0 cm long                                   | 5. <i>T. sinuatum</i>     |
| 4a. Heads 2.5-8 x 1.5-3.0 cm, glabrous; achenes 2.5-3.5 cm long with a long beak, strongly muricate    | 1. <i>T. dubius</i>       |
| b. Heads 2.5-4 x 0.8-1.5 cm, glabrous or sparsely hairy; achenes 1-1.5 cm long, shortly beaked, smooth | 2. <i>T. gracilis</i>     |

1. *Tragopogon dubius* Scop., Fl. Carn. 2, 2: 95. 1722. *Tragopogon pratense* sensu Hook.f., Fl. Brit. India 3: 418. 1881, non L. Fig. 89.

Herbs, perennial; stems 30-80 cm high, branched, leafy, glabrous or sparsely hairy, fleshy; branches slender. Leaves crowded at the base linear or linear-lanceolate, 10-25 x 0.5-2 cm, glabrous or sparsely hairy, with broad sheathing base, sessile; upper leaves with broad, rounded auricled bases. Heads broadly campanulate, 2.5-8 x 1.5-3 cm, erect, usually glabrous; peduncle long, thickened at the base of head. Involucral bracts 1-seriate, 7-8, lanceolate or oblong-lanceolate, 3-8 x 0.5-1cm, gradually narrowed and pointed at apex, usually glabrous or sparsely rugose, thickened at the base. Ligules yellow. Achenes lanceolate, 2.5-3.5 cm long with a slender, long white beak as long or longer than body, strongly muricate. Pappus 2.0-2.5 cm long, feathery with soft white hairs, connate at base, yellowish or brownish.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas on moist slopes, river banks and road sides, 2000-4500 m. Jammu & Kashmir and Himachal Pradesh.

Afghanistan and Pakistan.

2. *Tragopogon gracilis* D. Don in Mem. Wern. Soc. 3: 414. 1820. Fig. 90.

Herbs, perennial with long rhizomatous rootstock; stems solitary or many branched, 10-50 cm high, leafy, usually branched from base, erect, glabrous, rarely sparsely hairy. Leaves crowded at base of stem, filiform or narrowly linear or linear-lanceolate, 5-25 x 0.5-0.8 cm, glabrous, sheathing at base. Heads erect, broadly cylindrical or campanulate, 2.5-4 x 0.8-1.5 cm, glabrous or sparsely hairy; peduncle erect, slender, fleshy, thickened at the base of head. Involucral bracts 1-seriate, 7-8, lanceolate 2.5-4 x 0.3-0.5 cm. Ligules yellow. Achenes, lanceolate, 10-15 mm, smooth, stout beaked, sparsely muricate. Pappus yellowish or pale brownish, 15-20 mm long, feathery, connate at the base.

*Fl. & Fr.* Feb. - July.

*Distrib.* India: W. Himalayas on dry open slopes, also in crevices of rocks, 1500-3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Afghanistan and Pakistan.

3. *Tragopogon kashmirianus* Singh, For. Fl. Srinagar 123. 1976.

Herbs, biennial; stems 25-60 cm high, almost glabrous, simple or branched. Leaves linear, gradually narrowed above from dilated, sheathing base, upto 25 cm long, upper leaves successively smaller. Heads solitary 7-9 cm across, solitary on flattened peduncles.



Fig. 89. *Tragopogon dubius* Scop. : a. Habit; b. Achene.

Involucral bracts 1-seriate, broadly lanceolate, usually long. Ligules yellow, purple striated. Anther yellow in lower half, violet in the upper, 3-4 mm long, slender. Achenes greyish brown, 12-16 mm long, gradually narrowed to a 12-20 mm long beak. Pappus 25-40 mm long, connate at the base; bristles tawny, straight, plumose, ashy.

*Fl. & Fr.* June - July.

*Distrib.* India: W. Himalayas on slopes in dry and exposed situations, 1500-2000 m. Jammu & Kashmir.

Endemic.

*Notes.* *T. kashmirianus* a tetraploid species is closer to *T. porrifolium* L. in having swollen peduncles, bracts being longer than ligules, stouter beak and ashy pappus hairs.

4. *Tragopogon orientalis* L., Sp. Pl. 789. 1753; Stewart in Nasir et Ali, Ann. Cat. vas. Pl. W. Pak. 797. 1972.

Herbs, perennial; stems whitish, 50-100 cm high, erect, finely glabrous, somewhat grooved, usually solitary or branched at top. Leaves narrowly linear, 20-30 x 0.5-0.8 cm, finely glabrous or sparsely hairy, rounded and sheathed at base; upper with a sessile, auricled base. Heads campanulate, solitary, many flowered, 3-4 x 1-1.5 cm, erect. Involucral bracts 1-seriate, 6-8, broadly lanceolate or oblong-lanceolate, 2.5-3.5 x 0.5-0.7 cm. Ligules yellow. Achenes subcompressed, 1.5-2 cm long, many ribbed, transversely tugose, thickened at the base. Pappus 1.5-2 cm long, feathery, with soft brown hairs, connate at base, yellowish.

*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas on dry exposed situations, 1500-3500 m. Jammu & Kashmir; Rare.

Pakistan, Europe and N. Asia.

5. *Tragopogon sinuatum* Ave. Lal. Pl. Ital. Bor. 17. 1829. *Tragopogon porrifolium* sensu Hook.f., Fl. Brit. Ind. 3: 418. 1881, non L.

Herbs, perennial with rootstocks; stems 50-100 cm high, leafy, with a solitary or branched scape, grooved, somewhat fleshy. Leaves crowded from base upwards, linear, finely glabrous, with a broad sheathing base; upper leaves with a broad, auricled base. Heads broadly campanulate or bell shaped, solitary, 3.5-6 x 2-3.5 cm, erect; peduncle thickened at the base of head, grooved, fleshy. Involucral bracts usually 1-seriate, 7-8, broadly lanceolate or oblong-lanceolate 2.5-8 x 0.7-1 cm. Achenes yellowish, lanceolate, 3-5 cm long, with a long, slender beak, muricate, strongly thickened towards body. Pappus yellowish, 2.5-3.0 cm long, connate at the base.

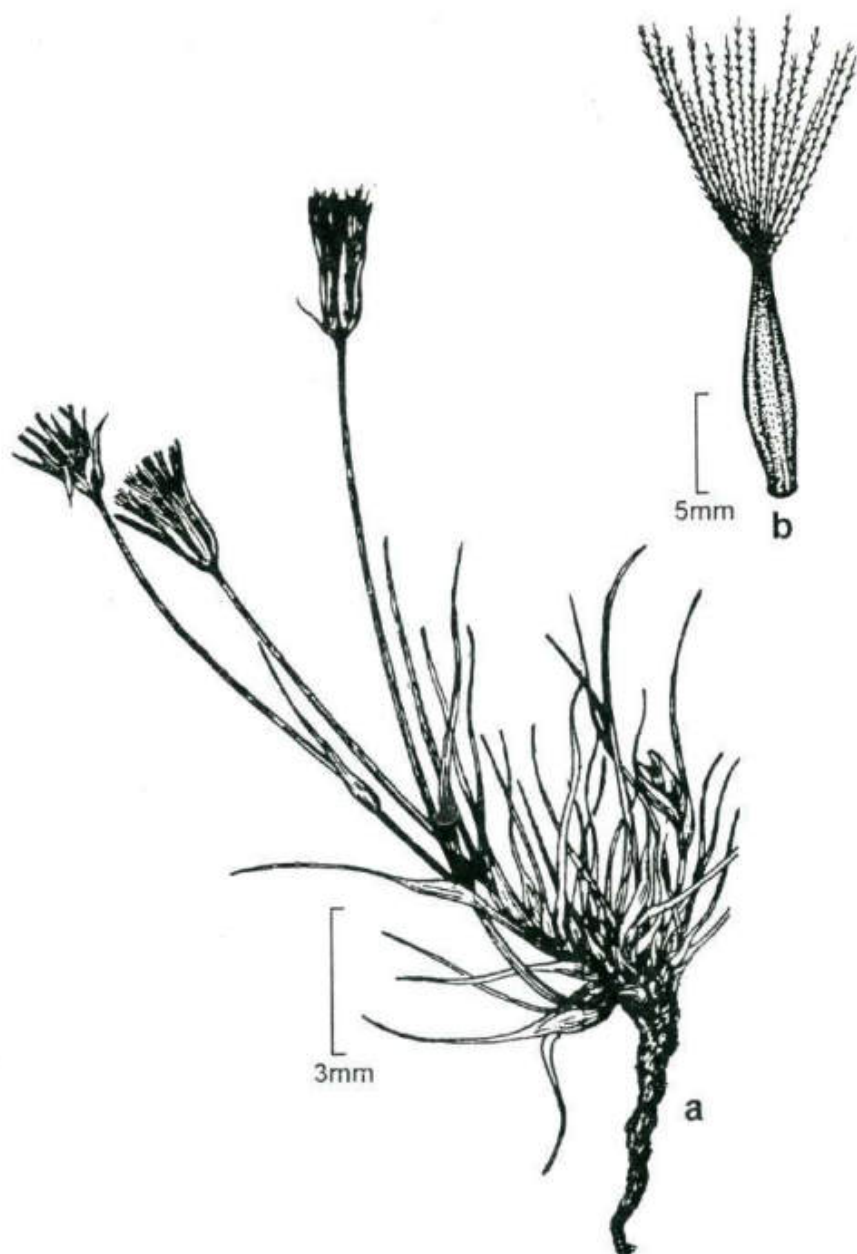


Fig. 90. *Tragopogon gracilis* D. Don : a. Habit; b. Achene.



*Fl. & Fr.* June - Sept.

*Distrib.* India: W. Himalayas on open dry situations from 1500-4000 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, Asia minor and Europe.

### Tribe 6. EUPATORIEAE Cass.

(B.P. Uniyal)

Herbs, shrubs or vines. Leaves mostly opposite, rarely alternate or whorled, simple or compound. Heads discoid, 1-many flowered. Involucral bracts 1-many seriate. Corolla white, blue, pink, purple or red, tubular to campanulate or funnelform lobes glabrous, hairy or glandular. Stamens 4-5; anthers rounded or hastate at base. Style branches well developed, appendaged. Achenes prismatic or flattened, ribbed. Pappus of awns, scales, bristles or glandular knobs, rarely absent.

Mainly of American distribution; ca 100 genera and 200 species; 5 genera and 15 species in India.

*Literature.* KING, R.M. & H. ROBINSON (1969). Studies in compositae-Eupatorieae XI. Typification of Genera. *Sida* 3: 329-342. KING, R.M. & H. ROBINSON (1975). Eupatorieae. *Ann. Miss. Bot. Gard.* 62: 888-1004.

#### KEY TO THE GENERA

- |   |                       |
|---|-----------------------|
| 1a. Involucral bracts more than 5                             | 2                     |
| b. Involucral bracts 3-5 with usually equal number of florets | 4                     |
| 2a. Pappus of 10 or more capillary bristles                   | 3. <i>Eupatorium</i>  |
| b. Pappus of 3-5 scales or clavate hairs                      | 3                     |
| 3a. Pappus of scales  | 2. <i>Ageratum</i>    |
| b. Pappus of clavate hairs                                    | 1. <i>Adenostemma</i> |
| 4a. Usually scandent; florets 4; corolla glabrous within      | 4. <i>Mikania</i>     |
| b. Erect herbs; florets 5; corolla hairy within               | 5. <i>Stevia</i>      |

#### 1. *Adenostemma* J.R. & G. Forster

Herbs, small or large, glabrous or glandular pubescent; stems usually fistulose. Leaves usually opposite or upper alternate, variously shaped, sessile or petioled. Heads homogamous, corymbose, 10-60 flowered. Involucral bracts 10-30, sub 2-seriate, sometimes connate at base, spreading on maturity. Corolla tubular, regular, usually hairy or glandular without; limb 5-toothed. Anthers glandular tipped, base obtuse. Style arms

elongated, dilated above. Achenes angled, slightly curved, smooth, tuberculate or muricate. Pappus hairs 3-5, often clavate or ending in a knob.

Chiefly American; ca 20 species, 1 in India.

*Literature.* GRIERSON, A.J.C. (1972). Critical Notes on the Compositae of Ceylon. *Ceylon J. Sci. (Bio. Sci.)* 10: 42-60. PANIGRAHI, G. (1975). *Adenostemma* (Compositae) in the Indian Region. *Kew Bull.* 30: 647-655.

*Adenostemma lavenia* (L.) Kuntze, Rev. Gen. Pl. 1: 304. 1891. *Verbesina lavenia* L., Sp. Pl. 902. 1753.

Herbs, annual or perennial; stems decumbent-ascending, often rooting at nodes, glabrous below, pubescent in the upper part. Leaves variously shaped, acute or obtuse, entire or serrate, up to 25 x 14 cm, faintly to prominently veined, petiolate or sessile. Heads corymbose. Involucral bracts sub 2-seriate, free or sometimes connate at base, glabrous or hairy on back, ciliate on margins. Achenes smooth, muricate or tuberculate. Pappus hairs 4-5, ending in a knob.

Very variable species. Following varieties are recognised from India (Panigrahi 1975).

#### KEY TO THE VARIETIES

- |   |                                  |
|---|----------------------------------|
| 1a. Achenes smooth  | 2                                |
| b. Achenes lightly or densely muricate or tuberculate   | 3                                |
| 2a. Leaves prominently reticulate beneath; involucral bracts hairy on back                              | 1.7. var. <i>reticulatum</i>     |
| b. Leaves not prominently reticulate beneath; involucral bracts smooth on back                          | 1.5. var. <i>madurense</i>       |
| 3a. Achenes only lightly muricate   | 1.1. var. <i>angustifolium</i> ✓ |
| b. Achenes densely muricate or tuberculate  | 4                                |
| 4a. Leaves alternate, upper sessile; involucral bracts not ciliate on the margins                       | 1.2. var. <i>elatum</i> ✓        |
| b. Leaves usually opposite, petioled; involucral bracts ciliate on margins                              | 5                                |
| 5a. Leaves lanceolate, oblong-obovate or elliptic-ovate   | 6                                |
| b. Leaves broadly ovate or rhombic-parabolic  | 7                                |
| 6a. Leaves lanceolate, oblong-ovate, acute; corolla 3 mm long; limb densely hairy                       | 1.4. var. <i>lavenia</i> ✓       |
| b. Leaves elliptic-ovate, obtuse; corolla ca 1.8 mm long; limb smooth                                   | 1.6. var. <i>microcephalum</i>   |
| 7a. Leaves broadly ovate, herbaceous; achenes more densely muricate in the upper half than in the lower | 1.3. var. <i>latifolium</i> ✓    |
| b. Leaves rhombic parabolic, coriaceous; achenes densely muricate throughout                            | 1.8. var. <i>rugosum</i>         |

✓ 1.1. var. **angustifolium** (Arn.) B.P. Uniyal Comb. nov. *Adenostemma angustifolia* Arn. Nova. Acta Phys. Med. Acad. Leop. Card. Nat. Curr. 18: 347. 1836. *A. viscosum* J.R. & G. Forst. var. *angustifolium*, Hook.f., Fl. Brit. India 3: 242. 1881, p.p. quoad syn. *A. angustifolium*.

*Distrib.* India: Uttar Pradesh, W. Bengal, Sikkim, Assam, Karnataka and Andamans.

Myanmar, Sri Lanka and Thailand.

✓ 1.2. var. **elatum** (D. Don) Hochr. in Candollea 5: 298. 1934. *Adenostemma elatum* D. Don, Prodr. Fl. Nepal. 181. 1825. *A. viscosum* J.R. & G. Forst. var. *elatum* (D. Don) C.B. Clarke, comp. Ind. 29. 1876; Hook.f., Fl. Brit. India 3: 242. 1881.

*Distrib.* India: Uttar Pradesh, West Bengal, Sikkim, Nagaland and Meghalaya.

Nepal, Bangladesh and Myanmar.

1.3. var. **latifolium** (D. Don) Panigrahi in Kew Bull. 30(4): 651. 1975. *Adenostemma latifolium* D. Don, Prodr., Fl. Nepal. 181. 1825. *A. viscosum* J.R. & G. Forst. var. *latifolium* (D. Don) C.B. Clarke, Comp. Ind. 29. 1876; Hook.f., Fl. Brit. India 3: 242. 1881.

*Distrib.* India: W. Himalayas up to 1525 m.

Nepal and Bangladesh.

✓ 1.4. var. **lavenia**. *Adenostemma viscosum* J. R. & G. Forst., Char. Gen. Pl. 90. t. 45. 1776. *A. viscosum* var. *lavenia*; Hook.f., Fl. Brit. India 3: 242. 1881, p.p.

*Distrib.* India: Throughout, ascending up to 1200 m.

1.5. var. **madurensense** (DC.) Panigrahi in Kew Bull. 30(4): 654. 1975. *Adenostemma madurensense* DC. in Wight, Contrib. Bot. Ind. 9. 1834. *A. viscosum* J. R. & G. Forst. var. *reticulatum* (DC.) Hook.f., Fl. Brit. India 3: 242. 1881, p.p. quoad syn.

*Distrib.* India: Karnataka and Tamil nadu.

Myanmar and Sri Lanka.

1.6. var. **microcephalum** (DC.) Koster in Blumea 1: 474. 1935. *Adenostemma microcephalum* DC., Prodr. 5: 111. 1836. *A. viscosum* var. *elatum* auct.; Hook.f., Fl. Brit. India 3: 242. 1881, quoad Syn. *A. microcephalum* DC. non *A. elata* D. Don 1825.

*Distrib.* India: Bihar, Assam and Meghalaya.

Bangladesh.

1.7. var. *reticulatum* (DC.) Panigrahi in Kew Bull. 30(4): 654. 1975. *Adenostemma reticulatum* DC. in Wight, Contrib. Bot. Ind. 8. 1834. *A. viscosum* J.R. & G. Forst. var. *reticulatum* (DC.) C.B. Clarke, Comp. Ind. 30. 1876; Hook.f., Fl. Brit. India 3: 243. 1881, p.p.

*Distrib.* India: Tamil Nadu, Kerala and Nicobar.

Myanmar and Sri Lanka.

1.8. var. *rugosum* (DC.) Ram Lal in Bull. Bot. Surv. India 9: 262. 1968. *Adenostemma rugosum* DC. in Wight, Contrib. Bot. Ind. 8. 1834. *A. viscosum* J.R. & G. Forst. var. *rugosum* (DC.) C.B. Clarke, Comp. Ind. 29. 1876; Hook.f., Fl. Brit. India. 3: 243. 1881.

*Distrib.* India: Maharashtra, Karnataka and Tamil Nadu.

## 2. *Ageratum* L.

Annual or perennial herbs. Leaves alternate or opposite, deltoid-ovate, elliptic or lanceolate, entire, dentate or shallowly lobed. Heads discoid, many flowered. Involucral bracts many, lanceolate, glabrous or pilose. Corolla lobes 5, papillose within. Anthers appendaged. Style appendages linear, usually dense papillose. Achenes 4-5 angled, glabrous or bristly on the ribs. Pappus of 4-5 scales, flattened at base.

All warmer countries; ca 45 species, 2 in India.

*Literature.* JOHNSON, M.F. (1971). A monograph of the genus *Ageratum* L. (Compositae-Eupatorieae) *Ann. Miss. Bot. Gard.* 58: 6-88.

### KEY TO THE SPECIES

- 1a. Involucral bracts glabrous; corolla shorter than the awned pappus scales 1. *A. conyzoides*  
 b. Involucral bracts pilose without; corolla as long as or longer than the awned pappus scales 2. *A. houstonianum*

1. *A. conyzoides* L., Sp. Pl. 839. 1753; Hook.f., Fl. Brit. India 3: 243. 1881.

Beng.: *Uchunti*; Guj.: *Ajgantha*; Kan.: *Nayituls*; Konk.: *Vosadi*; Mar.: *Osadi*, *Sahadevi*; Nep.: *Ilami*; Ori.: *Boksunga*.

Herbs, annual or perennial; stems terete, pilose. Leaves opposite, ovate, 3-nerved from base, usually crenate, up to 10 x 7 cm, sparsely pilose above, glandular punctate beneath. Heads many flowered. Involucral bracts many, 2-seriate, ca 3.5 mm long, prominently 2-nerved, scarious margined, glabrous on back. Corolla white or blue; tube glandular. Achenes black, ca 1 mm long, short bristly on the ribs. Pappus of 5 scales, flattened at base.

*Fl. & Fr.* Round the year.

*Distrib.* India: throughout, ascending to 1500 m. in Himalayas. All tropical countries.

*Note.* Leaf juice applied to wounds. Abnormality in leaves and ascidium has been reported by D.N. Chakraverti (*Sci. & Cult.* 25(3): 208. 1959).

✓ 2. *Ageratum houstonianum* Mill., Gard. Dict. ed. 8. 1768.

Herbs, annual or perennial, reaching to 60 cm high. Leaves opposite, deltoid-ovate, 3-nerved from base, crenate-serrate, ca 10 x 5.5 cm, sparsely pilose on both the surfaces; petioles up to 4 cm long. Heads many flowered. Involucral bracts many, 2-seriate, ca 4.5 mm long, 2-nerved, scarious margined, pilose on back. Corolla narrowly funnelform. Achenes ca 1.2 mm long, sparsely bristly on ribs. Pappus of 5, free scales.

*Fl. & Fr.* Major part of the year.

*Distrib.* India: Punjab, Delhi, Uttar Pradesh, Bihar, W. Bengal, Sikkim, Arunachal Pradesh, Assam, Meghalaya, Rajasthan and Tamil Nadu.

Nepal, Indonesia, Mexico, W. Indies, Peru, Colombia and British Honduras.

*Note.* Very closely associated with the former and in similar habitats, but not so adventive.

### 3. *Eupatorium* L.

Herbs or shrubs. Leaves usually opposite, rarely alternate, entire or serrate. Heads homogamous, corymbose or paniculate, few-many flowered. Involucral bracts 1-5 seriate, equal or unequal. Corolla tubular; limb 5-lobed or toothed. Anthers appendiculate at tip, base usually obtuse. Style branches usually long, pubescent, papillose. Achenes 4-5 angular, glandular or eglandular, glabrous or hairy on the ribs. Pappus hairs uniseriate, capillary, scabrous.

Distributed in Europe, Asia, Africa but chiefly in Mexico, West Indies and Tropical S. America; ca 1200 species, 10 in India.

*Literature.* BENNETT, F.D. & V.P. RAO (1968). Distribution of an Introduced weed *Eupatorium odoratum* L. (comp.) in Asia & Africa and Possibilities of its Biological Control. PANS 14(3): 227-281. GRANT, W.F. (1953). A Cyto-taxonomic study in the genus *Eupatorium*. Amer. J. Bot. 40: 729-742. KING, R.M. & H. ROBINSON (1970). *Eupatorium* A composite genus of Arcto-tertiary distribution. Taxon 19: 769-774. RAO, R.R. & M.K.V. RAO (1980). the genus *Eupatorium* L. (Asteraceae) in North East India. Proc. Ind. Nat. Sci. Acad. B. 46: 587-592.

## KEY TO THE SPECIES

- |  |   |
|--|---|
| 1a. Leaves finely dissected into capillary segments  | 3. <i>E. capillifolium</i>  |
| b. Leaves not as above   | 2   |
| 2a. Leaves 3-5 fid; segments lanceolate  | 2. <i>E. cannabinum</i> ssp. <i>asiaticum</i> var. <i>heterophyllum</i> |
| b. Leaves simple   | 3   |
| 3a. Achenes with shining glands  | 4   |
| b. Achenes without glands  | 5   |
| 4a. Leaves palmately 3-5 nerved; involucre bracts mostly acute                                       | 7. <i>E. nodiflorum</i>   |
| b. Leaves penni-nerved; involucre bracts all obtuse  | 4. <i>E. chinense</i>   |
| 5a. Leaves entire  | 6   |
| b. Leaves serrate or toothed   | 7   |
| 6a. Heads many flowered; involucre bracts 3-seriate  | 10. <i>E. triplinerve</i>   |
| b. Heads 4-8 flowered; involucre bracts sub 2-seriate  | 6. <i>E. ligustrinum</i>  |
| 7a. Leaves obovate, 7-nerved   | 5. <i>E. erythropappum</i>  |
| b. Leaves lanceolate, oblong-obovate, elliptic or rhombic-deltoid, 3 nerved from base or penninerved | 8   |
| 8a. Involucre bracts 1-2 seriate, equal in length  | 9. <i>E. riparium</i>   |
| b. Involucre bracts 1-many seriate, outer smaller than the inner                                     | 9   |
| 9a. Heads 4-8 flowered; involucre bracts sub 2-seriate   | 6. <i>E. ligustrinum</i>  |
| b. Heads many flowered; involucre bracts 3-5 seriate   | 10  |
| 10a. Stems, petioles and involucre bracts glandular hairy; achenes glabrous                          | 1. <i>E. adenophorum</i>  |
| b. Stems sparsely pubescent; achenes hairy on the ribs   | 8. <i>E. odoratum</i>   |

1. *Eupatorium adenophorum* Spreng., Syst. 3: 420. 1826. *Ageratina adenophora* (Spreng.) King & Robinson in Phytologia 20: 204. 1970. Fig. 91.

Herbs, tall, branched; stems glandular, subterete. Leaves broadly ovate-triangular, elliptic or rhombic-elliptic, acuminate, dentate in the upper part, entire in the lower part, upto 12.5 x 6.5 cm, glandular on the nerves beneath, petioled; petioles up to 3.5 cm long. Heads terminal, corymbose, many flowered; peduncles glandular hairy. Involucre bracts 3-seriate, lanceolate-elliptic, 3-5 mm long, glandular margined, 3-nerved; outer shorter, gradually increasing in length. Florets white. Achenes black, ca 2 mm long, glabrous, 5-angled. Pappus hairs dirty white, 10.

*Fl. & Fr.* Feb. - June.

*Distrib.* India: Uttar Pradesh, W. Bengal, Sikkim, Tripura, Meghalaya, Nagaland, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala.

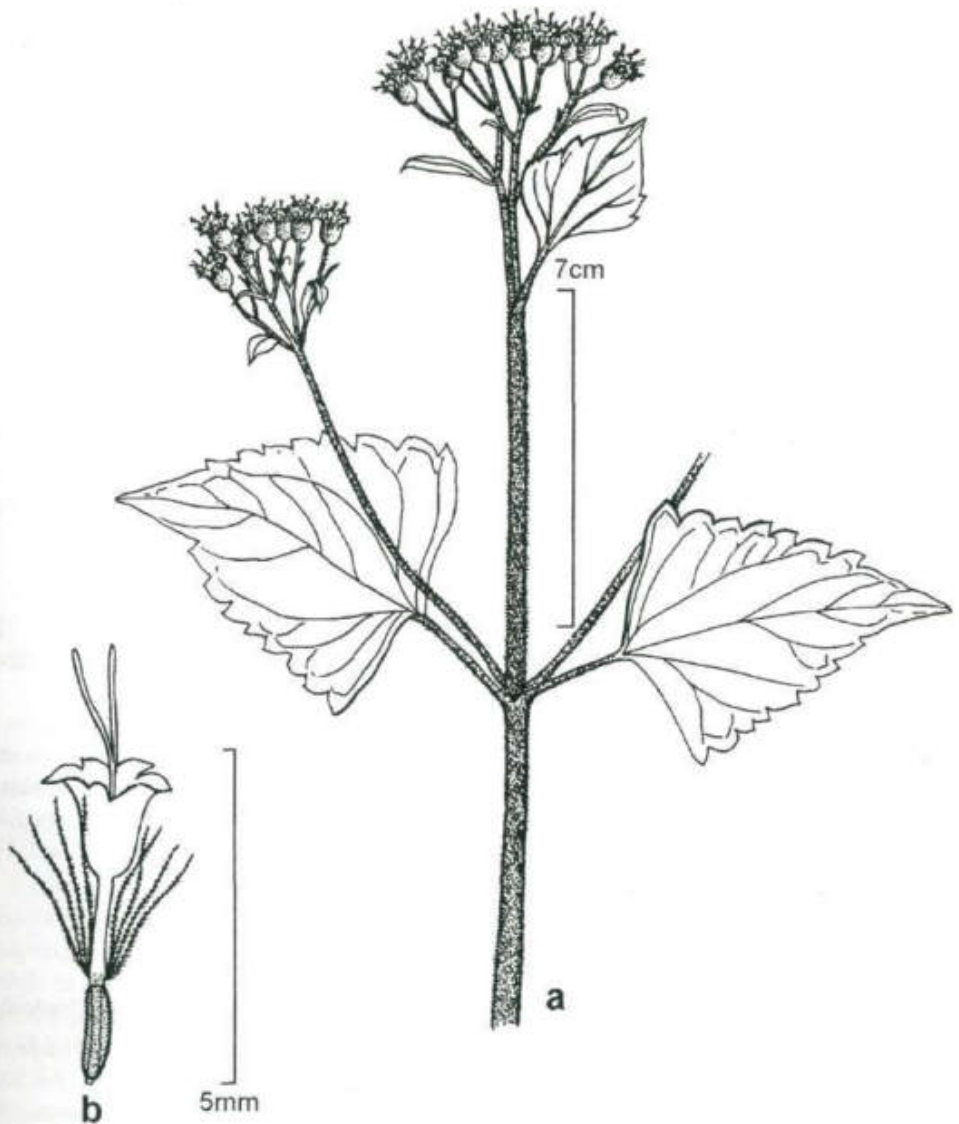


Fig. 91. *Eupatorium adenophorum* Spreng. : a. Habit; b. Achene with floret.

Native of Mexico.

*Note.* Leaf juice applied externally on cuts and wounds to stop bleeding (Srivastava et al. in J. Econ. & Taxon. Bot. 11(2): 416. 1987).

**2. *Eupatorium cannabinum* L. subsp. *asiaticum* var. *heterophyllum* (DC.) Kitam.** in Act. Phyt. Geobot. 32: 139. 1981. *E. heterophyllum* DC., Prodr. 5: 180. 1836. *E. cannabinum* auct. non L.; Hook.f., Fl. Brit. India 3: 243. 1881.

Herbs or undershrubs to 175 cm tall. Leaves usually palmately 3-5 fid; lobes lanceolate or ovate-lanceolate, acuminate, coarsely serrate; shortly petioled. Heads corymbose, 2.5 mm across. Involucral bracts many seriate; outer shorter; inner ovate, ca 6 mm long. Achenes black, ca 3 mm long. Pappus hairs white.

*Fl. & Fr.* Dec. - March.

*Distrib.* India: Assam, Meghalaya and Nagaland. Naturalized. Native of Europe.

Nepal, Bhutan, Bangladesh, Myanmar, China and Europe.

**3. *Eupatorium capillifolium* (Lam.) Small** in Mem. Torrey Bot. Club 5: 31. 1894; Sahu in Curr. Sci. 51: 440. 1982. *Artemisia capillifolia* Lam., Encycl. Meth. Bot. 1: 267. 1783.

Herbs or undershrubs; stems cylindrical, pubescent, striate. Leaves finely dissected into filiform segments. Heads axillary, racemose or paniculate, 5-flowered. Bracts 1-3 on the pedicel. Involucral bracts 2-seriate, broadly scarious margined; outer ovate, ca 1 mm long; inner oblong-obovate, ca 2.5 mm long, acuminate. Achenes ca 1.5 mm long, angled, glabrous. Pappus hairs reddish, uniseriate.

*Fl. & Fr.* Aug. - Nov.

*Distrib.* India: Uttar Pradesh, Arunachal Pradesh, Meghalaya, Madhya Pradesh and Rajasthan. Introduced. Native of America.

Nepal and Myanmar.

*Note.* The capillary leaf segments at once distinguish this species from other species.

**4. *Eupatorium chinense* L., Sp. Pl. 837. 1753. *E. reevesii* Wallich ex DC., Prodr. 5: 179. 1836; Hook.f., Fl. Brit. India 3: 243. 1881.**

Herbs, to 2 m tall, hoary pubescent; stems glandular pubescent. Leaves ovate or oblong-ovate to lanceolate, acuminate, entire or serrate, up to 6 x 3 cm, short hairy



above, more beneath. Heads in corymbs, 5-flowered. Involucral bracts 1-2 seriate, obtuse; outer ca 1 mm long, hairy on back; inner oblong-obovate, ca 3 mm long, obtuse, hairy. Achenes ca 2 mm long, glandular, hairy on the ribs. Pappus hairs many, uniseriate.

*Fl. & Fr.* Jan. - March.

*Distrib.* India: Subtropical Himalayas ascending to ca 1800 m. Himachal Pradesh, Arunachal Pradesh and Meghalaya.

Nepal, Bhutan, China and Japan.

✓ **5. *Eupatorium erythropappum*** Robinson in Proc. Bost. Soc. Nat. Hist. 31(6): 248. 1908; Ghosh et. al. in J. Bombay Nat. Hist. Society 73(3): 554. 1976.

Shrubs; stems minutely pulverulent. Leaves opposite or basal alternate, decussate, obovate, acute, serrate, up to 5.5 x 2.2. cm, glabrous, 7-nerved. Heads in corymbs. Involucral bracts 8-9, unequal, linear-oblong, 3-4 mm long, pubescent, rounded on the tip. Achenes black, ca 3 mm long, hispid. Pappus hairs reddish.

*Distrib.* India: W. Bengal.

Mexico.

✓ **6. *Eupatorium ligustrinum*** DC., Prodr. 5: 181. 1836; Yonzone et al. in Ind. For. 96(5): 351. 1970.

Undershubs or shrubs up to 1.5 m tall; branchlets slender, obtusely angled, glabrescent or glandular, short pubescent. Leaves elliptic-obovate, acute or abruptly acuminate, entire in the lower half, remotely serrate in the upper half, rarely entire throughout, upto 8.5 x 3 cm, glabrous, gland punctate on the lower surface, petioled; petioles slightly dilated at base, ca 1 cm long. Heads in glandular, short rusty pubescent, paniculiform corymbs, 6-8 flowered; peduncles glandular, rusty pubescent. Involucral bracts 6-8, sub 2-seriate, linear-lanceolate, glandular pubescent; outer ca 2.5 mm long, acute; inner ca 4.5 mm long, obtuse, scarious margined. Corolla white. Achenes black, ca 2 mm long, 5-angled, shortly ciliate on angles. Pappus hairs white.

*Fl. & Fr.* Aug. - Dec.

*Distrib.* India: Uttar Pradesh and West Bengal.

✓ **7. *Eupatorium nodiflorum*** Wallich ex DC., Prodr. 5: 179. 1836. *E. cannabinum* auct. non L.; Hook.f., Fl. Brit. India 3: 243. 1881. p.p.

Herbs ca 50 cm high; stems more or less purplish, terete, ribbed, scabrid. Leaves elliptic-lanceolate or elliptic-ovate, sharply serrate or subentire, up to 4.5 x 1.2 cm, densely glandular and scabrid beneath, 3-nerved; upper leaves alternate. Heads in dense terminal corymbs, 5-flowered. Involucral bracts about 8; outer shorter, acute or subacute, glabrous, with shining glands; inner ca 5 mm long. Achenes black, 4-5 angular, glabrous, glandular, ribbed. Pappus hairs white.

*Fl. & Fr.* June. - Dec.

*Distrib.* India: North East India up to 1650 m. West Bengal, Meghalaya and Arunachal Pradesh.

Tropical Asia.

8. *Eupatorium odoratum* L., Syst. Nat. ed. 10. 1205. 1759. *Chromolaena odorata* (L.) King & Robinson in Phytologia 20: 204. 1970. *Eupatorium conyzoides* Vahl, Symb. Bot. 3: 96. 1794; Hook. f., Fl. Brit. India 3: 244. 1881. *E. repandum* Willd., Sp. Pl. 3: 1767. 1803.

Herbs or shrubs up to 3 m tall; stems glandular pubescent. Leaves opposite, deltoid-ovate, triangular or lanceolate, acute or acuminate, entire or serrate-dentate, up to 10 x 3 cm, glabrous above, pubescent and red glandular beneath. Heads in corymbs, terminating the branches, 3-4 mm across. Involucral bracts 3-5 seriate, oblong, ovate-lanceolate, 3-4 nerved, glabrous to sparsely pubescent; outer ca 1.5 mm long; inner ca 6.5 mm long, narrower. Achenes ca 4 mm long, 4-5 ribbed, bristly on ribs. Pappus hairs white, many.

*Fl. & Fr.* Nov. - May.

*Distrib.* India: Throughout. Naturalised.

Tropical Asia & Mexico.

*Note.* *E. odoratum* f. *sauarrosom* (involucre squarrose chiefly in bud) has been reported from Gujarat (Shah et al in J. Bombay Nat. Hist. Soc. 65: 261. 1968).

9. *Eupatorium riparium* Regel, Gaertnflora 15: 324. t. 525. 1866. **Fig. 92.**

Herbs or shrubs to 1 m high; stems decumbent-ascending, often rooting at lower nodes, pubescent in the upper part. Leaves elliptic-lanceolate, acuminate, serrate-dentate in the upper 2/3, up to 10 x 3 cm, nearly glabrous, 3 nerved from base, petioled; petiole ca 1 cm long, widened at base. Heads in paniculate corymbs, ca 20 flowered. Bracts linear ca 3.5 mm long. Involucral bracts equal, 1-2 seriate, about 12, linear-lanceolate-oblong, 3-5 mm long, subacute, 2-nerved, shortly pubescent. Corolla white; tube narrow;

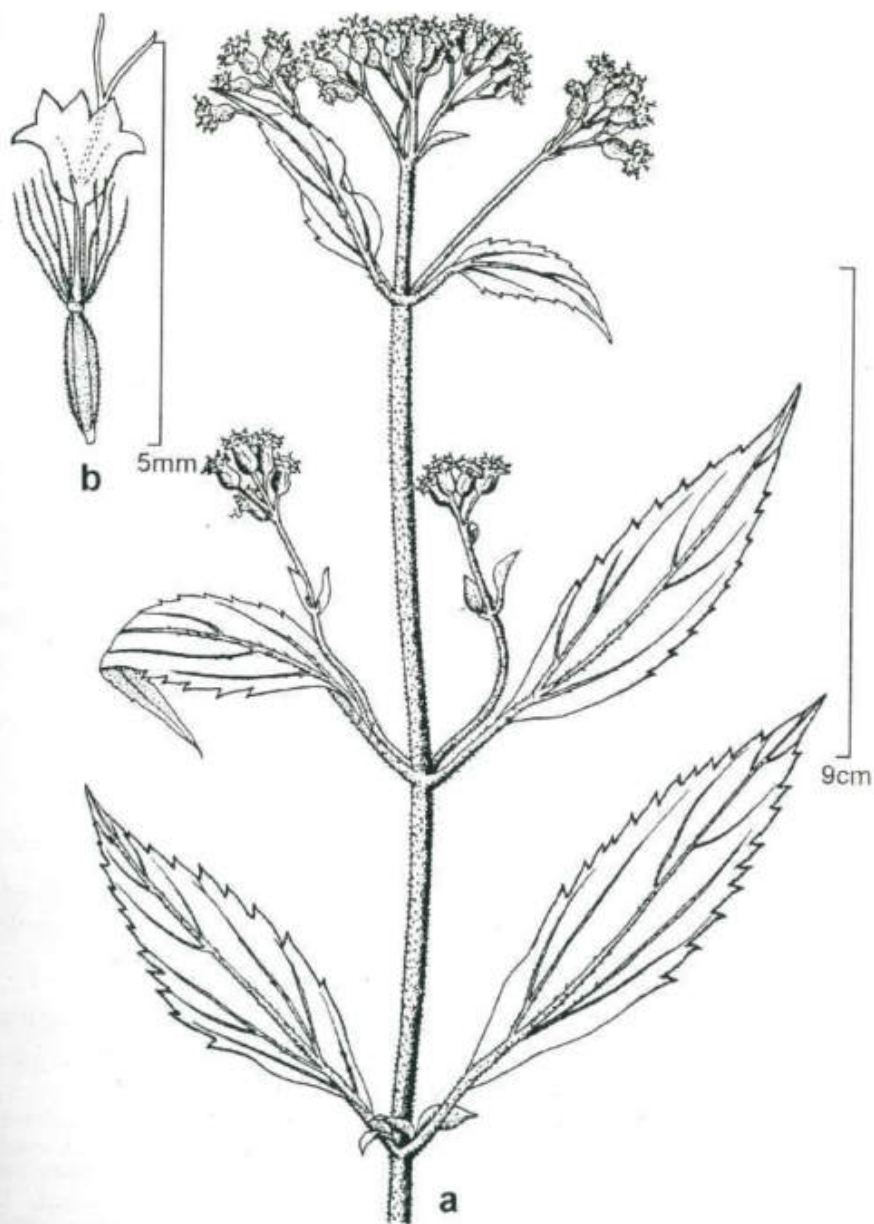


Fig. 92. *Eupatorium riparium* Regel : a. Habit; b. Achene with floret.

lobes glandular. Achenes black, ca 2 mm long, angled, pubescent on ribs. Pappus hairs whitish.

*Fl. & Fr.* Feb. - May, Dec.

*Distrib.* India: Uttar Pradesh and Meghalaya. Naturalised.

Sri Lanka, Indonesia and Mexico.

*Note.* The plant has medicinal uses (Koster in *Blumea* 1: 503. 1935).

10. *Eupatorium triplinerve* Vahl, *Symb. Bot.* 3: 97. 1794. *E. ayapana* Vent, *Malm.* 2. t. 3. 1804; *Hook.f.*, *Fl. Brit. India* 3: 244. 1881.

Herbs or undershrubs to 60 cm high; stems cylindrical, pubescent, ribbed. Leaves lanceolate, oblanceolate or narrowly elliptical, narrowed at both the ends, acute or subacute, slightly recurved, at margins, up to 10 x 1.8 cm, glabrous, minutely glandular beneath, petioled; opposite petioles forming a ring around the stem. Heads paniculate, many flowered. Involucral bracts 3-seriate, linear, many, prominently 1-2 nerved, pubescent; outer ca 2 mm long; inner ca 4.5 mm long. Achenes ca 2 mm long, 5-angular, slightly pubescent on the ribs. Pappus hairs shorter than corolla.

*Fl. & Fr.* Dec. - April.

*Distrib.* India: cultivated in gardens.

Tropical Asia, Africa, S. Africa and W. Indies.

*Note.* Plant is used as diaphoretic, diuretic, emetic and in Jaundice, Scurvy, for fomenting sores and ulcers. Juice of fresh leaves used as haemostatic agent, particularly for checking internal haemorrhage.

*Eupatorium birmannicum* DC. has been reported from manipur by Hijam Bikramjit Singh (*J. Bombay Nat. Hist. Soc.* 90(2): 321. 1993 (94).

#### 4. *Mikania* Willd.

Herbs or shrubs, erect or twining. Leaves opposite, petioled. Heads spicate, racemed or paniced, discoid, 4-flowered. Involucral bracts 4. Receptacle naked. Corolla funnellform or broadly campanulate, 5-lobed. Anthers appendaged. Style arms long, acute. Achenes truncate, 4-10 ribbed. Pappus hairs many, 1-2 seriate, often connate at base.

From United states through Mexico, C. America and W. Indies to S. America, few species in E. Hemisphere; ca 300 species, 1 in India.

*Literature.* BHASKARNAIR, V.K. (1968). A Note on the occurrence of *Mikania cordata* (Burm.f.) Robinson in South India. *Sci. & Cult.* 34: 254. HOLMES, W.C. (1982). Revision of old World *Mikania* (Compositae). *Bot. Jahrb.* 103 (2): 211-246. RAIZADA, M.B. (1958). Distribution of *Mikania scandens* Willd. in India. *Ind. For.* 84: 648. ROBINSON, B.L. (1934). *Mikania scandens* and its near relative. *Contrib. Gray Herb.* 104: 55-71.

✓ *Mikania micrantha* Kunth in H.B.K., *Nov. Gen. Sp.* 4: 134. 1820. *M. scandens* auct.; C.B. Clarke, *Comp. Ind.* 34. 1876, non Willd.

Twiners; stems terete or slightly angled, mostly fistulose. Leaves opposite, cordate-hastate, short acuminate, undulate or distantly blunt toothed, up to 13 x 10 cm (excluding petiole), thin, glandular punctate, 3(-5) nerved from base, petioled; petiole up to 6 cm long. Heads in corymbose panicles. Involucral bracts oblong, ca 3.5 mm long, glabrous or puberulous. Achenes 1.5-2 mm long, 4-5 ribbed, glandular. Pappus hairs many, uniseriate.

*Fl. & Fr.* June. - Sept. - Dec.

*Distrib.* India: Naturalized in several parts : Uttar Pradesh, W. Bengal, Sikkim, Assam, Tripura and Kerala.

Nepal, Myanmar, Malay Archipelago, Cochinchina, Anaam, Philippines, Taiwan, Tropical Africa and America.

*Note.* Natives use the leaves to cure wounds (*Blumea* 1: 505. 1935).

### 5. *Stevia* Cav.

Herbs or shrubs, erect. Leaves alternate or opposite, linear-orbicular, entire or deeply lobed, usually glandular punctate, sessile or petioled. Heads in corymbose panicles, discoid, 5-flowered. Involucral bracts 5, uniseriate. Corolla hairy or glandular without, hairy within. Achenes fusiform or cylindrical, strongly 5-ribbed with few-many glands or bristles. Pappus a crown of scales, with 1-30 bristles.

Southwestern United States through Mexico, C. America and S. America to Argentina; ca 200 species, 1 in India.

*Literature.* KING, R.M. & ROBINSON, H. (1975). Eupatoriaceae. *Ann. Miss. Bot. Gard.* 62: 995-1001. ROBINSON, B.L. (1930a). Observations on the genus *Stevia*. *Contrib. Gray Herb.* 90: 36-58. ROBINSON, B.L. (1930b). The *Stevias* of North America. *Contrib. Gray Herb.* 90: 90-180.

*Stevia ovata* Willd., *Enum. Hort. Berol.* 855. 1909; R.R. Rao et al. *Fl. Ind. Enum. Aster.* 73. 1988.

Herbs, perennial; stems terete, often purplish. Leaves opposite, ovate to oblong-elliptic, entire or serrate, up to 9 x 5 cm, decurrent on to petiole, glandular punctate on the surfaces. Heads 6-8 mm high. Involucral bracts narrowly oblong, ca 4.5 mm long,

glandular punctate. Achenes ca 2.5 mm long, ribbed, hispid. Pappus a crown of scales with 2 (in the specimen studied) bristles.

*Distrib.* India: Himachal Pradesh. Naturalized.

Sri Lanka, Mexico, C. America, S. America, Venezuela and Ecuador.

#### DOUBTFUL SPECIES

***Stevia eupatoria*** Willd. Included in the checklist (R.R. Rao et al. 1988) on the basis of a collection from Himachal Pradesh. The identity needs confirmation.

#### CULTIVATED SPECIES

***Eupatorium coelestinum*** L., sp. Pl. 838. 1753. Herbs. Leaves triangular-ovate, coarsely toothed, thin, flowers light blue-violet.

Native of Tropical America.

***Eupatorium ianthinum*** Hemsl. in Biol. Contr. Am. Bot. 2: 96. 1881.

Shrubby; stems rusty pubescent in young stage. Leaves ovate, large, serrate. Flowers light violet, in terminal corymbs.

Native of Mexico.

### Tribe 7. H E L I A N T H E A E Cass.

(H.J. Chowdhery)

Shrubs or herbs, rarely trees or climbers, scabrous or silky villous. Leaves opposite or sometimes alternate near the inflorescence, simple or compound, entire, toothed, lobed or dissected, petioled or sessile. Inflorescence scapose, paniculate or often of solitary, long-stalked terminal heads. Bracts and bracteoles present. Heads usually radiate, sometimes discoid, rarely disciform, monoecious. Involucral bracts few to many, usually leafy, sometimes dry, hard or membranous, generally biseriate or rarely multiseriate. Receptacle paleaceous, sometimes epaleaceous, flat or conical; pales usually flat or concave or enfolding the florets, occasionally tightly enveloping the achenes. Ray florets mostly yellow; corolla ligulate, rarely tubular or reduced, 2-3 denticulate or entire. Disc florets with 4-5 lobed, campanulate corolla. Anthers obtuse at the base, not tailed, with a terminal appendage, distinct or scarcely coherent in some genera. Ovary often compressed, often with a cupular nectary; style truncate or appendiculate to subulate,

with or without appendages. Achenes thick, flattened, terete or 3-4 angled or winged. Pappus of scales, awns, bristles or pales or absent.

The tribe Heliantheae is generally considered as the most primitive tribe of the family on account of the opposite leaves, solitary or few large heads, leafy involucre, chaffy receptacles, carpellate ray and bisexual disc florets, tailless anthers, style branches without distinct stigma, etc. The species of the tribe have remarkable adaptation to varied ecological conditions.

Bentham (1873) divided the tribe into 10 subtribes. Hooker (1881) while treating *Compositae* in Flora of British India mentioned 7 subtribes viz., Lagasceae, Millerieae, Melampodieae, Ambrosieae, Verbesineae, Coropsidaeae, and Galinsogaeae. As the distinguishing characters of these subtribes are more or less overlapping, the tribe is treated without any divisions.

Predominantly distributed in tropical, subtropical and temperate regions; ca 300 genera, 27 genera and 56 species in India.

*Literature.* BENTHAM, G. (1873). Notes on the classification, history and geographical distribution of *Compositae*. *J. Linn. Soc. Bot.* 13: 335-577. BENTHAM, G. & HOOKER, J.D. (1873). *Genera plantarum* 2: 163-533. CRONQUIST, A. (1955). Phylogeny and taxonomy of the *Compositae*. *Am. Midl. Nat.* 53: 478-511. SOLBRIG, O.T. (1963). The Tribes of *Compositae* in Southern United States. *J. Arn. Arb.* 44: 436-461. WODEHOUSE, R.P. (1928). Pollen grains in the identification and classification of plants. I. The *Ambrosiaceae*. *Bull. Torrey Bot. Club* 55: 181-198. 6. WOODSON, R.E.Jr. & SCHERY, R.W. (1975). Fl. Panama: *Compositae*. *Ann. Miss. Bot. Gard.* 62: 835-1321.

#### KEY TO THE GENERA

- |   |                   |
|---|-------------------|
| 1a. Heads non-glomerulate, more than one flowered   | 2                 |
| b. Heads in terminal glomerules, one flowered   | 27                |
| 2a. Heads unisexual   | 3                 |
| b. Heads bisexual   | 4                 |
| 3a. All leaves alternate; involucre in fruit with straight or hooked spines and distinct beak     | 27. Xanthium      |
| b. At least some leaves opposite; involucre in fruit with small spines or tubercles near the apex | 3. Ambrosia       |
| 4a. Receptacle epaleaceous  | 2. Adenocaulon    |
| b. Receptacle paleaceous  | 4                 |
| 5a. Leaves divided to the base or deeply pinnatifid   | 5                 |
| b. Leaves simple or pinnately compound  | 7                 |
| 6a. Achenes linear, with retrorsely barbed pappus awns  | 4. Bidens         |
| b. Achenes somewhat rounded, without retrorsely barbed pappus awns                                | 18. Parthenium    |
| 7a. Ray achenes only fertile; epappose  | 8                 |
| b. Ray achenes sterile or fertile; disc achenes always fertile; pappose or epappose               | 9                 |
| 8a. Achenes trigonous or laterally compressed, covered with hooked bristles                       | 1. Acanthospermum |
| b. Achenes flat, dorsally compressed, smooth, with a short neck at the apex                       | 17. Moonia        |
| 9a. Disc achenes rounded or laterally compressed; pappus absent or of 2 short, weak scales        | 10                |
| b. Disc achenes dorsally compressed or angular; pappus present or absent                          | 19                |

- 10a. Outer involucre bracts clavate, spreading; inner ones enclosing the achenes 11  
 b. Outer involucre bracts erect; inner ones not enclosing the achenes 12
- 11a. Outer involucre bracts prominently glandular; terrestrial herbs 20. *Siegesbeckia*  
 b. Outer involucre bracts, eglandular; marshy herbs 9. *Enhydra*
- 12a. Receptacle flat, never conical 13  
 b. Receptacle convex or conical 18
- 13a. Pales bristle like 7. *Eclipta*  
 b. Pales linear or oblanceolate, concave or folded 14
- 14a. Shrubs or small trees; pales accrescent 16. *Montanoa*  
 b. Herbs; pales not accrescent 15
- 15a. Pales obtuse, lacerate; flowers white; pappus of 2 weak awns 5. *Blainvillea*  
 b. Pales acute, entire; flowers yellow; pappus present or absent 16
- 16a. Pappus absent or of 2 minute scales 23. *Tithonia*  
 b. Pappus of 2 scales with numerous minute scales in between 17
- 17a. Heads always erect, solitary or few in loose corymbs 26. *Wedelia*  
 b. Heads cernuous after anthesis, solitary or in pairs on short axillary peduncles 8. *Eleutheranthera*
- 18a. Heads heterogamous; receptacle convex; achenes enclosed in hardened, pointed palea  
 b. Heads homogamous; receptacle conical; achenes naked 19. *Sclerocarpus*
- 19a. Pappus absent, if present of 2-3 bristles or awns 21. *Spilanthes*  
 b. Pappus consisting of 5 or more bristles or scales 20
- 20a. Achenes compressed 21  
 b. Achenes fusiform, angular 23
- 21a. Margins of achenes lacinate-winged; pappus of 2 unbarbed awns 22. *Synedrella*  
 b. Margins of achenes not lacinate-winged 22
- 22a. Pappus awns present 25. *Verbesina*  
 b. Pappus awns absent 14. *Guizotia*
- 23a. Pappus awns not retrorsely barbellate 12. *Glossocardia*  
 b. Pappus awns retrorsely barbellate 24
24. Medium sized to tall herbs; leaves cauline; style branches short, subulate 4. *Bidens*  
 b. Small herbs; leaves basal, rosulate; style branches with long, villous appendages 25
- 25a. Achenes with 2 retrorsely barbed pappus awns 13. *Glossogyne*  
 b. Achenes without pappus awns 6. *Chrysanthellum*
- 26a. Erect, annual herbs; pappus of short fimbriate scales, about 1 mm long 11. *Galinsoga*  
 b. Prostrate, ascending, perennial herbs; pappus of fine plumose bristles, about 5 mm long 24. *Tridax*
- 27a. Heads homogamous 15. *Lagascea*  
 b. Heads heterogamous 10. *Flaveria*

### 1. *Acanthospermum* Schrank

Herbs, annual, dichotomously branched, pubescent. Leaves opposite, simple or pinnatifid. Inflorescence of solitary heads in the axils or at forks of branches. Heads radiate, small, subsessile to sessile. Involucre bracts biseriate; outer elliptic-ovate, foliaceous; inner completely enveloping ray achenes. Receptacle convex; pales membranous. Ray florets 5-6; corolla yellow, emarginate or tridentate at apex; tube equalling the corolla or slightly shorter. Disc florets many; corolla campanulate, 5-lobed. Anthers cordate-sagittate. Style clavate, obtuse, hispidulous, undivided. Achenes of ray florets trigonous, slightly compressed, enveloped by inner involucre bracts, tough, echinate with straight or uncinat prickles. Pappus absent.



Distributed in W. Indies, S. America and Madagascar; ca 10 species, 1 in India.

*Literature.* BLAKE, S.F. (1921). Revision of the genus *Acanthospermum* *Contr. U.S. Nat. Herb.* 20: 383-392.

*Acanthospermum hispidum* DC., *Prodr.* 5: 522. 1836; R.R. Rao *et al.*, *Fl. Ind. Enum. Aster.* 1. 1988. **Fig. 93.**

Tam.: *Kombumul, Mullichedhi.*

Herbs, erect, upto 50 cm high, hispidly hairy; stems diffusely branched, terete, covered with spreading, hirsute hairs and small glandular hairs. Leaves simple, opposite, elliptic, obovate to spatulate or oblanceolate, cuneate at base, margins decurrent, coarsely serrate, obtuse or acute at apex, 3-8 x 2-5 cm, scabrous, sessile or shortly petioled. Heads radiate, subsessile, 1 cm across. Involucral bracts in 2 series; outer 5, lanceolate, 4-4.5 mm long, pubescent; inner connate, 3-5 mm long, enveloping the ovary of ray florets, softly prickly with 2 long, straight apical awns. Ray florets 5-8, female; corolla yellowish-white, 3-lobed, 2 mm long. Styles puberulous, undivided. Disc florets 5-6 or 7, bisexual; corolla yellow, 1.5-2.5 mm long; tube 5-lobed, thinly papillose. Stamens 5; anthers linear with sagittate base. Style shortly bifid. Scales narrowly spatulate, 1.5-2 mm long. Achenes of ray florets black, triangular, enveloped by the inner bracts, with numerous lateral, hooked spinules or bristles and 2 large, straight or hooked, 3-4 mm long, apical, wide spreading spines; achenes of disc florets, glandular. Pappus absent.

*Fl. & Fr.* Jan. - June.

*Distrib.* India: A weed of fallowlands, widely distributed in plains ascending upto 1500 m. Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh, Rajasthan and Tamil Nadu.

Nepal, Sri Lanka, Philippines, New Guinea, Australia, S. America and S. Africa.

## 2. *Adenocaulon* W.J. Hooker.

Herbs, erect, annual or perennial. Leaves alternate; lower ones whitish beneath, long petioled. Heads heterogamous, disciform, small, in glandular panicles. Involucre campanulate; bracts 5, unequal, herbaceous. Receptacle flat. Florets all tubular; outer 4-7, female, fertile, rarely with imperfect achenes; inner 4-5, hermaphrodite, sterile. Anther bases entire or minutely 2-toothed. Achenes obovoid, obscurely ribbed, covered with stalked glands. Pappus absent.

Temperate Asia, and America; 5 species, 1 in India.

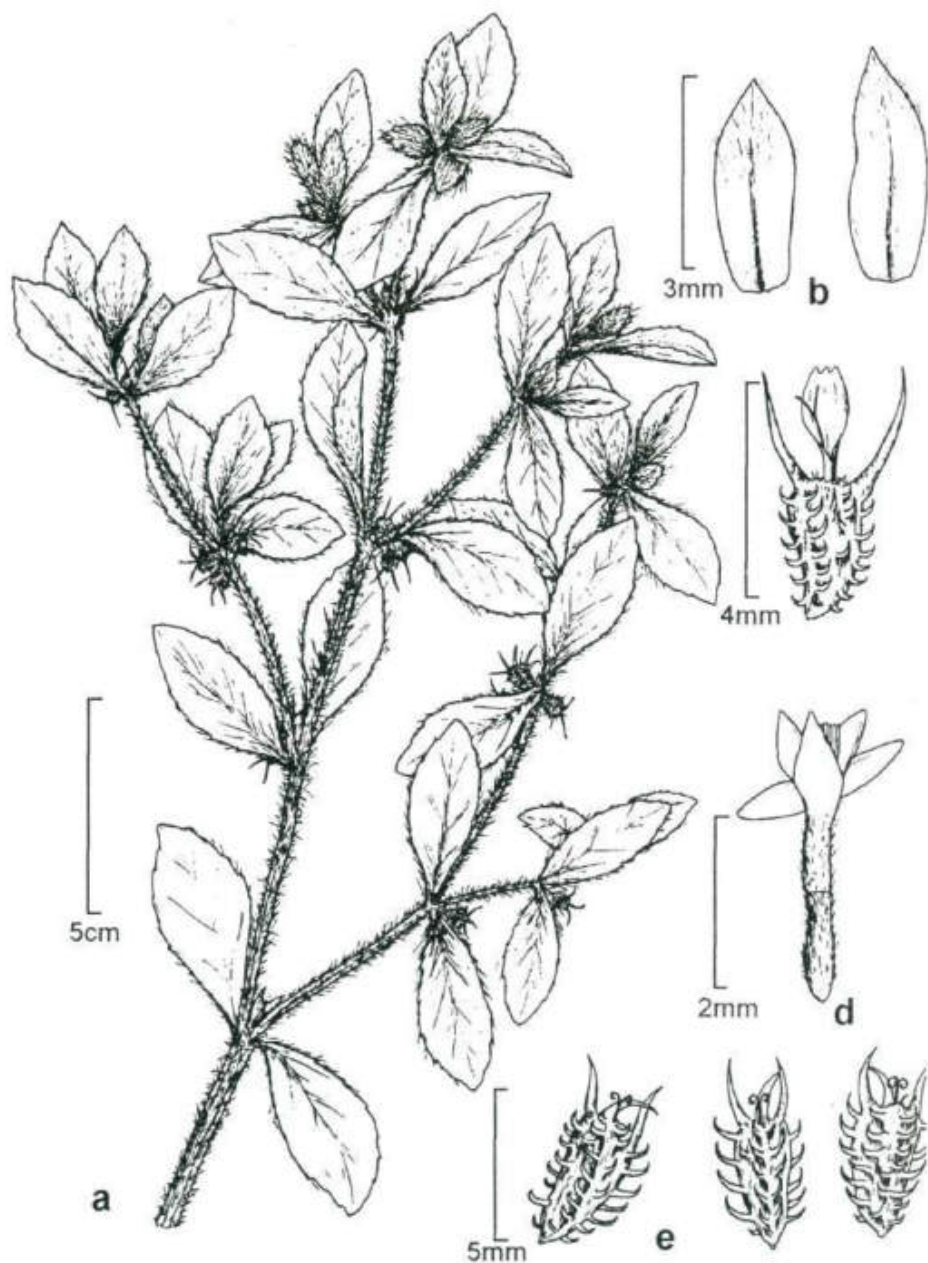


Fig. 93. *Acanthospermum hispidum* DC. : a. A portion of the twig; b. Involucral bracts; c. Ray floret; d. Disc floret; e. Achenes.

*Adenocaulon himalaicum* Edgew. in Trans. Linn. Soc. 20: 64. 1846. *A. bicolor* (auct. non Hook.f.) C.B. Clarke, Comp. Ind. 132. 1876. **Fig. 94.**

Herbs, perennial, erect, up to 1 m high; roots thick, fibrous; branches covered with grey, cottony hairs. Leaves alternate, membranous, orbicular or cordate, 5-10 cm across, sinuately angled and toothed, upper surface glabrous, lower white-tomentose; lower leaves on long, more or less winged petioles; upper ones small, sessile. Heads discoid, in loose panicles, 5-8 mm across; pedicel slender, viscidly glandular towards the end. Involucral bracts green, 5, spreading, reflexed in fruits. Receptacle flat, devoid of scales. Flowers pale-yellow or white, about 10, outer ones fertile; corolla 5-lobed. Achenes club-shaped, 6-7 mm long, densely clothed with large, stalked glands. Pappus absent.

*Fl. & Fr.* June - Oct.

*Distrib.* India: Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, S. China, Japan and America.

### 3. *Ambrosia* L.

Herbs or undershrubs, glandular, aromatic. Leaves alternate or opposite, simple to pinnately or palmately lobed or dissected, petiolate or sessile. Inflorescence of distinct staminate and carpellate heads usually on the same plant. Staminate heads in terminal racemose or spicate clusters, sessile or stalked. Carpellate heads in sessile or stalked clusters in axils of leaves. Heads unisexual, staminate heads with involucral bracts laterally connate and saucer-shaped. Receptacle paleaceous. Male florets, few to many; corolla campanulate, hyaline, 5-lobed. Stamens 5, appendaged. Style short, truncate. Involucral bracts in female heads fused to form a hard, vase shaped conceptacle. Corolla and stamens absent. Styles exerted through spine-like beaks, elongate, spreading. Achenes tightly enclosed in the involucre.

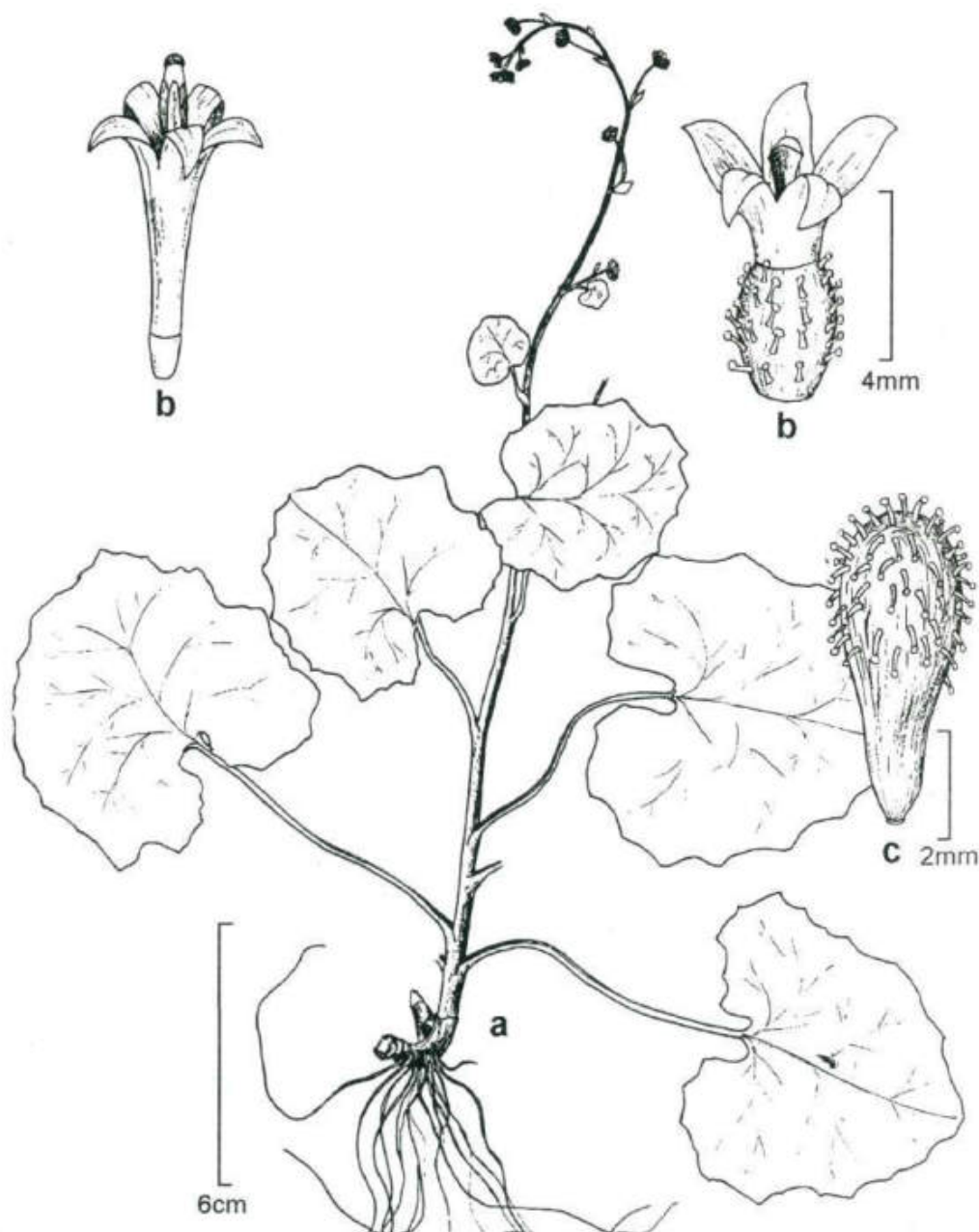
Distributed primarily in N. America; ca 30 species, 1 in India.

*Literature.* PAYNE, W.W. 1964. A re-evaluation of the genus *Ambrosia* (Compositae). *J. Arn. Arb.* 45: 401-438.

*Ambrosia artemisiifolia* L., Sp. Pl. 988. 1753.

**Fig. 95.**

Herbs up to 3 m tall; stems glabrous or hairy, ridged, branched. Leaves alternate in the upper part, opposite in the lower part, deeply cut in to many lobes, bi or tripinnatifid with small segments, 4-16 x 2-8 cm, nearly smooth, with prominent midrib. Heads yellowish-white, 3-4 mm across. Male and female flowers separate. Male flowers in small inverted racemes at the tip of the branches, slender, becoming lax. Female flowers



**Fig. 94.** *Adenocaulon himalaicum* Edgew. : a. Habit; b. Florets: sterile and fertile; c. Achene.

borne at leaf bases and in the fork of upper branches. Involucre saucer-shaped, glabrous or hairy. Achenes light pale-brown, topshaped, 4-5 mm long, enclosed in a woody hull, with awl-shaped beak. Pappus of simple hairs.

*Fl. & Fr.* July - Dec.

*Distrib.* India: N.E. India, a weed of Jhum fallows and roadsides.

China, Tropical Africa and N. America.

*Note.* The windborne pollens of this species are said to cause serious allergic diseases.

#### 4. *Bidens* L.

Herbs, erect or diffuse, glabrous or hairy, rarely shrubby. Stems tetragonous, branched, mostly pubescent, striate or sulcate. Leaves opposite, simple or compound or bipinnatisect, entire, toothed. Heads homo or heterogamous, discoid or radiate, solitary or in corymbose-panicles, usually pedunculate. Involucre campanulate, biseriate, shortly connate at the base; outer involucral bracts herbaceous or leafy; inner membranous, with scarious margins. Receptacle flat or convex. Ray florets white or yellow, sterile or absent. Disc florets yellow, fertile, 5-lobed. Anthers often black. Style branches flattened, apically pilose with a short, narrow appendage. Achenes black or brown, narrowly fusiform or linear, tetragonous, truncate and erostrate at the apex. Pappus of 2-4 stiff, smooth or retrorsely barbed bristles.

Distributed throughout the world; ca 230 species 10 in India.

*Literature.* SHERFF, E.E. (1916 & 1928). Studies in the genus *Bidens* III. *Bot. Gaz.* 61: 495-506. 1916; VIII. 85: 1-29; IX. 86: 435-447. SHERFF, E.E. (1937). The genus *Bidens* in *Field. Mus. Nat. Hist. Bot. Ser.* 16: 1-709.

#### KEY TO THE SPECIES

- |   |                           |
|---|---------------------------|
| 1a. Leaves simple   | 2                         |
| b. Leaves pinnately lobed   | 5                         |
| 2a. Leaves petiolate; pappus awns 3   | 4. <i>B. comosa</i>       |
| b. Leaves sessile; pappus awns 2-4  | 3                         |
| 3a. Pappus awns equal, retrorsely barbed  | 3. <i>B. cernua</i>       |
| b. Pappus awns unequal, smooth  | 4                         |
| 4a. Leaves up to 1 cm long, entire; margins of achenes smooth   | 6. <i>B. minima</i>       |
| b. Leaves up to 10 cm long, serrate; margins of achenes retroserrate                                    | 9. <i>B. tetraspinosa</i> |
| 5a. Leaves ternate or imparipinnate or pinnatipartite   | 6                         |
| b. Leaves deeply pinnatisect  | 9                         |
| 6a. Outer involucral bracts leafy, 10-40 mm long; achenes cuneate with retrorse setae along the margins | 10. <i>B. tripartita</i>  |

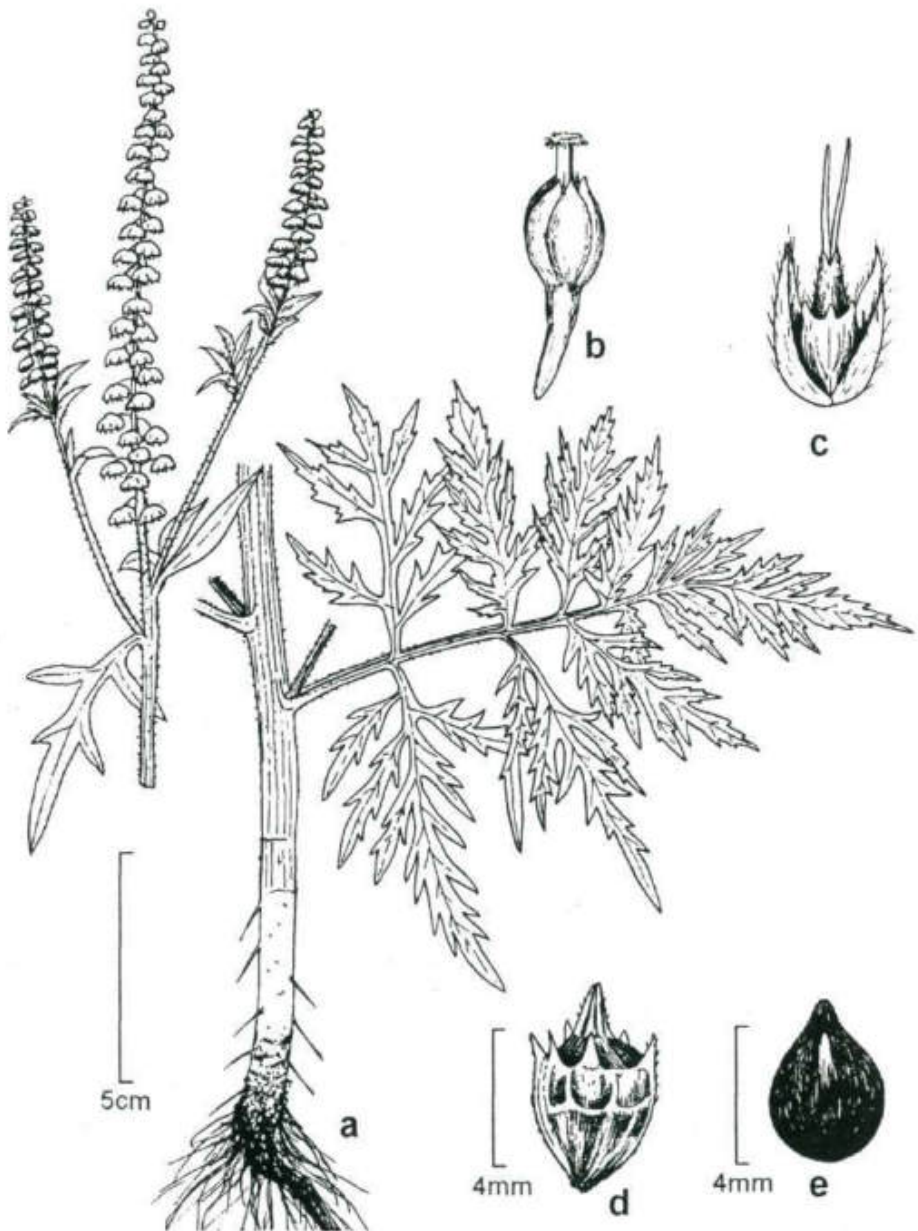


Fig. 95. *Ambrosia artemisiifolia* L. : a. Habit; b. Male floret; c. Female floret; d. Achene enclosed in the fused involucral bracts; e. Achene.

- b. Outer involucrel bracts linear or narrowly spatulate, 3-8 mm long; achenes linear, glabrous or more or less hispid in the upper part 7
- 7a. Leaves 3-5 partite or undivided; outer involucrel bracts narrowly spatulate 7. *B. pilosa* - 7
- b. Leaves pinnate or bipinnate; outer involucrel bracts linear or linear-lanceolate 8
- 8a. Leaves pinnate; leaflets deltoid-ovate; heads 5-8 mm across 2. *B. biternata* - 8
- b. Leaves bipinnate; leaflets lanceolate; heads 3-5 mm across 1. *B. bipinnata* - 8
- 9a. Tall herbs, 50-100 cm high; achenes, 10-20 mm long, with linear, ascending-strigose beak 8. *B. sulphurea* - 8
- b. Small herbs, 15-25 cm; achenes 5-9 mm long, without a beak 5. *B. humilis*

1. *Bidens bipinnata* L., Sp. Pl. 832. 1753. *B. pilosa* L. var. *bipinnata* Hook.f., Fl. Brit. India 3: 309. 1881.

Herbs, erect, branched up to 1 m high; stems 4-angled, glabrous. Leaves opposite, 2-3 pinnatipartite or pinnate, 4-20 cm long; segments ovate-lanceolate, acute or acuminate, serrate, thinly hairy. Heads yellow, on 1-8 cm long peduncles, 6-10 mm across. Involucrel bracts in 2 series; outer linear-spatulate, 2-3 mm long; inner ovate-lanceolate, obtuse, 3-4 mm long. Ray florets 2-5; corolla bilobed. Disc florets many. Achenes 6-20 mm long, 4-angled, tapering towards the apex, glabrous to shortly hispid. Pappus setae 2-4, 2-3 mm long, retrorsely bristly.

*Fl. & Fr.* March - Nov.

*Distrib.* India: Common in waste places, forest edges. Jammu & Kashmir, Himachal Pradesh, Punjab and Uttar Pradesh.

Nepal, China, Malaysia, Korea, Japan, Philippines, Australia, New Guinea, Africa and Madagascar.

2. *Bidens biternata* (Lour.) Merr. & Sherff in Bot. Gaz. 88: 293. 1929. *Coreopsis biternata* Lour., Fl. Cochinch. 508. 1790. *Bidens pilosa* auct. non L., Hook.f., Fl. Brit. India 3: 309. 1881.

Herbs, erect up to 90 cm high; stems angled, sparsely pubescent when young. Leaves opposite (upper alternate), pinnate or bipinnate, 5-10 cm long; leaflets ovate, deeply dentate or pinnatifid, acute, subsessile, 1.5-3 cm long; petiole 1-5 cm long. Heads radiate, borne on the dichotomously branched peduncles, several, 1-10 cm long. Involucrel bracts in 2 series; outer narrowly linear-oblongate, 5 mm long, ciliate at the margins; inner ovate-lanceolate, 6 x 2 mm, glabrous, membranous at margins. Ray florets generally 3; corolla white or yellow. Disc florets many; corolla tubular, pubescent. Achenes black, linear, tetragonous, 7-15 mm long, glabrous with 2-5 awns at the apex.

*Fl. & Fr.* April - Oct.

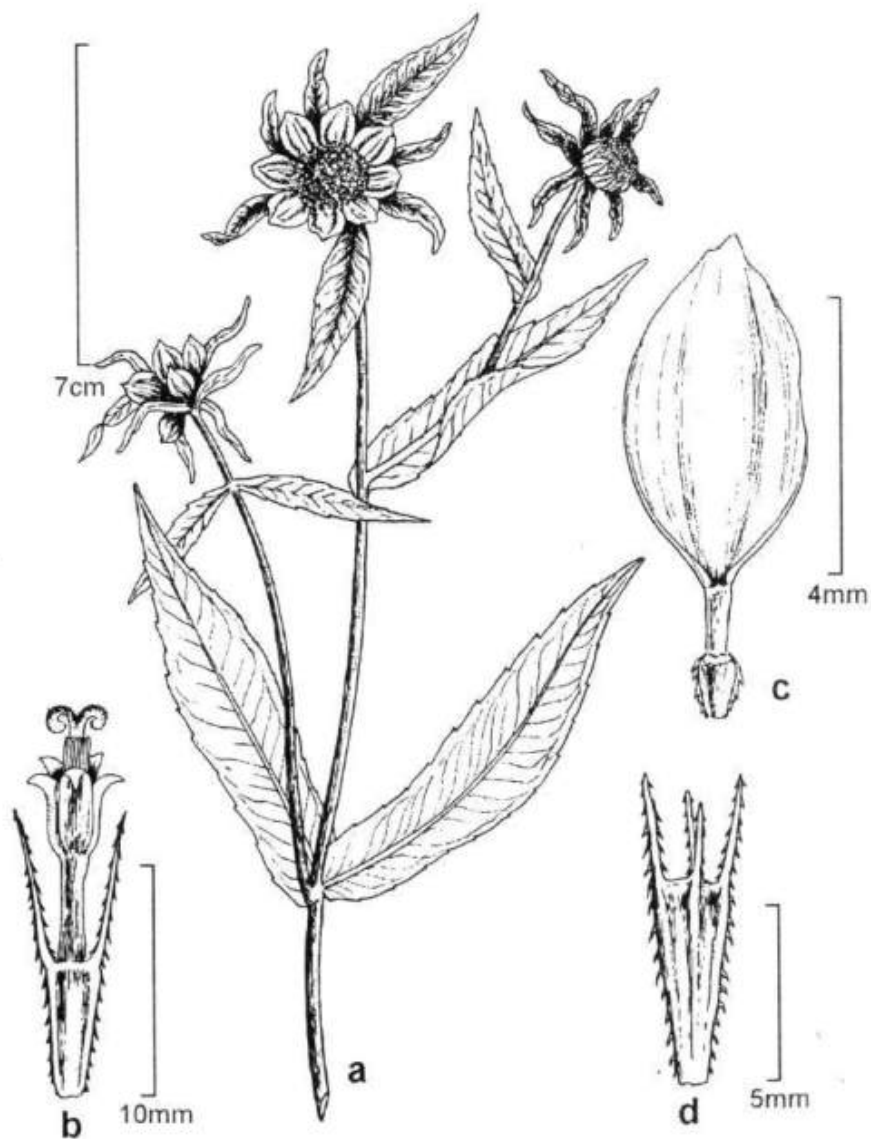


Fig. 96. *Bidens cernua* L. : a. A portion of the twig; b. Disc floret; c. Ray floret; d. Achene.



*Distrib.* India: Common in waste places, gardens and cultivated fields. Uttar Pradesh, Punjab.

Nepal, Sri Lanka, Malaysia, Thailand, Philippines, Indonesia, China, Korea, Japan, New Guinea, Australia, Africa, Madagascar and France.

3. *Bidens cernua* L., sp. Pl. 832. 1753; Hook.f., Fl. Brit. India 3: 309. 1881.

Fig. 96.

Herbs, 30-60 cm high, erect, simple or branched, glabrous, with fibrous rootstock; stema rooting from the lower part, somewhat succulent. Leaves opposite, linear, lanceolate, subcordate, at base serrate. 3-10.5 x 0.5-1 cm, sessile. Heads solitary, drooping. 1-3 cm across. Involucral bracts in 2 series; outer leafy, narrowly lanceolate, serrate, 2-4 cm long; inner broadly ovate, 5-10 mm long membranous, with transparent margins. Ray florets absent. Disc florets bisexual, corolla tubular, 5-dentate or lobed. Achenes 4-angled, 5-7 mm long, truncate at apex, base cuneiform, narrow, margins barbed. Pappus of 2-4, retrorsely barbed bristles.

*Fl. & Fr.* March - July.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal and North America.

4. *Bidens comosa* (Gray) Wiegand in Bull. Torrey Bot. Club 436. 1897; Mathur & Uniyal in J. Econ. & Taxon. Bot. 6(2): 405. 1985.

Fig. 97.

Herbs, 50-80 cm high, erect, simple or branched. Leaves simple, opposite, ovate-lanceolate, 2-10 x 0.6-2 cm, narrowed at the base to a petiole. Heads yellow, solitary. Involucral bracts foliaceous, 1-2.5 cm, subequal, overtopping the florets. Disc florets tubular; corolla 5-fid. Achenes truncate at the tip, barbed downwards on the entire margin. Pappus awns 3, unequal, barbed.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: Himachal Pradesh.

N. America.

5. *Bidens humilis* H.B. & K., Nov. Gen. Sp. 4: 234. 1820.

Fig. 98.

Herbs, erect, annual, rarely branched, herbs up to 25 cm high; stems slender, more or less rectangular, whitish hairy. Leaves opposite, pinnatisect; segments acuminate, 1.5-

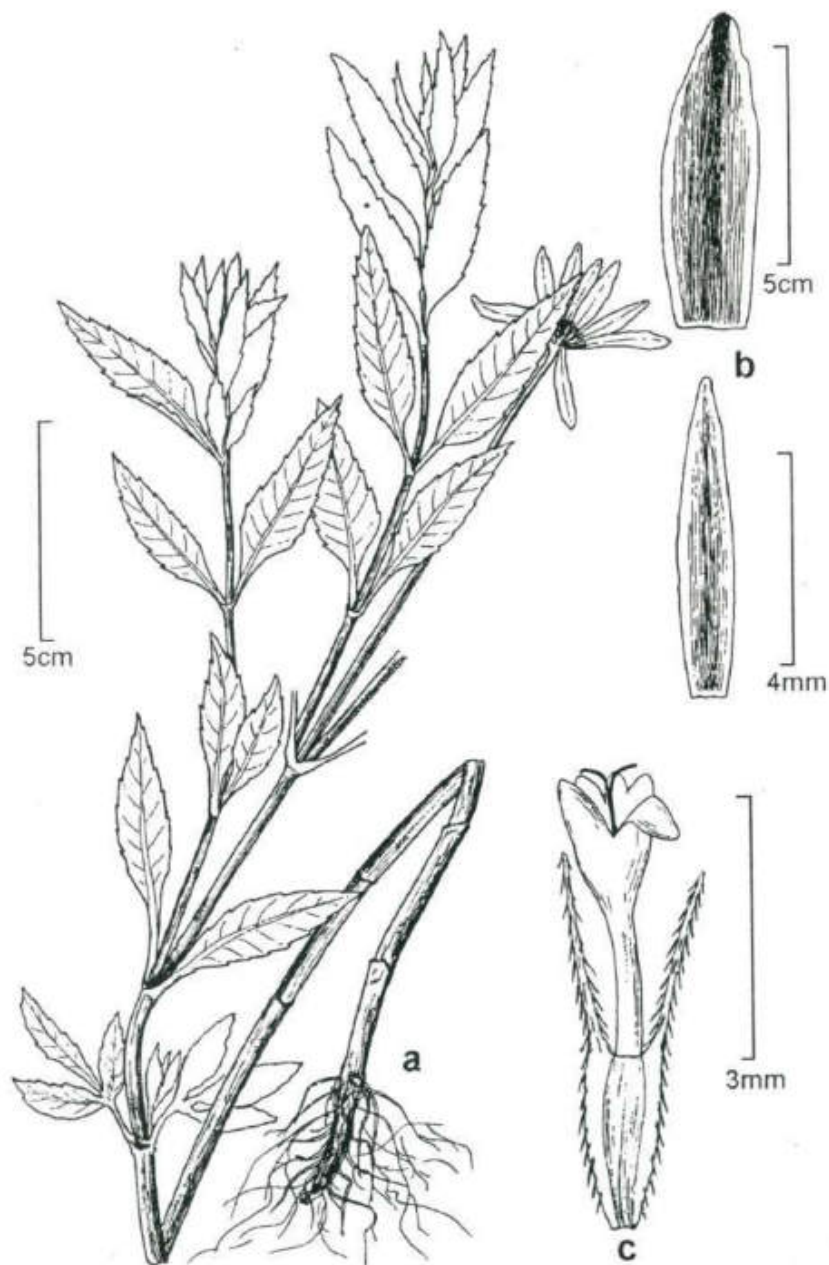


Fig. 97. *Bidens comosa* (Gray) Wiegand : a. Habit; b. Involucre bracts, c. Disc floret with achene.

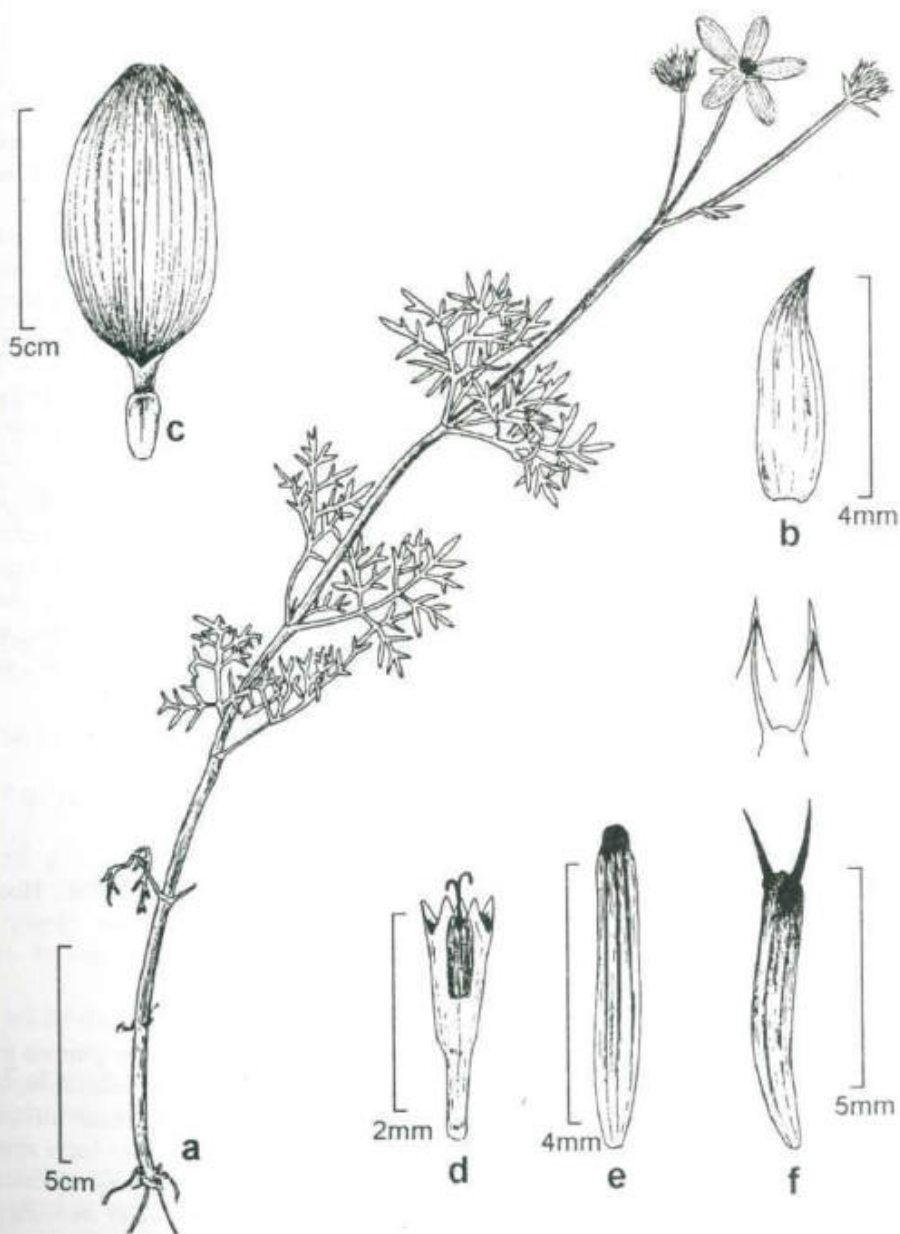


Fig. 98. *Bidens humilis* H.B. & K. : a. Habit; b. Involucral bract; c. Ray floret; d. Disc floret; e. Palea; f. Achene.

4.0 cm long, whitish on lower surface. Heads radiate, solitary, terminal, 2.0-3.0 cm across; peduncle slender, up to 4.5 cm long, with usually leaf-like bracts. Involucral bracts in 2 series; outer herbaceous, up to 4 mm long; inner membranous. Ray florets few; corolla yellow 1.0 x 0.5 cm; veins brownish-black. Ovary not fertile. Disc florets many; corolla tubular, 3.5-4.0 mm long, 5-lobed. Style branches dark brown, pilose. Achenes brownish-black, 5-9 mm long, slightly angled and compressed, slender, with 2 stiff, retrorsely strigose bristles, 1 mm long.

*Fl. & Fr.* April - Aug.

*Distrib.* India: South India on hills in moist shady places, up to 1600 m.

6. *Bidens minima* Huds., Fl. Ang. 310. 1762; Kak & Javeid in Curr. Sc. 44(17): 644. 1975.

Herbs, 2-10 cm high, erect, simple. Leaves opposite, oblong-lanceolate, acute, entire, with a prominent mid vein, 5-10 x 1.5-2 mm, sessile. Heads homogamous, terminal, solitary, sometimes 2, campanulate, 5-8 mm across, erect. Involucral bracts in 2 series; outer 5-6, broadly lanceolate; inner yellow with brown streaks, oblong-lanceolate. Receptacle flat. Florets yellowish, few (9-15). Stamens with acute, apical appendages. Ovary tetragonal. Achenes brown, 3-5 mm long, brown, smooth, with 2 short and 2 long, erect spines.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: On floating islands. Jammu & Kashmir.

7. *Bidens pilosa* L., Sp. Pl. 832. 1753. *B. chinensis* auct. non Willd., Hook.f., Fl. Brit. India 3: 309. 1881.

Tam.: *Mukkutthi*.

Herbs, hairy or glabrous, branched, up to 1.10 m tall. Leaves imparipinnate with a large terminal pinnate lanceolate to ovate, acuminate, coarsely toothed, veins dark, lower surface with white, translucent crystals; petioles narrowly winged. Heads discoid to radiate, in lax corymbose panicles, 5-15 mm across, long peduncled. Involucre sparsely hairy at base; bracts biseriate; outer green, linear-oblongate to obovate or narrowly spatulate, with dark, thick mid nerves, obtuse, 5-8 x 2-2.5 mm; inner dark small or nearly equalling the outer ones, ovate, with green or whitish scarious margins, acute. Pales dark linear, acute, with broad, scarious margins, 4-5 mm long. Ray florets few, sterile; corolla when present white to cream coloured. Disc florets yellow, many. Achenes black, fusiform, 6-10 mm, papillose with few pale, erect setae on the ribs near the apex, apex with brownish, scarious, 2-3 retrorsely barbellate setae.

## KEY TO THE VARIETIES

- 1a. Capitula discoid  
b. Capitula radiate

- 7.1. var. *minor*  
7.2. var. *pilosa*

7.1. var. *minor* (Bl.) Sherff in Bot. Gaz. 70: 387. 1925. *B. sundaica* var. *minor* Blume, Bijdr. 914. 1826.

Herbs, erect, up to 110 cm tall. Leaves opposite, 3-sometimes 5-partite, petiolate; leaflets ovate to elliptic-lanceolate, serrate, sharply acuminate, cuneate, gradually attenuate at base, glabrous, 0.6-8 x 0.6-2.6 cm. Heads radiate, terminal, in the axils of upper leaves, on 2-8 cm long, glabrous, ribbed peduncles. Involucral bracts biseriate; outer acute, connate at the base, narrowly spatulate, ciliate, 4-6 mm long; inner lanceolate, with pale margins. Ray florets 4-7; corolla creamy to white, elliptical with 5 subacute teeth, 5-8 mm long, 5-nerved. Style arms 2-3, short. Achenes dark-brown, linear, compressed, triangular, 5-12 mm long with 2-3 apical awns, glabrous. Disc florets many; corolla tubular, 5 dentate. Anthers black. Style arms 2, acute, papillose. Achenes dark brown, linear, quadrangular, compressed, 4-5 mm long, with 2-3 apical awns.

*Fl. & Fr.* March - Oct.

*Distrib.* India: Common weed of roadsides, cultivated fields and open fallows. Uttar Pradesh, Meghalaya and elsewhere in warmer parts of the country.

Sri Lanka; Neapal C. & S. America and Africa.

7.2. var. *pilosa*

*Fl. & Fr.* March - Nov.

*Distrib.* India: Common weed of gardens, waste places, roadsides and agricultural fields. Punjab, Haryana, Delhi, Uttar Pradesh and Tamil Nadu.

Sri Lanka, C. and S. America, Africa, S.E. Asia, Australia and New Zealand.

8. *Bidens sulphurea* (Cav.) Sch.-Bip. in Seemann, B. Voy. Herald 308. 1856. *Cosmos sulphureus* Cav., Ic. Descr. Pl. 1: 56. t. 79. 1791. Fig. 99.

Herbs, erect, annual, branched up to 1 m high; stems slender, more or less quadrate with large, whitish hairs. Leaves 2-3 pinnatisect; segments acuminate and aristate-tipped, 10-15 cm long, glabrous or with scattered stout hairs; petioles slender, angled, hispid-ciliate at the expanded base. Heads orange, radiate arising at terminal nodes, solitary or few, showy, up to 6 cm across; peduncles slender, apically narrowed, up to 15 cm long with one or more leaf-like bracts. Involucral bracts in 2 series; outer herbaceous, 5-7 mm long; inner membranous, scarious, narrow but broader and longer than the outer bracts.

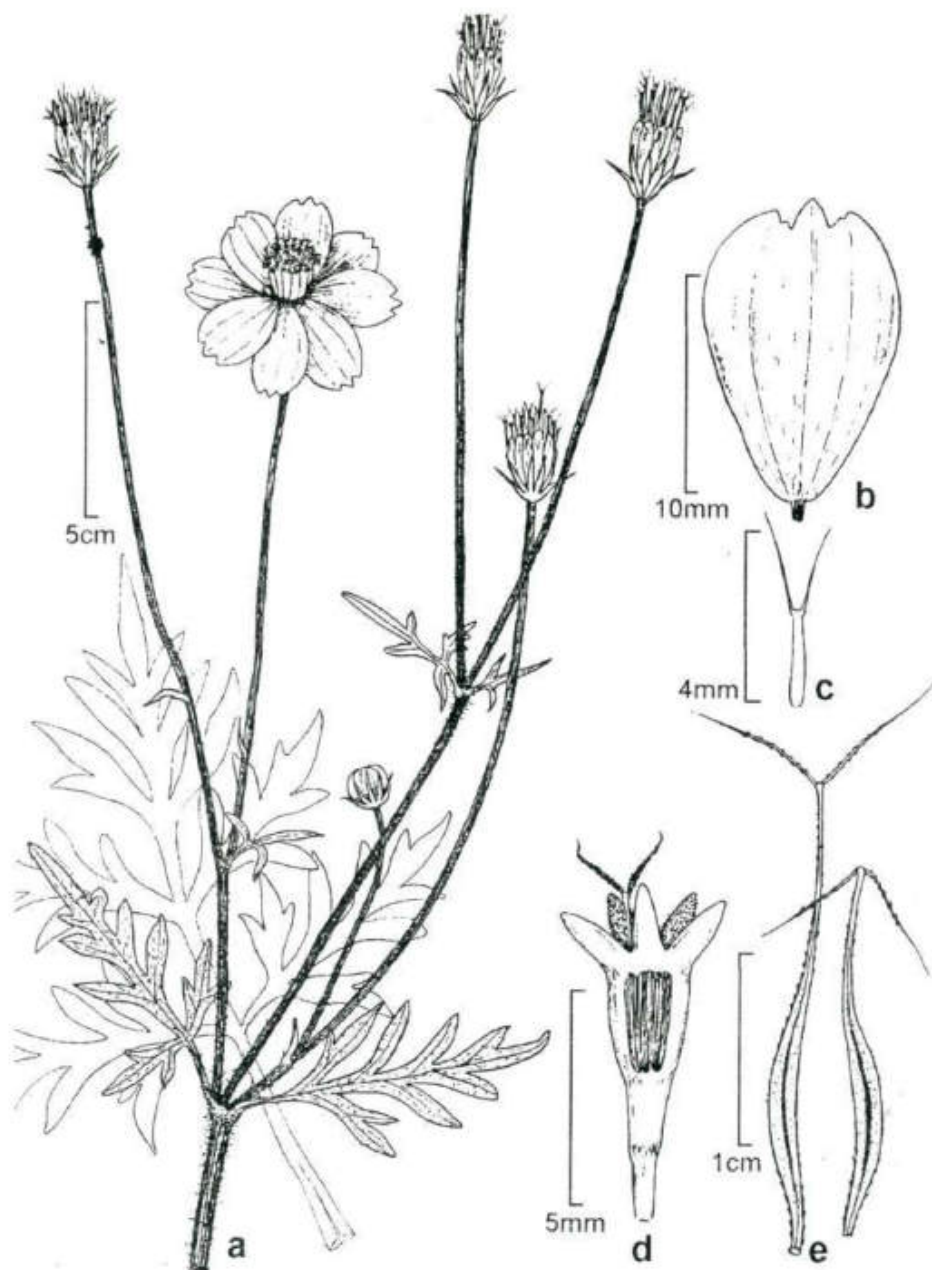


Fig. 99. *Bidens sulphurea* (Cav.) Sch.-Bip : a. A portion of the twig; b. Corolla of the ray floret; c. Young ray achene; d. Disc floret; e. Achenes.

Ray florets few; corolla yellow-orange, obovate, 15-30 mm long, 2-3 denticulate, sparingly pilose. Ovary not fertile. Disc florets many; corolla tubular-cylindrical, 7-12 mm long; apical lobes narrowly obtuse, ciliate on the innerside. Anthers yellow; filament flattened, densely ciliate. Ovary slightly expanded basally, angles with short hairs. Style branches yellow, pilose. Achenes black, compressed, up to 20 mm long, slender, slightly curved, sharply angled, somewhat the upper part narrowed into a linear, ascending-strigose beak terminating in 2 stiff, retrorsely strigose bristles, 3 mm long.

*Fl. & Fr.* Feb. - Nov.

*Distrib.* India: Cultivated as ornamental, naturalized in many places. Punjab, Haryana, Delhi, Uttar Pradesh, Bihar, W. Bengal, Madhya Pradesh and Rajasthan.

Nepal, Tropical Asia, N. America and Africa.

**9. *Bidens tetraspinosa* Kak & Javeid in J. Bombay Nat. Hist. Soc. 79: 175. 1982.**

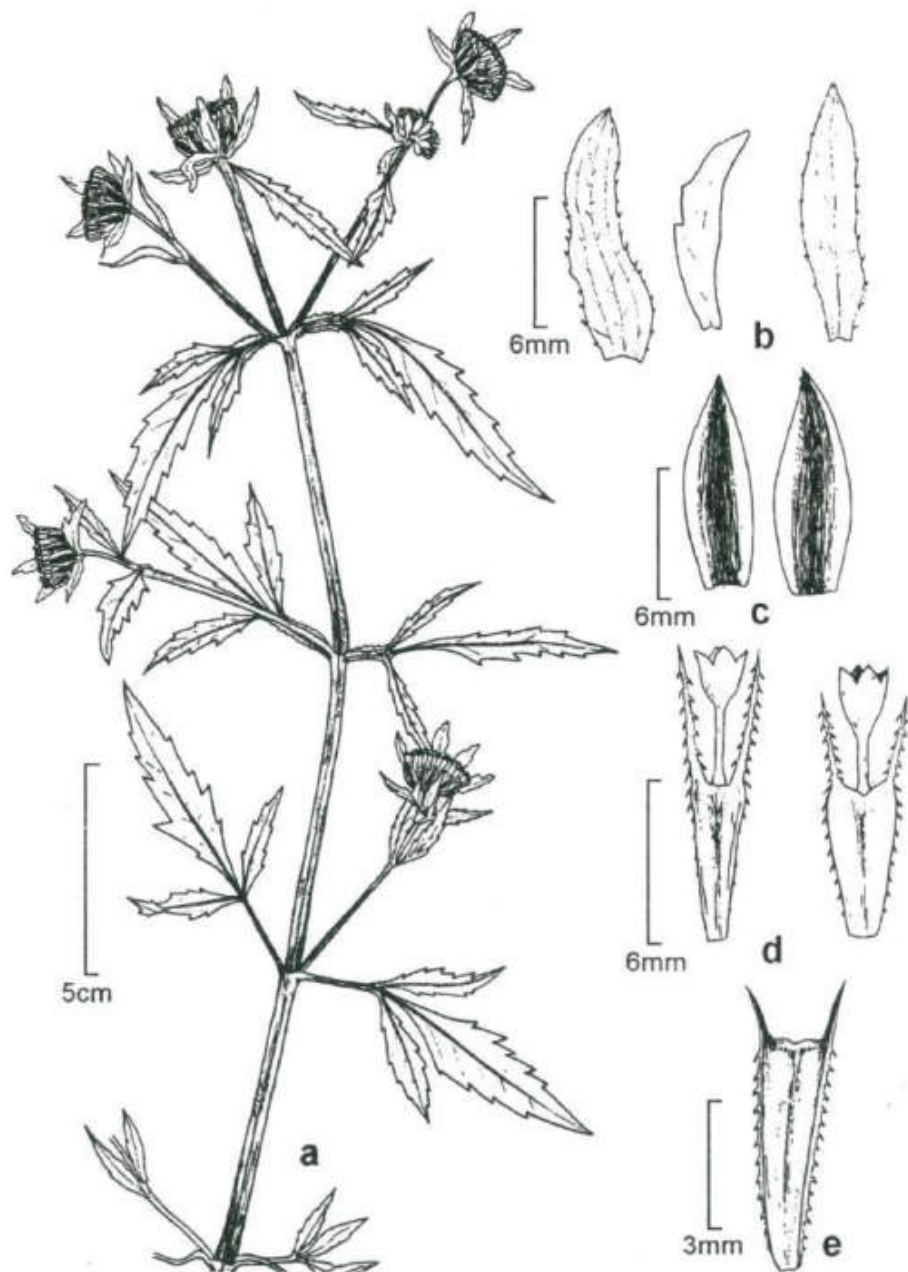
Herbs, diffuse or ascending with lower nodes rooting; stems branched, sulcate. Lower leaves entire or remotely toothed with cuneate to sessile base; upper linear, acute, irregularly serrate, 7-10 cm long. Involucral bracts in 2-series; outer 2-6, yellow with brown streaks, lanceolate, 6 x 3 mm, inner linear-lanceolate. Receptacle flat or dome-shaped, pitted, ca 4 mm across. Florets homogamous; corolla tubular-campanulate, 5-lobed. Stamens with acute, apical appendages. Ovary quadrangular; stigma rays linear, short. Achenes cuneate, 3-4.2 x 1.5-2 mm, 4 angled with 4-unequal, smooth, spines; shorter ones 1-1.2 mm; longer ones 2 mm long, retrorsely serrate on angles.

*Fl. & Fr.* July - Sept.

*Distrib.* India: Aquatic or marshy herbs. Jammu & Kashmir.

**10. *Bidens tripartita* L., sp. Pl. 831. 1753; Hook.f., Fl. Brit. India 3: 309. 1881. p.p. Fig. 100.**

Herbs, annual, upto 1 m high, glabrous to hirsute. Leaves opposite, 3-lobed, tripartite or simple; segments lanceolate, acuminate, serrate, 3-6 x 0.7-1.5 cm; undivided leaves elliptic-lanceolate, acuminate, serrate, gradually attenuate at the base, 2-3 x 0.4-1 cm, petioled or sessile. Heads discoid, solitary, terminal or in the axils of upper leaves 1-2.5 cm across; peduncles 1-6 cm long. Involucre in 2-series; outer 5-9 foliaceous, lanceolate-spathulate, 1-3 cm long, spreading, entire or dentate, ciliate along the margins, inner ovate or elliptic-lanceolate, 8-10 mm long, acute, acuminate or obtuse, membranous, glabrous. Pales oblong-lanceolate, as long as the achenes, scarious with dark lines. Ray florets absent. Disc florets many; corolla tubular-campanulate, 5-toothed. Style arms lanceolate, acute. Achenes dark brown, cuneate-linear, 5-8 mm long, compressed, with sparsely retrorsely hispid margins. Pappus awns 2-3.



**Fig. 100.** *Bidens tripartita* L. : a. A portion of the twig; b. Outer involucral bracts; c. Inner involucral bracts; d. Florets; e. Achene.



## KEY TO THE VARIETIES

- 1a. Plants glabrous; leaves sessile  
 b. Plants hirsute; leaves petioled

- 10.1. var. *repens*  
 10.2. var. *tripartita*

**10.1. var. *repens*** (D. Don) Sherff in Bot. Gaz. 81. 45. 1926. *B. repens* D. Don, Prodr. Fl. Nepal. 180. 1825. *B. tripartita* sensu Hook.f., Fl. Brit. India 3: 309. 1881. p.p.

*Fl. & Fr.* April - Sept.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

N. America.

**10.2. var. *tripartita***

*Fl. & Fr.* : March - Sept.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, C.I.S., S.E. Australia, Europe and N. Africa.

**5. *Blainvillea* Cass.**

Herbs, annual, erect, branched, scabrid-villous. Leaves simple, opposite; upper alternate, dentate, petiolate. Heads heterogamous, radiate, small, terminal or axillary. Involucre campanulate. Involucral bracts in 1-2 series; outer green; inner merging with membranous, concave scales. Ray florets few; corolla yellow, 2-3 lobed. Disc florets tubular-campanulate, 5-lobed. Anther base obtuse. Style branches flattened, acute. Achenes of the ray florets triquetrous to dorsally compressed. Disc achenes laterally compressed, truncate at the apex. Pappus of 2-5 unequal bristles.

Pantropical; ca 10 species, 1 in India.

*Literature.* KOSTER, J.T. & PHILIPSON, W.R. (1950). Nomenclatural changes in *Spilanthes* and *Blainvillea* with remarks and a key to the species of *Spilanthes* in Malay Archipelago. *Blumea* 6: 349-354.

***Blainvillea acmella*** (L.) Philipson in *Blumea* 6: 350. 1950. *Verbesina acmella* L., Sp. Pl. 901. 1753. *Blainvillea latifolia* (L.f.) DC. ex Wight, Contr. Bot. Ind. 71. 1834; Hook.f., Fl. Brit. India 3: 305. 1881. **Fig. 101.**

Herbs up to 130 cm tall, annual, stout, simple or sparingly branched, pubescent; stems clothed with white, somewhat crisped hairs; branchlets scabrid. Leaves ovate-lanceolate or rhomboid-ovate with cuneate or rounded base, acuminate at apex, dentate-

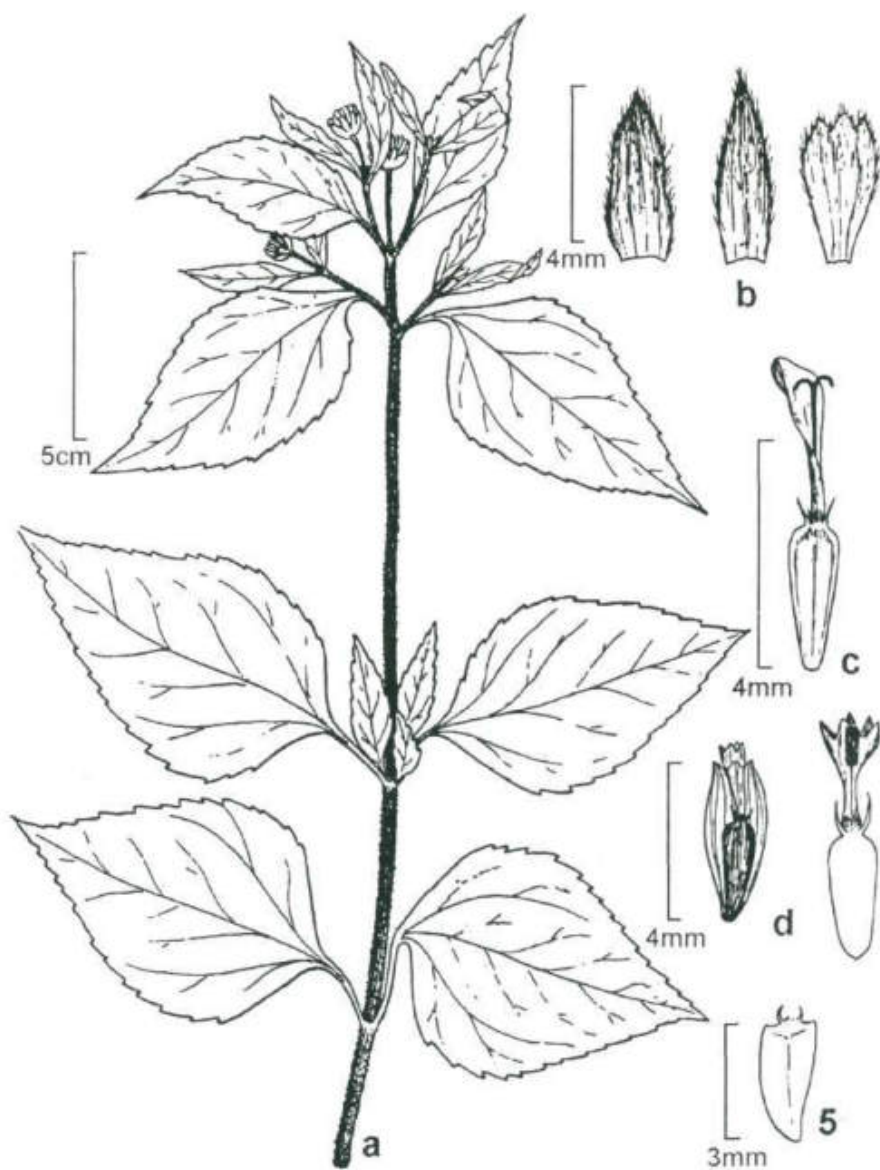


Fig. 101. *Blainvillea acmella* (L.) Philipson : a. A portion of the twig; b. Involucral bracts; c. Ray floret; d. Disc florets; e. Achene.

serrate, 6-15 x 3-9 cm, appressed hairy; petiole 1-2 cm long. Heads white, radiate, solitary, terminal or axillary or at the fork of the branches, 5-8 mm across; peduncles 0.5-4 cm long. Involucre campanulate; bracts few; outer ones broad, ovate to rhomboid, 4-5 mm, acute, pubescent, leaflike; inner gradually passing into oblong, folded, scarious scales. Ray florets few with yellow or white, 2 dentate corolla, 5 mm long. Disc florets with white or yellow, tubular, campanulate, 5-lobed, corolla; tube 1-2 mm; lobes obovate, acute. Stamens 5; anthers linear with obtuse base. Achenes dark brown to black, obovoid-cuneate, triquetrous, 4-5 mm long, transversely rugose; disc achenes laterally compressed, truncate at apex. Pappus of 2-5 unequal, plumose setae, 6-10 mm long.

*Fl. & Fr.* April - Nov.

*Distrib.* India: A pantropic weed. Jammu & Kashmir, Punjab, Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu.

Sri Lanka, China, Africa and America.

## 6. *Chrysanthellum* Rich.

Herbs, annual, erect or prostrate with short, slender taproot. Leaves alternate or opposite, entire or dentate to bipinnately dissected with fine divisions. Glabrate; petiole slender, slightly stem clasping. Inflorescence of solitary, ascending heads on slender, glabrate peduncles with scale-like or foliaceous bracts. Heads radiate. Involucral bracts in 2-3 series; outer ones few, linear-lanceolate, conspicuously thickened at base. Receptacle semiglobose; pales usually persistent. Ray florets many; corolla yellow with a short tube and 2 longitudinal distinct ribs with 2-3 denticulations at the apex. Ovary laterally flattened. Disc florets many; corolla campanulate with five lobes, glabrous. Anthers dark. Style branches with flattened, pilose margins. Achenes often dimorphic; outer ones oblong, tuberculate, sometimes puberulent, apex slightly expanded into 2 lateral ears; inner ones black, flat, with massive, light coloured wings. Pappus lacking.

Distributed in the tropics of old and new world; ca 6 species, 1 in India.

*Chrysanthellum americanum* (L.) Vatke, Abh. Nat. ver. Brem. 9: 122. 1887. *C. indicum* DC., Prodr. 5: 631. 1836; Hook. f., Fl. Brit. India 3: 310. 1881. **Fig. 102.**

Herbs, procumbent, annual; stems rigid, grooved, glabrous to scabrous, 4-angular. Leaves deltoid, pinnatifid, succulent; segments oblong or cuneiform, obtusely lobed, membranous at margins; petioles dilated at sheathing base. Heads 5-8 mm across, enlarging in fruit. Involucral bracts equalling achenes, oblong to elliptic, 2-5 x 1-1.5 mm obtuse, strongly nerved with broad membranous margins. Ray florets few, female; corolla yellowish-white, 1-1.5 mm, dark veined. Style bifid. Disc florets many, bisexual;

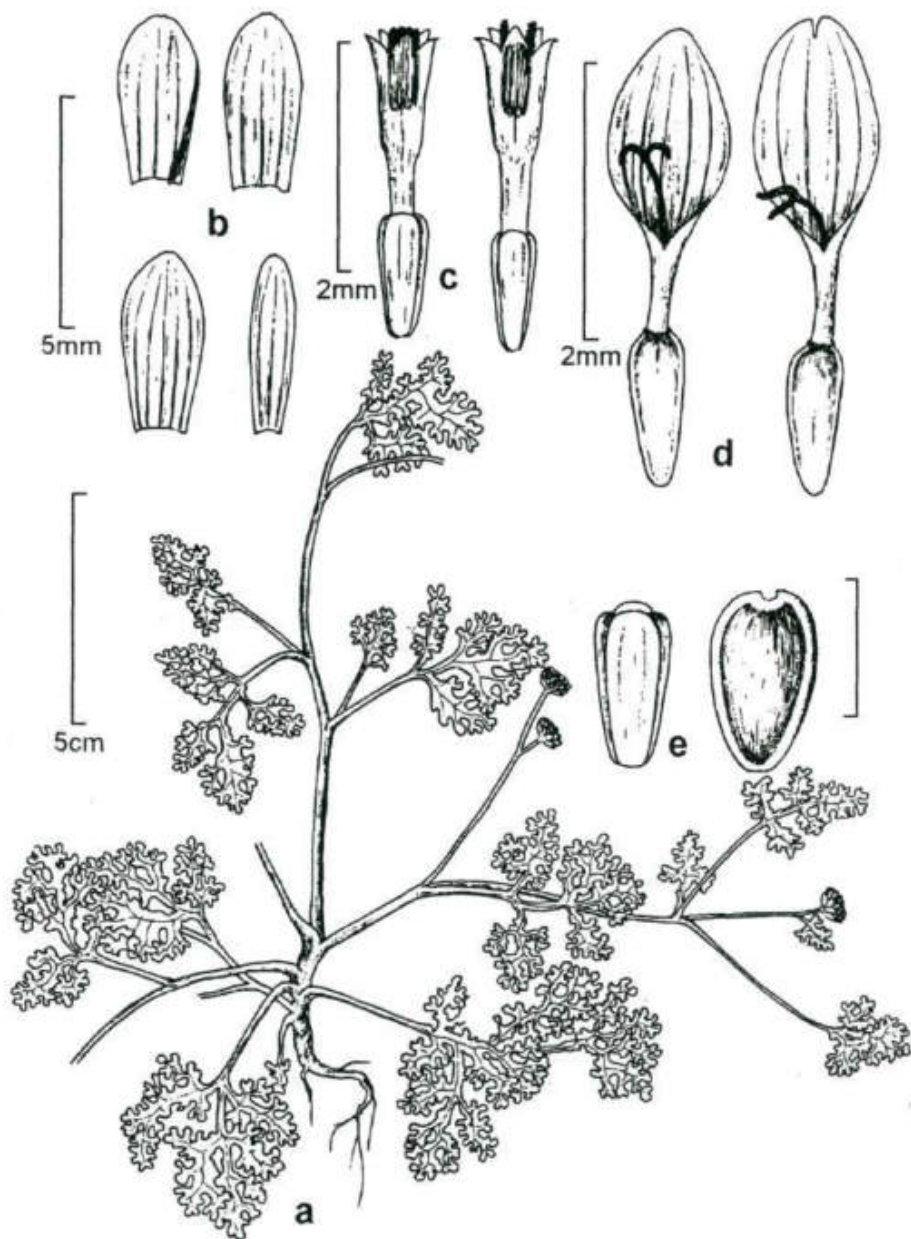


Fig. 102. *Chrysanthellum americanum* (L.) Vatke : a. Habit; b. Involucral bracts; c. Disc florets; d. Ray florets; e. Achenes.

corolla tubular, 1.5-2 mm. Achenes cuneate-oblong, 2.5-3 x 1 mm, grooved, smooth, with thick margins.

*Fl. & Fr.* July - Dec.

*Distrib.* India: Uttar Pradesh, Bihar, West Bengal, Madhya Pradesh, Gujarat and Andhra Pradesh.

Madagascar and Tropical Africa.

### 7. *Eclipta* L. *nom. cons.*

Herbs, annual or perennial, erect, prostrate, decumbent, sprawling. Leaves simple, opposite, entire or toothed, generally pubescent with verrucose hairs. Inflorescence solitary or heads fascicled; peduncles elongate, appressed pubescent. Heads radiate. Involucral bracts in 2 or more irregular series, ovate-lanceolate, mucronulate. Ray florets in 2-3 series; corolla yellow or white; tube short, puberulent. Staminodes usually present. Disc florets many, fertile; corolla campanulate; lobes ciliate. Anthers sagittate. Achenes dorsiventrally flattened, tuberculate. Pappus of thick scales.

In the warmer regions of America, Africa, Australia and Asia; 4 species, 1 in India.

*Literature.* SANTAPAU, H. (1957). *Eclipta prostrata*, *E. erecta* or *E. alba*: which is the correct name? *J. Bombay nat. Hist. Soc.* 54: 476-477.

✓ *Eclipta prostrata* (L.) L., *Mant. Pl.* 2: 286. 1771. *Verbesina prostrata* L., *Sp. Pl.* 902. 1753. *Eclipta alba* (L.) Hassk., *Pl. Jav. Rar.* 528. 1848; Hook.f., *Fl. Brit. India* 3: 304. 1881.

Fig. 103.

Tam.: *Krisilaanganni*; *Kaiyaanthavarai*.

Herbs, strigose, 10-50 cm high, often rooting from lower nodes; stems generally creeping, appressed-pubescent. Leaves simple, opposite, elliptic-oblong or oblong-lanceolate, apically mucronate, cuneate at base, entire, serrate or shallowly toothed; teeth mucronulate; 1.5-7.5 x .5-2.5 cm, pubescent, subsessile. Heads white solitary or fascicled, axillary, on 5-7 cm long, solitary or paired, unequal peduncles, 0.3-1.0 cm across. Involucral bracts in 2 series, ovate-lanceolate, acute to short acuminate, 3-6 mm., pubescent. Ray florets in 2-3 series with 2 dentate corolla, 1-3 mm long; tube short, sparingly pubescent above. Disc florets numerous; corolla campanulate, 1-1.5 mm long; tube short, sparingly pubescent apically, 4-lobed; lobes ciliate at margins on the ventral surface. Stamens 4-5, sagittate. Style branches acute, pubescent. Achenes dark brown, oblong-turbinate, dark brown, dorsiventrally compressed and sharply angled, the apical ridge with few small hairs. Pappus a ring of thick, ciliate, partially or completely united scales forming a cone on the top of the achene.

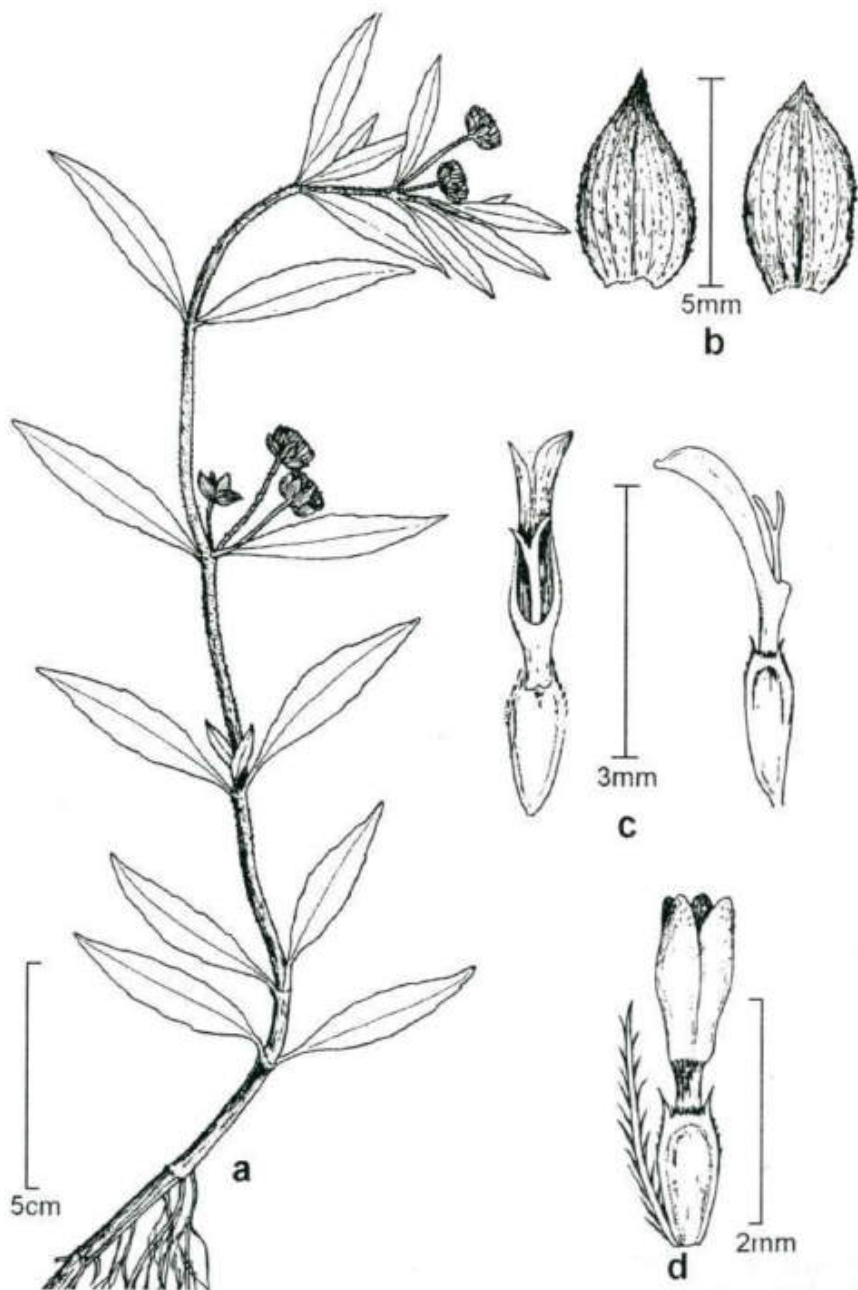


Fig. 103. *Eclipta prostrata* (L.) L. : a. Habit; b. Involucral bracts; c. Ray florets; d. Disc floret.

*Fl. & Fr.* Throughout the year.

*Distrib.* India: All tropical regions of India in moist places, ascending up to 2000 m.

### 8. *Eleutheranthera* Poit. ex Bosc.

Herbs, erect, branched. Leaves simple, opposite, petiolate. Heads homogamous, heterogamous, small, in the axils of upper leaves, discoid or radiate. Involucre nearly campanulate. Bracts few, herbaceous. Receptacle convex; scales membranous. Ray florets when present few, ligulate. Disc florets tubular, narrowly campanulate, 5-toothed. Anthers sagittate at the base, truncate at apex. Style branches acuminate, covered with minute hairs at the apex. Achenes narrowly obovoid, compressed, 3-4 angled, rotundate at the apex, often tuberculate. Pappus absent.

Monotypic genus of central and S. America, introduced into tropical Asia, Africa and New Guinea.

*Eleutheranthera ruderalis* (Sw.) Sch.-Bip. in Bot. Seil. 24: 165. 1866. Bennett in Curr. Sci. 34: 411. 1965. *Melampodium ruderalis* Sw., Fl. Ind. Occ. 3: 1372. 1806.

Herbs, annual, erect, up to 50 cm high, branched; stems sparsely pubescent, slender. Leaves ovate to ovate-lanceolate, shallowly crenate to serrate, slightly attenuate at the base, obtuse to acute at apex, 3-6 x 1.5-3 cm, scabrous on both the surfaces, trinerved, petioles up to 1.5 cm long. Heads homogamous, solitary or 2-4 in each axil, 4-6 mm across; peduncles up to 2 cm long, drooping. Involucral bracts few, unequal, oblong to oblong-ovate, 5-7 x 1.5-2.5 mm, obtuse, densely hispid. Florets 6-9, bisexual, each floret subtended by a receptacular bract. Receptacular bracts elliptic-oblong, acute to acuminate, 4-5 mm long. Corolla yellow, tubular, 2-2.5 mm long, 5-toothed, minutely pubescent on teeth. Anthers sagittate at base. Ovary linear-oblong; style branches linear, minutely hairy at the tip. Achenes 3-4 mm long, verrucose on the angles, minutely white puberulous near the apex.

*Fl. & Fr.* May - Nov.

*Distrib.* India: West Bengal and Andaman & Nicobar Island.

Sri Lanka. Indonesia, Singapore, New Guinea, Fiji, Africa, C. & S. America.

### 9. *Enhydra* DC.

Herbs, marshy, glabrous or scabrous. Leaves opposite, entire to subcrenate, sessile. Heads sessile, heterogamous, subradiate, axillary, unilateral or in alternate axils. Involucral bracts few, foliaceous, in opposite pairs; outer 2 larger. Receptacle

convex or conical; pales enclosing the flowers. Ray florets female, fertile; corolla small, 3-4 toothed. Disc florets hermaphrodite, fertile or inner ones sterile; corolla tubular, campanulate, 5-lobed. Anther bases obtuse, entire. Style arms dorsally compressed with hispid tips. Achenes oblong, enclosed in pales, outer dorsally; inner laterally compressed. Pappus absent.

In the warmer parts of the world; 10 species, 1 in India.

*Enhydra fluctuans* Lour., Fl. Cochinch. 511. 1790; Hook. f., Fl. Brit. India 3: 304. 1881. Fig. 104.

Herbs, decumbent, branched, submerged, aquatic, rooting at nodes; stems purple at the nodes, erect-ascending from a creeping base, fleshy, hollow, glabrous; younger parts hairy. Leaves simple, opposite, linear-oblong, fleshy, acute to obtuse, entire to subcrenate, gland dotted, with prominent midrib, sessile. Heads yellow, axillary or terminal, surrounded by leafy involucre bracts, sessile. Involucre bracts in 2 series, persistent; outer 2 bracts ovate-oblong, 1-1.5 x 0.6-0.8 cm, glabrous; inner 2 broadly ovate, 5 mm broad, fleshy, glabrous. Receptacle rounded to concave, fleshy. Ray florets female, in several rows, fertile; corolla white with purple tinge, 3-lobed, 2-2.5 mm long. Ovary up to 4.5 mm long enclosed in the pales; style linear; stigma bifid. Disc florets campanulate, 2-2.5 mm apically 5-lobed. Anthers linear. Ovary oblong, up to 2.5 mm long; style arms flattened, oblong-obtuse, hispid at the tips. Achenes oblong, 4-5 long, compressed. Pappus absent.

*Fl. & Fr.* Jan. - April.

*Distrib.* India: E. and N.W. India, in Marshes, ditches and ponds. Jammu & Kashmir, Uttar Pradesh, West Bengal, Sikkim, Assam and Tripura.

Pakistan, Bangladesh, China, Indonesia and Malaya (Malayésia).

### 10. *Flaveria* Juss.

Undershrubs or herbs, annual or perennial; stems purplish, few to many, erect, or decumbent, glaucous, glabrous to densely short pubescent or tufted-pubescent in the axils. Leaves opposite, decussate, linear-lanceolate, oblong-ovate or elliptic to oblanceolate, entire, serrate-dentate or spinulose serrate, connate to connate-perfoliate, glabrous or short-pubescent, petiolate or sessile. Heads radiate or discoid, tightly or loosely aggregated on short peduncles in usually flat-topped corymbose panicles or glomerule-like structures in axils. Receptacles small, convex, naked or setose. Ray florets if present 1-2, female, fertile; corolla yellow, oblong, ovate or elliptic, usually rather small and inconspicuous. Disc florets 1-15; corolla yellow, tubular; tube glabrous or minutely pubescent, 5-lobed. Style linear-oblong, flattened, obtuse and minutely pubescent at the



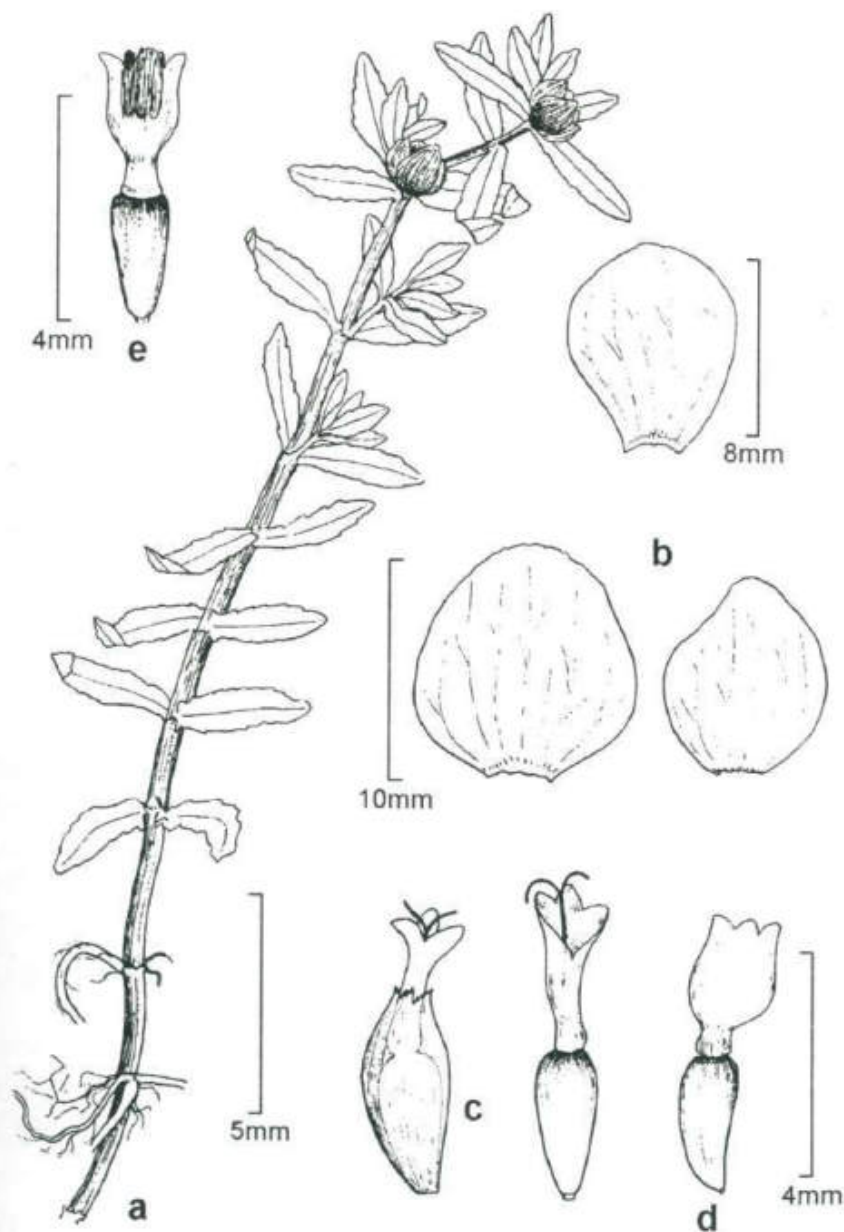


Fig. 104. *Enhydra fluctans* Lour : a. Habit; b. Involucre bracts; c. Ray florets; d. Disc floret; e. Young achene.

apices. Anthers with conic appendages. Achenes black, 10-ribbed, somewhat flattened, glabrous, those of ray florets usually larger, narrowly oblanceolate or linear-oblong. Pappus mostly absent.

Native of N. America, widely naturalised in many parts of the world. ca 21 species, 2 in India.

*Literature.* POWELL, A.M. (1978). Systematics of *Flaveria* (Flavariinae-Asteraceae). *Ann. Miss. Bot. Gard.* 65(2): 590-636.

#### KEY TO THE SPECIES

- |                                    |                        |
|------------------------------------|------------------------|
| 1a. Receptacle of glomerule setose | 2. <i>F. trinervia</i> |
| b. Receptacle of glomerule naked   | 1. <i>F. bidentis</i>  |

1. *Flaveria bidentis* (L.) Kuntze, Rev. Gen. 3: 148. 1898. *Ethulia bidentis* L., Mant. 110. 1767. *Flaveria contrayerba* Pers., Syn. 2: 489. 1807; Gamble, Fl. Pres. Madras 2: 711. (501) 1921.

Herbs annual, to 100 cm high; stems generally purplish, sparsely-villous. Leaves lanceolate-elliptic, serrate or spinulose-serrate, 5-12 (-18) x 1-2.5 (-7) cm, glabrous or densely short-pubescent; petioles 0.3-1.5 cm, base nearly connate. Inflorescence of tightly aggregated heads in scorpioid cymes. Heads obscurely radiate. Involucres up to 5 mm long, oblong, angular. Ray florets with short pale-yellow, corolla, 1-2 mm long, ovate-oblique, acute. Disc florets 3 to 8; corolla 2-2.5 mm long, tubular; lobes acute. Anthers up to 1 mm long. Achenes of ray florets oblanceolate or subclavate up to 2.5 mm long. Pappus absent.

*Fl. & Fr.* April - Dec.

*Distrib.* India: Madhya Pradesh, Rajasthan, Maharashtra and Tamil Nadu.

Egypt, Great Britain, S. Africa and America.

✓ 2. *Flaveria trinervia* (Spreng.) C. Mohr, Contr. U.S. Nat. Herb. 6: 810. 1901. *Oedera trinervia* Spreng., Bot. Gard. Halle 63. 1800. *Flaveria australasica* sensu Gamble, Fl. Pres. Madras 2: 711 (501). 1921.

Herbs 15-90 cm high, annuals, slender, erect; stems purple, glabrous. Leaves lanceolate, oblanceolate to elliptic, serrate dentate to spinulose-serrate, 3-10 x 1-3 cm, glabrous; petioles 1-2 cm long, base connate. Glomerule of 1-flowered heads aggregated in cymes, surrounded by floral leaves, solitary, terminal or at the forks of branches, radiate. Involucre campanulate. Involucral bracts 2-4; outer linear-lanceolate, 3-4 mm; inner oblong, 4-4.5 mm, folded, entire or minutely dentate at apex. Ray florets whitish

yellow, short, up to 1.5 mm long, oblique or suborbicular, almost enclosed in the bracts. Disc florets 2-2.5 mm long; corolla campanulate; tube pubescent; lobes acute. Anthers 1 mm long. Style exerted, 2 mm long with truncate stigma. Achenes black, oblanceolate, compressed, 2-2.6 mm long; those of ray longer. Pappus absent.

*Fl. & Fr.* March - Oct.

*Distrib.* India: Uttar Pradesh, W. Bengal, Madhya Pradesh, Rajasthan, Gujarat, Andhra Pradesh and Tamil Nadu.

W. Indies, Mexico, America; Tropical Africa and Asia.

*Note.* *Flaveria australasica* Hook. is an Australian plant and does not occur in India as mentioned by Powell (1978).

### 11. *Galinsoga* Ruiz & Pavon

Herbs, erect, annual, decumbent or procumbent; stems branched, sparsely to densely pubescent, often rooting at the lower nodes. Leaves simple, opposite, narrowly oblong to broadly ovate, entire to dentate-serrate, pubescent or glabrous, sessile or petiolate. Heads radiate or discoid; peduncles slender, pilose to glandular hairy. Involucral bracts biseriate; outer glandular hairy or pilose or glabrous; inner with purplish-red tip, glabrous to pilose, margins entire or slightly lacinate. Receptacle conical to convex, paleate, the inner ones persistent. Ray florets fertile; corolla white, trifold or trilobed; tube pubescent. Style bifid; branches recurved. Disc florets many, fertile; corolla yellow or yellow-green, tubular to campanulate, 5 lobed, acute, erect or reflexed; tube hairy or glabrous. Anthers sagittate. Style branches recurved. Ray achenes black, turbinate, often compressed, glabrous or hispid. Pappus coroniform or of short scales on the side of the achene. Disc black, achenes narrowly turbinate, subterete, glabrous or hispid. Pappus of 8-20 linear-lanceolate, ovate-obovate, fimbriate, ciliate or lacinate scales.

Distributed all over the new world; ca 16 species, 2 in India.

*Literature.* CANNE, J.M. (1977). A revision of the genus *Galinsoga* (Compositae : Heliantheae). *Rhodora* 79: 319-389. CANNE, J.M. (1978). Circumscription and generic relationship of *Galinsoga* (Compositae : Heliantheae). *Madrone* 25(2): 81-88.

#### KEY TO THE SPECIES

- 1a. Stems densely glandular hairy; ray florets 5-8 mm long; pales of the disc florets entire; pappus scales awn tipped 2. *G. quadriradiata*
- b. Stem glabrescent; ray florets not exceeding 4 mm; pales of the disc florets 2-3 fid; pappus scales not awn tipped 1. *G. parviflora*

1. *Galinsoga parviflora* Cav., Ic. Descr. Pl. 3: 41. t. 281. 1795; Hook.f., Fl. Brit. India 3: 311. 1881. Fig. 105.

Herbs annual, up to 90 cm high, erect, flaccid, simple or branched, young parts pubescent; stems generally decumbent below, glabrescent, short hairy or glandular hairy in the upper part. Leaves ovate or ovate-oblong to lanceolate, acute-acuminate, base rounded-cuneate, margins undulate-serrate to entire, 2.5 x 1-4 cm, sparsely pilose later glabrescent; petioles 0.3-1.5 cm long. Heads axillary, terminal, 0.5 cm across on 1-3.5 cm long glandular hairy peduncles. Involucre campanulate, 0.4-0.5 cm in diam. Involucral bracts in 2 series, 5-10; outer oblong, acute, 2-3.5 x 1-2 mm, slightly hairy or glabrous; inner ovate, concave, 3-3.5 x 1-2 mm. Ray florets 4-5; corolla white, 1-2.5 mm long, usually 3-lobed with a short pubescent tube. Style 1-2 mm long; stigma linear, puberulous, acute, recurved. Disc florets many; corolla yellow, 1-1.5 mm long, tubular with 5 lobes, hairy. Style 1 mm long; stigma dilated, puberulous, acute, recurved. Achenes black, fusiform, 1.5-2.0 mm long, puberulous. Pappus scales 8-12, 1-1.5 mm long.

*Fl. & Fr.* Dec. - April

*Distrib.* India: More or less throughout the country, ascending to 1800-2000 m. A weed of waste places and roadsides.

Nepal, Sri Lanka, New Guinea and America.

2. *Galinsoga quadriradiata* Ruiz & Pavon, Syst. Veg. 1: 198. 1798. *G. ciliata* (Rafin.) Blake in Rhodora 24: 35. 1922; Babu in Bull. Bot. Surv. India 11: 184. 1969. *Adventina ciliata* Rafin. New. Fl. Am. 1: 67. 1836. Fig. 106.

Herbs to 80 cm high, erect, simple or sparingly branched, pubescent, young parts densely pubescent. Leaves ovate-lanceolate or elliptic-oblong, coarsely serrate; serratures acute to blunt; acute, base cuneate to acuminate, 3-8 x 1.5 cm, scabrid along the nerves. petioles 1-1.5 cm long. Heads axillary and terminal, up to 5 mm across; peduncles glandular hairy, 0.5-1.5 cm long. Involucral bracts in 2 series, 6-8, ovate-obovate, obtuse, glandular hairy, concave, 4-4.5 mm long with thinly scarious margins. Ray florets 4-5; corolla white, 3-dentate, hairy, 5-6 mm long; tube short. Style 1-1.5 mm, linear, bifid; stigma dilated, glabrous, acute. Disc florets many; corolla yellow, 3-4 mm long, tubular 5-lobed. Stamens 5. Style 1 mm; stigma dilated, puberulous, acute. Achenes black, turbinate, 1-1.5 mm long, hairy. Pappus scales 15-20, ciliate, 1-1.5 mm long, awn tipped.

*Fl. & Fr.* Dec. - May

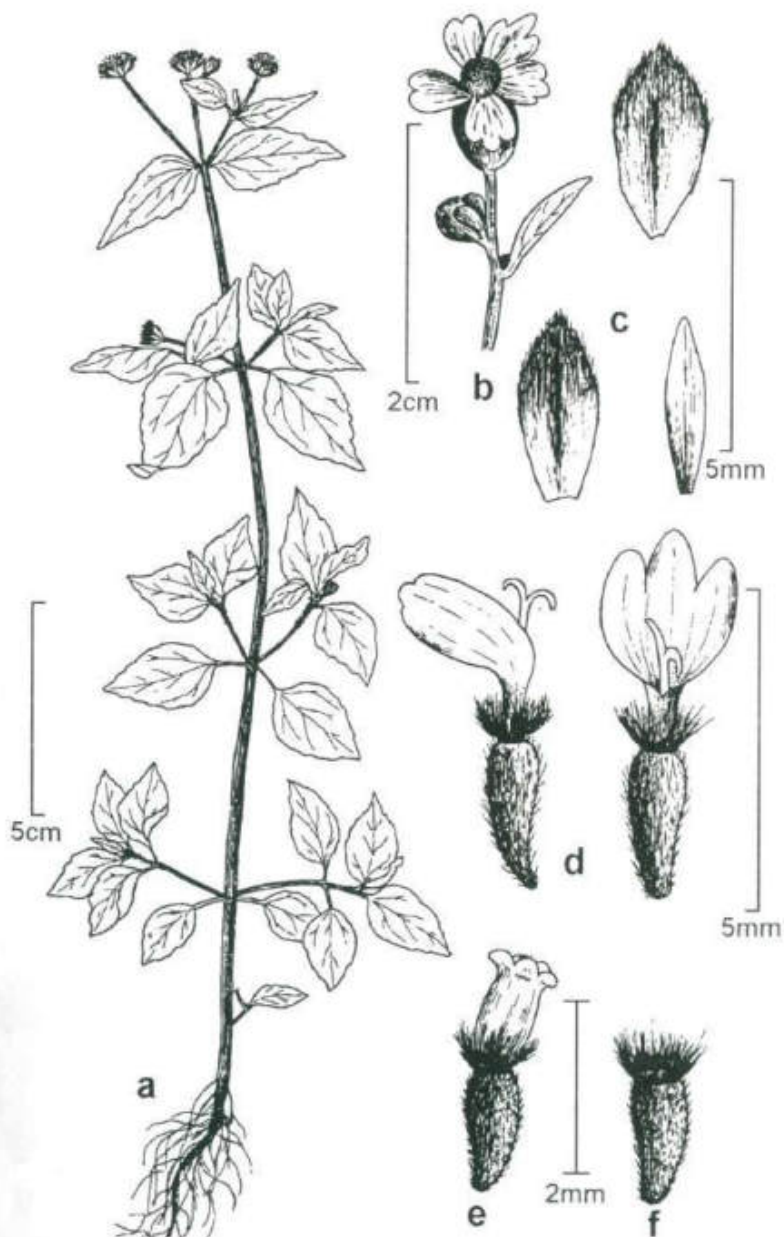


Fig. 105. *Galinsoga parviflora* Cav. : a. Habit; b. Head; c. Involucral bract; d. Ray florets; e. Disc floret; f. Achene.

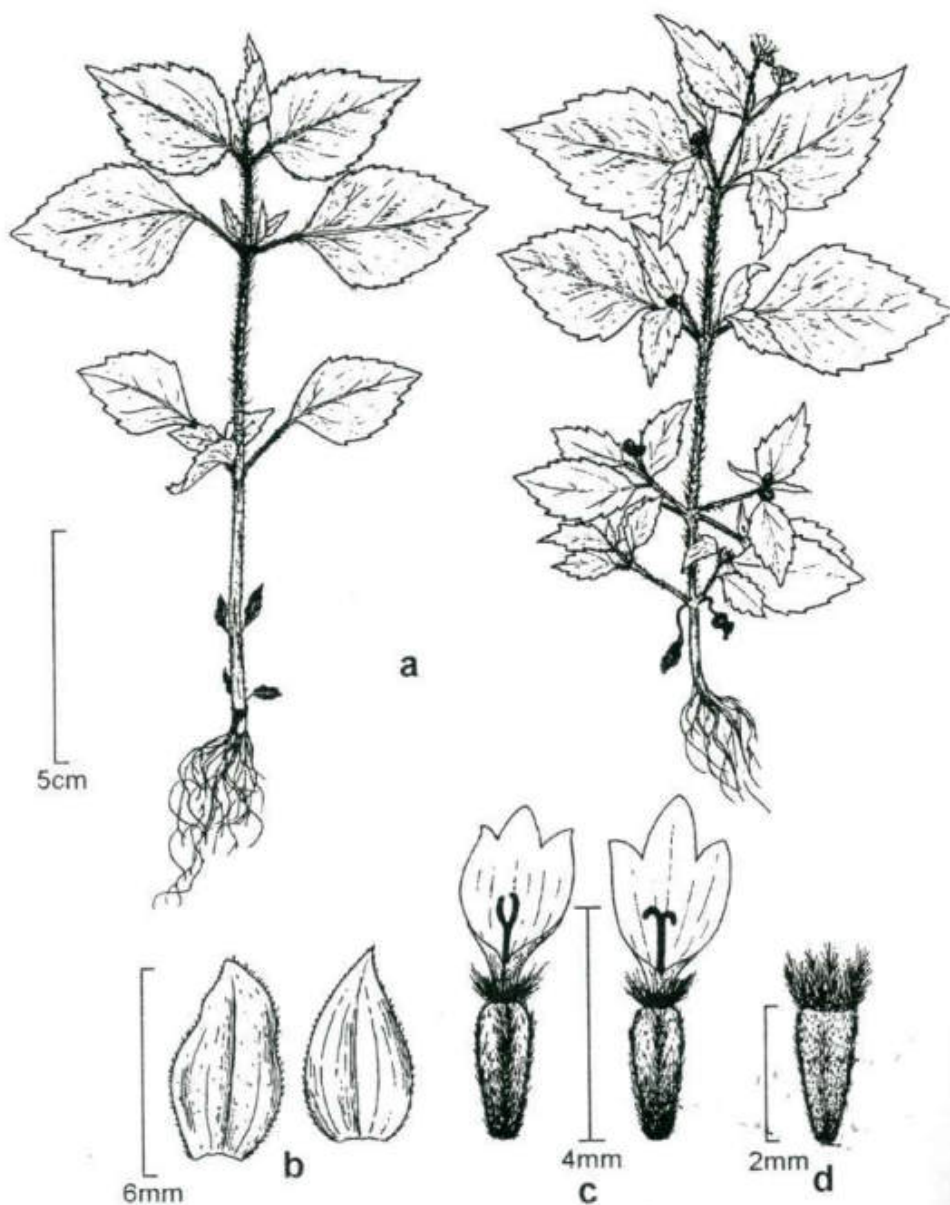


Fig. 106. *Galinsoga quadriradiata* Ruiz & Pavon : a. Habit; b. Involucral bract; c. Ray florets; d. Achene.

*Distrib.* India: A cosmopolitan weed of fallows, roadsides and open places, frequently associated with *G. parviflora* Cav. Subhimalayan and penninsular region, ascending to 2000 m.

## 12. *Glossocardia* Cass.

Herbs, annual, branched, glabrous. Leaves alternate, slender, 1-2 pinnatisect. Heads yellow, heterogamous, small, terminal and axillary. Involucre oblong. Involucral bracts few; outer 1-3, slender; inner oblong with broad membranous margins. Receptacle small, flat. Ray florets female, solitary, fertile; corolla bifid, sometimes 3-lobed. Disc florets bisexual, few, fertile, tubular; corolla 4-lobed. Anther base obtuse, entire. Style bifid with linear, acute, hispid tips. Achenes narrowly oblong, dorsally much compressed, faces densely hairy. Pappus of 2 smooth, stiff awns.

Two species in India.

### KEY TO THE SPECIES

- |  |                        |
|--|------------------------|
| 1a. Prostrate herbs; awns of the achenes spreading vertically  | 1. <i>G. bosvallea</i> |
| b. Erect herbs; awns of achenes spreading horizontally, setose | 2. <i>G. setosa</i>    |

1. *Glossocardia bosvallea* (L.f.) DC. in Wight, Contrib. Bot. Ind. 19. 1834. *Verbesina bosvallea* L.f., Suppl. Pl. 379. 1781. *Glossocardia linearifolia* Cass., Dict. Sci. Nat. 19: 62. 1821; Hook.f., Fl. Brit. India 3: 308. 1881. Fig. 107.

Herbs up to 15 cm high, ascending, usually prostrate, diffusely branched, glabrous; branches grooved. Leaves pinnatisect; pinnules narrowly linear, 7 x 1 mm, puberulous, base decurrent, apex apiculate, petiolate; petioles 1.5-2 cm long. Heads radiate, solitary, axillary, stalked, with flat receptacle and linear-lanceolate, scarious palea. Involucre cylindrical. Involucral bracts in 2-4 series; outer oblong-lanceolate, 3-3.5 x 1-1.5 mm, with greenish midrib, scarious, fimbriate; inner oblanceolate, 7-8 x 1-1.5 mm, glabrous with pale membranous margins. Ray florets with bilobed or trilobed corolla, 3-3.5 mm. Style slightly bifid, 2 mm long; stigma obtuse. Disc florets with 4-lobed, tubular-campanulate corolla, 2-2.5 mm long; lobes ovate, acute. Stamens 4; anthers oblong. Style 2-2.5 mm; stigma puberulous, acute. Achenes brownish-black, compressed, densely ciliate on angles with stiff hairs. Pappus awns spreading, smooth, stiff.

*Fl. & Fr.* July - Dec.

*Distrib.* India: In open, dry places amidst grasses. Delhi, Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu.

2. *Glossocardia setosa* Blatt. et Hallb. in J. Bombay Nat. Hist. Soc. 26: 536. 1919.

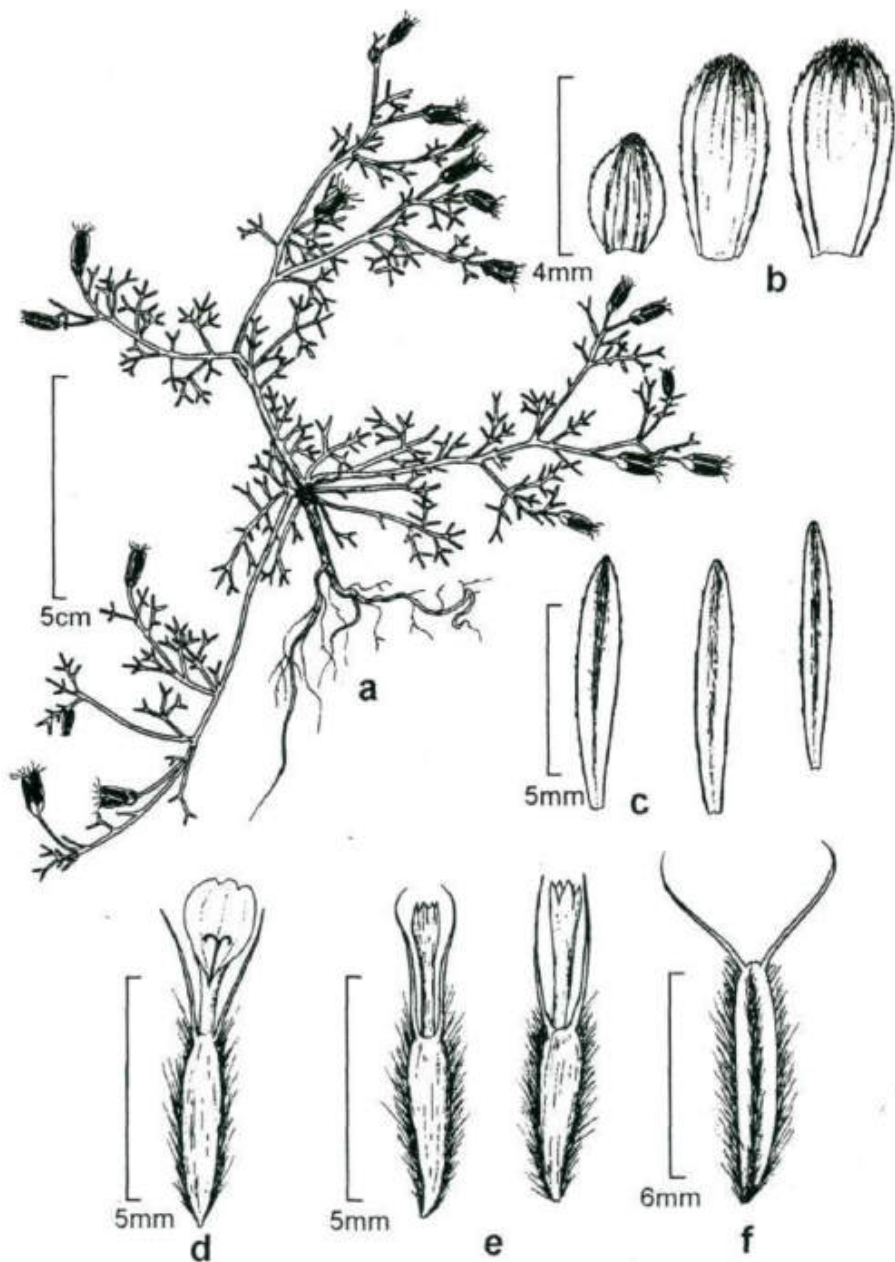


Fig. 107. *Glossocardia bosvallea* (L.f.) DC. : a. Habit; b. & c. Involucral bracts; d. Ray floret; e. Disc florets; f. Achene.



Herbs up to 45 cm high, woody at base, diffuse or erect, much branched. Leaves slender, uni or bipinnatisect; segments linear, apiculate. Heads numerous, terminal or axillary, 10 mm long, pedunculate. Involucre oblong. Outer involucre bracts brown-green, 3, unequal, all broad margined, scarios, somewhat lacerate, largest broadly ovate, 3 mm long and broader than the others, obtuse at apex, other bracts acuminate, cuspidate, midrib prominent on the dorsal side; inner brown 3-5, unequal (largest ca 6 x 2-2.5 mm), oblong, obtuse, striate, glabrous, margins white scarios. Receptacle small, somewhat convex, minutely pitted; pales few. Achenes dark brown, linear-oblong, attenuate at both ends, flattened, margins with long patent setae on face, dark brown, longitudinal lines with adpressed setae, 8-9 mm long, crowned with 2 nearly horizontal awns, 3 mm long, setose.

*Fl. & Fr.* Aug. - Oct.

*Distrib.* India: In dry exposed fields.

Rajasthan. Endemic.

*Notes.* Pradhan (J. Econ. Taxon. Bot. 6: 477. 1985) treats this species under *G. bosvallea* (L.f.) DC.

### 13. *Glossogyne* Cass.

Herbs, annual or perennial, glabrous with thick, woody rootstock; stems erect, ramose. Leaves mostly radical, crowded, pinnatisect with narrow segments; cauline leaves if present few, alternate. Heads radiate, heterogamous, solitary, terminal. Involucre bracts connate at base, 2-3 seriate. Receptacle flat. Ray florets few, fertile; corolla yellow to orange brown to white, oblong, spreading, 3-lobed. Disc florets orange yellow, tubular, 5-lobed. Anther base obtuse, apex acute, unappendaged. Style branches with long, linear appendages. Achenes linear, dorsally compressed, bearing two retrose barbed awns at the apex.

S. China, S.E. Asia, Indo-Malesia and Australia; ca 8 species, 1 in India.

*Glossogyne bidens* (Retz.) Alston in Trimen, Handb. Fl. Ceylon 6: 168. 1931.  
*Zinnia bidens* Retz., Obs. 5: 28. 1789. *Glossogyne pinnatifida* DC. in Wight, Contrib. Bot. Ind. 19. 1834; Hook.f., Fl. Brit. India 3: 310. 1881. Fig. 108.

Herbs, perennial, up to 45 cm high; rootstock stout, woody, fusiform; stems several from the rootstock, simple or widely branched in the upper part, glabrous, grooved. Leaves many in a basal rosette, petiolate, 2-10 cm long; segments 3-10, linear-lanceolate, entire, acute at the apex, 1-20 x 1-2 mm, hairy on the lower surface; cauline leaves 2-4 on each stem or sometimes absent, much reduced, 1-3 cm long; segments 1-5, linear-

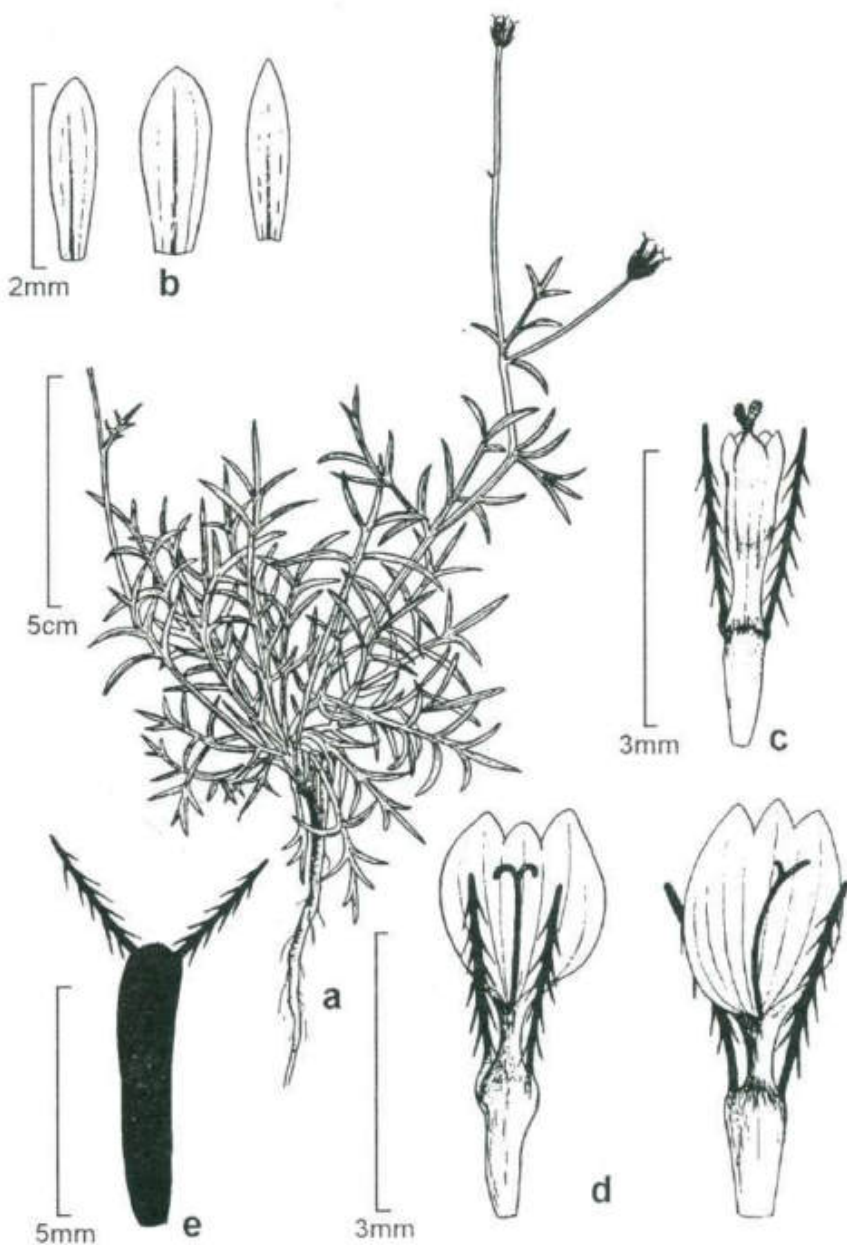


Fig. 108. *Glossogyne bidens* (Retz.) Alston : a. Habit; b. Involucral bracts; c. Disc floret; d. Ray florets; e. Achene.

lanceolate, entire, acute; uppermost cauline leaves sometimes scale-like. Heads solitary, terminal, on 2-8 cm long peduncle. Involucre campanulate, 3-4 mm in diam. Involucral bracts linear-lanceolate, 3-5 mm long, glabrous, obtuse or acute at the apex. Ray florets yellow; corolla ovate, 2.5-3 mm long, with dark veins; 3-dentate. Disc florets with yellow, tubular, corolla, 2-3 mm long, 5-dentate. Achenes dark brown to black, linear-oblong, 7-10 mm long, 5-ribbed on both faces. Pappus awns divergent, 2-3 mm long, retrose barbed.

*Fl. & Fr.* Jan. - Nov.

*Distrib.* India: In all open, dry, gravelly or rocky habitats, associated with grasses. Jammu & Kashmir, Punjab, Uttar Pradesh, Bihar, West Bengal, Orissa, Madhya Pradesh, Andhra Pradesh and Karnataka.

Sri Lanka, Myanmar, Thailand, China, Philippines, Australia and Nepal.

#### 14. *Guizotia* Cass.

Herbs, annual. Leaves opposite or upper ones alternate. Heads heterogamous, rayed, terminal or axillary, peduncled. Involucral bracts imbricate, in 2 series; outer herbaceous; inner scarious. Receptacle convex, with scales. Ray florets yellow, ligulate, female, fertile; corolla 2-3 toothed. Inner florets hermaphrodite, fertile; corolla campanulate, shortly 5-lobed; tube short and woolly, embracing the top of the achene. Anther bases truncate, entire. Style arms with subulate, hairy tips. Achenes glabrous, dorsally compressed, 3-4 angled, rounded at tip. Pappus absent.

Mostly in tropical Africa; 12 species, 1 in India.

*Literature.* BAAGOE, J. (1974). The genus *Guizotia* (Compositae) - A taxonomic revision. *Saertryk. Af. Botanisk. Tidsskrift.* 69: 1-39.

*Guizotia abyssinica* (L.f.) Cass. in Dict. Sci. Nat. 59: 248. 1829. *Polymia abyssinica* L.f., Suppl. 383. 1781. *Verbesina sativa* Roxb. ex Sims. in Bot. Mag. 26: t. 1017. 1807; Hook.f., Fl. Brit. India 3: 308. 1881. **Fig. 109.**

Tam.: *Ucchi yellu, Saeruvamalai yellu.*

Herbs up to 2 m. tall, divaricately branched, hirsute. Leaves opposite, oblong, lanceolate, with amplexicaul base, acute, entire or irregularly serrate, 1.5-8 x 0.3-1.5 cm. Heads radiate, solitary, axillary or subterminal, numerous, 2.5-4.5 cm across with more or less conical receptacle, long stalked. Involucral bracts in 2 rows; outer elliptic to ovate, finely dentate, 5-10 x 3-6 mm, herbaceous, inner oblong to spatulate, small, ciliate, scarious, obtuse, 5-7 x 2-3 mm. Ray florets few, subtended by scales resembling

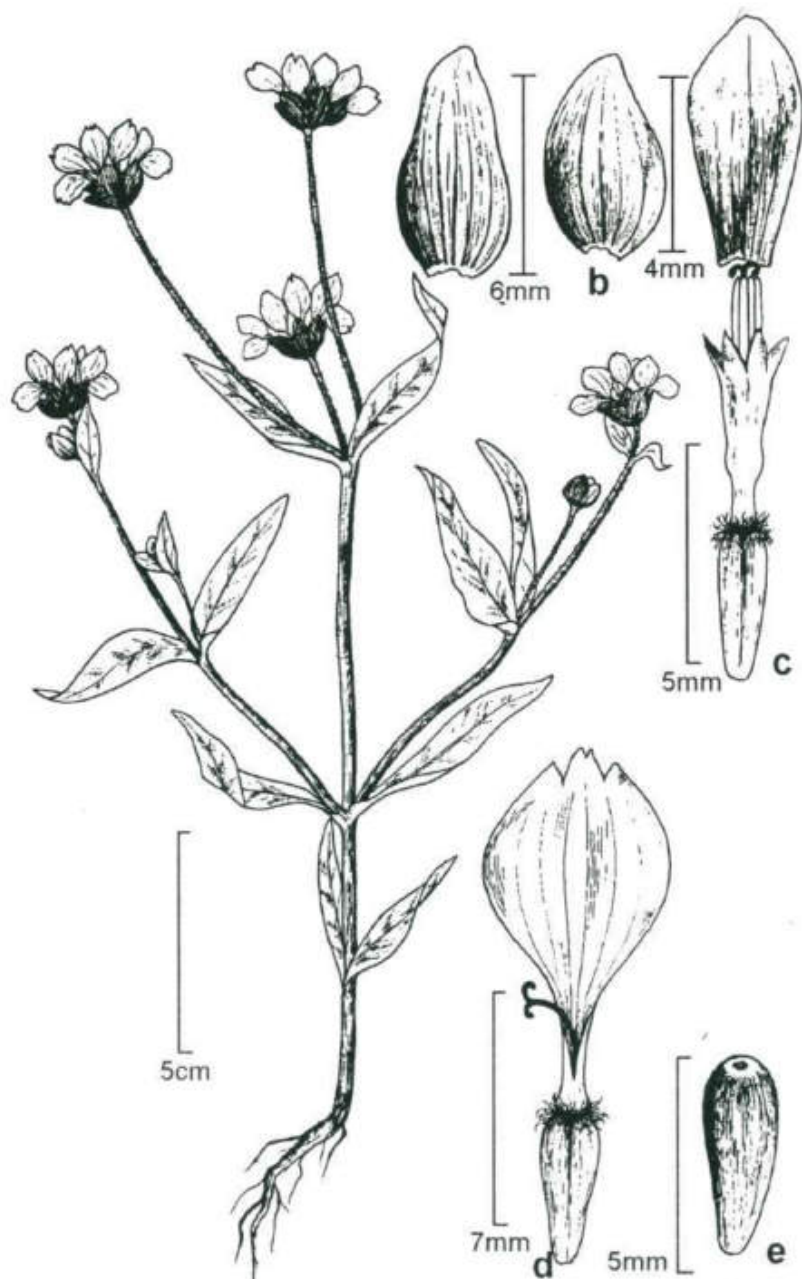


Fig. 109. *Guizotia abyssinica* (L.f.) Cass. : a. Habit; b. Involucre bracts; c. Disc floret; d. Ray floret; e. Achene.

the inner involucrel bracts; corolla yellow, 10-12 mm long. Style arms short, curved. Disc florets many; corolla campanulate, 5-lobed, 5-6 mm long. Achenes shining brown or black, 4-5 x 1-1.5 mm, widened above.

*Fl. & Fr.* Feb. - Nov.

*Distrib.* India: Uttar Pradesh, Bihar, West Bengal, Sikkim, Orissa, Maharashtra and Tamil Nadu.

Native of tropical Africa.

### 15. *Lagascea* Cav.

Herbs, erect, annual; stems branched. Leaves simple, alternate or opposite. Heads one flowered, aggregated into terminal glomerules. Involucre tubular, connate at the base. Florets hermaphrodite, tubular, funnel-shaped at the apex, 5-lobed. Anthers with oblong, obtuse appendages at the apex, sagittate. Style branches elongate, subulate. Achenes narrowly obovoid or fusiform, somewhat compressed. Pappus minutely coroniform or absent.

From Mexico, tropical S. America to West Indies; 15 species, 1 in India.

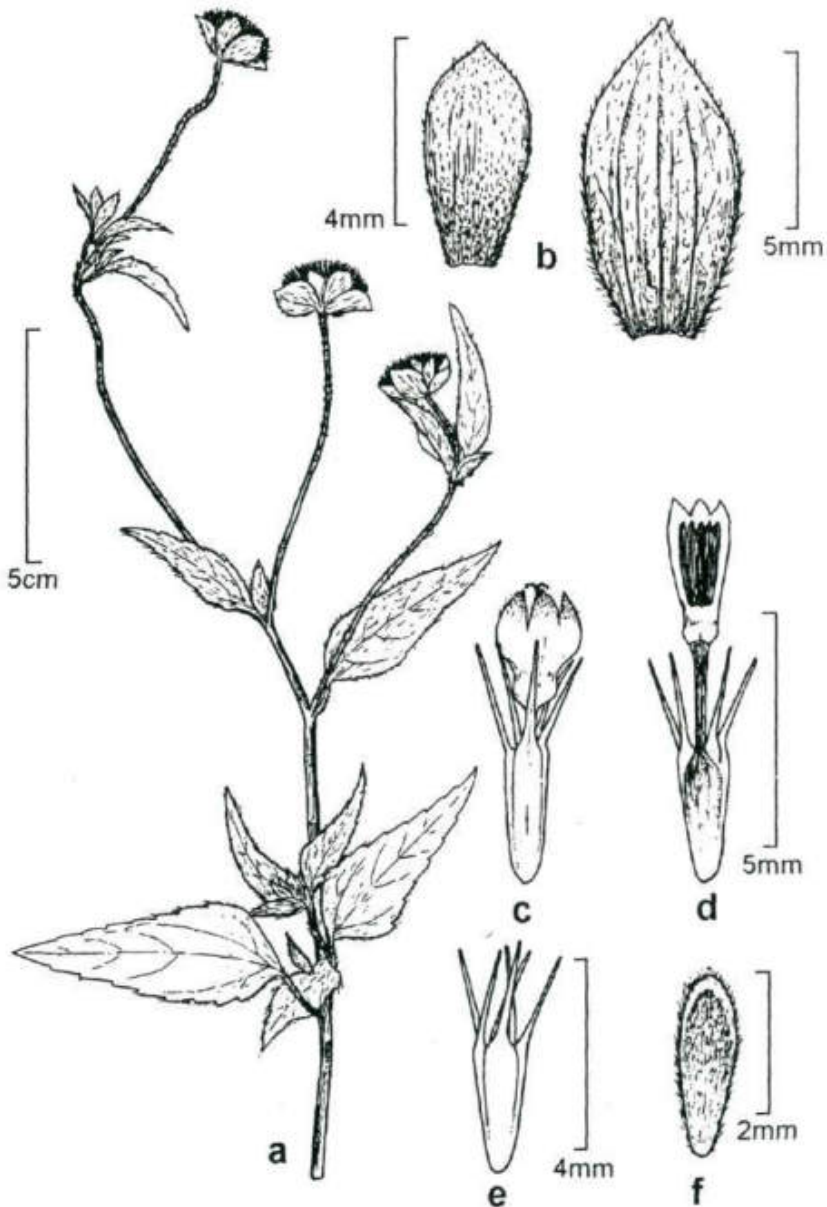
*Lagascea mollis* Cav., *Anales Sci. Nat.* 6: 332. t. 44. 1803; Hook.f., *Fl. Brit. India* 3: 302. 1881. Fig. 110.

Herbs up to 1 m high, white pubescent. Leaves distant, elliptic or ovate-lanceolate, margins shallowly and distantly serrate, acute at base, gradually acuminate at apex, 3-5 x 1-2 cm, softly white pubescent on both surfaces; petiole 2 cm long. Heads solitary, terminal, one flowered, aggregated in glomerule, 5-15 mm across, long peduncled, enclosed by acuminate, ovate-lanceolate, leafy, pubescent bracts; bracts 7-12 x 4-6 mm. Receptacle flat, pubescent. Involucre tubular-campanulate. Involucrel bracts 4-5, linear-lanceolate, connate into a sheath below, 4-5 mm, long, acuminate, herbaceous. Florets white, bisexual; corolla tubular-campanulate, broadened above middle; tube narrowly cylindrical below, 3-4 mm, 5-lobed. Stamens 5; anthers linear. Ovary oblong, faintly 3-quetrous, pubescent above; style bifid; stigma pubescent, curved inwards. Achenes black, 2.5-3 mm, compressed, 3-angled, weakly ribbed, pubescent above, glabrous below, enclosed within the involucre. Pappus of a fimbriate cup.

*Fl. & Fr.* April - Nov.

*Distrib.* India: American weed of cultivated fields, waste places and roadsides. Himachal Pradesh, West Bengal, Assam, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra and Tamil Nadu.

Malaya, Mexico and Tropical S. America.



**Fig. 110.** *Lagascea mollis* Cav. : a. A portion of the twig; b. Involucral bracts; c. & d. Florets; e. Involucre enclosing the achene; f. Achene.

### 16. *Montanoa* La Llave & Lexarza

Shrubs or trees. Leaves simple, opposite, entire or lobed, sometimes serrate-crenate, 3-nerved; petioles slender, sometimes winged, glandular pubescent. Heads mostly in open panicles. Bracts and bracteoles foliaceous or scale-like. Heads radiate, sometimes showy. Involucral bracts in 2 series; outer 5-8, narrow, herbaceous; inner smaller, apiculate to spinulose. Paleae enclosing the florets, persistent in fruits, becoming chartaceous to coriaceous, sometimes spine tipped. Ray florets with an elongate, spatulate ligule, sometimes glandular; tube short. Ovary sterile. Disc florets numerous; corolla tubular, 5-lobed; tube short. Anthers with deltoid appendages. Style branches slender, clavate, truncate. Ovary of central florets abortive. Achenes obovoid, laterally compressed. Pappus absent.

Distributed from Mexico to Colombia; ca 50 species, 1 in India, naturalized.

*Montanoa bipinnatifida* C. Koch in Wochenschr. Vereins Beford. Gartenbaues Konigl Preuss. Staaten 7: 406. 1864. Fig. 111.

Shrubs, erect. Young branches hairy, becoming glabrous and lenticellate at maturity. Leaves irregularly 3-7 lobed, pinnatifid, serrate, hispid above, glandular and hairy on the nerves beneath; lobes acuminate; petioles 3-15 cm long. Heads in corymbs forming a hairy panicle, 6-10 cm across; peduncles 3-15 cm long. Involucral bracts in 2 series, ovate-lanceolate. Ray florets 5-10 with white corolla, entire, up to 3 cm long. Disc florets with yellow corolla, 1 cm long. Achenes obovoid. Pappus absent.

*Fl. & Fr.* Feb. - April

*Distrib.* India: Naturalized ornamental, ascending to 1000 m.

### 17. *Moonia* Arn.

Herbs, or undershrubs. Leaves opposite, simple to pinnately compound, petiolate. Heads solitary, terminal, pedunculate. Receptacle convex. Pales conduplicate, scarious with brown-orange longitudinal lines. Involucral bracts multiseriate, lanceolate to narrowly ovate; outer herbaceous; inner scarious with brown-orange longitudinal lines. Ray florets pistillate, fertile, uniseriate; corolla 3-dentate with few to many brown-orange longitudinal lines. Disc florets sterile, bisexual; corolla tubular, 4-lobed. Anthers black. Achenes black, obovoid, slightly radially compressed, glabrous.

Indo-malayan origin; 7 species, 2 in India.

*Literature.* STUSSY, T.F. (1975). A revision of *Moonia* (Compositae, Heliantheae, Coreopsidinae). *Brittonia* 27: 97-102. STUSSY, T.F. (1977). Revision of *Chrysogonum* (Compositae, Heliantheae). *Rhodora* 79: 190-202.

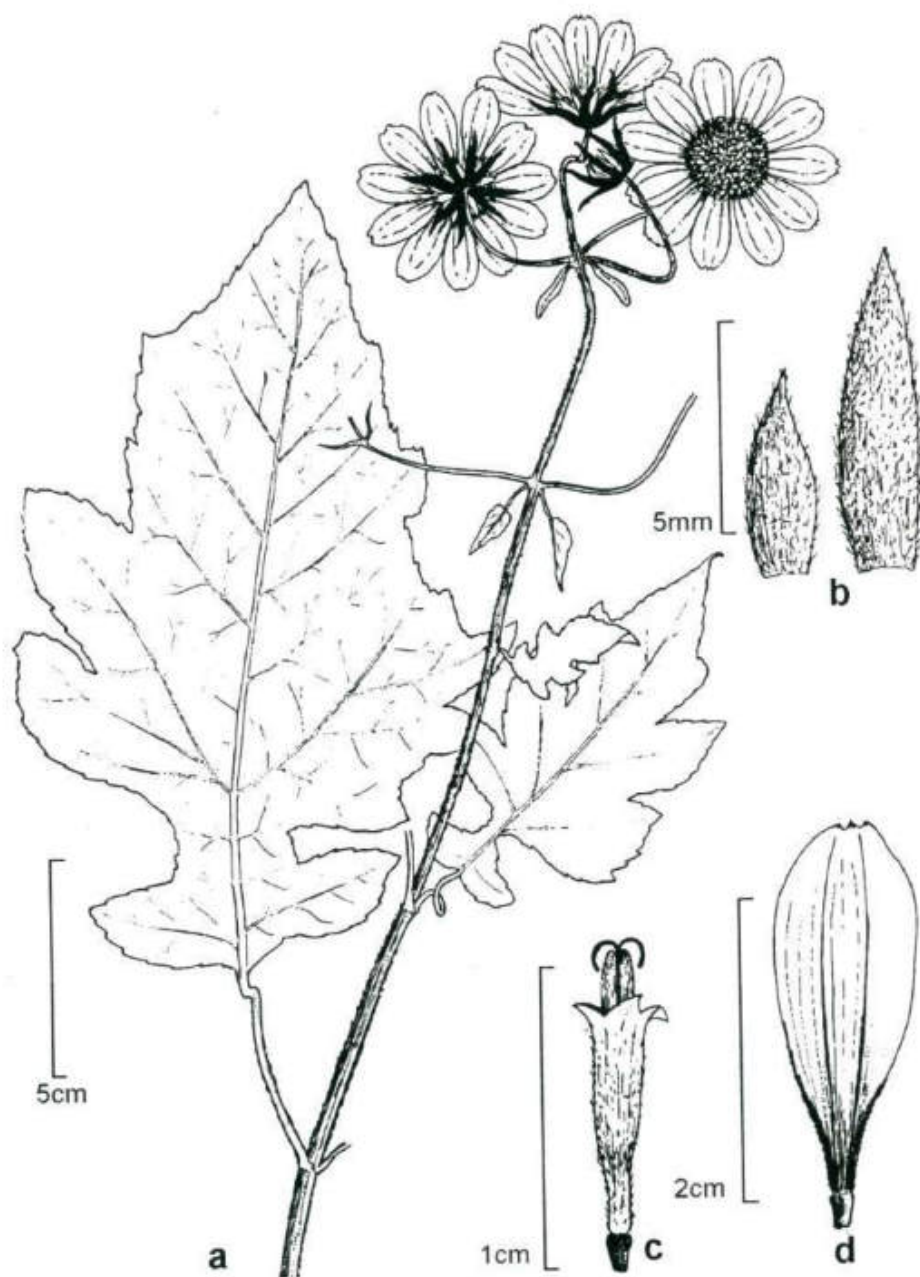


Fig. 111. *Montanoa bipinnatifida* C. Koch. : a. A portion of the twig; b. Involucral bracts; c. Disc floret; d. Ray floret.



## KEY TO THE SPECIES

- 1a. Ray florets few, narrow, deeply cleft in to linear lobes; involucre bracts ciliate on the margins  
 2. *M. heterophylla*
- b. Ray florets many, broad, shortly and obtusely 3-lobed; involucre bracts not ciliate on the margins  
 1. *M. arnottiana*

1. *Moonia arnottiana* Wight, Ic. Pl. Ind. Or. 3(4): 9. t. 1105. 1846. *Chrysogonum arnottianum* C.B. Clarke, Comp. Ind. 132. 1876; Hook.f., Fl. Brit. India 3: 303. 1881.

Fig. 112.

Undershrubs up to 2 m tall with woody, glabrous stem; younger parts hairy. Leaves pinnately compound, 10-15 cm long with 3-7 segments; segments lanceolate, toothed or serrate, glabrous on the upper surface, hairy along the veins on the lower surface; petioles 4-5 cm long. Heads terminal, 2.5-4 cm in diam; peduncles 1.5-2.5 cm long. Involucre bracts in two series; outer 6-7 mm long; inner 4-6 mm. Ray florets many, female, fertile; corolla white or creamy-yellow, 5-6 x 3-4 mm, tridentate, with dark coloured veins. Stigma bifid. Disc florets many, sterile; corolla tubular, 4-lobed, 3.5-4 mm long. Achenes black grey, obovoid, slightly compressed, glabrous.

*Fl. & Fr.* March - Sep.

*Distrib.* India: 1500 - 2100 m. Tamil Nadu.

Sri Lanka.

2. *Moonia heterophylla* Arn., Nov. Acta Caes. Leop.-Carol. German. Nat. Cur. 18: 349. 1836. *Chrysogonum heterophyllum* (Arn.) C.B. Clarke, Comp. Ind. 132. 1876; Hook.f., Fl. Brit. India 3: 303. 1881.

Herbs, 30-100 cm high; stem terete, yellow-green to brown-purple, glabrous at base, subglabrous to hairy at apex. Leaves simple, ovate to pinnately compound, acuminate to acute, truncate to attenuate, serrate, 1-6 cm long, upper surface subglabrous to hispid, petiolate. Heads up to 2.5 cm in diam., on 1-5.5 cm long, glabrous to hairy peduncle. Involucre bracts 10-15, 0.5-1.5 x 0.2-0.3 cm, acute, glabrous to subglabrous on abaxial surface, margins ciliate. Paleae narrowly elliptic, 4-5 x 1-1.6 mm, glabrous, rounded at the apex. Ray florets 3-5; corolla yellow, 1-6 x 2-5 mm. Stigma bifid. Disc florets many; corolla orange, tubular; up to 4 mm long. Anthers 1 mm long. Style 3 mm long, puberulent at the apex. Achenes 3-5 x 2-3 mm.

*Fl. & Fr.* Feb. - Sept.

*Distrib.* India: Western ghats, in damp shady places.

Sri Lanka.

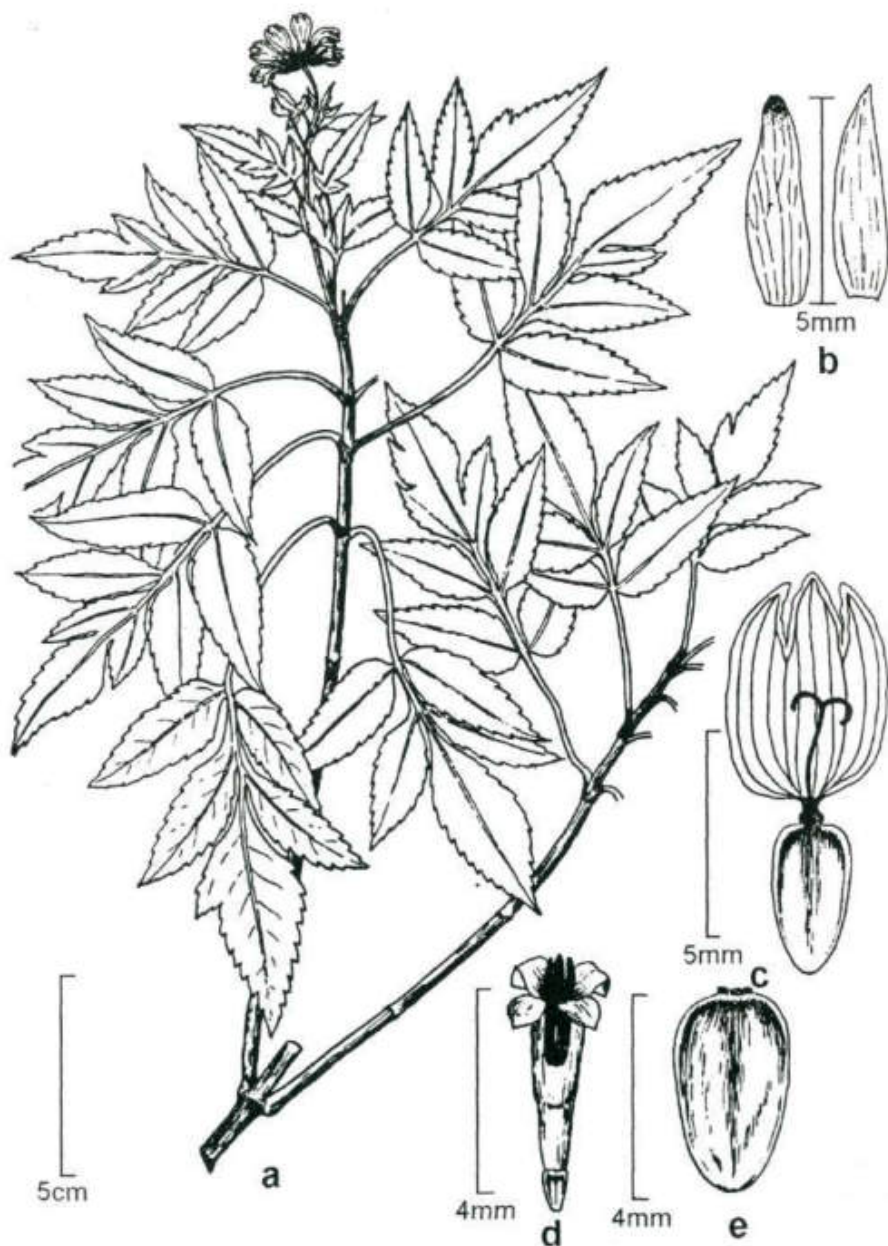


Fig. 112. *Moonia arnottiana* Wight : a. A portion of the twig; b. Involucral bracts; c. Ray floret; d. Disc floret; e. Achene.

### 18. *Parthenium* L.

Herbs or shrubs, aromatic, annual or perennial with ridged, terete stem. Leaves alternate, entire or highly divided. Inflorescence with solitary head or terminal corymb or panicle. Heads radiate. Involucral bracts biseriata, generally 5 in each series. Ray florets 5; corolla white, corolla and styles persistent at the apex of the achene. Disc florets with tubular corolla, 5 lobed. Anthers with white or yellow pollen. Achene a complex structure - obcompressed, rounded to somewhat keeled on the inner face, puberulent, margins thickened into rib-like structures which are attached to a pair of sterile disc florets; bracts fall together at maturity. Pappus of 2-3 awns or scales or even absent.

Throughout the western hemisphere; ca 16 species, 1 in India.

*Parthenium hysterophorus* L., Sp. Pl. 988. 1753; R.S. Rao in J. Bombay Nat. Hist. Soc. 54: 218. 1956. Fig. 113.

Herbs up to 1 m high, annual; stems puberulous to strigillose. Leaves usually lanceolate above to pinnately dissected downwards, 5-15 x 0.4-5 cm; pinnules oblong-lanceolate, entire to deeply lobed, puberulous, acute with decurrent base; petiole 3-4 cm long. Inflorescence a lax panicle of numerous small heads; peduncles 4-10 mm long. Heads radiate, 4-8 mm across. Receptacle convex, small. Involucre campanulate. Involucral bracts green, 5, elliptic-ovate, acute, 3-4 x 1-2 mm, pubescent. Ray florets 5, with 2 seriate disc florets on either side; corolla white to light yellow, ovate-orbicular, bilobed, obtuse. Style 1 mm long with stout, obtuse stigma. Disc florets many; corolla light yellow, narrowly campanulate, 1.5-2 mm long, 5 lobed, ovate-acute. Stamens 5; anthers linear. Style 1-5 mm, puberulous, entire. Achenes flattened, 2 mm long. Pappus of 2 broad, strongly reflected awns, 0.3-0.5 mm long, puberulous along the sides.

*Fl. & Fr.* May - March.

*Distrib.* India: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Bihar, Assam, Arunachal Pradesh, Maharashtra, Karnataka and Tamil Nadu.

A native of America now fairly naturalised in all states of India, causing a serious threat to agriculture.

### 19. *Sclerocarpus* Jacq.

Shrubs or herbs with slender, pubescent stem. Leaves alternate, sometimes opposite below, elliptic-ovate to filiform dissected, serrate, pubescent, scabrous above; petiole slender, sometimes short or even absent. Heads radiate, on long, stout peduncles, enclosed in leafy involucral bracts. Ray florets few; corolla elliptic, conspicuously

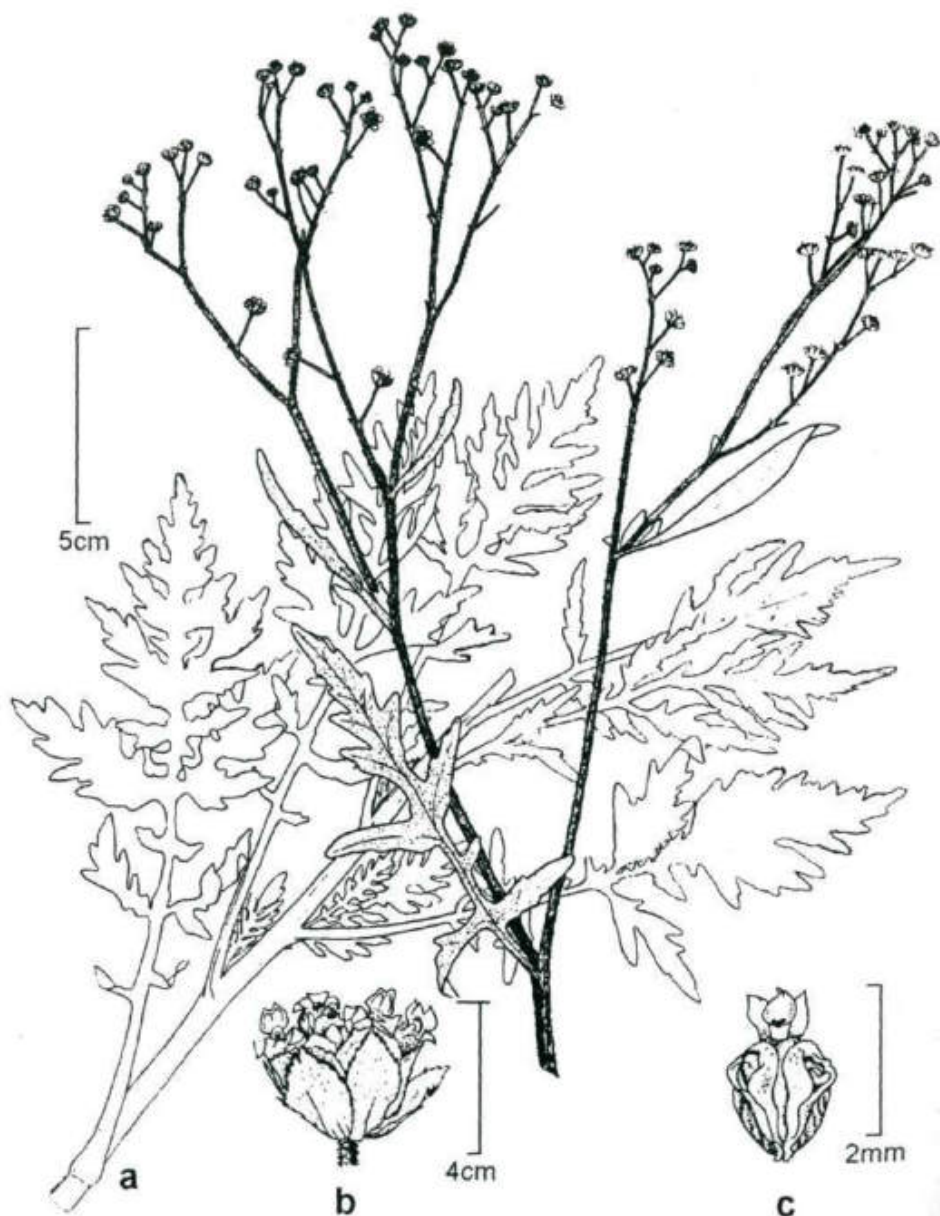


Fig. 113. *Parthenium hysterophorus* L. : a. A portion of the twig; b. Head; c. Achene.

notched at the apex. Ovary as long as corolla tube, sterile. Disc florets many; corolla tubular with elongate apical strigose lobes. Stamens dark. Ovary turbinate; style branches cylindrical, pilose. Pappus a ring of hairs or squamellae or even absent. Fruit a utricle, the sclerified paleae sometimes strongly oblique, generally with a beak, fused to the achene apex.

Temperate and tropical America and Africa; ca 8 species, 1 in India.

*Sclerocarpus africanus* Jacq., *lc. Pl. Rar.* 1: 17. t. 176. 1780-1784; Hook.f., *Fl. Brit. India* 3: 305. 1881. Fig. 114.

Herbs, 20-90 cm high, erect, branched, rough pubescent; stems striate, white pubescent. Lower leaves usually opposite; upper alternate, obovate-elliptic to ovate, acute, acutely or faintly toothed, 5-7 x 1-4 cm, scabrid-setulose above, pilose beneath, narrowed into a short stalk. Heads radiate, 8-15 mm across at the end of or in the forks of the branches. Involucral bracts few, leafy; outer spreading. Receptacle convex, covered with large, ribbed scales, enfolding the lower half of the fertile disc florets. Ray florets few; corolla broad, spreading, notched at the apex; tube hairy. Ovary sterile. Disc florets many; corolla tubular, 3-5 toothed. Achenes curved, ribbed, enclosed in the hardened, pointed scales or paleae. Pappus absent.

*Fl. & Fr.* March - Sept.

*Distrib.* India: Himachal Pradesh, Punjab, Uttar Pradesh, Maharashtra and Karnataka.

Pakistan, Nepal, Tropical E. and W. Africa.

## 20. *Siegesbeckia* L.

Herbs, annual, erect or procumbent or scapose; stems with multicellular hairs, often gland-tipped. Leaves simple, opposite, ovate-elliptic, entire or serrate, viscid pubescent; petioles mostly winged, sometimes basally auriculate to nearly connate-perfoliate. Inflorescence a many-flowered panicle. peduncles glandular hairy; bracts foliaceous; bractlets scale-like. Heads radiate, small. Involucral bracts 2-seriate; outermost linear-spathulate, apically rounded, mostly copiously stipitate-glandular; inner ovate, apically deltoid to acuminate, stipitate-glandular. Receptacle small, conical. Paleae ovate, scarious. Ray florets 5-15; corolla yellow. Style branches short. Disc florets many; corolla tube campanulate, with 5 deltoid lobes. Anthers yellow-green. Style branches flattened. Achenes black, minutely striate, curved, sometimes strongly angled. Pappus lacking.

In the warmer regions of old and new world; ca 9 species, 1 in India.

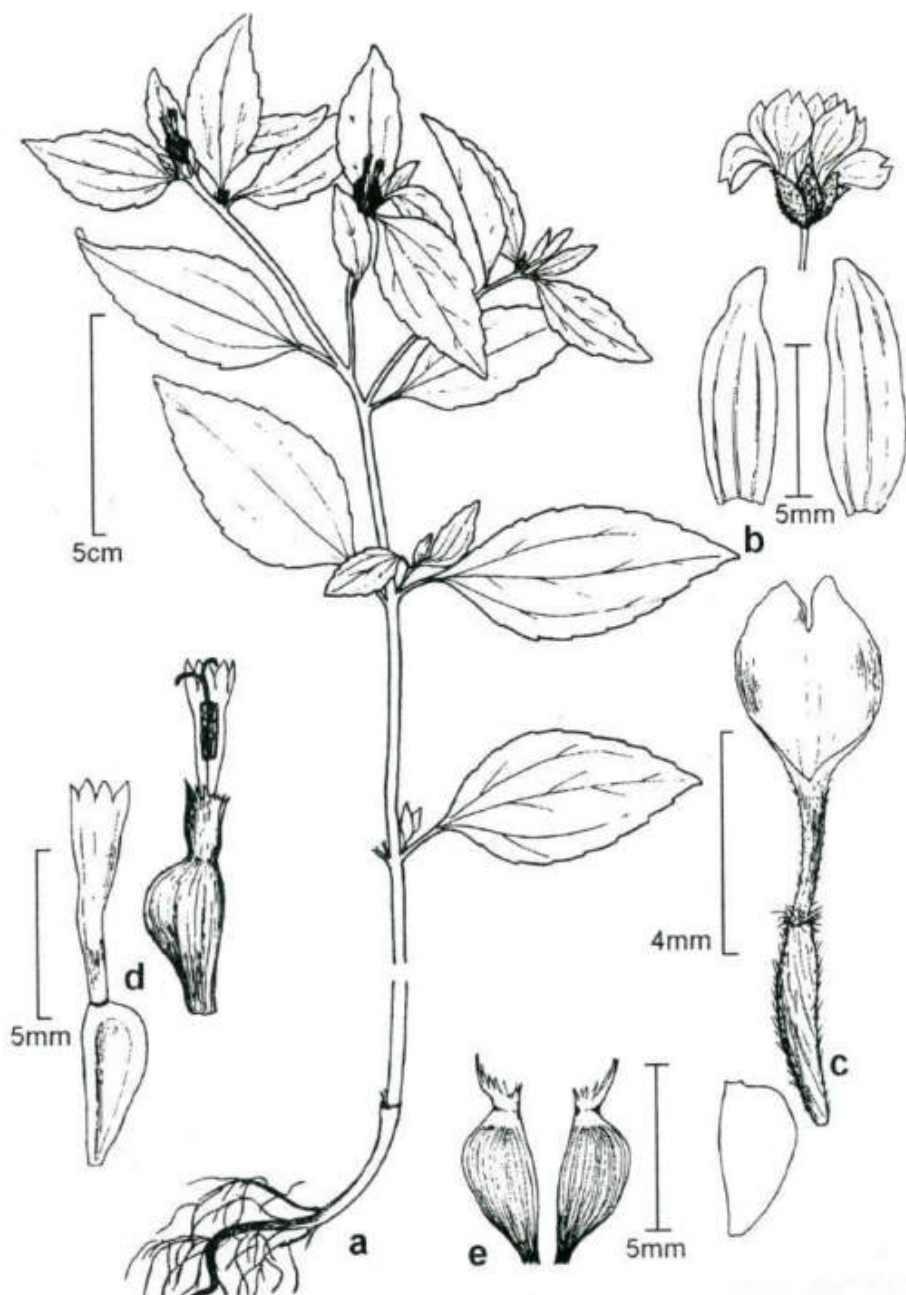


Fig. 114. *Sclerocarpus africanus* Jacq. : a. Habit; b. Involucre bracts; c. Ray floret; d. Disc florets; e. Scales and achene.

*Literature.* HUMBLER, J.E. (1972). Observation on the genus *Siegesbeckia* L. *Ciencia Y. Naturaleza* 13: 1-19. MALIK, C. (1961). *Siegesbeckia orientalis* L., A species complex in Western Himalayas. *U.A.R. Journ. Bot.* 4: 167-170.

*Siegesbeckia orientalis* L., Sp. Pl. 900. 1753; Hook.f., Fl. Brit. India 3: 379. 1881.

Fig. 115.

Herbs up to 1.5 m tall; stems purple tinged, clothed with whitish crisped hairs; branches opposite, spreading. Leaves opposite, ovate or broadly triangular, acute and apiculate to obtuse, cuneate at base, coarsely toothed, 5-12 x 3-10 cm, pubescent on both the surfaces, glandular beneath, strongly trinerved; petioles 1-5 cm long, winged. Heads radiate, in leafy panicles, 5-8 mm across. Involucral bracts in 2 series; outer 5, spatulate, 5-15 mm long, spreading, pubescent on the lower surface, densely studded with glandular hairs above; inner short, upto 6 mm long, glandular hairy on outer side. Receptacle flat, covered with short, concave scales. Ray florets 5, female; corolla yellow, reddish beneath, 1.5-2 mm long, bi or trilobed; tube up to 1 mm long. Ovary oblong, up to 4.5 mm long, angled, curved. Disc florets bisexual, about 12; corolla yellow, 1-2 mm; tubular, 5-lobed. Stamens 5. Ovary oblong, angled, curved, 3-4 mm; style dilated below; stigma puberulous, recurved. Achenes enclosed by 4-5 mm long scales, pubescent, sometimes glandular, generally persistent around the achenes. Achenes dark brown or blackish, up to 5 mm long, curved, angled, blunt at the base.

*Fl. & Fr.* April - Dec.

*Distrib.* India: Throughout, weed in gardens, waste places and roadsides ascending to 1800 m.

Nepal, Sri Lanka, China, Myanmar, Malaysia, Japan, Australia, Africa and all other Tropical and sub-tropical regions.

## 21. *Spilanthes* Jacq.

Herbs, annual, erect or prostrate-decumbent, sometimes rooting at nodes; stems branched, glabrous or pubescent. Leaves simple, opposite, ovate or elliptic, entire or shallowly toothed, glabrous or pubescent with short, simple hairs, generally trinerved. Inflorescence of solitary or few heads arising in the axils or terminal; peduncles slender, elongate. Heads yellow, white or purplish, radiate to discoid, globose to elongate-conical. Involucral bracts 1-2 seriate, lanceolate. Oblong to ovate, obtuse or sometimes mucronulate. Ray florets when present few, 1-2 seriate, showy; corolla 2-3 sinuate-toothed. Style branches slightly exserted. Disc florets many, bisexual; corolla tubular, 5-lobed. Style arms short, truncate. Achenes brown to black, margins ciliate. Pappus of 2-3 weak bristles or absent.

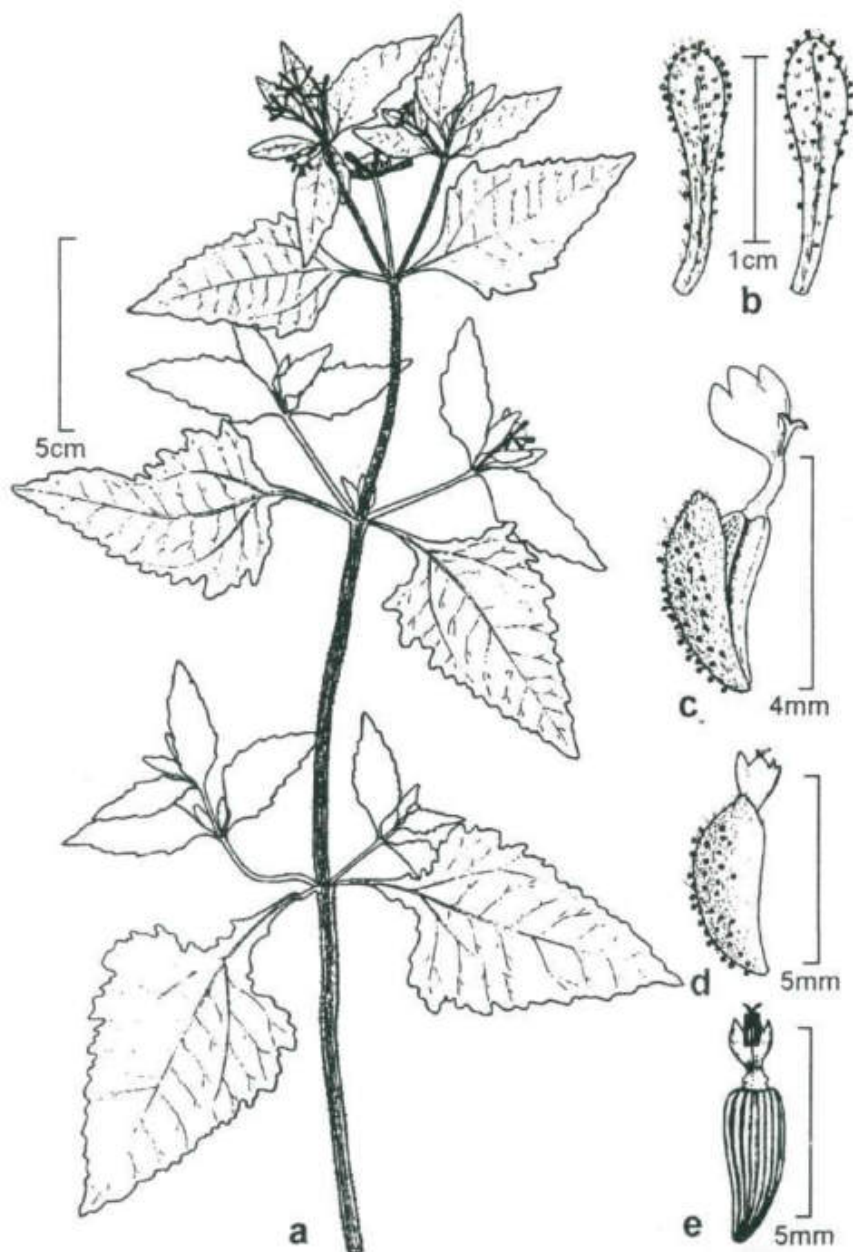


Fig. 115. *Siegesbeckia orientalis* L. : a. A portion of the twig; b. Involucre bracts; c. Ray floret; d. Disc floret; e. A young achene.



Distributed in C. and S. America, Myanmar, Malay peninsula, Indonesia, Philippines, Australia and Africa; ca 75 species, 6 in India.

*Literature.* KOSTER, J.T. & PHILIPSON, W.R. (1950). Nomenclatural changes in *Spilanthes* and *Blainvillaea* with remarks and a key to the species of *Spilanthes* in Malay archipelago. *Blumea* 6: 349-345.  
MOORE, A.H. (1907). Revision of the genus *Spilanthes*. *Proc. Amer. Acad. Arts & Sci.* 42: 521-569.

#### KEY TO THE SPECIES

- |  |                         |
|--|-------------------------|
| 1a. Achenes eciliate; pappus absent  | 1. <i>S. calva</i>      |
| b. Achenes ciliate; pappus present (sometimes absent in <i>S. oleracea</i> ) | 2                       |
| 2a. Heads rayed  | 3                       |
| b. Heads discoid   | 4                       |
| 3a. Heads 1 cm across; ray florets 8-12                                      | 2. <i>S. ciliata</i>    |
| b. Heads 4-5 mm across; ray florets 5-6                                      | 6. <i>S. uliginosa</i>  |
| 4a. Heads white  | 5. <i>S. radicans</i>   |
| b. Heads yellow or reddish-brown   | 5                       |
| 5a. Heads large, 1-2 cm across; achenes monomorphic                          | 3. <i>S. oleracea</i>   |
| b. Heads small, 4-5 mm across; achenes dimorphic                             | 4. <i>S. paniculata</i> |

✓ 1. *Spilanthes calva* DC. in Wight, Contrib. Bot. Ind. 19. 1834. *S. acmella* var. *calva* (DC.) C.B. Clarke, Comp. Ind. 138. 1876. *S. acmella* auct. non (L.) Murr.; Hook.f., Fl. Brit. India 3: 307. 1881.

Herbs with sparsely pubescent stem, 15-40 cm high. Leaves ovate, obtuse to acute, margins entire to undulate-serrate, 3.0-8.0 x 2.0-4.0 cm, sparsely pubescent on both surfaces; petioles 1-2 cm long. Heads 5-8 x 8-10 mm on 5-10 cm long peduncles. Bracts uniseriate, ovate, 3-5 x 1-3 mm, sparsely pubescent. Florets bisexual, closely spaced, outer few sterile; corolla tube yellowish white to yellow, 3 mm long, 5-lobed at the apex. Achenes dark brown to black, narrowly obovate, 1-2 x 1 mm, minutely glandular, enclosed within paleae.

*Fl. & Fr.* Feb. - April.

*Distrib.* India: Throughout the hilly regions ascending to 1500 m in marshy places.

Nepal, Sri Lanka, China, Myanmar, Indonesia and Malaysia.

2. *Spilanthes ciliata* H.B.K., Nov. Gen. et Sp. Pl. 208. 1820.

Herbs, diffuse, rooting at lower nodes; stems terete, glabrous. Leaves ovate-acute with rounded base, serrate at margins, 7 x 4 cm. Heads yellow rayed, subglobose, becoming conical, axillary solitary 1 cm across; peduncles up to 8 cm long. Involucral bracts biseriate; inner narrow, elliptic, 6 x 2 mm, 3-nerved with narrowly winged margins. Paleae concave, obtuse, keeled along the back, up to 3 mm long. Ray florets

8-12, female; corolla 3-dentate. Achenes black, trigonous, glabrous, ciliate along the margins, truncate at top with a short beak. Pappus of 3 awns, deciduous. Disc florets many, bisexual; corolla tube abruptly expanded from middle. Achenes black, oblong, 2 x 0.5 mm, truncate at the apex, laterally compressed, strongly margined, ciliate along the margins. Pappus of 2 unequal bristles.

*Fl. & Fr.* March - May.

*Distrib.* India: Common in wet or marshy places. Madhya Pradesh and Kerala.

A native of neotropics.

3. *Spilanthes oleracea* L., Syst. Nat. ed. 12, 2: 534. 1767. *Spilanthes acmella* var. *oleracea* C.B. Clarke, Comp. Ind. 138. 1876; Hook.f., Fl. Brit. India 3: 307. 1881.

Herbs, up to 50 cm high, annual or perennial, erect, somewhat succulent. Leaves triangular or triangular-ovate, obtuse at the apex, dentate to undulate-dentate or nearly entire, 1-5.5 x 1-5.0 cm, glabrous. Heads often 2 coloured, yellow and reddish-brown, discoid, solitary, axillary, 1-2 cm across on 7-9 cm long peduncles. Receptacle conical to oblong. Involucral bracts biseriate, oblong-obtuse, 4-6 mm long; corolla reddish-brown when young, tubular, 1.9-2.0 mm long, 5-lobed. Achenes monomorphic; up to 2 mm long, laterally compressed, ciliate at the edges. Pappus of 2 or 1 bristle or absent.

*Fl. & Fr.* Throughout the year.

*Distrib.* India: Throughout the country in tropical regions.

Nepal, Myanmar, Bangladesh, Malaysia, Indonesia, Sri Lanka and Brazil.

*Notes.* Leaves are used as pot herbs by natives in Meghalaya & Silhet. Cultivated as a medicinal plant too.

4. *Spilanthes paniculata* Wallich ex DC., Prodr. 5: 625. 1836. *Spilanthes acmella* var. *paniculata* (DC.) C.B. Clarke, Comp. Ind. 139. 1876; Hook.f., Fl. Brit. India 3: 307. 1881. Fig. 116.

Herbs up to 50 cm high; stems glabrous or nearly so, striate. Leaves ovate-elliptic to elliptic acute or obtuse, undulate serrate, 1.5-8 x 1-6 cm, sparingly pubescent on lower surface, gradually attenuate to a petiole; petioles up to 4 cm long. Heads discoid, subglobose to conical, 6-7 mm in diam.; peduncles up to 10 cm long. Involucral bracts biseriate, elliptic-lanceolate, ovate, obtuse, glabrous to sparsely pubescent, 3-5 x 1-2 mm. Florets bisexual, closely spaced, sometimes outer few sterile; corolla tube less than 1.5 mm long, bulbous at base, 5-lobed, densely pilose within. Style glabrous; stigma

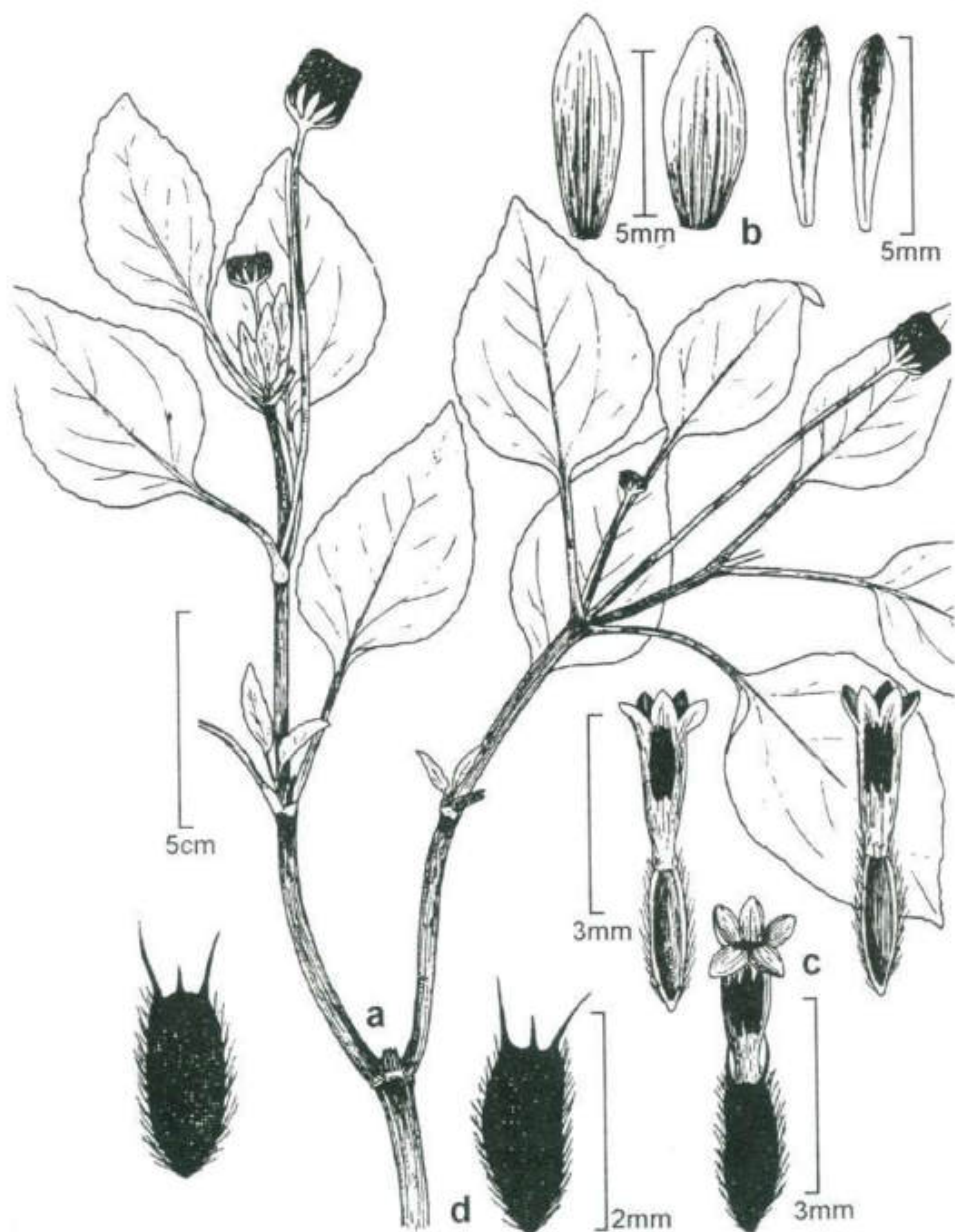


Fig. 116. *Spilanthes paniculata* Wallich ex DC. : a. A portion of the twig; b. Involucral bracts; c. Disc florets; d. Achenes.

lobes flat, densely papillose. Achenes black 2-3 x 2 mm, dimorphic, marginal ones trigonous and central ones flattened, strongly margined, margins densely ciliate with long hairs, sparsely pubescent on the surface. Pappus of 2-3 stiff awns.

*Fl. & Fr.* July - Oct.

*Distrib.* India: Cultivated in many parts of the country.

Nepal, Sri Lanka, Myanmar, Thailand, Indonesia, Philippines, Vietnam, S. America and New Guinea.

5. *Spilanthes radicans* Jacq., Collect. Bot. Chem. Hist. Nat. 11(3): 1714. 1804; Sivaraj. & Matthew in Anc. Sci. Life 3: 169. 1984.

Herbs, erect; stems terete, minutely pubescent. Leaves ovate, acute, base obtuse, margins minutely serrate, 7 x 4 cm, with 1 cm long, hairy petiole. Heads white, discoid, axillary, 8 mm across; peduncles 4-7 cm long. Receptacle glabrous; palea solitary, concave, boat shaped, 4 mm long, glabrous. Involucral bracts oblong, obtuse or subulate, 3-nerved from base, minutely hairy from outside. Corolla tube 2 mm long, base bulbous with a short neck, 4-5 lobed; lobes papillose. Achenes dimorphic, marginal ones trigonous, others brownish-black, ellipsoid, obcordate, laterally compressed, margins densely ciliate. Pappus of 2 subequal bristles.

*Fl. & Fr.* Oct. - Jan.

*Distrib.* India: Kerala.

A native of C. America and Mexico.

6. *Spilanthes uliginosa* Sw., Nov. Gen. Pl. Seu Prodr. Descr. Veg. Ind. Occ. 110. 1788; Sivaraj. & Matthew in Anc. Sci. Life 3: 169. 1984.

Herbs up to 1 m high, creeping or sometimes erect, rooting at nodes; stems subglabrous to scabrid-pilose. Leaves ovate-elliptic, obtuse, attenuate, entire or undulate, 1.5-6 x 1-3.5 cm, glabrous on both surfaces; petioles 1-1.5 cm long. Heads radiate, ovoid or subglobose, subpaniculate, 4-6 x 3-5 mm, turning to elongate-ovoid at maturity, 5-10 x 4-5 mm, borne on filiform peduncles, 1-4.5 cm long. Involucral bracts 5-8, uniseriate, ovate to lanceolate, obtuse, minutely pilose, fimbriate at the margins. Ray florets usually 5; corolla with 2-3 rounded lobes at the apex, 1-3 mm long. Style arms short. Disc florets many; corolla funnel-shaped, 2 mm long, 4 lobed. Achenes dimorphic, 1-1.5 x 0.5 mm long, marginal ones trigonous, central ones laterally compressed, margins sparsely ciliate. Pappus of 2 unequal bristles; absent in ray achenes.

*Fl. & Fr.* March - Sept.

*Distrib.* India: West Bengal and Tamil Nadu.

Nepal, Indonesia, Sri Lanka, New Guinea, Philippines and S. America.

## 22. *Synedrella* Gaertner

Herbs, annual, erect, procumbent, branched. Leaves opposite, simple, serrate, pubescent with white hairs, petiolate; petiole winged. Heads fascicled in upper leaf axils; peduncles short with foliaceous bracts. Heads radiate, sessile to subsessile, small. Involucral bracts many; outermost green; inner scarious, narrower. Ray florets 4-5; corolla yellow, 2-3 dentate. Ovary flattened with broad, erose margins and 2 awns; style branched, slender, pilose. Disc florets many; corolla tubular, 4-lobed, dorsally pubescent. Anthers dark. Ovary oblong, with 2 apical awns and a thick cap; style branches slender, flattened, pilose. Achenes dimorphic; those of ray florets flat with broad, light coloured toothed margins and 2 short apical awns; those of disc florets slender, tuberculate, with 2-3 hard, diverging, strigose awns.

Tropical America, Africa and Mexico; ca 50 species, 2 in India.

### KEY TO THE SPECIES

- 1a. Erect herbs, dichotomously branched; involucral bracts 1-2; achenes of ray florets dorsally compressed, winged; wings lacinate and spinous 1. *S. nodiflora*  
 b. Prostrate herbs, rooting at nodes, irregularly branched; involucral bracts 4; achenes of ray florets slightly compressed, narrowly winged; wings neither lacinate nor spinous 2. *S. vialis*

1. *Synedrella nodiflora* (L.) Gaertn., *Fruct. Sem.* 2: 456. t. 171. f. 7. 1791; Hook.f., *Fl. Brit. India* 3: 308. 1881. *Verbesina nodiflora* L., *Cent. Pl.* 1: 28. 1755.

Fig. 117.

Herbs, erect, upto 1.5 m tall, appressed pilose; stems terete, puberulent with ascending white hairs. Leaves usually at the stem dichotomies, ovate to elliptical, rounded or cuneate at base, acute at the apex, margins shallowly serrate to subentire, 3-10 x 1.5 cm, both surfaces with appressed, ascending, white hairs, distinctly trinerved, petioles up to 2 cm long, narrowly winged. Heads radiate, aggregated in groups of 1-4 at the forkings of the stem or leaf axils enclosed in foliaceous bracts, 4-6 mm across. Involucral bracts in 2-3 series; the outermost green, foliaceous, 1-1.5 x 0.3-0.4 mm; inner membranous, 6-7 x 1-2 mm. Receptacle convex. Ray florets 5-8; corolla yellow, 3-4 mm long, bilobed, tube 2-3 mm long. Ovary dorsiventrally flattened, oblong, margins erose, with two strigose awns; style branches flattened, slender, pubescent. Disc florets several; corolla yellow, up to 4 mm long; tube narrow; lobes short, dorsally pubescent. Anthers

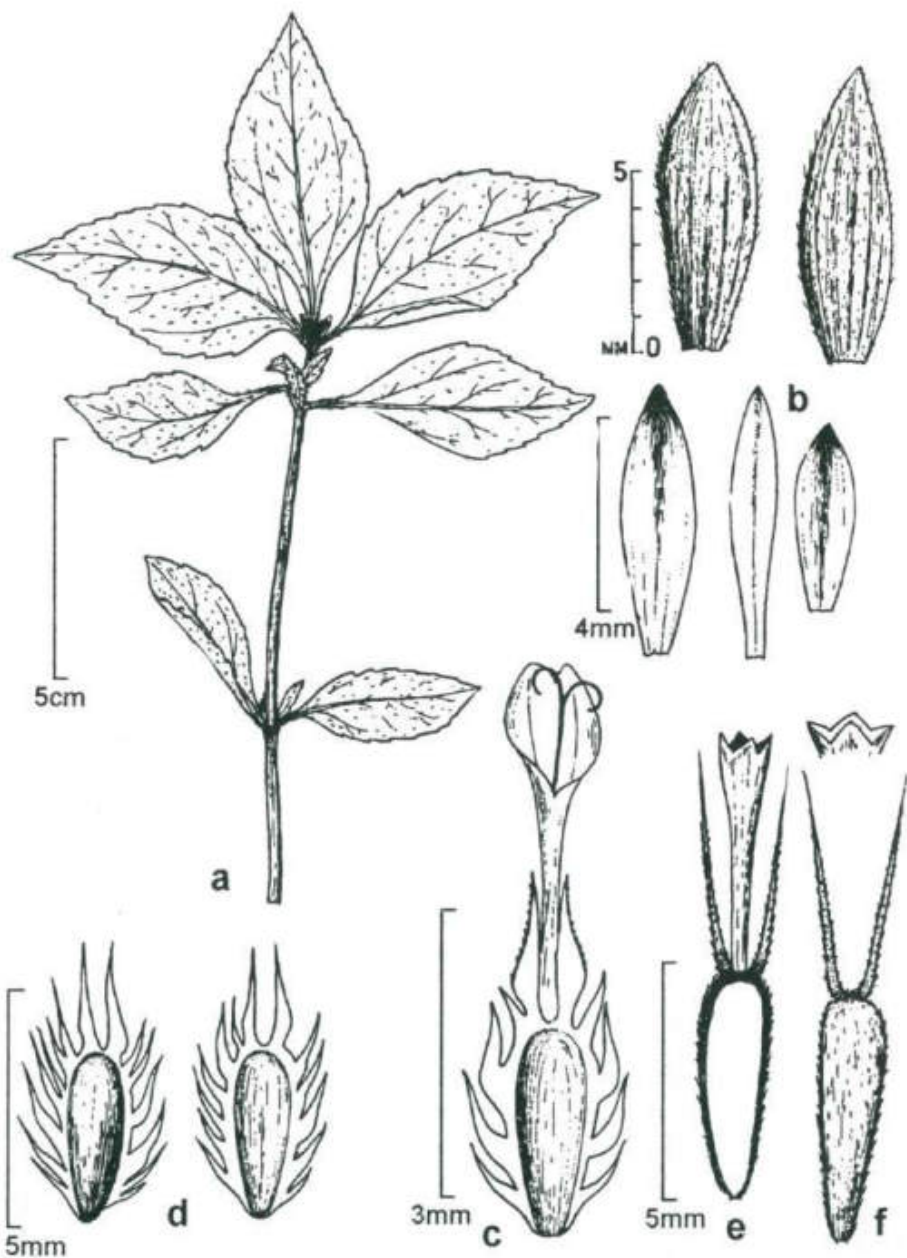


Fig. 117. *Synedrella nodiflora* (L.) Gaertn. : a. A portion of the twig; b. Involucral bracts; c. Ray floret; d. Ray achene; e. Disc floret; f. Disc achene.

dark. Ovary slightly compressed, oblong, with 2 flattened, stout, apical awns; style branches flattened, marginally pilose. Achenes dimorphic; ray achenes blackish oblanceolate, 4.5 x 1.5-2 mm, with pale narrow wings, each with 2-6 lacerate awn like appendages. Achenes of disc black achenes compressed, up to 4 mm long, slender, tuberculate, puberulous, with a pair of stout, slender strigose apical awns.

*Fl. & Fr.* Throughout the year.

*Distrib.* India: In marshy places, West Bengal, Madhya Pradesh, Assam, Tamil Nadu, Kerala and Andaman & Nicobar Islands.

Sri Lanka; China, Malaya, Polynesia, Tropical America and W. Indies.

2. *Synedrella vialis* (Less.) A Gray in Proc. Amer. Acad. 17: 217. 1882; Ahuja and Pataskar in Ind. For. 95. 267. 1969. *Calyptocarpus vialis* Less., Syn. Comp. 221. 1832.

Herbs, annual, branched from base, scabrid-hairy, rooting at nodes. Leaves ovate-lanceolate, acute, cuneate at base, serrate, 3-4 x 2-3.2 cm, hairy on both the surfaces, 3 nerved from the base; petiole ciliate. Heads axillary, solitary, sessile, sometimes two, one of them pedunculate; peduncle up to 3 cm long. Involucral bracts 4, herbaceous, ovoid or oblong-lanceolate, shortly hairy, ciliate along margins, each up to 7 x 4 mm; inner linear-lanceolate, paleaceous, 5 x 1 mm, merging into paleae of the receptacle. Ray florets ligulate, 5-9, female; corolla yellow, 2-3 lobed, style bifid. Achenes dorsally compressed, narrowly winged, crowned with 2 spines. Disc florets hermaphrodite, tubular; limb 4 fid at the apex. Style bifid. Achenes dorsally compressed, crowned with 2 spines or triquetrous and crowned with 3 spines; spines half the length of achenes, shortly hairy.

*Distrib.* India: Maharashtra and Uttar Pradesh.

Native to S. America, Mexico and W. Indies.

### 23. *Tithonia* Desf.

Small trees, shrubs or herbs; stems yellow, green, brown or purple, terete, glabrous or densely villous. Leaves alternate, occasionally opposite below, linear to deltate or 3-5 lobed, acute to acuminate, attenuate to auriculate or decurrent at base, pilose to subglabrous on both surfaces, serrate to crenate, petiolate or sessile. Heads solitary on fistulose, pilose to villous or subglabrous peduncles. Receptacle hemispheric to convex; paleae stiff, striate, acuminate or acute, usually with two secondary lobes embracing the achenes, persistent. Involucral bracts 2-5 seriate, linear to broadly rounded, rounded or acute, glabrous to pilose. Ray florets many; corolla orange or yellow. Achenes white to

light tan, triangular. Pappus absent or present. Disc florets with yellow corolla, 5-lobed. Anthers black to brown. Style bifid with papillate stigma. Achenes black, brown or mottled, triangular to quadrangular. Pappus of awns or of fused squamellae or absent.

Mexico, C. America and W. Indies; ca 10 species, 2 in India.

*Literature.* BLAKE, S.F. (1921). Revision of the genus *Tithonia*. *Contr. U.S. Natl. Herb.* 20: 423-436. LA DUKE, J.C. (1982). Revision of *Tithonia*. *Rhodora* 84: 453-522.

#### KEY TO THE SPECIES

- |  |                           |
|--|---------------------------|
| 1a. Perennials; ligules of ray florets 4.5 cm or more long | 1. <i>T. diversifolia</i> |
| b. Annuals; ligules of ray florets less than 3.5 cm long   | 2. <i>T. rotundifolia</i> |

1. *Tithonia diversifolia* (Hemsl.) A Gray in Proc. Amer. Acad. Arts 19: 5. 1883.

• *Mirasolia diversifolia* Hemsl., Biol Centr. Amer. Bot. 2: 168. t. 47. 1881. Fig. 118.

Shrubs or undershrubs, 2.5-5 m tall, with subterranean stolons; stems brown to green, round, glabrous to villous. Leaves alternate, deltoid, 3-5 lobed, acuminate with attenuate base, serrate on the margins, 7-33 x 7-22 cm, shortly hispid hairy above. Heads heterogamous, usually solitary, on 7-24 cm long, sparsely tuberculate-hispid peduncles. Involucral bracts many, 3-4 seriate, oblong-ovate; outer 6-10 x 4-7 mm, occasionally scarious; inner 10-20 x 3-10 mm. Ray florets 7-14; corolla yellow, linear, 4.8-7.0 cm long, bi or trifid at the apex. Achenes one seriate, white to yellow. Pappus absent. Disc florets numerous; corolla yellow, 5-lobed, 1.5-2 cm long; tube minutely pubescent. Anthers black, 4-5 mm long. Style 9-12 mm long with papillate stigma. Achenes black or mottled, quadrangular, 5-6 x 1.5-2 mm, puberulent. Pappus of fused squamellae with 2 subequal awns.

*Fl. & Fr.* Sept. - May.

*Distrib.* India: Common in ravine slopes, river banks and marshy wastelands etc. Uttar Pradesh, Meghalaya and Tamil Nadu.

Nepal, China, Myanmar, Sri Lanka, Malaysia, Indonesia, Philippines, Hongkong, New Guinea, Seychelles, Fiji, C. America, N. & S. America and Tropical & S. Africa.

2. *Tithonia rotundifolia* (Miller) S.F. Blake in Contr. Gray Herb. ser. 52: 41. 1917. *Tagetes rotundifolia* Miller, Gard. Dict. ed 8. *Tagetes* 4. 1768. *Tithonia tagetiflora* Lamk., Tab. Encycl. Meth. 2: 284. t. 708. 1797.

Herbs up to 4 m tall; stems green to purple, round, glabrous to softly pubescent. Leaves alternate, deltate to triangular or 3-5 lobed, acute to acuminate, base attenuate,



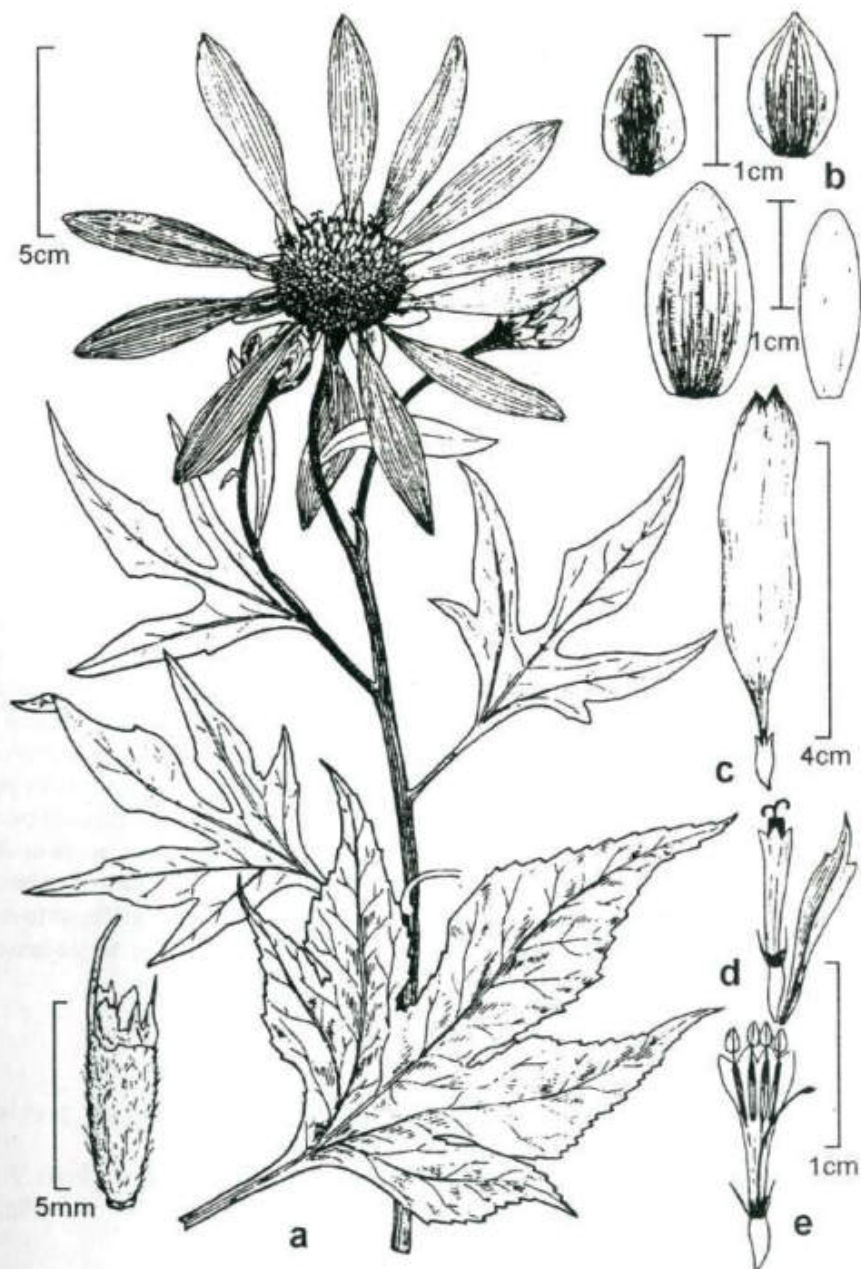


Fig. 118. *Tithonia diversifolia* (Hemsl.) A. Gray : a. A portion of the twig; b. Involucral bracts; c. Ray floret; d. & e. Disc florets; f. Achene.

crenate or serrate, 9-38 x 4-30 cm, sparsely pubescent or villous on the lower surface; petiole 2-10 cm long. Heads heterogamous, solitary, on short-villous to glabrous, 11-27 cm long peduncles. Involucral bracts many, 2-3 seriate, linear-lanceolate; outer acute, 17-30 x 4-7.5 mm, densely pubescent; inner 16-28 x 5-8 mm, acute or rounded, minutely pubescent. Ray florets many; corolla orange to yellow, oval or oblong, trifold, 9-16 x 7-18 mm. Achenes white-tan, triangular, sterile. Pappus absent or of short scales or awns. Disc florets many; corolla yellow, 5-lobed; tube minutely pubescent. Anthers black, 4-5.5 mm long. Styles 5-10 mm long with papillate stigma. Achenes black, brown or mottled, quadrangular, pubescent, fertile, 5-7 x 1.5-2.5 mm. Pappus of fused squamellae with 2 awns.

*Fl. & Fr.* July - Jan.

Cultivated in gardens and also wild.

#### 24. *Tridax* L.

Herbs, annual or perennial; stems procumbent, decumbent or erect, sparsely or densely hairy, subscapose to leafy. Leaves opposite, rarely alternate above, simple or lobed or divided, entire, serrate to dentate, sessile or petiolate. Inflorescence mostly of solitary heads; peduncles stout, erect, elongate, pubescent, often with gland tipped hairs. Heads discoid or radiate, campanulate. Involucral bracts greenish, often purplish at the apex, 2-3 seriate, unequal, purple margined, inner scarious. Ray florets white or yellow, bilabiate, often pubescent. Disc florets yellow, greenish-yellow, or whitish to purplish; limb tubular, glabrous or pubescent, 5-lobed; lobes equal, sublanceolate, acute or obtuse, erect or reflexed. Anthers nearly exerted, sagittate. Style branches recurved or revolute. Achenes turbinate, narrowly obconic to subcylindric, terete to ridged, glabrous to densely pubescent. Pappus usually of about 20, plumose bristles or fimbriate, linear-lanceolate scales, rarely absent.

ca 27 species, 1 in India.

*Literature.* POWELL, A.M. (1965). Taxonomy of *Tridax* (Compositae). *Brittonia* 17: 47-96.

✓ *Tridax procumbens* L., Sp. Pl. 900. 1753; Hook.f., Fl. Brit. India 3: 311. 1881. Fig. 119.

Tam.: *Seruppadithazhai, Kenathuppoendu.*

Herbs to 60 cm high, annual or perennial, weak, straggling, procumbent, hirsute. Leaves in distant pairs, elliptic-ovate to lanceolate, coarsely serrate to dentate or lobed, hispid, acute at apex, cuneate at base, 0.9-8.0 x 0.4-.5 cm; petiole 0.4-1.6 cm long, base

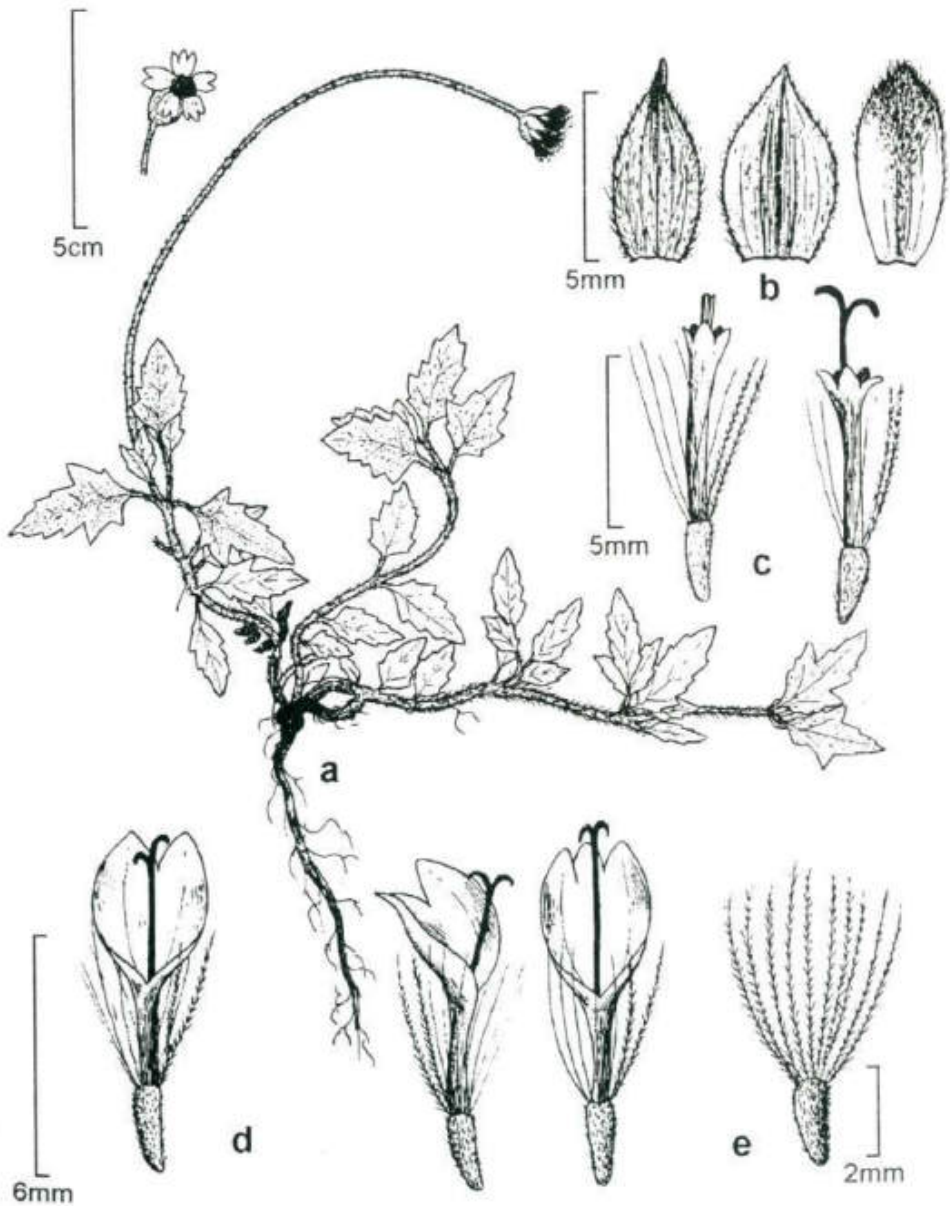


Fig. 119. *Tridax procumbens* L. : a. Habit; b. Involucre bracts; c. Disc florets; d. Ray florets; e. Achene.

somewhat stem-clasping. Head radiate, solitary, 0.5-1.8 cm across, on straight, erect peduncles, hirsute with long sprading-hairs. Involucral bracts 2-3 seriate; outer green, ovate-lanceolate, acuminate, densely glandular hairy, 5.5-6.5 x 2.0-3.0 mm; inner whitish-green, oval, apiculate, thinly hairy, margins scarious and often purple, cuspidate, 6.0-7.5 x 3.0 mm. Ray-florets pale-yellow to white, ligulate, 5-8, 2 to 3 lobed, 3-5 mm long; the tube 2.0-3.4 mm long. Style branches recurved. Disc florets numerous; corolla yellow to purple tinged, 3.0-7.0 x 0.5-1.5 mm; limb narrow, tubular, with 5 lanceolate lobes, apically hirsute. Style branches revolute, flattened. Achenes narrowly obconical, 1.5-2.5 mm long, densely pilose. Pappus of 15-20 unequal, plumose bristles, 2.0-6.0 mm long.

*Fl. & Fr.* Throughout the year

*Distrib.* India: Widespread throughout the tropical and subtropical parts of India. Common in waste places, road sides, gardens etc.

Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, Sri Lanka, Maldives, Malay Peninsula, Indonesia, Philippines, New Guinea, Hongkong, Fiji, C. and S. America and Africa.

## 25. *Verbesina* L.

Shrubs or herbs; stems glabrous or pilose. Leaves alternate or opposite, dentate or lobed or entire, pubescent with winged or auricled petioles. Heads radiate, heterogamous or rarely homogamous, solitary or corymbose. Involucre hemispherical. Involucral bracts in few series (2-5), dry or herbaceous; outer shorter. Ray florets in 1-2 series; corolla yellow or white, ligulate, entire or 2-3 dentate; tube generally pubescent. Ovary fertile, laterally compressed. Achenes obovoid, with winged margins. Pappus of 2 awns. Disc florets many, bisexual; corolla tubular, 5-dentate. Anthers acute at apex. Style-arms short with a triangular, acute, papillose apex. Achenes as in ray florets.

Mostly in C. and S. America; ca 200 species, 1 in India.

*Verbesina encelioides* (Cav.) Benth. in Benth. & Hook.f. Gen. Pl. 2: 380. 1873.  
*Ximenesia encelioides* Cav., Icon. 2: 60. t. 178. 1793. Fig. 120.

Herbs up to 2 m tall. Leaves simple, alternate, ovate-lanceolate, acute at both the ends decurrent, coarsely serrate, 5-10 x 3-6 cm; petiole winged, up to 5 cm long; wings narrow, dentate, slightly broadened below. Heads radiate, solitary, terminal or leaf opposed, 4-5 cm across. Receptacle flat to sub-convex. Paleae lanceolate, 6-8 x 1-1.5 mm, acuminate, vertically folded, scarious, scabrous on margins curved. Involucre more or less campanulate; bracts biseriate, oblong-lanceolate, acute, strigose. Ray florets in

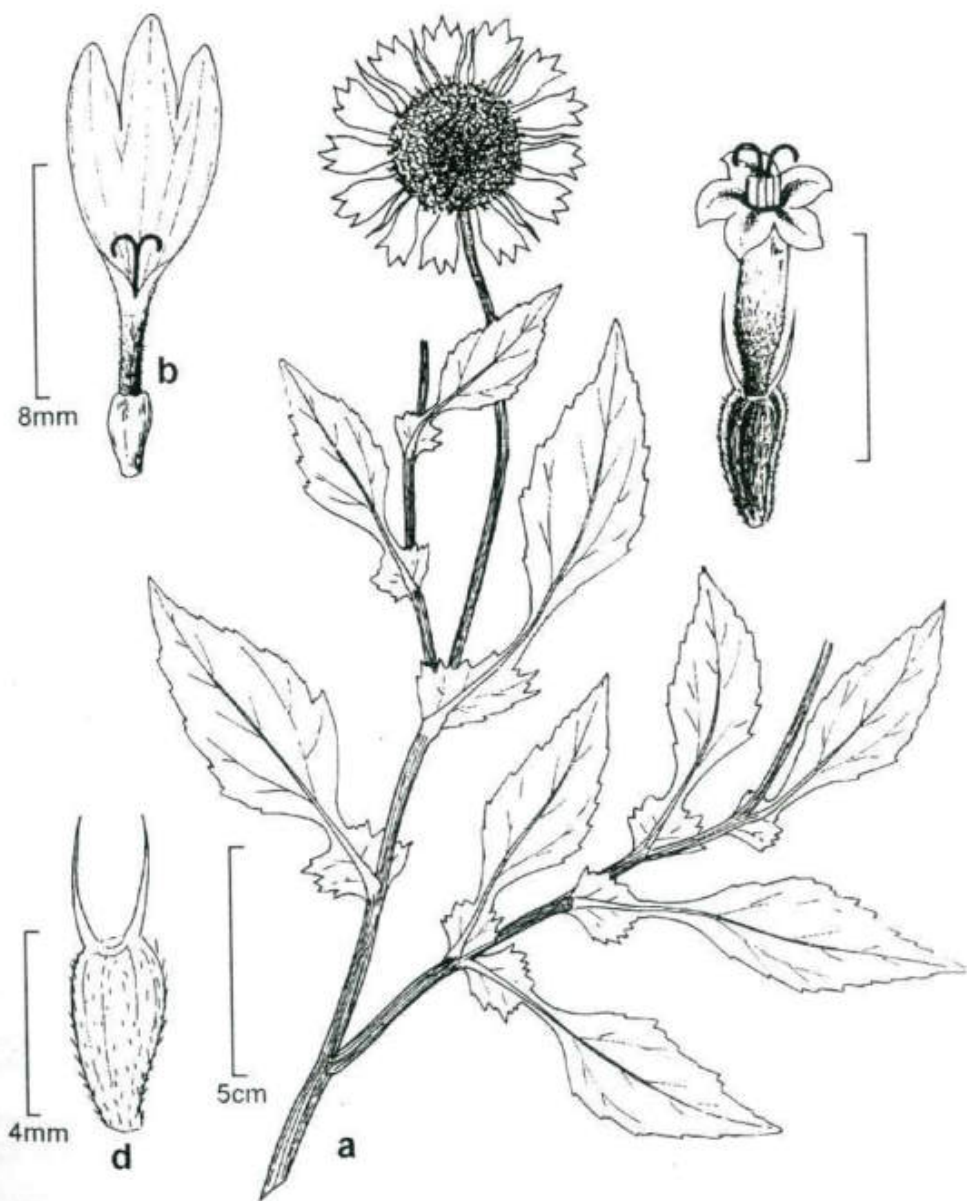


Fig. 120. *Verbesina encelioides* (Cav.) Benth. : a. A portion of the twig; b. Ray floret; c. Disc floret; d. Achene.

one series; corolla yellow, 5-11 mm; tube 2 mm long, hairy. Disc florets many; corolla 4 mm long, shortly tubular below, hairy, 5-lobed; lobes acute-lanceolate. Stamens 5; anthers linear-sagittate. Achenes margined.

*Fl. & Fr.* July - Oct.

*Distrib.* India: Uttar Pradesh, Delhi, Haryana, Rajasthan, Punjab, Madhya Pradesh, Bihar, Karnataka and Tamil Nadu.

America and New Guinea.

## 26. *Wedelia* Jacquem.

Herbs or shrubs, erect, ascending or procumbent with slender or stout and succulent stems and fibrous or stout rootstock. Leaves simple, opposite, dentate or entire. Heads radiate, heterogamous, solitary, terminal or on peduncles among the upper branches. Involucre campanulate; bracts 1-2 seriate; outer herbaceous; inner ones membranous. Receptacle flat or slightly convex. Ray florets several, female; corolla yellow or white, entire to 2-3 dentate. Ovary compressed; style branches slender, elongate, curved. Disc florets yellow, numerous, bisexual or rarely male, tubular-campanulate, 5-lobed. Anther bases sagittate; apical appendage ovate. Style arms broad, acute or obtuse. Achenes of the ray and disc florets cuneate-obovate, triquetrous or laterally-compressed, truncate or rounded at the apex. Pappus cup like or of 1-2 weak awns or absent.

In tropical and warm temperate regions of the world; ca 70 species 5 in India.

### KEY TO THE SPECIES

- |   |  |
|---|--|
| 1a. Involucral bracts nearly equalling the disc florets                       | 2  |
| b. Involucral bracts much longer than the disc florets                        | 3  |
| 2a. Climbing shrubs, 1-3 m tall   | 1. <i>W. biflora</i> ✓                       |
| b. Erect or suberect herbs, 15-60 cm high                                     | 3. <i>W. montana</i> var. <i>wallichii</i> ✓ |
| 3a. Leaves trilobed, margins toothed  | 4. <i>W. trilobata</i>                       |
| b. Leaves not lobed   | 4  |
| 4a. Leaves subsessile, spatulate-lanceolate, margins entire or feebly serrate | 2. <i>W. chinensis</i> ✓                     |
| b. Leaves distinctly petioled, ovate, acuminate, serrate                      | 5. <i>W. urticaefolia</i> ✓                  |

1. *Wedelia biflora* (L.) DC. in Wight, Contrib. Bot. Ind. 18. 1834. *Verbesina biflora* L., Sp. Pl. ed. 2. 1272. 1763; Hook.f., Fl. Brit. India 3: 306. 1881. Fig. 121.

Herbs or shrubs; scandent, straggling or climbing; stems sparsely pilose, ribbed. Leaves oblong-ovate or ovate, long or shortly acuminate, cuneate or rounded at base, trinerved, finely serrate, 3-6 x 0.5-3.5 cm, shortly appressed hispid on both surfaces, petiolate. Heads solitary or several in loose cymes, 7-8 mm across; peduncles up to 9 cm long, pubescent. Involucral bracts 8-10, ovate-elliptic, pubescent, 5-6 x 2-3 mm. Ray

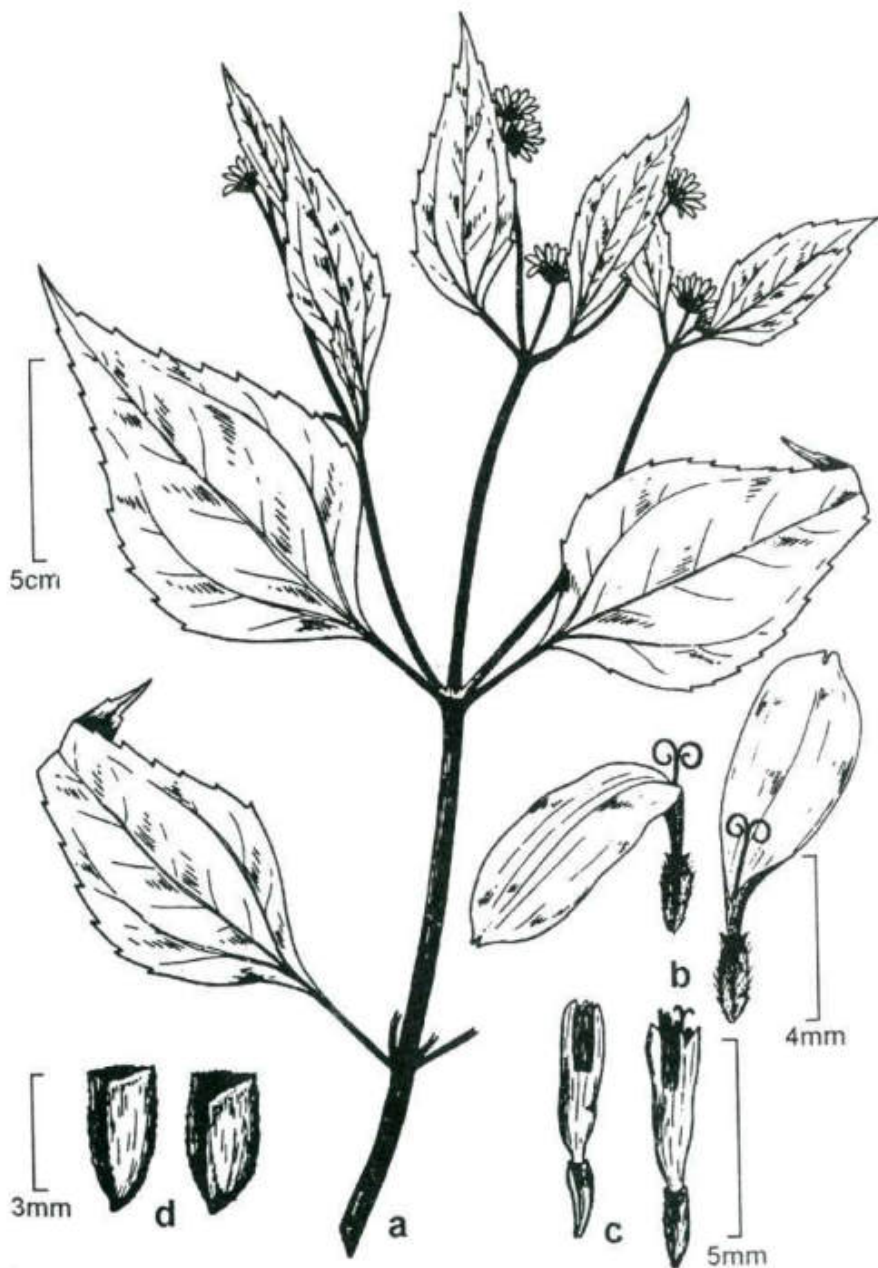


Fig. 121. *Wedelia biflora* (L.) DC. : a. A portion of the twig; b. Ray florets; c. Disc florets; d. Achenes.

florets 8-12; corolla oblong, emarginate or 2-3 lobed, appressed pubescent beneath, 6-15 x 4-6 mm. Style arms lanceolate, papillose the upper part. Disc florets many; corolla 5-6 mm long; lobes puberulous. Achenes dark brown, truncate at apex, 3-4 mm long; those of ray florets triquetrous and of disc almost compressed. Pappus a minute dentate cup with one or two weak bristles, 1-1.5 mm long.

*Distrib.* India: West Bengal, Maharashtra and Andaman & Nicobar Islands.

Malaya, China, Sri Lanka, Australia, E. Africa, Indonesia, Japan and Thailand.

2. *Wedelia chinensis* (Osbeck.) Merr. in Philipp. J. Sci. 12: 111. 1917. *Solidago chinensis* Osbeck., Dagb. Ostind. Tesa. 241. 1757. *Wedelia calendulacea* (L.) Less., Syn. Gen. Comp. 222. 1832; Hook.f., Fl. Brit. India 3: 306. 1881.

Herbs, procumbent or ascending, rooting at the lower nodes; stems reddish, glabrous. Leaves spatulate-oblongate, acute, trinerved, attenuate margins flat or slightly inrolled, entire or feebly serrate, 2-6 x 0.5-1.5 cm, shortly appressed hairy on both the surfaces, subpetiolate. Heads yellow, solitary on terminal peduncles, 5-7 mm across; peduncles 3-7 cm long. Involucral bracts in 2 series; outer oblong, 5-8 x 2-3 mm, acute or obtuse at the apex, appressed pubescent; inner lanceolate, 5-7 x 1-2.5 mm. Ray florets few; corolla 6-8 x 3-4 mm long. Achenes dark brown, 4-5 x 2-3 mm, rugulose, glabrous; those of ray florets triquetrous; those of disc florets compressed. Pappus a minute, irregularly margined, withered cup at maturity.

*Fl. & Fr.* Throughout the year.

*Distrib.* India: In marshy places. Assam, W. Bengal, W. & E. Peninsula, Tamil Nadu and Andaman & Nicobar islands.

Sri Lanka, China, Malay Peninsula and Japan.

3. *Wedelia montana* var. *wallichii* (Less.) H. Koyama in Acta Phytotax. Geobot. 34: 171. 1985. *W. wallichii* Less. in Linnaea 6: 162. 1831; Hook.f., Fl. Brit. India 3: 307. 1881. Fig. 122.

Herbs, erect or suberect, 15-60 cm high; stems hispid, pubescent. Leaves flaccid, ovate or ovate-lanceolate, crenate-serrate, acuminate, hispid, 3-10 cm long. Heads yellow, leaf-opposed, solitary, terminal, up to 2.5 cm in diam., short peduncled. Involucral bracts in 2-series; outer calyciform, 4-5, oblong-acute, imbricate, 1-1.5 cm long, each subtending a ray floret; inner narrow, lanceolate, 6-8 mm long. Ray florets 5; corolla yellow, 3-dentate, up to 1 cm long. Disc florets 4-7, each subtended by a conduplicate nerved, linear-lanceolate palea. Achenes brown, obpyramidal, obovoid,



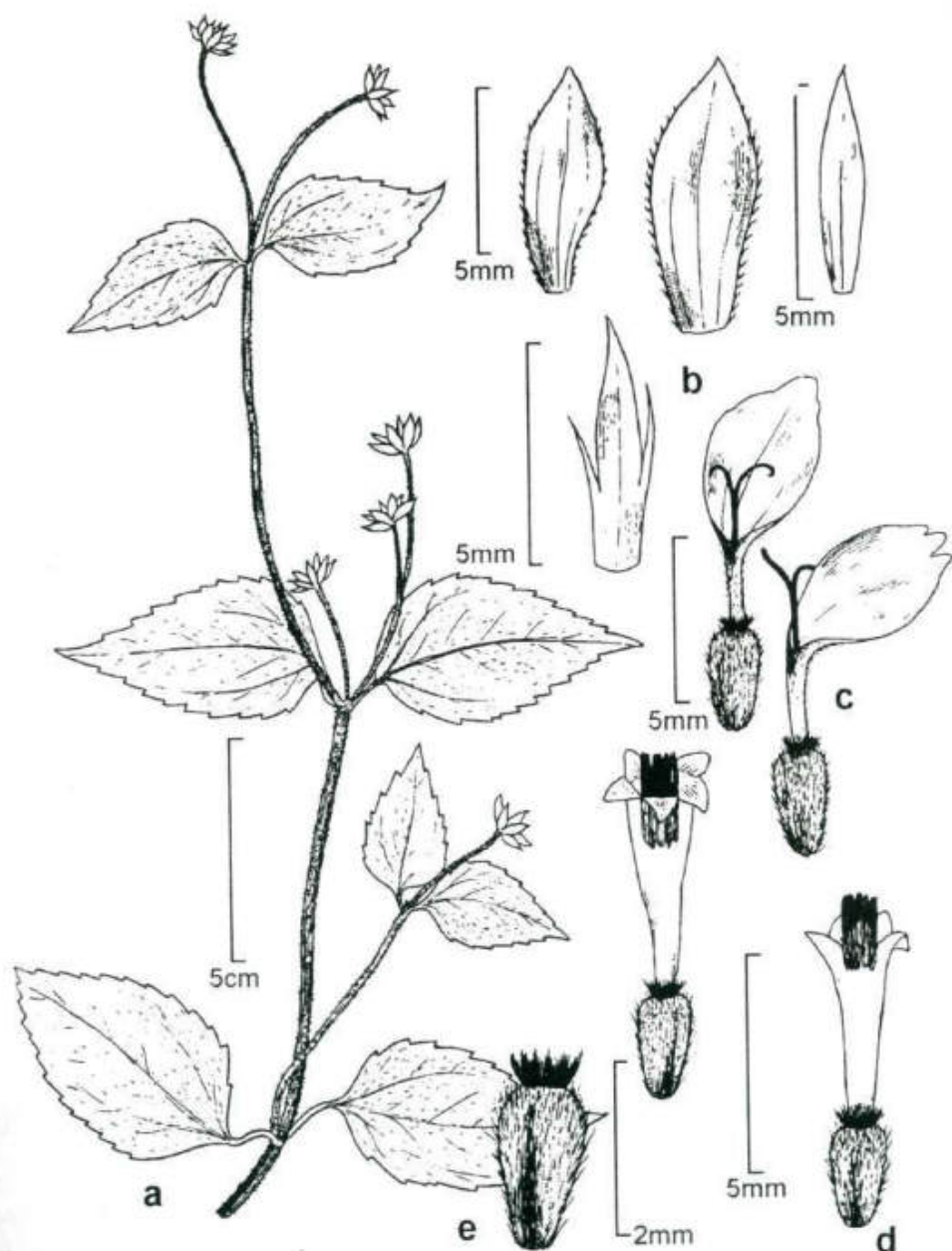


Fig. 122. *Wedelia montana* var. *wallichii* (Less.) H. Koyama : a. A portion of the twig; b. Involucral bracts; c. Ray florets; d. Disc florets; e. Achene.

scarcely compressed with a truncate apex, hairy at the top, 3 x 2.5 mm. Pappus a very short scaly or toothed ciliate ring.

*Fl. & Fr.* July - Dec.

*Distrib.* India: Uttar Pradesh, West Bengal, Sikkim, Arunachal Pradesh and Meghalaya.

Bhutan and Myanmar.

4. *Wedelia trilobata* (L.) A.S. Hitchc. in Rep. Missouri Bot. Gard. 4: 99. 1898. Shivarajan & Pradeep in Ind. J. For. 11: 161-162. 1988. *Silphium trilobatum* L., Syst. ed. 10: 1232. 1759.

Herbs, perennial, prostrate, diffuse, rooting at nodes; stems glabrous or pubescent (near nodal region). Leaves elliptic-obovate, usually with 3 angular lobes with toothed margins, acute at apex, basally cuneate, 3-10 x 3-7 cm, glabrous to sparingly pubescent; petiole short, up to 5 mm. Heads radiate, solitary on ebracteate peduncles, 2-2.5 cm across; peduncles strigose, 4-15 cm long. Involucre green; bracts lanceolate, 1-1.5 cm long, ciliate inner narrower. Ray florets 5-8; corolla bright yellow, 1.5-2.0 x 0.5-0.7 cm, 3-4 denticulate; tube short. Ovary trigonous; stigma bilobed. Pappus connate into a spathiform, fimbriate cup at the apex, devoid of awns. Disc florets many; corolla yellow; tube 5-8 mm long, 5 lobed; lobes deltoid, densely pubescent within. Anthers black, syngeneicous. Style branches flattened and marginally pubescent. Achenes blackish, warty, 4-6 mm long, crowned by the persistent pappus cup.

*Fl. & Fr.* June - Sept.

*Distrib.* India: Kerala.

Thailand, native of Tropical America.

5. *Wedelia urticaefolia* DC. in Wight, Contrib. Bot. Ind. 18. 1834; Hook.f., Fl. Brit. India 3: 306. 1881.

Herbs or undershrubs, branched. Leaves elliptic-ovate, serrate, truncate at base, acute at apex, 3-6 x 2-4 cm; petiole 1-2 cm long. Heads yellow, 2-3 cm across. Involucral bractse in two series; outer 8 x 3 mm, acute; inner rhomboid-lanceolate, 7 x 2 mm. Ray florets few; corolla broadly oblong, 7 x 5 mm. Ovary 4-angled; stigma linear, recurved, papillose. Disc florets many; corolla 5-lobed; tube 3-4 mm. Ovary compressed; stigma linear, pubescent, acute. Achenes elongate-cuneate, triquetrous, tip broadly truncate. Pappus absent, rarely of 1-2 bristles.

*Fl. & Fr.* Throughout the year.

*Distrib.* India: Major parts of India, in marshy places.

### 27. *Xanthium* L.

Herbs, annual, hispid-pubescent or glabrescent, armed or unarmed. Leaves alternate, entire or variously lobed, coarsely dentate, petiolate. Heads solitary or glomerate, terminal or axillary, unisexual. Male heads many flowered, nearly globose, sessile, borne at the apices of branches. Involucre 1-rowed. Female ones near the base of the shoot, ovoid, 2-locular, each locule containing one flower. Involucral bracts in 2 rows; outer small, free, inner connate, coriaceous, prickly, ending in 2 beaks; prickles straight or hooked. Corolla of male florets greenish, tubular, 5-toothed. Filaments united; anthers free. Corolla of female florets absent. Styler branches exerted through a hole on inside of each beak near the apex. Achenes 2 in each head, included in the hardened, spiny involucre at maturity. Pappus absent.

Cosmopolitan; ca 70 species, 3 in India.

#### KEY TO THE SPECIES

- |  |                       |
|--|-----------------------|
| 1a. Leaves green above, white beneath; Stems bearing yellow spines   | 3. <i>X. spinosum</i> |
| b. Leaves green on both surfaces; stems without spines   | 2                     |
| 2a. Fruiting involucre pale-green, covered with hooked bristles, devoid of glands or hairs; apical beaks divergent | 1. <i>X. indicum</i>  |
| b. Fruiting involucre greyish-green to red-brown, covered with hairs and glands; apical beaks straight or incurved | 2. <i>X. Pungens</i>  |

1. *Xanthium indicum* Koenig in Roxb., Fl. Ind. 3: 601. 1832. *X. strumarium* L., Sp. Pl. 987. 1753, p.p.; Hook.f. Fl. Brit. India 3: 303. 1881. (excl. syn. *X. strumarium* Boiss.)

Fig. 123.

Tam. : *Ottarachedi*, *Harlummutta*.

Herbs, erect, coarse, 1 to 1.5 m tall. Leaves alternate, broadly ovate to cordate, 3-5 lobed, acute or acuminate, rounded or cordate at the base, irregularly serrate on margins, 3-12 x 2-10 cm, hispid on both the surfaces; petioles 2-10 cm long. Male heads globose, 5-7 mm across. Involucral bracts few, 1-2 seriate, narrow, 2-3 mm long, pubescent. Florets numerous, crowded, each florets enclosed in a translucent scale; corolla whitish-green, tubular, 5-toothed. Anthers free. Ovary and styles absent. Female heads ovoid, 10-15 mm long; outer involucral bracts few, short; inner many, in one series, narrow, united, covered by hooked bristles and terminating into 2 strong, hooked divergent beaks. Florets 2; corolla absent. Style branches long, thread-like, protruding from between the beaks, 2-5 mm long. Achenes greyish black, narrowly ovoid or elliptic, 1-1.5 x 2-3.5 mm, smooth, tapering to a fine point at apex.

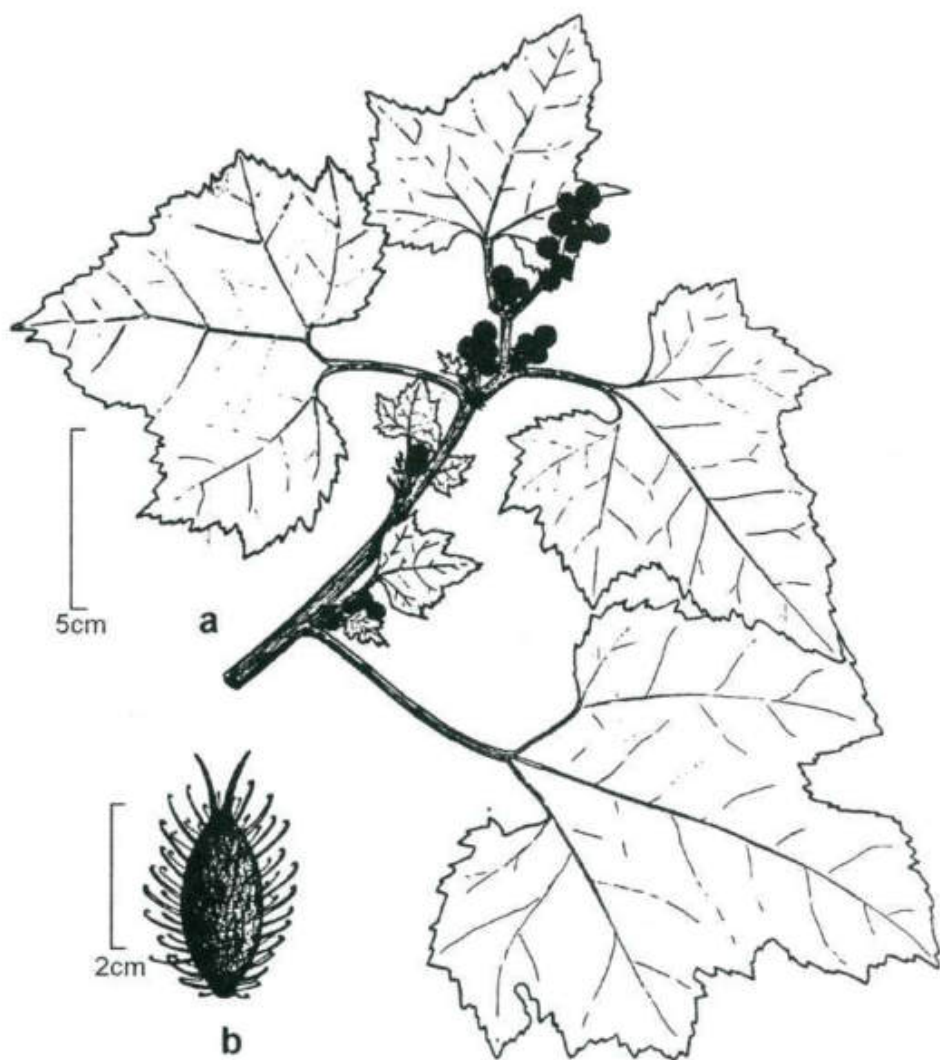


Fig. 123. *Xanthium indicum* Koenig : a. A portion of the twig; b. Achene.

*Fl. & Fr.* March - Dec.

*Distrib.* India: Throughout India in plains, a common weed of waste places, agricultural fields, roadsides etc.

Sri Lanka and Malay Peninsula.

*Note.* Tender shoots eaten as vegetable. The plant has sudorific and sedative properties. Leaves yield a yellow dye. Harmful to domestic animals.

2. *Xanthium pungens* Wallroth in Beitr. Bot. 1(2): 227 & 231-232. 1844; Maheshwari in Curr. Sci. 42(5): 327-328. 1973.

Herbs or undershrubs up to 1.5 m tall; stems angular, ribbed, sparsely hispid with short, thick hairs. Leaves cordate, entire or 3-5 lobed, cuneate at the base, acute at apex, irregularly, coarsely dentate with acute teeth, 6-10 cm long and 10-12 cm broad, minutely hispid on both surfaces; petiole 4.5-5.5 cm long. Female involucre yellowish-green turning red, oblong or ovoid, glabrescent or subglabrous, with minute hairs and glands, involucre spines slender, straight, usually 4 mm long, apex straight or hooked. Fruiting heads dark brown, 15-20 x 5-9 mm, bearing 2 terminal, straight or incurved beaks with hooked or straight apices.

*Fl. & Fr.* July - Dec.

*Distrib.* India: A noxious weed in waste places and by the road-sides. Punjab, Haryana, Delhi, Uttar Pradesh, Orissa, Gujarat and Andhra Pradesh.

N. America, Africa, Australia, Fiji and New Guinea.

3. *Xanthium spinosum* L., Sp. Pl. 987. 1753; Razi in Rec. Bot. Surv. Ind. 18: 56. 1959.

Herbs, well branched, robust, 50-100 cm high, with 1-2 stout, 3-fid, yellow spines in the leaf axils, sometimes spines replaced by a leaf fascicle. Leaves entire to 3-5 fid, white to grey tomentose on the lower surface, dark green above, sessile or shortly petiolate. Male heads in terminal inflorescence; female solitary, sessile in leaf axils. Fruiting involucre elliptic-oblong, 10-15 x 7-9 mm, spines yellow, hooked, slender; beak acicular.

*Fl. & Fr.* July - Dec.

*Distrib.* India: Jammu & Kashmir, Rajasthan and W. Bengal.

A weedy species almost cosmopolitan.

## CULTIVATED SPECIES

**Dahlia imperialis** Roetzl. ex Ortgies in Gart. Fl. 1863: 243. t. 407, 408. 1863.

Stems upto 4 m tall, trunk like. Leaves 3-pinnate; ultimate leaflets ovate, upto 5 cm long, incurved, serrate. Heads white, tinged with red.

Ornamental. Native of Mexico.

**Dahlia pinnata** Cav., Icon. 1: 57. t. 80. 1791.

Herbs, tuberous. Leaves opposite, usually bipinnate; pinnae ovate, crenate, dentate; rachis more or less winged. Ray florets rose coloured. Disc florets yellow.

Ornamental. Native of Mexico.

**Gaillardia amblyodon** J. Gay in Ann. Sci. Nat. Ser. 2. 12: 62. 1839; R.R. Rao et al., Fl. Ind. Enum. Asthac. 39. 1988.

Herbs, erect, 30-60 cm high. Leaves hirsute, oblong or spatulate, sessile and auriculate, margins entire or nearly so. Heads brown-red.

Cultivated in Botanic gardens, not very common.

**Gaillardia pulchella** Foug., Mem. Acad. Sci. Pairs 1786. 5. t. 1. 1788. Matthew, Fl. Tamil-Carnatic 3: 790. 1984. *G. bicolor* Lam., Encycl. 2: 590. 1788.

Herbs up to 40 cm high, thinly pubescent. Leaves simple, oblong-lanceolate, base rounded to acute, apex acute, margin entire, recurved, 3-8 x 0.5-1 cm. Heads solitary, terminal, long stalked, 2-4 cm across, radiate. Receptacle convex. Involucre campanulate. Involucral bract biseriate, obovate-lanceolate, herbaceous, scabrous, acuminate, 1.2 x 3 mm. Ray florets pink-yellow. Corolla 4-lobed, 5-6 mm; lobes lanceolate, connate near middle, narrowed at base. Disc florets with tubular corolla; tube 3-4 mm, 5-lobed, fimbriate, acuminate stamens 5, anthers linear with tailed base. Style 5-8 mm long; stigma linear, pubescent. Achenes 4-5 mm long, angular, upper portion broad, with 4 awns. Pappus of few equal or unequal paleaceous scales, 5-6 mm long ending in an awns.

*Fl. & Fr.* March - Sept.

Cultivated in gardens, often found as escape.

**Helianthus annuus** L., Sp. Pl. 904. 1753; R.R. Rao *et al.* Fl. Ind. Enum. Asterac. 43. 1988.

Extensively cultivated as ornamental as well as for edible oil extracted from seeds (achenes). A native of North America, cosmopolitan in distribution.

**Helianthus cucumerifolius** Torr. & Gray, Fl. N. Amer. 2: 319. 1842; R.R. Rao *et al.*, Fl. Ind. Enum Asterac. 43. 1988.

Cultivated and also common in waste places as an escape. A native of N. America.

**Helianthus scaberrimus** Ell., Sketch. 2: 423. 1823. Raghavan *et al.* in Rec. Bot. Surv. India: 45. 1981.

Reported from Gujarat.

**Helianthus tuberosus** L., Sp. Pl. 905. 1753; R.R. Rao, *et al.* Fl. Ind. Enum. Asterac. 43. 1988.

Known from Jammu & Kashmir, Uttar Pradesh, Assam and W. India. Tubers edible. Extensively cultivated for their tubers which are edible.

**Helianthus debilis** Nutt. in Trans. Amer. Philos. Soc. 7: 367. 1841.

Cultivated as an ornamental.

**Zinnia elegans** Jacq., Coll. 3: 152. 1789.

Annuals to 1 m high. Leaves cordate-ovate to elliptic, sessile. Florets variously coloured except blue and green.

Ornamental. Native of Mexico.

**Zinnia linearis** Benth., Pl. Hartw. 17. 1839.

Herbs, annual, upto 30 cm high. Leaves linear-lanceolate, entire. Heads upto 5 cm across. Ray florets orange.

Ornamental. Native of Mexico.

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