FLORA OF BILASPUR DISTRICT, M.P.

VOLUME 2

S. K. MURTI
G. PANIGRAHI

BOTANICAL SURVEY OF INDIA

FLORA OF BILASPUR

VOL. 2

SOLANACEAE TO POACEAE

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FLORA OF BILASPUR DISTRICT

(MADHYA PRADESH)

VOLUME 2

S. K. Murti
G. Panigrahi

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SOLANACEAE

A. L. Jussieu, Gen. Pl. : 124. 1789 ('*Solaneae*')

T. : *Solanum* L.

Cestrum noctornum L. (Lady of the night, with fragrant flowers, West Indies) and various cultivars of *Petunia* × *hybrida* Hort. Vilm. [*P. axillaris* (Lam.) Britton, Stearn & Pogg. × *P. integrifolia* (Hook.) Schinz & Thell. ('*P. violacea*'] are commonly grown in the gardens. Local tribals often grow *Nicotiana tabacum* L. (Tobacco, Smoking tobacco), cultigen originating in tropical America in Pre-Columbian period, in their kitchen gardens. Leaves are collected when yellowing, dried and fermented ('cured') in different ways to give tobacco for cigars, cigarettes, variously flavoured ; ground with molasses etc. for chewing tobacco. Different cultivars are usually grown for different purposes, e.g. *Virginia tobacco* for cigarettes, *Havana tobacco*—a large-leaved form for cigars ; also source of commercial nicotine, the stimulatory alkaloid, used for insecticides etc. and causes lung cancer—a principal source of taxation by all governments. *Nicotiana rustica* L. (wild tobacco)—original tobacco with 2n=48 introduced, plant smaller and harder, now grown for insecticides etc. *Lycopersicon esculentum* P. Miller, commercial tomato [= *L. lycopersicum* (L.) Karsten, "*Licopersicum lycopersicum*" Andes] is commonly cultivated.

1a. Fruits enclosed in greatly enlarged, sac-like calyx

- 2a. Flowers blue purple ; calyx in fruits deeply cleft, much enlarged, 5-angled ; ovaries usually 3-5-celled ; stigmas obscurely 3-5-lobed — NICANDRA
- 2b. Flowers yellowish or white ; calyx in fruits inflated, toothed or only short-lobed ; ovaries 2-celled ; stigmas obscurely 2-lobed — PHYSALIS

1b. Fruits never enclosed in calyx

- 3a. Flowers very large, tubular or funnel-shaped ; fruits capsular, 4-valved or irregularly dehiscing — DATURA
- 3b. Flowers small, rotate ; fruits baccate, indehiscent
  - 4a. Anthers not connivent in cone, not longer than filaments, dehiscing longitudinally — CAPSICUM
  - 4b. Anthers connivent in a cone around styles, longer than filaments, dehiscing by pores — SOLANUM

CAPSICUM L., Sp. Pl. : 188. 1753, et Gen. Pl. ed. 5 : 295. 1754 ; Pickersgill, Heiser and McNeill in Biol. Taxon. Solanac. Linn. Soc. Symp. Ser. 7. 679-700. 1979 (eds. Hawkes *et al.*).

LT. : *C. annuum* L. (vide N.L. Britton, Fl. Bermuda : 338. 1918).

1a. Annual or biennial herbs ; flowers usually solitary ; corolla white ; fruiting pedicels pendulous or nodding, solitary ; fruits long, narrow, longer than the pedicels — *C. annuum*

1b. Perennial herbs ; flowers usually 2-3-together ; corolla light greenish ; fruiting pedicels erect, 2 or more ; fruit ovoid-oblong, shorter than pedicels — *C. frutescens*

Capsicum annuum. L. Sp. Pl. : 188. 1753 ; Heiser & Pickersgill in Taxon. 18 : 282. 1969 ; Nicolson *et al.* Regnum Veget. 119 : 245. 1988. *Capo-molago* Rheede, Hort. Malab. 2 : 109-110, t. 56. 1679.

Erect herbs, glabrous. Leaves simple, entire or repand, obovate, elliptic to narrow lanceolate, acuminate, 8-11 × 2-3.5 cm. Flowers solitary, axillary, rarely 2-3 together, nodding ; pedicels 1.5-2 cm long ; calyx 2-3 mm long, nearly truncate or minutely 5-toothed, somewhat enlarging in fruits ; corolla rotate, 5-lobed, 6-8 mm long ; stamens 5, filaments longer than anthers, attached at base of corolla ; ovary 2-3-celled (cells often multiply under cultivation). Fruits indehiscent berries.

LT. : Van Royen material (vide Hepper in Dassan., Rev. Handb. Fl. Ceylon 6 : 395. 1988 (1987).

Note : 1. Trimen (1887 : 137) had cited *Herb. Hermann* 92 (BM) as the type, but Heiser & Pickersgill (1969) cited Rheede's plate t.56 as the type, the latter favoured by Nicolson *et al.* (*l.c.*)

2. *Capsicum annuum* L. var. *annuum* includes almost all the cultivated peppers with 5 main group of cultivars :

(i) *Cerasiforme*-group (cherry pepper)—fruits small, very pungent ;

(ii) *Conoides*-group (cone pepper)—fruits more or less erect, more or less conical ;

(iii) *Fasciculatum*-group (red cone pepper)—fruits erect, slender, red, clustered, very pungent ;

(iv) *Grossum*-group (bell pepper, green pepper, sweet pepper, pimento)—fruits large, thick-skinned, more or less bell-shaped, with depression at base, scarcely pungent (the principal salad-peppers, red, green or yellow) ;

(v) *Longum*-group (chilli pepper)—fruits usually drooping, to 30 cm long, very pungent, source of chilli-powder.

Fl. & Frt. : Almost throughout the year usually July to April.

Pasan, 13271 A ; Kabirchabutra, 15264 ; also found as escapes from cultivation.

2n=12, 22, 24, 48.

Native of tropical America ; introduced and commonly cultivated throughout India.

Pungent principle is capsaicin ; fruits carminative, extensively used as spice. Capsicum preparations are used as counter irritants in lumbago, neuralgia and rheumatism,

C. frutescens L., Sp. Pl. : 189. 1753 ; Haines, Botany 2 : 639 ; Hepper, in Dassan., Rev. Handb. Fl. Ceylon 6 : 395. 1988 (1987). *Vallia-capomolago* Rheede, Hort. Malab. 9 : 65, t. 39. 689.

Erect herbs or undershrubs, glabrous. Leaves simple elliptic ovate, entire, 6-12 × 2-4 cm. Flowers 2-3 together, axillary, rarely solitary, erect ; pedicels 1-2 cm long ; calyx minutely 5-lobed, somewhat enlarging in fruits ; corolla rotate or nearly so, usually 5-lobed ; stamens 5, filaments longer than anthers ; ovary 2-3-celled (but often, more locular under cultivation). Fruits indehiscent berries, ovoid-oblong many-seeded.

Fl. & Frt. : Almost throughout the year, usually July-Feb.

Note : A name much used for forms of *Capsicum annuum* L., is the source of Tobacco-sauce and other hot sauces. The character of single-flowered (*annuum*) vs. 2-more-flowered (*frutescens*) is not constant, but the fruits of the latter are larger (cf. Nicolson *et al., op.cit.* : 246. 988).

Kabirchabutra, 15263.

2n=24

Native of America ; introduced and cultivated throughout the tropics.

Rich in capsaicin ; source of Cayenne pepper ; used as a carminative and rubifacient.

DATURA L., Sp. Pl. : 179. 1753 & Gen. Pl. ed. 5 : 83. 1754.

LT. : *Datura stramonium* L. (vide N. L. Britton et A. Brown, 111. Fl. N. U. S. ed. 2, 3 : 169. 1913).

Note : *Datura stramonium* L. (Thorn-apple), (2n=24, 48) with fruits nodding, long-spiny, 4-locular and regularly dehiscent, may also occur in the district. Stramonium-drug is used in the treatment of asthma, comprises dried leaves (alkaloid hyoscamine and hyoscine), also intoxicant and hallucinogen. Seeds remain dormant for many years, and provide materials for intense genetic researches.

Datura metel L., Sp. Pl. : 179. 1753 ; Nicolson *et al.*, Regnum Veget. 119 : 246. 1988. *D. fastuosa* L., Syst. Nat. ed. 10, 2 : 932. 1759 ; Sp. Pl. ed. 2 (1) : 256. 1763 ; Haines, Botany 2 : 645. *Datura alba* Rumph. ex Nees, Trans. Linn. Soc. London 17 (1) : 73. 1834. *Nila-hummatu* Rheede, Hort. Malab. 2 : 49-50, t. 29.1679. (*Dhutura*-Oriya).

Undershrubs, glabrous. Leaves ovate, oblique, entire, angled or irregularly toothed, ovate, minutely grey-pubescent, 8-12 × 5-9 cm. Flowers solitary, axillary, white, pedicelled ; calyx tubular, herbaceous, 7 cm long, regularly 5-lobed at apex, upper part deciduous in fruits, leaving annular, enlarged, persistent base ; corolla funnel-shaped, plicate, up to 5 cm long, 5-toothed ; stamens near base of corolla-tube, filaments hairy at base. Capsules covered with rigid, highly glossy and purplish-red tubercles, and slightly bent pedicels, 2-locular, globose, 5 cm in diam., dehiscing irregularly.

Fl. : July-Aug. *Frt.* : Jan.-Feb.

Common in waste places, sometimes also planted in the gardens.

Bilaspur to Champa, 19371.

2n=24, 48.

Native of America, naturalised throughout India.

Sometimes, corolla is 'double' (*D. metel* Cv. "cornucopaea" or even three storied and colour becomes purple or violet. Fruits are poisonous ; leaves narcotic, antispasmodic ; seeds contain alkaloid hyoscine and hyosyamine and a fixed oil.

The following key will help to identify three confused species of *Datura* known to occur in India (cf. Nicolson *et al. l.c.* 1988).

1a. Plant softly hairy ; calyx unevenly lobed ; corolla 10-toothed ; fruits nodding, long-spiny, 2 locular, irregularly dehiscent — *D. innoxia* Miller

1b. Plants glabrous; calyx regularly-lobed; corolla 5-toothed

2a. Fruits slightly bent, with tubercles, 2-locular and irregularly dehiscent — *D. metel* L.

2b. Fruits nodding long-spiny, 4-locular and regularly dehiscent — *D. stramonium* L.

NICANDRA Adans., Fam. Pl. 2 : 219, 582. 1763. *nom. cons.*

T. : *N. physalodes* (L.) Gaertner ('*physaloides*') *Atropa physalodes* L. (*typ. cons.*)

Monotypic.

Nicandra physalodes (L.) Gaertn., Fruct. Sem. Pl. 2 : 237. t. 141. 1791 ('*physaloides*'); C. B. Clarke in Hook. f. FBI 4 : 240. 1883; Haines, Botany 2 : 637 ; *Atropa physalodes* L., Sp. Pl. : 181. 1753.

Erect, annual herbs; stems angular, glabrous. Leaves petioled, ovate-lanceolate, toothed or lobed, tapering and oblique at base, obtuse or acute, 7-15 cm long. Flowers solitary, axillary, terminal and leaf-opposed, light-purple, 2.5 cm or more across, erect at first, afterwards decurved; pedicels 2.5-3 cm long; calyx sub-5-partite; sepals foliaceous, in fruit much enlarged, scarious, over 2.5 cm long, cordate-ovate, acute; corolla campanulate, 2.5 cm long, limbs spreading, 5-plaited; stamens attached near base of corolla-tube. Berries globose, glabrous, 1.5-2 cm across, greenish-white, turning yellow.

Fl. : Oct.-Nov. *Frt.* : Jan.-Feb.

Common in waste places, nurseries.

Lamni : 13237A.

2n=19, 20, 20+113

Native of Peru, naturalized throughout India. (Murti, 1975).

Ornamental, alleged to keep off flies (shoo-fly); with alkaloids; weedy. Some seeds lack one chromosome and these can remain dormant for 30 years (Mabberley, 1987).

PHYSALIS L., Sp. Pl. : 182. 1753 & Gen. Pl. ed. 5. 85. 1754.

LT. : *P. alkekengi* L. (vide N. L. Britton et A. Brown, 111. Fl. N.U.S. ed. 2.3 : 156. 1913).

Physalis divaricata D. Don, Prodr. Fl. Nepal. 97.1825; Hara *et al.* Enum. 3 : 110. 1982 ; *P. minima sensu* C. B. Clarke in Hook. f. FBI 4 : 238. 1883, *non.* L. 1753 (=**P. angulata** L. 1753) ; Haines, Botany 2 : 637.

Erect, annual herbs ; stems pubescent. Leaves membranous, ovate, sinuate, angular or scarcely lobed, acuminate, pubescent or puberulous, 1-7 cm long ; petioles 2.5 cm long. Flowers solitary axillary, nodding, yellow, 5-merous ; pedicels 0.5-1 cm long ; flowering-calyx 0.8-1 cm long, lobes lanceolate, hairy ; fruiting-calyx 1.5-2.5 cm long, ovoid or subglobose, angled, teeth connivent, accrescent and inflated ; corolla campanulate, 0.8-1 cm long, limbs plicate, short-lobed ; stamens attached near base of corolla. Berries globose, yellowish, 1-1.5 cm across, enclosed in bladder-like calyx.

Fl : July-Aug. *Frt* : Oct.-Nov.

Common weed in nurseries, road sides.

2n=24, 48, 72.

Native of Neotropics, naturalized throughout India (Murti, 1975).

Note : Nicolson *et al.* (Regnum Vegetabile 119 : 248. 1988) treat *P. minima* L. (1753) as a synonym of *P. angulata* L. (1753) and state that *P. minima* L. var. *indica* (Lam.) C.B. Clarke in Hook. f. FBI 4 : 238. 1883 represents *P. parvillora* R. Br., non Willd.

Fruits and leaves, edible also preserved ; tonic, diuretic and purgative.

SOLANUM L., Sp. Pl. 184. 1753 ; Gen. Pl. ed. 5 : 85. 1754.

LT. : *S. nigrum* L. (vide N. L. Britton at A. Brown, 111. Fl. N.U.S. ed. 2,3 : 164. 1913).

1a. Unarmed herbs ; flowers 0.5-0.7 cm across ; berries 0.5 cm across — *S. nigrum*

1b. Armed shrubs or undershrubs, rarely unarmed in cultivation : flowers more than 1 cm across ; berries more than 1 cm across

2a. Diffuse, herbaceous undershrubs prickles long straight ; leaves usually deeply lobed ; sepals ovate-oblong — *S. surattense*

2b. Erect shrubs or undershrubs ; prickles short, curved ; leaves usually shallowly lobed ; sepals triangular-oblong — *S. violaceum*

Solanum melongena L. (*brinjal*) (2n=24, 36, 48) and *S. tuberosum* L. (Potato), a tetraploid cultigen, introduced from Chile in 1840s, are commonly cultivated in the district. *S. torvum* Swartz may also occur in the district.

2n=24

Solanum nigrum L., Sp. Pl. 186. 1753 ; C. B. Clarke in Hook. f. FBI 4 : 229. 1883 ; Haines, Botany 2 : 640 ; Fl. Hassan : 461. 1976. ('*Makoi*'—Hindi, *Black nightshade*—Eng.).

Erect herbs ; glabrous or sparingly pubescent. Leaves ovate or ovate-lanceolate, entire, sinuate toothed or lobed, decurrent at base in a short petiole, 3-8 × 1.5-5 cm. Flowers a few, sub-umbellate on extra-axillary peduncles, white ; pedicels 6-8 mm long, deflexed in fruits ; calyx saucer-shaped, 4-5 mm across ; sepals 5, ovate-oblong, in fruits often obscure ; corolla 0.5-1 cm long, nearly glabrous ; lobes 5, oblong, sub-acute ; filaments hairy at base. Berries red and black, sometimes yellow, glabrous, 6-7 mm across.

Fl. & Frt. : Almost throughout the year, chiefly Oct.—Jan.

Common weed in waste places.

Katghora : 6073.

Afghanistan, India, Sri Lanka, Burma ; introduced from America and naturalized.

A number of cytological types, 2n, 4n, 5n, 8n and trigenomic hexaploids etc. have been established in this species complex (2n=24, 36, 48, 72, 96, 108, 144).

Used as potherbs ; large-fruited forms (wonder-berries of Europe) used in pies. Fruit and herb juice of the plant antiseptic, anti-dysenteric, used in cardalgia and gripe. Leaves and tender shoots are boiled and eaten like spinach. Immature fruits contain four steroidal glycoalkaloids. Seeds contain a fatty oil.

S. surattense N. Burm. Fl. Ind. : 57. 1768 ; Merr. in Philip. Jour. Sci. 19 : 377. 1921 ; Babu, Herb. Fl. Dehra Dun : 341. 1977 ; *S. xanthocarpum* Schrad. & Wendl. in Schraders, Sert. Hannov. 1 : 8. t.2.1795 ! C. B. Clarke in Hook. f. FBI 4 : 236. 1883 ; Haines, Botany 2 : 643. (*Kantakari*—Sans. ; *Bheji-baigana*—Oriya.).

Diffuse herbaceous undershrubs ; copiously prickly. Leaves, ovate, oblong or elliptic, sinuate or sub-pinnatifid, glabrescent, 10-12 × 5-7 cm. ;

petioles 2.5 cm long. Cymes lateral, extra-axillary, a few-flowered ; peduncles short ; flowers deep blue, 2.5-3 cm across ; calyx 0.6 cm long, lobes ovate-oblong or lanceolate, acuminate ; usually prickly ; corolla 2.5 cm in diam., pubescent without, lobes shallow. Berries globose, 1.25-2.5 cm in diam., glabrous, much exceeding sepals, yellow or whitish and green blotched.

Fl. & Frt. : Dec.-June.

Common in waste places, along roads.

Bilaspur to Champa : 19359 ; Katra : 16730 ; Katghora : 6054 ; Masdeo river bank ; 8628.

2n=24

India, Sri Lanka, Malaya, Australia.

Roots expectorant, form a constituent of DASAMULA, employed in cough, asthma and pain in the chest. Stem, flowers and fruits carminative ; juice of leaves, mixed with black pepper, is prescribed in rheumatism. Extract of the herb shows antiviral activity against RANJKHET disease virus and also against sarcoma 180 in mice.

S. violaceum Ortega, Nov. Pl. Descr. Dec. : 56. 1798 ; Nicolson *et al. l.c.* 252. 1988. *S. anguivi* sensu Hara *et al.*, Enum. Pl. Nepal 3 : 111. 1982, non Lam. (1794) : *S. indicum* sensu C. B. Clarke in Hook. f FBI 4 : 234. 1883, non L. (1753, *nom. rej.* vide App. IV ICBN 1988) ; Haines, Botany 2 : 642. (*Vrihati*—Sans. ; *Barhanta*—Hindi ; *Byokura*—Beng.).

Erect shrubs or undershrubs ; stellately tomentose. Leaves ovate, sinuate or lobed, stellately woolly beneath, sub-scabridly stellate above, prickly on veins, 7-15 x 2.5-10 cm ; petioles 2.5 cm long. Cymes scorpioid, lateral, 3-11-flowered ; peduncles often extra-axillary ; pedicels 0.5-1.25 cm long, stellately woolly ; flowers pinkish blue, 2 cm across ; sepals acute, woolly, often with slender prickles ; corolla-lobes broadly triangular, tomentose without. Berries yellow, 1-1.5 cm across, globose, smooth, exceeding sepals.

Fl. & Frt. : Almost throughout the year.

Common in waste places.

Kabirchabutra : 19161 ; Chauradadar : 15216 ; Lamni : 13238A, 19202.

2n=24

India, Sri Lanka, Malaya, China, Philippines.

Note : 1. Although Hepper (J. Linn. Soc. Bot. 76 : 288. 1978) lectotypified *S. indicum* L., nom. rej. on Hermann material (BM) which was identified with *Solanum ferox* L., the Committee for Spermatophyta rejected the name (Art. 69. 1 ; Append. IV, ICBN. 1988).

2. The white-flowered African plants previously known as *S. indicum* L. are distinct from the purple-flowered ones in Asia. The African species is *S. anguivi* Lam. ; the correct name for the Asiatic taxon is *S. lasiocarpum* Dunal, Hist. *Solanum* : 223, 1813.

Roots carminative and expectorant ; useful in cough and catarrah affections, dysuria and colic, an ingredient of DASAMULA (an Ayurvedic preparation) ; fruits laxative, digestive ; seeds yield a semi-drying oil.

SCROPHULARIACEAE

A. L. Juss., Gen. Pl. : 117. 1789. ('*Scrophulariae*')

T. : *Scrophularia* L.

Angelonia salicariifolia Bonpl. (trop. American) and *Antirrhinum majus* L. (Snapdragon ; Mediterranean) are also cultivated in gardens.

1a. Leaves all alternate ; corolla rotate or subrotate — VERBASCUM

1b. Leaves all opposite, or atleast the lower ones opposite ; corolla bilabiate

2a. Corolla-lobes 4

3a. Stamens 4 ; capsules globose, septicidal — SCOPARIA

3b. Stamens 2 ; capsules compressed, usually, loculicidal — VERONICA

2b. Corolla-lobes 5

4a. Stamens 2, both perfect, exserted — VERONICA

4b. Stamens 4, all perfect or 2 perfect and 2 staminodes, all included

5a. Two lateral or anterior corolla-lobes exterior in bud

6a. Corolla-tubes short, broad or tube ventricose above ; anthers 2-celled, one cell perfect, other empty and stipitate, filaments pubescent — SOPUBIA

6b. Corolla-tubes long, slender, abruptly incurved ; anthers 1-celled, filaments glabrous — STRIGA

5b. Two posterior upper corolla-lobes exterior in bud

7a. Anthers 1-celled — SUTERA

7b. Anthers 2-celled

8a. Anther-cells contiguous

9a. Leaves cauline; flowers solitary axillary — BACOPA

9b. Leaves mostly radical; flowers in sub-secund racemes — MAZUS

8b. Anther-cells separate

10a. Stamens 2 in corolla-tube and 2 in corolla-throat — LINDERNIA

10b. Stamens all in corolla-tube

11a. Bracteoles at base of pedicels; calyx-lobes dissimilar — MECARDONIA

11b. Bracteoles subtending calyx; calyx-lobes similar

12a. Decumbent, marshy or aquatic herbs, not viscid-pubescent; placentas united in a column and winged by remains of septa; seeds angular — LIMNOPHILA

12b. Erect, terrestrial, viscid-pubescent herbs; placentas separating in fruits or if joined in a column, then not winged; seeds ellipsoid — STEMODIA

BACOPA Aublet, Hist. Pl. Guiane: 128, 1775, *nom. cons.*

T.: *B. aquatica* Aublet

Note: *Bacopa* Aublet is *nom. cons.* against *Moniera* P. Browne (1756) and *Brami* Adanson (1763), both being only taxonomically (=) congeneric.

Bacopa monnieri (L.) Pennell, Proc. Acad. Nat. Sci. Philadelphia 98 : 94 1946 ; Cramer, in Dassan., Rev. Handb. Fl. Ceylon 3 : 421. 1981; Nicolson *et al.*, Regnum Vegetab. 119 : 239. 1988. *Lysimachia monnieri* L in Torner, Cent. Pl. 2 : 9. 1756. *Gratiola monnieri* (L.) L., Syst. Nat. ed. 10 : 851, June, 1759. *Gratiola monnieria* L. Amoen. Acad. 4 : 306. Nov. 1759, *nom. illeg.* (include type of *L. monnieri* L. 1756) *Bramia indica* Lam., Encycl. 1 : 459. 1785. *Herpestis monnieria* Kunth in H. B. K., Nov. Gen. Sp. 2 : 366. 1818, *nom. illeg. Bacopa monnieria* Wettst. in Engl. & Prantl, Pflanzenfam., IV, 3 B : 77. 1891 ('*monniera*'), nom. illeg. superfl. ; Benth., Scroph. Ind. : 30. 1835 ('*monniera*') : Haines, Botany 2 : 652. *Brami* Rheede, Hort. Malab. 10 : 27, t. 14. 1690. (*Nira-brahmi*—Sans. ; *Brahmi*—Oriya).

Creeping-ascending perennial herbs, rooting at nodes, glabrous, often punctate, sub-succulent. Leaves sessile, obovate-oblong or spathulate, entire, obtuse, often punctate, 1-2 × 0.4-0.8 cm. Flowers solitary, axillary, white or pale-violet, blue ; peduncles longer than leaves, deflexed in fruits ; calyx bi-bracteate, deeply 5-partite, lobes unequal, outer ovate, sub-obtuse, larger than inner ones, falcate-lanceolate ; corolla-tube broadly campanulate, 1 cm long, upper lip 2-lobed, lower lip 3-lobed, the middle one being larger than the two lateral ones, inserted on top of corolla-tube, exserted ; stamens didynamous : styles persistent, stigmas capitate. Capsules ovoid, acute, 3 – 4 × 2 mm long, many-seeded, seeds reticulate.

Type : South America (America meridionales), *Hallman.*

Fl. & Frt. : June-Dec.

Common on marshy places.

Khuria, 19350 ; Korbi, 19998,

2n=64, 68.

Throughout the tropics.

Note : While '*monniera*' is a correctable orthographic variant of '*monnieria* (Art. 75.4) ; '*monnieria* (a substantive in nominative singular), is, not the same word as '*monnieri* (substantive in genitive singular), and therefore is not correctable (Art. 75.).

Improves intellect, used for epilepsy, insanity and other nervous diseases. Leaves contain alkaloids, *brahmine* and *herpestine* and a saponin hersaponin, which shows cardiotonic action on frogs. Plant boiled in

water and used as a lotion against skin eruptions and also taken orally as a purgative.

LIMNOPHILA R. Brown, Prodr. : 442. 1810, *nom. cons.*

T. : *L. gratioloides* R. Br. nom. illeg. [*Hottonia indica* L. ; *Limnophila indica* (L.) Druce].

Aromatic marsh herbs or aquatics, sometimes grown in aquaria ; some locally medicinal and used for flavouring food.

1a. Flowers sessile, in head-like axillary clusters — *L. rugosa*

1b. Flowers pedicelled, solitary axillary, cymose or in racemes

2a Leaves dimorphic, submerged finely divided, pinnatifid, aerial entire ; flowers solitary axillary — *L. indica*

2b Leaves all similar, linear-oblong ; flowers in racemes or cymes

3a. Flowers in axillary and terminal many-flowered racemes ; calyx glabrous — *L. aromatica*

3b. Flowers in terminal panicles or cymose, occasionally solitary axillary ; calyx hirsute

4a. Hairy herbs ; leaves 3- or 4-nately whorled, linear-oblong ; fruiting-calyx striate — *L. chinensis* var. *chinensis*

4b Glabrous herbs ; leaves opposite, broadly elliptic ; fruiting-calyx not striate — *L. chinensis* var. *clarkei*

Limnophila aromatica (Lam.) Merr., Interpr. Rumph. Herb. Amb. : 466. 1917 ; Nicolson *et al.*, Regn. Veget. 119 : 240. 1988. *Ambulia aromatica* Lam., Encycl. Meth. Bot. 1 : 128. 1783. *Limnophila gratissima* Bl., Bijdr. : 749. 1826 ('*Lymnophila*') ; Haines, Botany 2 : 657, Type : Java, Balavia, *Blume* 1176 (L.). (*Kuttra*—Hindi ; *Karpur*—Beng.)

Erect herbs ; simple, rarely branched above, glabrous. Leaves undivided opposite, some 3-nately whorled, half-amplexicaul, linear-oblong, subacute, punctate, serrulate, 3-7 cm long. Racemes terminal and axillary, sometimes up to 30 cm long ; flowers bluish violet, 6-12 mm long ; pedicels 5-10 mm long, glandular ; calyx shorter than pedicels, glandular, lobes lanceolate, acuminate, at fruiting hemispheric, striate ; corolla about 1.5 cm long, tubes cylindric ; upper lip sub-erect, 2-fid ; lower lip spreading, 3-fid ; stamens 4, didynamous, included. Capsules ellipsoid, acute, about 5 mm long.

Type : Rheede, Hort. Malab. 10. t. 6. 1690 (vide Cramer in Rev. Handb. Fl. Ceylon 3 : 430. 1981)

Fl : Sept.-Oct. *Frt.* : Nov.-Dec.

Common in marshy places and in abandoned rice fields.

Pasarkhet : 16815 ; Kabirchabutra : 15250 ; Katghora : 3970, 3986, 6066, 8677 ; Korba to Kudmura : 16797, 16800.

2n=68

India, Sri Lanka, Malaya, Philippines, China, Japan, Australia.

The plant smells like a mango (Manga-nari Rheede, *l. c.* 10 : 11-12, t. 6. 1690) and Cramer (*l.c.*) mentioned a turpentine smell. Used as a spinach, eaten raw or steamed, considered antiseptic, galactogogue and aperient. Juice is used as febrifuge ; yields an essential oil.

L. chinensis (Osbeck.) Merr. in Amer. Jour. Bot. 3 : 581. 1916, et Interpr. Rumph. Herb. Amb. : 47. 1917 ; Philcox in Kew Bull. 24 (1) : 151. 1970 ; Cramer, *op. cit.* : 428.1981. *Columnea chinensis* Osbeck., Dagb. Ostend. Resa : 230. 1757 ; *Stemodia hirsuta* Heyne ex Benth. in Lindl., Bot. Reg. 17. sub. t. 1970. 1832. LT : India, *Heyne in* Wall. Num. list no. 3930A (K). *Limnophila hirsuta* (Benth.) in Benth. in DC., Prodr. 10 : 388. 1846 ; Haines, Botany 2 : 658.

Erect, stout, hairy herbs ; stems often hollow. Leaves 3-nately whorled, sessile or narrowed into a short petiole, linear-oblong, or elliptic-obovate, serrulate, punctate, veins obscure, about 2.5 cm long. Flowers pedicelled, 1-2-nate, axillary or cymose or panicled at top of stems, purple, about 1 cm long ; calyx hirsute, lobes lanceolate, finely acuminate ; fruits striate, 5-7 mm long, subtended by 2 bracteoles ; corolla-tubes cylindric, lobes spreading 5-7 mm in diam. Capsules globose or subglobose, about 5 mm in diam.

Type not traced.

Fl. : Apr.-Oct. *Frt.* : Nov.-Dec.

Common in marshy places.

Kabirchabutra : 13330.

India, Sri Lanka.

L. chinensis (Osbeck.) Merr. var. **clarkei** (Haines) S. K. Murti in Bangladesh J. Bot. 10(1) : 34. 1981 ; *L. hirsuta* (Heyne ex Benth.) Benth. var. *clarkei* Haines, Botany 4 : 628. 1922 ; *L. chinensis* (Osb.) Merr. in Amer. Jour. Bot. 3 : 581. 1916, *pro. part.* ; Philcox in Kew Bull. 24 : 170. 1970, *pro-part.*

Erect, glabrous herbs. Leaves opposite, sessile or narrowed into short petioles, broadly elliptic or elliptic-oblong, serrulate, veins obscure, 1.5-3 cm long. Flowers pedicelled, 1-2-nate, solitary axillary or cymose, purple, 1-1.5 cm long ; calyx hirsute or glabrescent, lobes smooth, lanceolate, acuminate, 5-7 mm long ; corolla-tubes cylindric, lboes spreading, 5-7 mm in diam. Capsules orbicular-ellipsoid, about 6 mm in diam.

Type : Bihar, Chotonagpore, Ranchi, 610 m. *Clarke s.n.* (K)

Fl. & Frt : Oct.-Dec.

Common in marshy places.

Pasarkhet : 12945.

India.

L. indica (L.) Druce in Rep. Bot. Exch. Club. Brit. Isles. 1913, 3 : 420. 1914 ; Philcox in Kew Bull. 24(1) : 115. 1970 ; Nicolson *et al.*, Regnum Vegetab. 119 : 240. 1988. *Hottonia indica* L., Syst. Nat. ed. 10 : 919. 1759, et Sp. Pl. ed. 2 : 208. 1762. *Limnophila gratioloides* R. Br., Prodr. : 442. 1810, nom. illeg. (Art. 63.1) ; Hook. f. in FBI 4 : 271. 1884 ; Haines, Botany 2 : 658. *Tsjeria-mangø-nari* Rheede, Hort. Malab. 9 : 165, t. 85.1689. *Tsjudan-tsjera* Rheede, Hort. Malab. 12 : 71, t. 36.1693.

Erect or diffusely branched, marshy or aquatic herbs, puberulous, glandular, aromatic, stems quadrangular, rooting from lower nodes. Leaves verticillate, emergent, serrulate to lobed, submerged ones dissected, pinnatifid, upper 3-fid and uppermost entire and opposite. Flowers axillary, solitary, about 1 cm across, bluish-white, pedicelled ; pedicels up to 2 cm long ; bracteoles present ; calyx divided less than half-way down, 4-5 mm long, lobes linear, in fruit hemispheric, smooth ; corolla 6-8 mm long. Capsules ovoid-ellipsoid, as long as the calyx.

Type : Herb. Linn. 204.2 (LINN.) (vide Philcox *l.c.*)

Fl. & Frt. : Sept.-Feb.

Common in marshy places, cultivated fields.

Keonchi : 13265 ; Khondra : 12768, 12771 ; Korba ; 8721 : Katghora : 8670, 8680 ; Kabirchabutra : 15246 ; Pasan : 15292.

2n=34

Southeast Africa, West Asia, India, Southeast Asia, China, Malesia to Australia.

Plant has odour like camphor or oil of lemons ; leaves eaten as potherb ; plant considered as antiseptic and carminative ; a liniment prepared from it is used in elephantasis.

L. **rugosa** (Roth) Merr. in Interp. Rumph. Herb. Amb. : p. 466. 1917 ; Philcox in Kew Bull. 24 (1) : 135. 1970 : Cramer, *op.cit* : 429, 1981. *Herpestis rugosa* Roth., Nov. Pl. Sp. 290. 1821 : *Limnophila roxburghii sensu* Hook. f. in FBI 4 : 265. 1884, *non* G. Don 1837 ; Haines, Botany 2 : 656. (*Kala Karpur*—Beng.)

Annual herbs ; stems erect, stout, from a creeping base, aromatic. Leaves opposite, elliptic or ovate, obtuse or sub-acute, crenulate, coriaceous, punctate beneath, rugose, narrowed into a petiole, 4-8 x 1.5-3 cm ; petioles 1-2 cm long. Flowers sessile, clustered in axils, in head-like spikes, blue purple or lilac, often with yellow mouth ; calyx pubescent, lobes unequal, lanceolate, finely acuminate, not striate in fruit ; corolla pubescent, tubes yellowish or blue-purple, mouth yellow. Capsules compressed, oblong-ellipsoid, grooved, 5-6 mm long.

Type : India, *Heyne* (L).

Fl. : July-Aug. : *Frt.* : Nov.-Dec.

Common in moist shady places.

Kabirchabutra : 15236, 13332.

2n=36

Palaeotropics.

Used as flavouring agent and for perfuming hair ; leaves yield an essential oil, infusion of leaves used as diuretic, stomachic and digestive.

LINDERNIA Allioni, Malanges Philom. Math. Soc. Roy. Turin (Misc. Taur.) 3 (1) : 178, t.5, f. 1. 1766.

T. : *L. pyxidaria* Allion

Vandellia L. Mant. : 89. 1767.

T. : *V. diffusa* L.

Ilysanthes Rafin., Ann. Nat. : 13. 1820. T. : *I. riparia* Rafin.

Bonnaya Link & Otto, Ic. Pl. Selec. Berol. 25, t. II. 1821.

T. : *B. brachiata* Link & Otto.

Note : *Lindernia* Allioni, *Vandellia* L., *Ilysanthes* Rafin. and *Bonnaya* Link & Otto : Haines (1922) reduced the four genera to two, uniting *Bonnaya* with *Vandellia* and *Ilysanthes* with *Lindernia*. Alston (1931), Pennell (1943), Airy Shaw (1973) and Cramer (1981) fused them all under *Lindernia* All. But *Lindernia-Ilysanthes* complex is still taxonomically unresolved, since Mabberley (1987) cites *Ilysanthes* Raf. as an alternate name for *Lindernia* All.

2. Cramer (1981) lists *Anagalloides procumbens* Krocker [=*Lindernia procumbens* (Krock.) Philcox] as the type species of *Lindernia* All.

1a. Leaves palmately 3-5-veined
- 2a. Both pairs of stamens perfect — *L. procumbens*
- 2b. Anterior pairs of stamens imperfect
  - 3a. Fruiting pedicels 2-4 cm long; corolla 1 cm long; lower leaves lanceolate, acute at base — *L. hyssopioides*
  - 3b. Fruiting pedicels up to 1.5 cm long; corolla 5 mm long; lower leaves ovate, rounded at base — *L. parviflora*

1b. Leaves pinnately veined from a mid-vein
- 4a. Stamens 4, all perfect
  - 5a. Mature capsules twice as long as calyx — *L. anagallis*
  - 5b. Mature capsules shorter, equalling or slightly exceeding calyx — *L. crustacea*
- 4b. Stamens 2 perfect, 2 staminodes
  - 6a. Leaves linear or narrowly lanceolate scarcely serrate, serrations distant, shallow; corolla bluish or purple, flowering calyx cleft to base — *L. antipoda*
  - 6b. Leaves broadly elliptic-oblong, closely, sharply and deeply serrate, serrations aristate; corolla white, with red streaks and dots; flowering calyx cleft to middle — *L. ciliata*

Lindernia anagallis (N. Burm.) Pennell in J. Arnold Arbor. 24 : 252. 1943; Philcox in Kew Bull. 17 : 484. 1964, et *ibid.* 22(1) : 45. 1968; Cramer, Rev. Handb. Fl. Ceylon 3 : 410. 1981. *Ruellia anagallis* N. Burm., Fl. Ind. : 135. 1768. *Gratiola cordifolia* Colsmann, Prodr. Desc. Grat : 15. 1793. (Type : Ceylon, *Koenig*). *Vandellia pedunculata* Benth., Scroph. Ind. : 37. 1835; Hook. f. in FBI 4 : 282. 1884. *V. cordifolia* (Colsm.) G. Don, Gen. Syst. 4 : 549. 1838; Haines, Botany 2 : 663. Type : India, Wall. Num. List no 3939C p.p. (K-Wall.). *Lindernia cordifolia* (Colsm.) Merr., Enum. : Born. Pl. : 524. 1921, et Enum. Philipp. Pl. 3 : 437. 1923.

Stems prostrate or decumbent, rooting at lower nodes, branches divaricate and ascending to 30 cm with a central spongy pith, glabrous, sometimes faintly purplish at nodes. Leaves shortly petioled, ovate or ovate-oblong, base rounded or cordate, obtuse or subacute, obscurely crenate-toothed or entire, 1-2 × 0.8-1.5 cm, with distinct lateral veins beneath. Petiole 1-3 mm long. Flowers solitary axillary, bluish, 6-7 mm across; pedicels 0.6-3.4 cm long; sepals free to base, linear lanceolate, glabrous on both surfaces, subulate, half as long as capsules; corolla 1-1.5 cm long with a tube 6-8 mm long, glandular-puberulous outside, upper lip entire or notched, lower lip 3-lobed, faintly mauvish-violet, yellow towards base; stamens 4, longer filaments toothed or appendaged at base; spur of anterior cells 1 mm long. Capsules linear-cylindric, 8-10 mm long, acute, glabrous. Seeds ellipsoid, longitudinally grooved and foveolate, tawny.

Type : Java, 1759, *Kleinhof s.n.* (L.)

Fl : July-Aug. *Frt* : Sept-Nov.

Common in marshy places, in abandoned rice fields.

Kabirchabutra : 19169, 13331, 15249; Pasan to Pendra : 19139; Pali : 8690.

2n = 22.

Indomalaysia and tropical Australia.

Note : *L. angustifolia* (Benth.) Wettst. differs from *L. anagallis* in having stems erect and leaves linear and sessile.

L. antipoda (L.) Alston in Trimen, Handb. Fl. Ceylon, Suppl. 6 : 214. 1931; Philcox, Kew Bull. 17 : 484. 1964, et *Ibid.* 22(1) : 57. 1968; Cramer, Dasan. Rev. Handb. Fl. Ceylon 3 : 413. 1981. *Ruellia antipoda* L., Sp. Pl. : 638. 1753. *Gratiola veronicifolia* Retz., Obs. Bot. 4 : 8. 1786 (Type : not known); *Bonnaya veronicifolia* (Retz.) Spreng., Syst. Veg. 1 : 14. 1825; Hook. f. in FBI 4 : 2851. 1884, p.p. excl. var. *verbenaefolia*; Haines, Bot. 2 : 664. *Ruellia anagallis* auct., non N. Burm. (1768).

Prostrate or decumbent-ascending annual herbs and rooting at nodes, branches 4-angled, ascending to 28 cm, glabrous. Leaves subsessile or short-petioled, oblong, oblong-lanceolate, elliptic or obovate, subacute, crenate-serrate or serrate, glabrous, 1-3.5 × 0.3-0.5 cm, punctate and glabrous on both surfaces, cuneate or subacute at base, subacuminate to obtuse at apex. Flowers axillary or in bracteate racemes, blue or pinkish, 8-10 mm long; pedicels up to 1.5 cm long; bracts 3-7 × 1.2 mm, serrulate, in fruiting divaricate; calyx cleft to base; segments linear-lanceolate, serrulate in upper part, 5-7 mm long, corolla 6-10 mm long, pale violet or white, tube 3-7 mm long; stamens 2, upper perfect, two lower longer with outwardly curved sterile filaments. Capsules erecto-patent, twice as long as calyx or more, linear, cylindric.

Lectotype : Ceylon, *Hermann* 235 (BM) (vide Philcox l.c.).

Note : *Cramer* (l.c.) cites *Hermann* 17 (BM) as type.

Fl. : July-Aug. *Frt* : Oct.-Dec.

Common in marshy places.

Achanakmar : 13218 ; Korbi : 19102, Katghora : 8678, 8714 ; Pasan to Pendra : 19143 ; Kabirchabutra : 19175.

2n = 18, 22, 36 (as *L. veronicaefolia*).

India, from the Gangetic Plain eastwards and southwards to Sri Lanka, Malaysia and Philippines.

L. ciliata (Colsm.) Pennell, Brittonia 2 : 182. 1936 ; Philcox, Kew Bull. 22(1) : 51. 1968 ; Nicolson *et al.*, Reg. Veg. 119 : 242. 1988. *Gratiola ciliata* Colsm., Prodr. Desc. Grat. : 14. 1793 (Type : Java, not known). *G. serrata* Roxb., Fl. Ind. 1 : 139. 1820 (Type locality : Bengal). *Bonnaya brachiata* Link & Otto, Ic. Pl. Select. 4 : 25. t. 11. 1820 ; Hook. f. in FBI 4 : 284. 1884. *Vandellia brachiata* (Link & Otto) Haines. Botany 2 : 663. *Pee-tsjanga-puspam* Rheede, Hort. Malab. 9 : 115, t. 59. 1689.

Erect annual herbs up to 13 cm high ; branches divaricate from base, 4-angled, strigose on angles. Leaves sessile, oblong, obtuse or acute, sharply, closely, deeply serrate, teeth mucronate, margins thickened, 1-3 × 0.5-1 cm, glabrous on both surfaces. Racemes terminal, 3 cm long, 3-15 flowered, with opposite, bracteate flowers ; pedicels 1-2.5 mm long ; flowers pinkish-white with red streaks ; pedicels 1-2.5 mm long, stiff ; calyx 4-5 mm long, keeled, cleft to middle, segments linear-lanceolate, finely acuminate, ciliate ; corolla tube linear, 0.5-0.8 cm long, pale mauve or white ; stamens 2, perfect, staminodes 2, exserted. Capsules erect or spreading, 8-10 mm long, linear-cylindric, acute.

Type : Java, *Koenig s.n.* (C).

Fl. & Frt. : July-Sept.

Common in damp places, cultivated fields.

2n = 18.

Achanakmar : 13207; Lamni : 19241A; Khondra : 12804.

Indomalayasia.

Note : Roxburgh (1820) identified Rheede t. 59 as probably *Ruellia serrata*, but Chamisso and Schlechtendel (Linnaea 2 : 568. 1827) and J. Hooker (1884), with *Bonnaya brachiata* Link & Otto.

L. crustacea (L.) F.v. Muell., Syst. Cens. Austral. Pl. 1 : 97. 1882; Philcox, in Kew Bull. 22. : 17. 1968; Nicolson *et al.* Reg. Veg. 119 : 243 1988, *Capraria crustacea* L., Mant. Pl. : 87. 1767; *Vandellia crustacea* (L.) Benth., Scroph. Ind : 35. 1835; Hook. f. in FBI 4 : 279. 1884; Haines, Botany 2 : 661. *Katu-pee-tsjanga-puspam* Rheede, Hort. Malab. 9 : 113. t. 58. 1689.

Erect or decumbent-ascending annual herbs; stems trichotomously branched from base, glabrous or sparsely hairy. Leaves ovate or lanceolate, subcordate or rounded at base, subobtuse or acute at apex, subentire to serrate, short-petioled, 0.5-2 × 0.4-1.5 cm. Flowers solitary, axillary, purple; pedicels slender, 0.5-2 cm long; calyx 3-4 mm long, 5-ribbed, short-lobed; corolla 0.6 cm long, lower lip with a yellow spot at base; stamens 4, perfect, anterior filaments apendiculate. Capsules oblong-obovate obtuse, apiculate, 3 mm long.

LT. : Rumph. in Herb. Amb. 5 : t. 170. 1750 (vide Cramer 1981, as type).

Fl. & Frt. : July-Dec.

Common in damp places, cultivated fields.

Pali : 8687; Lamni : 19241B; Katghora : 8673; Pasarkhet : 12958.

2n = 14, 28, 32, 42.

Palaeotropics.

Used for bilious affections and dysentery; also used as poultices for boils, sores, itch and ringworm.

L. hyssopioides (L.) Haines, Botany 635. 1922; Philcox, Kew Bull. 22(1) : 50. 1968; Cramer, *op. cit.* : 414. 1981. *Gratiola hyssopioides* L.,

Mant. Pl. Alt. : 174. 1771; *Ilysanthes hyssopioides* (L.) Benth. in DC., Prodr. 10 : 419. 1846; Hook. f. in FBI 4 : 283. 1884.

Slender, erect, simple or diffusely branched herbs. Leaves in distant pairs, sessile, oblong-lanceolate or lanceolate, usually entire, 1-3-veined. Flowers axillary, pale blue or purple. 0.5-1 cm long; pedicels filiform, 1-3 cm long; bracts lanceolate with a single serration; calyx about 0.3 cm long, lobes divided to base, sepals narrowly lanceolate, glabrous on both surfaces, fruiting sepals half the length of capsules; corolla 0.6-1.2 cm long upper lip of corolla entire at margins pale blue; stamens 2, perfect, inserted about middle of corolla tube; staminodes 2, glandular, clavate. Capsules deflexed, ovate-oblong, acute, 0.5 cm long, longer than calyx, rounded at ends, minutely striate; seeds oblong, 0.4 mm long, striate, tawny.

Type: India, Tranquebar, *Koenig* (7).

Fl. & Frt. : Aug.-Oct.

Common in wet places, paddy fields and near streams.

Korba : 8697, Kota to Bilaspur : 13051.

2n = 18.

India, Sri Lanka, Southeast Asia, China.

L. parviflora (Roxb.) Haines, Botany : 635. 1922; Pennell in Acad. Nat. Sci. Phil. Monogr. 5 : 31. 1943; Fl. Hassan : 522. 1976. *Gratiola parviflora* Roxb., Pl. Corom. 3 : 3. t. 203. 1811. *Ilysanthes parviflora* (Roxb.) Benth. in DC., Prodr. 10 : 419. 1846; Hook. f. in FBI 4 : 283. 1884.

Erect or decumbent ascending, simple or diffusely branched herbs. Leaves sessile, ovate, elliptic or linear-oblong, usually entire, base rounded, subacute, 0.4-1.5 × 0.2-0.7 cm. Flowers axillary solitary, forming into a leafy raceme, white or bluish-white, 8-10 mm long; pedicels 1-1.5 cm long; calyx 2-3 mm long; fruiting calyx 3-4 mm long, sepals linear-lanceolate, acute; corolla twice as long as calyx; stamens 2, perfect; staminodes 2. Capsules ovate-oblong, acute, 6 mm long, apiculate.

Iconotype: *Roxburgh*, Pl. Corom. t. 203.

Fl. : July-Aug. *Frt.* : Oct.-Dec.

Common in wet places.

Korba 8672; Kenda : 16777.

Tropical Africa to S.E. Asia.

L. procumbens (Krocker) Borbas, Beknem. Fl. : 80. 1881; Philcox in Taxon 14 : 30, 1965, et in Kew Bull. 22(1) : 29. 1968; Babu, Herb. Fl.

Dehra Dun : 356. 1977. *Anagalloides procumbens* Krock., Fl. Siles 2(1) : 398. t. 26. 1790. *Lindernia pyxidaria* L., Mant. Pl. 2 : *t.* 252. 1771, *nom. illeg. superfl.*; Haines, Botany 2 : 665. *Vandellia erecta* Benth., Scroph. Ind.; 36. 1835, *pro. maj. part.*; Hook. f. in FBI 4 : 281. 1884.

Erect, glabrous herbs, branches divaricate. Leaves sessile, elliptic-oblong or ovate, tapering towards base, entire or obscurely crenate, 3-5-veined, 1-2 cm long. Flowers bluish-white, axillary, 5-6 mm long, on slender, suberect, spreading or rarely deflexed, 10-15 mm long pedicels; calyx, 2.5 mm long, sepals lanceolate or linear, obtuse; corolla twice as long as calyx; stamens 4, perfect. Capsules ovoid-orbicular or broadly ellipsoid, 2.5 mm long.

Lectotype: *Krocker*, Fl. Siles t. 26. (vide Philcox l.c.).

Fl. & Frt. : Oct.-Feb.

Common in marshy places.

Kota : 13074; Pasan : 15290; Kenda : 16776; Keonchi to Lamni 15397; Keonchi : 15385.

2n = 30 (as *L. pyxidaria*).

India, Thailand, China, Japan, Malaya.

MAZUS Lour., Fl. Cochinch. : 385. 1790.

T. : *M. rugosus* Lour.

Mazus pumilus (N. Burm.) van Steenis, Nova Guinea n.s. 9 : 31. 1958; Hara *et al.*, Enum. 3 : 127. 1982; *Lobelia pumila* N. Burm., Fl. Ind. : 186. t. 60. f. 3. 1768. *Lindernia japonica* Thumb., Fl. Jap. : 253. 1784. Type : Japan (not known), *Mazus japonicus* (Thumb.) Kuntze, Rev. Gen. Pl. : 462. 1891. *M. rugosus* Lour., Fl. Cochinch. : 385. 1790. Type : Indo-china (not known); Hook. f. in FBI 4 : 259. 1884; Haines, Botany 2 : 651.

Annual, glabrous, tomentose low herbs without a distinct scent; stems simple or stoloniferous. Leaves opposite below, obovate-spathulate, crenate-serrate to crenate-dentate, narrowed into a short petiole, 2.5-7 cm long. Flowering stems many from base; racemes terminal, subsecund; flowers bluish-white, 5 mm long; pedicels mostly ebracteate, 0.5-1 cm long; calyx widely campanulate, 5-lobed, lobes half as long as tubes, cleft to middle, lobes ovate-lanceolate, acute, spreading in fruits, fruiting sepals 1 cm long; corolla lower lip bullately 2-lobed at base, gland-hairy outside, 1 cm long, 2-lobed; stamens 4, didynamous, filaments of anterior stamens inappendiculate at base; anther cells divergent. Capsules subglobose, loculicidal, 2-valved, 3-4 mm long; seeds very numerous, minute.

Type: Burmann. *l.c.*, t. 60. f. 3.

Fl. & Frt.: Almost throughout the year.

In damp shady places.

Kabirchabutra: 15224; Lamni: 13239.

2n = 16, 40, 52.

Afghanistan, India, Nepal, Burma, Vietnam, China, Malay Peninsula, Java, Philippines and Japan.

Mat-forming ground-cover plants, naturalized in lawns in U.S., Jamaica and Scotland. Infusion is given as tonic; aperient and febrifuge.

MECARDONIA Ruiz & Pav., Prod. 94. 1794.

T.: *M. ovata* Ruiz & Pavon.

Mecardonia procumbens (Mill.) Small, Fl. Southeast U.S. : 1065. 1903; Fl. Hassan : 523. 1976. *Erinus procumbens* Mill., Gard. Dict. Abr. ed. 8. No. 6. 1768. *Lindernia dianthera* Swartz, Prodr. Veg. Ind. Occ. : 92. 1788. *Bacopa procumbens* (Mill.) Greenm., Publ. Field Columb. Mus Bot. Ser. 2 : 261. 1907; Backer & Bakh. f., Fl. Java 2 : 507, 1965. *Mecardonia dianthera* (Swartz) Pennell, Proc. Acad. Nat. Sci. Philadel. 98 : 87. 1940.

Erect, ascending annual or biennial herbs, many branches from base, glabrous; stems angular. Leaves subsessile, ovate-lanceolate or ovate-elliptic, tapering towards base, subacute, crenate-serrate, 1-2 × 0.5-0.7 cm. Flowers axillary, solitary, yellow; pedicels 0.8-1.3 cm long, subtended by 2 bracteoles; calyx deeply 5-partite, segments unequal, outer sepals ovate-oblong, retuse, 7-8 mm long, near sepals linear; corolla 7 mm long, obscurely 2-lipped, yellow; stamens 4, didynamous, anther 2-celled, separate, stipitate. Capsules oblong, 7 mm long, septicidal.

Fl. & Frt.: Almost throughout the year.

Common in shady moist places, roadsides, cultivated fields, on slopes.

Passan to Korbi: 19080; Khondra: 12778; Lamni: 13239A; Kabirchabutra: 13372.

2n = 20 (as *Bacopa procumbens*).

Native of tropical America, naturalised throughout India (Murti, 1975).

SCOPARIA L., Sp. Pl. : 116. 1753 & Gen. Pl. ed. 5 : 52. 1754.

T.: *S. dulcis* L.

Scoparia dulcis L., Sp. Pl. : 116. 1753; Haines, Botany: 2 : 668; Cramer, *op. cit.* : 439. 1981. *Gratiola micrantha* Nutt., Amer. J. Sci.

5 : 267. 1822. Type : N. America, Florida, *Ware* s.n. (PH). *Scoparia grandiflora* Nash, Bull. Torrey Bot. Club 23 : 105. 1986. Type : North America, *Nash* 2417 (NY). (*Sweet Broom-weed*—Eng.) **Fig. 18**

Erect or ascending, woody, perennial herbs; stems up to 60 cm high, angled, divaricately branched, glabrous. Leaves opposite and 3-nately whorled, lanceolate or elliptic-lanceolate, narrowed into a short petiole, crenate-serrate, punctate on lower surfaces, 1-4 × 0.4-1.5 cm. Flowers 1-3 together in axils, ebracteate, often forming leafy racemes; pedicels 5-10 mm long; flowers bluish-white; sepals 4, subequal, lanceolate, ciliolate, 0.2-0.3 cm long; corolla rotate, 2-3 mm long, white-hairy on throats, lobes 4, obtuse, subregular; stamens 4, anthers subsagittate, cells divergent. Capsules globose, 2-4 mm across, septicidally 2-valved; seeds numerous, scrobiculate.

Type : Holland, living specimen in Cliff. Gard.

Fl. & Frt : July-Sept.

Common in waste places, near water channels.

Lamni : 15422; Kabirchabutra : 19196; Katghora : 6070.

2n = 20, 40.

Native of Tropical America, naturalized in India (Murti, 1975). It is used to sweeten well-water (Mabberley, 1987). An antidiabetic compound, amelin, occurs in the leaves and stems of green plants; plant also used as a cattle-fodder.

SOPUBIA Ham. ex D. Don, Prodr. Fl. Nepal. : 88. 1825.

Type : *S. trifida* Ham. ex D. Don.

Sopubia delphinifolia (L.) G. Don, Gen. Syst. 4 : 460. 1838, ('*delphinifolia*') ; Haines, Botany 2 : 669. *Gerardia delphinifolia* L. in Juslenius Cent. I. Pl. : 21. 1756, ('*delphinifolia*'). (*Dudhali*—Marathi).

Erect herbs; stems up to 1 m high, 4-grooved, spotted with purple, smooth or hispidulous, much-branched. Leaves all verticillate, pinnatisect, segments filiform, 2.5-4.5 cm long. Flowers axillary, solitary, racemose above, 2.5-3.5 cm long; purple or pink; bracteate, pedicels 2-bracteolate; calyx campanulate, 5-toothed, teeth longer than tube, linear subulate, entire; corolla subcampanulate, subrotate or subregular, bilabiate, rose or pinkish

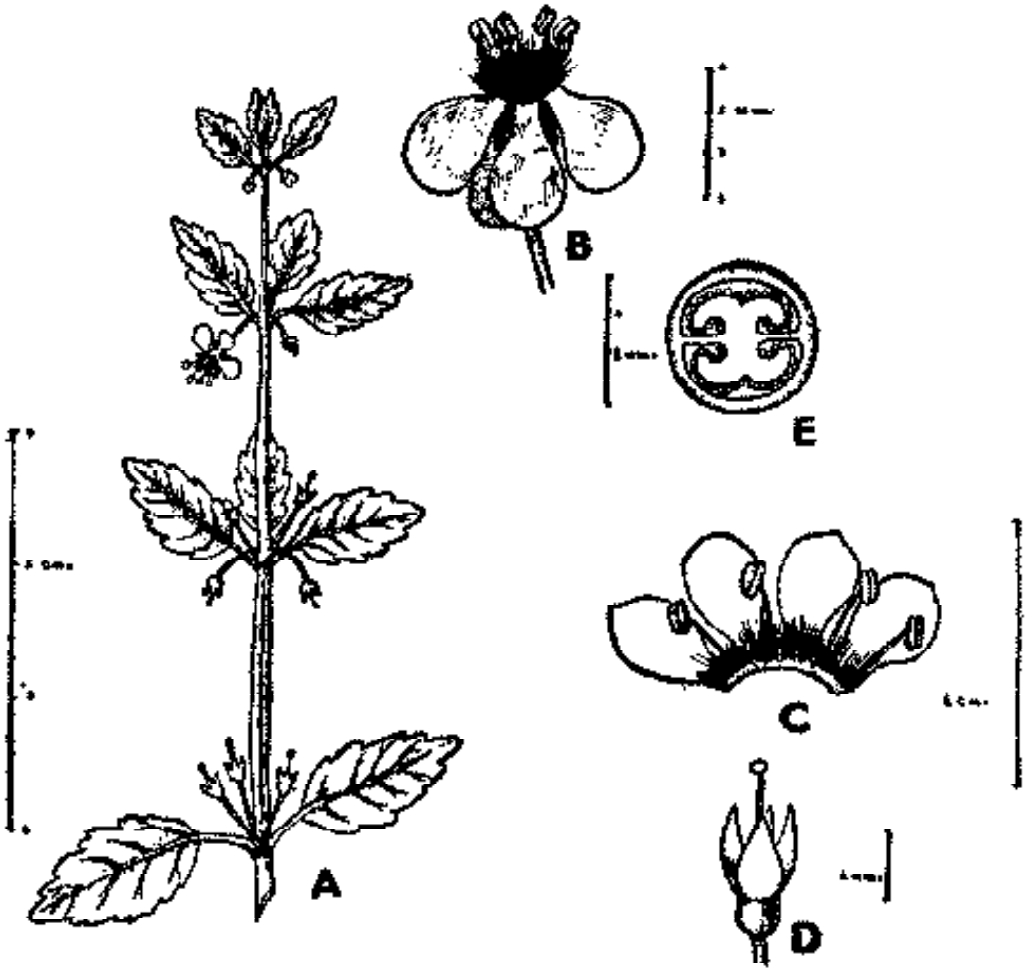

Fig. 18. *Scoparia dulcis* L.

A. A leafy branch with flowers. B. Flower spread out. C. Corolla tube spread out with epipetalous stamens with hairs arising from the base of the tube. D. Flower with calyx and style. E. T. S. ovary.

violet; limbs 2.5 cm in diam., puberulous outside on lobes; stamens 4, didynamous, included anther-cells cohering in pairs, one of each pair perfect, other stipitate, empty, acuminate. Capsules rounded at the top, ovoid or oblong, longer than calyx.

Type : "India orientalis", Linn. Herb. no. 764.1 (LINN).

Fl. & Frt. : July-Sept.

Frequently found in moist places, cultivated fields.

Madai : 12874.

2n = 36.

India, Sri Lanka.

Juice applied to sores on feet caused by exposure to moisture.

STEMODIA L., Syst. Nat. ed. 10 : 1091, 1118, 1374. 1759, *nom. cons.*

Type : *S. maritima* L.

ICBN, 1988 cites *Stemodia maritima* L., but Cramer (1981) credits the authority of the specific epithet to "P. Browne, Hist. Jamaica : 261. 1756", because Linnaeus (1759) is reported by him to have cited 'P. Browne'. But P. Browne had described *Stemodiacra* P. Br., not *Stemodia* L.

Stemodia viscosa Roxb., Pl. Corom. 2 : 33, t. 163, 1802; Haines, Botany 2 : 655. *Stemodiacra viscosa* (Roxb.) O. Kuntze, Gen. Pl. 2 : 466. 1891. (*Nukachoni*—Beng).

Erect, viscidly pubescent, aromatic perennial herbs; branched from the base; stems 4-angular, to 55 cm high. Leaves sessile, oblong, base cordate-amplexicaul, serrate or serrulate, 1-4 cm long. Racemes terminal and axillary; flowers pedicelled, numerous, about 1 cm long, 2-bracteolate, violet; pedicel equalling or exceeding calyx; calyx deeply 5-partite, sepals lanceolate, acute, half as long as corolla; corolla 2-lipped, tubes about 8 mm long, limb 4 mm in diam.; stamens 4, didynamous, anther cells stipitate. Capsules 4-5 mm, long, ovoid, 4-valved.

Type : India, Roxburgh IC. t. 163 (CAL, K).

Fl. & Frt. : Oct.-Feb.

Occasionally found in moist cultivated fields.

Khami to Pandaria, 16705.

2n = 42.

West Asia, India, tropical America (Mabberley, 1987).

Dried plants are slightly fragrant and mucilaginous and used as a demulcent.

STRIGA Lour., Fl. Cochinch, : 22. 1790.

Type: *S. lutea* Lour. [*Buchnera asiatica* L.; *Striga asiatica* (L.) Kuntze].

Note: 1. Although Cramer (1981) treated *Buchnera asiatica* L. (1753) as nom. confusum, presumably under Art. 69, Nicolson *et al.* (1988) quote Hepper (Rhodora 76 : 46. 1974), who lectotypified the species with Linn. Herb. 790.10 (LINN) and treat it as the correct name.

2. Hemiparasitic, often pestinential on crops like sugar-cane, maize, and sorghum etc. Germination of seeds improves when seed is passed through rumen.

Striga angustifolia (D. Don) Saldanha, Bull. Bot. Surv. India 5 : 70, 1963. *Buchnera angustifolia* D. Don, Prodr. Fl. Nepal. : 91. 1825. *Striga euphrasioides* sensu Haines, Botany 2 : 671, non (Vahl) Benth. (1836) (vide App. IV, ICBN 1988).

Erect, scabrid or strigose herbs; stems simple, filiform up to 40 cm high. Leaves lower ones opposite, upper ones alternate, linear or linear-oblong, subacute, hispid, 0.5-4 cm long, upper ones smaller, passing into bracts. Spikes terminal, leafy, interrupted; flowers distant, white, 1-2 cm long; calyx 5-6 mm long, 15-ribbed, 5-fid, lobes 3-veined, veins terminating at the tip of each lobe, hispid, fruiting calyx campanulate; corolla 1-2 cm long, tubes pubescent at curves; stamens 4, didynamous. Capsules ovoid or oblong, loculicidal, 5-7 mm long, glabrous, dehisced valves strongly reflexed; seeds cuneiform, trigonous, glabrous, black.

Type: Nepal, *Wallich*?

Fl. & Frt.: July-Nov.

Common in moist places, cultivated fields, near water channels, waste places.

Katghora : 6041; Bilaspur to Sepur : 13005.

2n = 40.

India, Sri Lanka, Indonesia.

Buchnera euphrasioides Vahl (1794) [*Striga euphrasioides* (Vahl) Benth. (1835)] is now listed as nom. rej. under Art. 69.1 (vide Appendix IV, ICBN, 1988, *sphalm.* as "*Buchnera euphrasioides* (Vahl) Benth."), although Cramer (1981) listed it as conspecific with *Striga angustifolia* (D. Don) Saldh.

SUTERA A. W. Roth, Bot. Bemerk. : 172. 1807.

T. : non designatus (Farr *et al.* 1979).

Note : 1. E. P. Philips (Gen. S. African Fl. Pl. ed. 2. : 670. 1951) selected *S. foetida* (Andrews) Roth (*Buchnera foetida* Andrews) as the lectotype.

2. *Sutera fodina* Willd. of Central Africa has 15.3% nickel and 4.5% chromium by weight. *S. atropurpurea* (Benth) Hiern of South Africa has saffron substances in its flowers. (Mabberley 1987).

Sutera dissecta (Del.) Walp. Rep. 3 : 271. 1844; E. A. Bruce in Bull. Misc. Inf. Kew 1940 : 63-64. 1940. *Capraria dissecta* Del., Fl. Egypt. 1 : 95. t. 32. f. 2. 1812; *Sutera glandulosa* Roth, Nov. Pl. Sp. : 290. 1821; Hook. f. in FBI 4 : 258. 1884; Haines, Botany 2 : 651.

Erect, viscid-pubescent, annual herbs, branched from base. Leaves pinnatifid, lower opposite, upper alternate, ovate segments toothed and dissected; petioles short. Flowers in axillary and terminal racemes, ebracteolate, sessile or pedicelled, white; sepals 5, narrow, 2 mm long; corolla-tubes exceeding calyx, slender, lobes 5, spreading; stamens 4, didynamous, included. Capsules ellipsoid-oblong or ovoid-oblong, septicidal, about 4 mm long.

Fl. & *Frt.* : Jan.-Mar.

Occasionally found on moist alluvium.

Pondu to Ratanpur : 16784.

Africa, India.

VERBASCUM L., Sp. Pl. : 177. 1753 & Gen. Pl. ed. 5 : 83. 1754; Cramer in Dassan., Rev. Handb. Fl. Ceylon 3 : 388. 1981.

LT. : *V. thapsus* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 3 : 173. 1913).

Celsia L., Sp. Pl. : 621. 1753. & Gen. Pl. ed. 5 : 272. 1754.

Type : *Celsia orientalis* L.

Note : 1. O. Kuntze (Gen. Pl. 2 : 468. 1891) combined the two Linnaean genera, accepting *Verbascum* L. as the correct name (Art. 57.2).

2. Seeds long-lived (germination after 90 years with 20 per cent success; some still viable after 100 years (Mabberley, 1987).

Verbascum chinense (L.) Sant., Fl. Purandhar : 90. 1958; Cramer *op. cit* : 390. 1981. *Scrophularia chinensis* L., Mant. Pl. 2 : 250. 1771. *Celsia coromandeliana* Vahl, Symb. Bot. 3 : 79. 1794; Haines, Botany 2 : 649. Type : "India orientalis". *Koenig* ? *Verbascum coromandelianum* (Vahl) Kuntze, Rev. Gen. Pl. 1 : 468. 1891. (*Bhutakeshi*—S; *Kukshima*—Beng).

Erect, annual herbs, 60-100 cm high, glandular pubescent above, indumentum hirsute or strigose. Basal leaves in a rosette; lower ones alternate, long-petioled, oblong-obovate, lyrate-pinnatifid; upper ones sessile, ovate, obtuse, crenate-dentate, passing into bracts upwards. Racemes terminal, simple or panicled, lax, glandular hairy; 30-60 cm long; flowers ebracteate, yellow, 1 cm in diam; calyx 5-lobed, 3-5 mm long, glandular pubescent, sepals ovate-lanceolate, entire or toothed; corolla-lobes 5, obtuse; stamens 4, filaments equal, hairy. Capsules globose or subglobose, 6-7 mm long, septicidal, glandular.

Type : Linn. Herb. no. 773. 20 (LINN).

Fl. : Nov.-Jan. *Frt.* : Feb.-May.

Occasionally found in moist places, near streams, often a weed in cultivated fields in drier habitats.

Keonchi to Lamni : 15388.

2n = 80, 92 (as *Verbascum coromandelina*).

Afghanistan, India, Sri Lanka, Burma, China.

Juice of leaves sedative and astringent, used in diarrhoea and dysentery. Plant juice used as febrifuge and applied on eruptions on the skin; leaves included in cigarettes for asthmatics.

VERONICA L., Sp. Pl. : 9. 1753 & Gen. Pl. ed. 5. 10. 1754;

Cramer in Dassan., Rev. Handb. Fl. Ceylon 3 : 436. 1981.

LT. : *V. officinalis* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 3 : 199. 1913).

Note: Corolla rotate and anthers 2, held laterally and grasped by visiting insects, such that they come together dusting pollination agents with pollen (Mabberley, 1987).

Veronica anagallis-aquatica L., Sp. Pl. : 12. 1753; Hook. f. in FBI 4 : 293. 1884; Haines, Botany 2 : 667; Hara *et al.*, Enum. 3 : 128. 1982. (*Trilokia*—U.P.).

Erect, succulent herbs; stems creeping below. Leaves sessile or the lowest petioled, oblong or oblong-lanceolate or linear-oblong, entire or serrate, base usually cordate, 5-12 × 0.7-1 cm. Racemes 7-12 cm long, axillary, slender, lax-flowered; pedicels spreading, 4-6 mm long; flowers white or pinkish; calyx 4-5-partite, 2-3 mm long, segments lanceolate, oblong, subacute; corolla 1.8-2 mm long, rotate, lobes 4-5; stamens 2, exserted. Capsules broadly ovate or orbicular, laterally compressed, 3.5-4 mm long.

Fl. & Frt.: Feb.-May.

Common in marshy places.

Pondu to Ratanpur: 16781.

2n = 18, 36.

North America, Europe, India, Nepal.

Leaves used in salads; herbs antiscorbutic; roots used for preparation of girgles; it is said to pulverise stones in the bladder.

OROBANCHACEAE

Vent., Tabl. Regne Veg. 2 : 292. 1799 ('*Orobanchoideae*')

T: *Orobanche* L.

ABGINETIA L., Sp. Pl. : 632. 1753 & Gen. Pl. ed. 5 : 280. 1754.

Type: *A. indica* L.

Note: Parasitic on roots of monocots, esp. *Poaceae*.

Aeginetia indica L., Sp. Pl. : 632. 1753; Roxb., Fl. Ind. ed. 2, 3 : 30. 1832 ('*Aegenetia*'); Haines, Botany 2 : 673. *Orobanche aeginetia* L., Sp. Pl. ed. 2 : 883. 1762, *nom. illeg.* (Art. 63.1).

Erect, leafless herbs; root-parasites; scapes or stems solitary or several, 15-40 cm long, with a few scales near base. Flowers solitary, terminal, violet or purple; calyx spathaceous, beaked, split in front nearly to base, acute, 2-3 cm long; corolla tubular, curved, 2-4.5 cm long, limbs 2.5 cm

in diam., spreading, obscurely 2-lipped, lobes 5, broad, 2 upper connate, margin fimbriate; stamens 4, included; ovary 1-celled. Capsules ovoid globose, 1.5-2 cm long, sub-2-valved.

Type: *Tsjem-cumulu* Rheede, Hort. Malab. 11 : 97. t. 47. 1692.

Fl. & Frt.: July-Nov.

Common in leaf-litters in damp places, on slopes in forest margins.

Achanakmar, 13223; Lamni, 15405.

Indomalayasia, Japan.

Pest of sugar-cane plants converting sucrose to reducing sugars Alcholic extract gave a β-sitosterol, aegitic acid, a monoterpenoid lactone, aeginetolide.

LENTIBULARIACEAE

L. C. Rich. in Poiteau et in Turpin, Fl. Paris 1 : 26. 1808. ('*Lentibularieae*').

T.: *Lentibularia* Seguier, nom. illeg. (= *Utricularia* L.).

UTRICULARIA L., Sp. Pl. : 18. 1753, et Gen. Pl. ed. 5 : 11. 1754.

Lectotype: *U. vulgaris* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2, 3 : 227. 1913).

Note: Submerged aquatics with no roots (not even in seedlings); no clear distinctions between roots, stems and leaves, the stem bearing photosynthetic appendages carrying bladders with trap-doors; when these are triggered by small animals/insects, the animal/insect is sucked into the bladder and the trap door re-closes, the plant absorbing the nutrients from the corpse. In tropical species the flowers are aerial on axes with small leaves. All leaves, bladders, runners, tubers, erect shoots etc. are homologous, developing from similar primordia under different conditions. Epiphytic species have tuberous branches holding water.

1a. Terrestrial herbs with foliar organs simple and glabrous; bracteoles present — *U. caerulea*

1b. Aquatic herbs with foliar organs dissected into filiform segments; bracteoles absent

2a. Ultimate segments of foliar organs very numerous and with setulae; seeds not winged — *U. aurea*

2b. Ultimate segment of foliar organs a few and without or with very few lateral setulae; seeds winged — *U. exoleta*

Utricularia aurea Lour., Fl. Cochinch. : 26. 1790; Taylor in Fl. Males. Ser. I. 8 : 296. 1977. *U. flexuosa* Vahl. Enum. 1 : 198. 1804; C. B. Clarke in Hook. f. FBI 4 : 329. 1884. *pro. part. excl. syn. U. australis* R. Br.; Haines, Botany 2 : 676. (*Mundari-*)

Aquatic herbs; stolons stout, much-branched. Primary leaf-segments 3 or more in whorls; leaves divided into capillary segments, with bladders. Bracts ovate. Scapes 3-8-flowered, racemose; peduncles 12-15 cm long, without scales and floats; flowers pedicelled, yellow; pedicels deflexed in fruit; calyx 2-partite, segments ovate, somewhat enlarged in fruit, subacute, patent; corolla 2-lipped, spurs nearly as long as lower lip, 0.5-1 cm in diam.; stamens 2, attached to base of corolla, filaments curved; stigmas unequally 2-lobed. Capsules subglobose.

Fl. & Frt. : Sept.-Nov.

Common in muddy soil of ditches, submerged cultivated fields.

Kota to Bilaspur : 13043.

2n = 42.

Note : *U. aurea* Lour. differs from *U. australis* R. Br. by the absence of scales and presence of 3 or more primary leaf-segments.

Africa, India, Sri Lanka, Malaya, Australia.

Horticulturally useful in aquatic part of a rockery.

U. caerulea L., Sp. Pl. : 18. 1753; Taylor in Fl. Males. Ser. I. 8 : 287. 1977; Haines, Botany 2 : 676 : Hara *et al.*, Enum. 3 : 132. 1982; Basak, Bull. Bot. Surv. Ind. 21 : 216. 1979. *U. racemosa* Wall. ex Walp. in Meven. Observ. Bot. Nov. Acta 19 : 401. 1843; A.DC., Prodr. 8 : 21. 1844; C. B. Clarke in Hook. f. FBI 4 : 333. 1884; Haines, Botany 2 : 676.

Erect, slender herbs. Leaves linear-spathulate, disappearing when in flower. Scapes single, up to 20 cm long, slender; scales and bracts attached at middle; flowers 3-7, subsessile, blue or purple, lower distant, uppermost often subcapitate, 5-7 mm long; calyx 2-partite; fruiting sepals ovate-orbicular; corolla 2-lipped, upper lip of corolla very narrow, lower lip 6-7 mm long, obscurely 4-lobed; spur 6-9 mm long, subacute; stamens 2, attached at base of corolla, filaments curved; stigmas unequally 2-lobed. Capsules ovate, subglobose, compressed, papillose, about 2 mm long. Seeds not glochidiate.

Lectotype : Herb. Hermann 23 (BM) (vide J. E. Smith, Exot. Bot. 2 : t. 119. 1805; Trimen 1887; 134).

Fl. & Frt. : Sept.-Dec.

Common in ditches, cultivated fields.

Katghora : 8707.

2n = 40.

Indomalaysia.

Note : Bhattacharya (*Taxon* 35 : 750. 1986) treated Rheede t. 70. 1689 as the lectotype of *U. caerulea* L. and proposed rejection of the name. This lectotypification was earlier opposed by Basak (*Bull. Bot. Surv. India* 21 : 216. 1979, not mentioned by the proposer. Nicolson *et al.* (*Regnum Vegetab.* 119 : 162. 1988) treat Rheede t. 70 as representing *U. reticulata* Sm. (1805).

Used for dressing wounds.

U. exoleta R. Br., Prodr. : 430. 1810; C. B. Clarke in Hook. f. FBI 4 : 329. 1884; Haines, Botany 2 : 676; Taylor in Fl. Males. Ser. I. 8 : 294. 1977. *U. gibba* L. ssp. *exoleta* (R. Br.) P. Taylor, Mitt Bot. Staatssamml. Munchen 4 : 101. 1961; Kew Bull. 18 : 204. 1964.

Aquatic herbs; branches many, with small bladders; free-floating, sometimes attached to mud. Leaves multipinnate, segments capillary, ultimate leaf-segments a few, not setulose, easily detached from peduncles. Traps ovoid, with truncate, ciliate, lateral mouths; upper lip with 2-branched appendages. Scapes slender, up to 10 cm long, minutely bracteate near middle, 1-3-flowered; bracts and scales basifixed, scale 1; flowers yellow, about 5 mm long; pedicels slender, 4-6 mm long; calyx 2-partite, segments subequal, elliptic, obtuse, scarcely enlarged in fruits; corolla 2-lipped, upper lip broadly ovate, entire or obscurely lobed; spurs slightly exceeding lower lip; stamens 2, attached at base of corolla, filaments curved; stigmas unequally 2-lobed. Capsules globose equalling or longer than sepals. Seeds winged.

Type : Australia, *R. Brown* (BM).

Fl. & Frt : July-Nov.

Common in ditches, ponds and in submerged cultivated fields.

Pali : 8727; Keonchi : 15386; Katghora : 8685.

Paleotropics.

BIGNONIACEAE

A. L. Juss., Gen. Pl. : 137. 1789 ('*Begnoniae*')

Type : *Bignonia* L.

Jacaranda acutifolia Kunth in Humb. & Bonpl., *Kigelia pinnata* (Jacq.) DC., *Spathodia campanulata* Beauv., *Millingtonia hortensis* L.f., *Tabebuia pentaphylla* (L.) Hemsl. and *Tecoma stans* (L.) Kunth are some of the ornamental shrubs and trees occasionally found in gardens or as evenue-trees in the district. *Pyrostegia venusta* (*Ker-Gawl.*) Miers, a scandent shrub, is commonly cultivated in the gardens. *Millingtonia hortensis* L.f. is not only ornamental with fragrant flowers and fruits to 30 cm long, but its leaves are a poor substitute for opium in cigarettes.

1a. Leaves 2-3 pinnate ; capsules strongly tuberculate without ; septa of capsules only faintly pitted ; seeds flat, not grooved between wings — RADERMACHERA

1b. Leaves 1-pinnate ; capsules not tuberculate ; septa of capsules prominently pitted ; seeds trigonous, grooved between wings — STEREOSPERMUM

RADERMACHERA Zollinger & Moritzi in Zoll., Syst. Verz. Ind. Arch. 3 : 53. 1855

Type : *R. stricta* Zoll. & Mor.

Radermachera xylocarpa (Roxb.) K. Schum. in Engl. & Prantl., Nat. Pflanzenfam. 4(3b) : 243. 1895 ; Haines, Botany 2 : 689 ; Fl. Hassan : 536. 1976 ; *Bignonia xylocarpa* Roxb., Fl. Ind. 3 : 108. 1832. *Stereospermum xylocarpum* (Roxb.) Wight, Icon. : t. 1335-36. 1848 ; C. B. Clarke in Hook. f. FBI 4 : 383. 1884. (*Khonda-partolli*,. *Akash-garuda*—Oriya).

Large deciduous trees. Leaves opposite, bipinnate, pinnae 3-4-pairs, 60-90 cm long ; leaflets elliptic to ovate, short-acuminate, acute, entire or coarsely serrate, mature glabrous, 4-7 × 2-3.5 cm, Panicles terminal, stout, ovoid, pubescent, 17-18 cm long : pedicels sub-capitately corymbose on branches ; flowers 3.5-6 cm long, white with yellow tinge ; calyx 1 cm long, campanulate, puberulous, 5-toothed, 2 upper teeth broader and obtuse, all mucronate ; corolla 3 cm long, subglabrous, ventricose from near base, lobes round, crisped ; stamens 4, didynamous, filaments hairy below ; staminodes present ; disc conspicuous. Pods up to 95 cm long and 2.5-4.5 cm broad, cylindric, woody, tubercled. Seeds 2.5 cm long, winged.

Fl. : Apr.-May. *Frt.* : Apr. (of the following year) ; leafless when in flower.

Frequently found on slopes.

Khuria to Aurapani : 15477.

India.

The seeds are said to be specific antidote for snake-bite (Panigrahi, 1963). Wood for house-building, furniture, carts and carriages; suitable for packing cases and for railway-sleepers; tender fruits eaten as a vegetable. Resin extracted from the wood is used for skin-troubles.

STEREOSPERMUM Cham. in Linnaea 7 : 720. 1833 ('1832').

Type : *S. kunthianum* Cham.

Stereospermum chelonoides (L.f.) DC. in Bibl. Univ. Geneve 2.17; 125. 1838, *pro. part. quoad basionym tantum*; Santisuk in Kew Bull. 28(2) : 176. 1973. *Bignonia chelonoides* L.f., Suppl. Pl. : 282. 1782, *pro. part. excl. syn.* Rheede, Hort. Malab. 6 : 47. t. 26. *Bignonia suaveolens* Roxb., Fl. Ind. ed. Carey 3 : 104. 1832. *Stereospermum suaveolens* (Roxb.) DC., Prodr. 9 : 211. 1845; C. B. Clarke in Hook. f. FBI 4 : 382 1884; Haines, Botany 2 : 688. ('*Chota Padar, Paral*—Hindi; *Patoli*—Oriya).

Large deciduous trees; young parts hairy. Leaves opposite; 30-45 cm long; leaflets 7-9, broadly elliptic or oblong, abruptly acuminate or acute, entire or serrulate, sessile or short-petioled, young ones viscous glandular or eglandular hairy, 7-17 × 6-7.5 cm. Panicles large, compound, glandular-pubescent; flowers crimson with yellow streaks, fragrant, 2.5-3.5 cm long; calyx 0.8-1 cm long, glandular hairy, lobes 3-5, short and broad; corolla campanulate, 2-lipped, 2.5-3 cm long villous within on lower side, hairy in throat, puberulous without, lobes rounded crisped, crenate; stamens 4, didynamous. Capsules woody, linear obscurely 4-ribbed, 40-45 × 1-2 cm. Seeds deeply notched in middle, subtrigonous.

Type : India, *Koenig* (LINN).

Fl. : Apr.-May. *Frt.* : Sept.-Feb.

Common in mixed forests.

Achanakmar : 15426, 19293; Pali : 8570; Khondra : 12814; Lamni : 13250; Katghora : 8646.

India, Sri Lanka, Burma.

Good timber and excellent firewood and yields good quality charcoal. Root-bark is an ingredient of DASAMULA. Ethanolic extract of flowers showed activity against *Ranikhet*-diseases of virus and anti-cancer activity against human epidermal carcinoma of the nasopharynx.

Note : *Stereospermum colais* (Dillwyn) Mabb., Taxon 27 : 553. 1978 (*Bignonia colais* Ham. ex Dillwyn, Rev. Hort. Malab : 28. 1839) is the correct name for *Stereospermum personatum* (Hassk.) Chatterjee, Bull. Bot. Soc. Bengal 12(1) : 70. 1948; Santisuk, Kew Bull. 28 : 180. 1973 (*Dipterospermum personatum* Hassk, Flora 25(2) Beibl. : 28. 1842).

PEDALIACEAE

R. Br., Prodr. : 519. 1810 ('*Pedalinae*')

Type : *Pedalium* Royen ex L.

Note : Although both *Martyniaceae* Stapf [in Engler et Prantle, Nat. Pflanzenfam. 4'3 b ; 265. 1895] (T. *Martynia* L.) and *Pedaliaceae* R. Br. (1810), are listed as Nomina Familiarum Conservanda (App. II B, 1988), Mabberley (1987), following Cronquist (1981), treats the former as a subfamily of the latter and distinguishes the two subfamilies as :

1a. Flowers axillary; gynaecium superior; placentation axile. Old World plants — PEDALOIDEAE

1b. Inflorescence terminal, gynaecium superior; placentation parietal. New World Plants — MARTYNIOIDEAE

Nicólson *et al.* (1988) also include *Sesamum* L. under the *Pedaliaceae* R. Br.

1a. Flowers in terminal racemes; stamens only 2 perfect, 3 staminodes; placentation parietal; fruits drupaceous with dehiscent pericarp and hard 2-clawed endocarp — MARTYNIA

1b. Flowers solitary axillary; stamens 4, didynamous, all perfect, 1 staminode; placentation axile, fruits capsular, 2 valved, not clawed or spinous — SESAMUM

MARTYNIA L., Sp. Pl. : 618. 1753 & Gen. Pl. ed. 5 : 270. 1754;

Stapf in Engl. & Prant. Nat. Pflanzenfam. 4 : 265-269. 1895.

Lectotype : *M. annua* L. (vide M. L. Green, Prop. Brit. Bot. 167. 1929).

Monotypic, Mexican genus; naturalized throughout India.

Martynia annua L., Sp. Pl. : 616. 1753. *M. diandra* Glox., Obs. Bot. 14. t. 1. 1785; Haines, Botany 2 : 694. (*Devil's claw, Tiger claw*; *Baghanakhi*—Oriya).

Erect, annual herbs, densely viscid glandular hairy, stems fistular. Leaves opposite, broadly ovate-orbicular, subobtuse at apex, dentate, glandular hairy, 20-45 cm across, petioled. Racemes axillary, 5-15 cm long; bracts pink, spathulate rounded, caducous; bracteoles pink, inserted below calyx; flowers drooping, pale pink with purple spots; calyx yellowish-white, unequally 5-lobed, 1.5-2 cm long, glandular pubescent; corolla tubular, campanulate, 5-6 cm long, mouth oblique, glandular-pubescent outside; lobes broadly rounded, lower lip with a yellow blotch at base; stamens epipetalous; disc fleshy. Fruits green, obliquely ovoid, with a short, upturned beak, glandular pubescent.

Fl. : July-Aug. *Frt.* : July-Nov.

Common in waste places, roadsides.

Achanakmar : 19295; Bilaspur : 12996; Katghora : 7102.

2n = 36.

Native of Mexico; naturalized throughout India.

Fruits alexiteric, used for inflammation; seeds yield semi-drying oil; leaves used for epilepsy and applied to tubercular glands of the neck; juice is used as gargle for soar-throat; fruits sometimes pickled.

SESAMUM L., Sp. Pl. : 634. 1753 & Gen. Pl. ed. 5 : 282. 1754.

Lectotype : *S. indicum* L. (vide M. L. Green, Prop. Brit. Bot. 169. 1929; Bruce, Kew Bull. 1953 : 425. 1953).

Sesamum indicum L., Sp. Pl. : 634. 1753; Nicolson *et al.* Regnum Vegetab. 119 : 207. 1988. *S. orientale* L., Sp. Pl. : 634. 1753; Backer & Bakh. f., Fl. Java 2 : 544. 1965. *S. mulayanum* Nair in Bull. Bot. Surv. India 5 : 252-253. 1963. *S. indicum* var. *subindivisum* DC., Pl. Rar. Jard. Genev. : 18. 1825. *Schit-elu* Rheede, Hort. Malab. 9 : 105-106, t. 54. 1689. *Car-elu* Rheede, *l.c.* : 107, t. 55. 1689. (*Gingelly, Sesame; Khasa, Rasi*—Oriya; *Tila*—Sansk.)

Erect, pubescent or puberulous annual herbs. Leaves variable, upper usually alternate, narrowly oblong, subentire, middle ovate, toothed, lower usually opposite, 3-lobed or pedatisect; petioles 1-4.5 cm long. Flowers solitary or 2-3 in axils, pale or purplish with yellow spots, 2-2.5 cm long; bracteoles inserted at the base of pedicels; calyx 0.5-0.6 cm long, lanceolate, lobes unequal; corolla tubular-campanulate, 2.5-3.5 cm long, pubescent, whitish or with red purplish or yellow marks, limbs 2-lipped, with 5 rounded lobes; stamens included, anthers sagittate. Capsules tetragonous, oblong, erect, scabrid pilose, short-acuminate, 2-valved half way down or ultimately 4-valved, 1.5-3 cm long.

L.T. : India, Herb. Linn. 802.3 (LINN) (vide Abedin l.c.).

Fl. : Oct.-Dec. *Frt* : Dec.-Jan.

Commonly cultivated, also found as escapes from cultivation.

Madai to Korbi : 19482.

2n = 26, 52, 58.

Tropical Africa, Asia, Sri Lanka.

Seeds yield an oil (Gingelly oil) used for cooking, as hair-oil and for making soaps. The oil is emollient, demulcent and laxative. Oleaginous edible seeds are a rich source of protein, 'globulin'; seed-cake is an esteemed animal-feed.

Note : Although Graham (Cat. Bomb. Pl. : 126. 1839) is said to be the first author to unite the two Linnaean specific epithets of equal priority, accepting *S. orientale* L. as the correct name for the combined taxon, it was indeed De Candolle (*Pl. Rar. Jard. Genev.* : 18. 1825; Prodr. 9 : 250. 1845) who had earlier combined the two taxa, accepting *S. indicum* L. as the correct name (Art. 57.1).

ACANTHACEAE

A. L. Juss., Gen. Pl. : 102. 1789. ('*Acanthi*')

Type : *Acanthus* L.

Note : Mabberley (1987) recognises three subfamilies within the *Acanthaceae* :

Nelsonioideae (ovules many, jaculators 0) ;

Thumbergioideae (ovules 4, jaculators 0) ;

Acanthoideae (ovules 2-many, jaculators present).

He states : "closely allied to *Scrophulariaceae* with no meaningful distinction between them : *Nelsonioideae* are perfectly intermediate and kept here only by tradition".

1a. Seeds without retinacula, not laterally compressed

2a. Prostrate herbs; calyx 4-partite; corolla-lobes imbricate in bud; stamens 2 — NELSONIA

2b. Climbing herbs; calyx minute, annular or 10-15-toothed; corolla-lobes twisted in buds; stamens 4 — THUNBERGIA

1b. Seeds with retinacula, laterally compressed

3a. Corolla with a single 3-lobed spreading lower lip, upper lip absent or obsolete; anthers 1-celled — BLEPHARIS

3b. Corolla distinctly 2-lipped or with 5 sub-equal lobes; anthers 2-celled

4a. Corolla-lobes twisted in buds; anther-cells parallel or one slightly below the other

5a. Ovules 3 to many in each cell; capsules 6-or more-seeded

6a. Corolla distinctly 2-lipped — HYGROPHILA

6b. Corolla sub-equally 5-lobed

7a. Bracts absent; bracteoles large, foliaceous; capsules clavate, with a sterile stalk-like solid base — DIPTERACANTHUS

7b. Bracts large imbricate; bracteoles small or absent; capsules fusiform not clavate, seed-bearing throughout — HEMIGRAPHIS

5b. Ovules 2 in each cell; capsules upto 4-seeded

8a. Placentas separating elastically from the base of capsules — PETALIDIUM

8b. Placentas remaining attached to the base of capsules

9a. Stamens 4, didynamous, anthers minutely mucronate or spurred at base — DYSCHORISTE

9b. Stamens 2, anthers blunt at base — ERANTHEMUM

4b. Corolla-lobes imbricate in buds; one anther-cell placed much above the other

10a. Ovules 3 to many in each cell; capsules 6- or more-seeded

11a. Leaves hairy, oblong, obtuse; flowers sessile, in axillary racemes; capsule elliptic, hairy — INDONEESIELLA

11b. Leaves glabrous, narrow, acute; flowers pedicelled, in lax panicled racemes; capsule linear-oblong, glabrous — ANDROGRAPHIS

10b. Ovules 2 or rarely 1 in each cell; capsules 2-4-seeded

12a. Corolla-lobes 5, sub-equal — BARLERIA

12b. Corolla distinctly 2-lipped

13a. Stamens 4, didymous — LEPIDAGATHIS

13b. Stamens 2

14a. Placentas separating elastically from base of capsules

15a. Flowers crowded in axillary cymes; anther-cells not spurred — DICLIPTERA

15b. Flowers in 1-sided spikes; anther-cells spurred — RUNGIA

14b. Placentas remaining attached to valves of capsules

16a. Anther-cells appendaged with a white basal spur

17a. Calyx-lobes 4, rarely with a minute fifth one; only lower cell of each anther spurred — ROSTELLULARIA

17b. Calyx-lobes 5; both anther-cells spurred — GENDARUSSA

16b. Anther-cells not appendaged; cells only minutely apiculate at base or muticous

18a. Anthe-cells minutely apiculate at base; capsules oblong, clavate; corolla longer than bracts — ADHATODA

18b. Anther-cells muticous; capsules ellipsoid; with a narrow stalk like base; corolla shorter than bracts — PERISTROPHE

ADHATODA P. Mill., Gard. Dict. Abridg. ed. 4. 1754.

T. : *J. adhatoda* L.

Justicia L. has been lectotypified by Britton & Brown (1913) by *J. adhatoda* L., but Medicus (1790), in describing *Adhatoda zeylanica* Medic., explicitly stated that *J. adhatoda* L. belongs to the genus *Adhatoda* P. Miller (1754) (Farr *et al*, 1979). It would mean that Medicus typified *Adhatoda* P. Miller by *J. adhatoda* L. In view of this, Britton & Brown's lectotypification of *Justicia* L. by the type species of *Adhatoda* P. Miller at a later date and as listed by Farr *et al* (1979), should be set aside and another type should be selected for *Justicia* L. In fact, Hitchock & Green in Int. Bot. Cong. Cambridge 1930, Nomencl. Propos. Brit. Bot. : 116. 1924, lectotypified *Justicia* L. by *J. hyssopifolia* L. and Bremekamp (1948) recommended that *Justicia* L. be confined to *J. hyssopifolia* L. But, earlier, Nees in Wall., Pl. As. Rar. 3 : 103. 1832 restricted *Justicia* L., to *J. echolium* L. Mabberley (1987), however, treats *Adhatoda* Miller as a congeneric synonym of *Justicia* L.

Adhatoda zeylanica Medic., Hist. Commentat. Acta Acad. Elect. Sci. Theod.-Palat. 6 : Phys : 393. 1790. *Justicia adhatoda* L., Sp. Pl. : 15. 1753 ; Hara *et al*., Enum. Pl. Nepal. 3 : 141. 1982 ; Malik & Ghafoor in Nasir & Ali, Fl. Pakistan 188 : 39. 1988. *Adhatoda vasica* Nees in Wall. Pl. As. Rar. 3 : 103. 1832 ; C. B. Clarke in J. Hook. FBI 4 : 540. 1885 ; Haines, Botany 2 : 728. *Dicliptera rheedei* Kostel., Allg. Med.-Pharm. Fl. 3 : 934. 1834 ('*rheedii*').

Erect shrubs or undershrubs, stems 4-gonous, appressed hairy towards apex and with branches thickened at the nodes. Leaves elliptic or lanceolate-oblong, acute at both ends or short-acuminate at apex, entire, minutely pubescent, 4-20 × 1.5-6 cm ; petioles about 2 cm long ; bracts herbaceous, usually linear, clasping solitary flowers ; bracteoles narrower, longer than calyx ; flowers subsessile, white with reddish spots, about 3 cm long ; calyx deeply 5-lobed, sepals lanceolate, hairy, 7 mm long ; corolla white, longer than bracts, tube short, limbs inflated, 2-lipped, upper lip emarginate or subentire ; lower lip 3-lobed ; stamens 2, inserted near throat of corolla, anther cells placed at different levels, not parallel, not spurred. Capsules 2 cm long, clavate, pubescent, stipitate, 4-seeded ; seeds usually rugose.

Fl. & Frt. : August-March.

Common in waste places, along roads, also grown as hedge.

Ratanpur : 19503; Pali : 8701.

2n = 34, 40, 46, 50, 56.

Indomalaysia.

Fresh or dried leaves used widely to treat various internal disorders, particularly as a cough medicine and to treat asthma. Leaves rich in vitamin C and carotene and yield an essential oil. Glycodene Terp vasak (a trade name) is used to suppress cold/cough is obtained from its leaves. Wood is used for beads and is a good fuel and is used as gun-powder and as charcoal. The chief principle in the leaves is vasoicine—a promising uterotonic abortifacient.

ANDROGRAPHIS Wall. ex Nees in Wall. Pl. Asiat. Rar. 3 : 77, 116. 1832.

T. : *A. paniculata* (N. Burm) Wall. ex Nees (*Justicia paniculata* N. Burm.).

Andrographis paniculata (N. Burm.) Wall. ex Nees in Wall. Pl. Asiat. Rar. 3 : 116. 1832; Haines, Botany 2 : 734; Nicolson *et al.*, Regnum Vegetab. 119 : 36. 1988. *Justicia paniculata* N. Burm., Fl. Ind. : 9. 1768. *Cara-caniram* Rheede. Hort. Malab. 9 : 109-110, t. 56. 1689. (*Kalmegh*—Beng.: *Chiraita*—Oriya; *Kariat, Creat*—Eng.)

Erect, woody, spreading herbs; stems 4-angular, glabrous below, glandular hairy above. Leaves ovate-elliptic, narrowed at both ends, glabrous, 3.5-6 × 1.2-1.8 cm. Racemes lax, paniculate, divaricate, 8-10 cm long; bracts acicular, 2 mm long; bracteoles minute or absent; flowers white or pale purple with purple spots; sepals linear-lanceolate, pubescent; corolla tube *c.* 1-2 cm long, 2-lipped for half its length, hairy; stamens 2, filaments hairy, anther cells parallel; ovules 3-10 in each cell. Capsules compressed, thrice as long as broad, 1.5-2 cm long, glabrous when mature, *c.* 1.8 cm long. Seeds hardly compressed, usually rugose.

Fl. & Frt. : Sept.-May.

Common in forest clearings, on slopes, between rock boulders.

Katghora : 7112; Pasan to Semra : 15356.

2n = 28, 50.

India, Sri Lanka.

Bitter stomachic and tonic and febrifuge; decoction of the dried plant is taken orally as a cure for sluggishness of liver, jaundice and fevers.

Plant is astringent, anodyne, alexipharmic, used in dysentery, cholera, diabetes, itches and piles.

BARLERIA L., Sp. Pl. : 636. 1753 & Gen. Pl. ed. 5 : 283. 1754.

LT. *B. cristata* L. (vide M. L. Green, Prop. Brit. Bot. : 169. 1929).

Many xerophytes with bracteolar thorns; seeds with hairs which swell when wetted.

1a. Prickly shrubs with yellow flowers; capsules ovoid, 2-seeded — *B. prionitis*

1b. Unarmed shrubs with red, blue or blue-purple flowers; capsules oblong or narrowly ellipsoid, 4-seeded

2a. Spike dense, secund; bracteoles oblong or elliptic; outer calyx-segments ovate, rounded, without spinule-tipped apex, margins ciliate-denticulate — *B. strigosa*

2b. Spikes a few-flowered, not secund; bracteoles linear; outer calyx-segments lanceolate, with spinule-tipped apex, margins spinulose-dentate — *B. cristata*

Barleria cristata L., Sp. Pl. : 636. 1753; C. B. Clarke in J. Hook. FBI. 4 : 488. 1884: Haines, Botany 2 : 716; Hara *et al.*, Enum. 3 : 139. 1982.

Erect or diffused undershrubs; branches strigose, adpressedly hairy. Leaves lanceolate oblong to ovate-elliptic, acute at base, acute or short-acuminate at tip, subsessile, yellow, hairy beneath; 5-15 × 2-4 cm. Flowers solitary or paired in axils or forming dense, capitate, compound spikes, showy, bright rose coloured; sepals 4, outer sepals ovate or lanceolate, toothed, softly hairy, 2-2.5 cm long, inner ones lanceolate-linear, ciliate, 1 cm long; corolla-tubes funnel-shaped, lobes 5, subequal, ovate, 3.5-4 cm long; stamens 2 perfect, 2 rudimentary-; disc large, often cupular. Capsules glabrous, 1-1.5 cm long, 4-seeded.

Fl. : Sept.-Nov. *Frt.* : Oct.-Jan.

Common in forest clearings, waste places.

Khondra : 12761.

2n = 34, 36, 38, 40.

India, Nepal, Burma, Sri Lanka.

Plants are ornamental; leaves and roots used for coughs and inflammations.

B. prionitis L., Sp. Pl. : 636. 1753; Haines, Botany 2 : 714; Nicolson *et al.*, Regnum Vegetab. 119 : 37. 1988. *Coletta-veetla* Rheede, Hort, Malab. 9 : 77-78, t. 41. 1689. (*Kanta jatti*—Beng.; *Korunta*—Sansk.).

Bushy undershrubs; branchlets puberulous. Leaves elliptic, acuminate at both ends, spine-tipped, entire, 8.5-10 × 2.5-3.5 cm. Spikes terminal and also 1-3 flowers in axils-; bracts linear or linear-oblong, spine-tipped, 1.5-2 cm long; flowers yellow; sepals 4, outer oblong-lanceolate, spine-tipped, about 1.8 cm long; inner linear-lanceolate, about 1.2 cm long; corolla tubular, funnel-shaped, 2-lipped, pubescent outside, 2.5-3.5 cm long; lobes 5, stamens 2 perfect, 2-rudimentary; disc cupular. Capsules 2-seeded, 1.8-2.5 cm long, with a solid beak.

I.T. : Herb. Hermann No. 233 (BM) (vide Trimen, 1887 : 145).

Note : Wood *et al.* (Kew Bull. 38 : 436. 1983) designated a Linnaeän specimen (S) as lectotype.

Fl. & Frt : Sept.-Feb.

Common in waste places.

Khondra : 12850; Korba : 16792.

2n = 30, 32, 40.

Africa, India, Sri Lanka, Burma, Malay Peninsula.

Juice of leaves given with honey in catarrhal affections; paste of roots applied to boils and granular swellings; leaves chewed to relieve tooth-ache; roots febrifuge.

B. strigosa Willd., Sp. Pl. 3 : 379. 1800; Haines, Botany 2 : 715; Hara *et al.*, Enum. Pl. Nepal. 3 : 139. 1982.

Erect undershrubs; branches fulvous-strigose, 4-angled. Leaves ovate or elliptic-ovate to oblong, acute or acuminate, decurrent on petioles, glabrate above, strigosely hairy on veins beneath, 8-20 × 5-10 cm. Spikes dense, unilateral, fulvous hairy, 2.5-7.5 cm long, bracteoles about 1 cm long, lanceolate, hairy on the back, margins ciliate; flowers blue or pale blue, 5 cm long and about 3.5 cm wide; sepals 4, outer ones ovate, obtuse, ciliate, denticulate, appressedly long-hairy, 2.5-3 cm long; inner ones linear-lanceolate, 1-1.4 cm long; corolla tubular, funnel-shaped, 2-lipped, 3.5-6 cm long; lobes ovate; stamens 2 perfect, 2 or 3 rudimentary; disc large, cupular. Capsules 4-seeded, 1.8 cm long, glabrous.

Fl. : Sept.-Nov. *Frt.* : Feb.-May.

Common between rock boulders, waste places, forest clearings.

Khuria to Aurapani : 15476 ; Keonchi : 13295.

2n = 42.

India, Nepal, Burma.

The leaves and roots are used for coughs and inflammations.

BLEPHARIS A. L. Jussieu, Gen. Pl. : 103. 1789

T. : *B. boerhaviifolia* Pers., nom. illeg. [*B. maderaspatensis* (L.) Heyne ex Roth, *Acanthus maderaspatensis* L.].

Seed-hairs swell when wetted.

1a. Leaves petioled, membranous, acute, glabrous-glaucous beneath, 3.5-8 cm long ; calyx with outer lobes 2.5 cm long ; corolla 1.5-2 cm long — *B. maderaspatensis*

1b. Leaves sub-sessile, thick, obtuse, hairy beneath, 0.5-2.5 cm long ; calyx with outer lobes 5 mm long ; corolla 5-7 mm long — *B. repens*

Blepharis maderaspatensis (L.) Heyne ex Roth, Nov. Pl. Sp. 320. 1821 ; *Acanthus maderaspatensis* L., Sp. Pl. : 639. 1753 ; *Blepharis boerhaviifolia* Pers., Syn. Pl. 2 : 180. 1806, nom. illeg. ; Haines, Botany 2 : 736.

Procumbent prostrate herbs ; stems scabrous or puberulous, rooting at nodes. Leaves 4 in a whorl, membranous, elliptic or elliptic-oblong, glabrous-glaucous beneath, acute at both ends or acuminate at apex, repand-toothed or almost entire, 3-6 × 1.5-2 cm. Flowers sessile, 1-4 together in axils, often combined into a leafy spike, white, about 2 cm long ; bracteoles in five pairs, obovate-spathulate, bristle-ciliate, green-veined, 0.4-1.5 cm long ; sepals 4, oblong, unequal ; outer oblong, entire, 1.5-2 cm long, inner linear ; corolla white with a yellow spot on throat, tubes ovoid, horny, bilabiate, upper lip obsolete ; stamens 4, anthers 1-celled, bearded along margins. Capsules ellipsoid, compressed, 2-seeded, 0.6-0.8 cm long. Seeds compressed, hairy.

Fl. & Frt. : Aug.-Mar.

Common on slopes, inside forest in shady places.

Katghora : 7103 ; Khuria to Aurapani : 15473.

2n = 26, 30.

Tropical Africa to Burma.

B. repens (Vahl) Roth, Nov. Pl. Sp. : 321. 1821; *Acanthus repens* Vahl, Symb. Bot. 2 : 76. 1791; *Blepharis mollugimifolia* Pers., Syn. Pl. 2 : 180. 1806; Haines, Botany 2 : 636.

Small, procumbent or prostrate herbs; branches patently hairy. Leaves 4 in a whorl, subsessile, thick, narrow-elliptic to oblong, obtuse. 1-2 cm long, hairy beneath. Spike capitate, heads mostly 1-flowered; bracts spinose-ciliate or awned, shorter than bracteoles, many outer bracts barren; ebracteoles 8, elliptic or oblong, subsessile, bristle-ciliate; flowers blue, 5-6 mm long; calyx-segments 4, lobes 5 mm long, one of them bifid at the tip; corolla white-tubular, 2-lipped, 5-7 mm long; stamens 4, didynamous, anthers 1-celled, bearded along margins. Capsules ellipsoid, 2-seeded, 5 mm long.

Fl. : Sept.-Dec. *Frt.* : Feb.-Mar.

Occasionally found along forest roads, in ditches.

Kota to Bilaspur : 13054.

2n = 34.

India, Sri Lanka.

DICLIPTERA A. L. Jussieu, Ann. Mus. Natl. Hist. Nat. 9 : 267. 1807, *nom. cons.*

T. : *D. chinensis* (L.) Juss. (*Justicia chinensis* L. (typ. cons.).

Dicliptera verticillata (Forssk.) C. Christensen in Dansk Bot. Arkiv. V. 4. 3 : 11. 1922; Bhandari, Fl. Ind. Desert : 300. 1978; *Dianthera verticillata* Forssk., Fl.-Aegypt-Arab. : 9. 1775; *Dicliptera micranthus* Nees in Wall., Pl. As. Rar. 3 : 112. 1832; Haines, Botany 2 : 732.

Decumbent herbs; branches striate, puberulous or glabrate. Leaves ovate or rhomboid, acute and apiculate or acuminate, cuneate at base, tapering into a petiole, lanceolate, glabrous or somewhat hispid beneath, 5-7 × 2.5-3.5 cm. Flowers white, in dense, axillary whorls or contracted cymes at nodes; ultimate cymes mostly of one perfect flower and 4-barren flowers; barren flowers enclosed by 2, oblong-obovate, hairy and densely ciliate involucral bracts, bracts flat, orbicular, tips awned; calyx about

3.5 mm long, with 5, narrowly subulate, acuminate segments; corolla tubular, 5 mm long, slender, deeply 2-lipped, upper lip narrow, entire or emarginate, liwer 3-lobed, recurved; stamens 2, usually exserted, anther cells not spurred; stigmas short- 2-fid. Capsules clavate, short-stalked, membranous, 0.4 cm long.

Fl. & Frt. : Oct.-Feb.

Common in waste places, cultivated fields.

Khuria : 15493.

2n = 30.

Africa, India.

DIPTERACANTHUS Nees in Wall., Pl. As. Rar. 3 : 75, 81. 1832; Bremek. in Verh. Kon. Ned. Akad. Wt. (II), Afd. Natuurk. Tweede Sect. 45(1) : 15. 1948.

LT. : *D. prostratus* (Poir.) Nees (*Ruellia prostrata* Poir.) (vide Bremekamp, *l. c.*).

Mabberley (1987) reduces *Dipteracanthus* Nees as a congeneric synonym of *Ruellia* L.

Seeds mucilaginous-pubescent when wetted, although appearing glabrous when dry. Cultivated as ornamental herbs and shrubs.

1a. Creeping or rambling herbs; flowers up to 2.5 cm long, 1-2 cm in diam.; capsules pubescent — *D. prostratus*

1b. Erect herbs; flowers 4.5-5.5 cm long, 2.5-3.5 cm in diam; capsules glabrous — *D. suffruticosus*

Dipteracanthus prostratus (Poir.) Nees in Wall., Pl. As. Rar. 3 : 81. 1832; Fl. Hassan : 546. 1976; *Ruellia prostrata* Poir. in Lam., Encycl. Meth. Bot. 6 : 349. 1804; Haines, Botany 2 : 706.

Decumbent herbs; stems with short or long internodes, pubescent upwards. Leaves ovate-lanceolate or elliptic, obtuse or acute, lineolate by raphides and sparsely hairy or nearly glabrous, 1.5-8 × 1-4 cm; petioles hairy. Flowers subsessile, solitary, axillary or a few together, white; bracteoles spatulate-elliptic, often foliaceous, appressed-pubescent, 1-2 cm long; bracts foliaceous, 1 cm long; sepals 5, linear-lanceolate, acute, ciliate, 1 cm long; corolla lilac-coloured, caducous, narrowly tubular, thin, ventricose, pubescent outside, lobes 5, rounded, sub-orbicular; stamens 4,

didynamous, anther-cells parallel, not spurred; staminodes 0. Capsules pubescent, 1.8-2 cm long, clavate with solid base. Seed flat, discoid.

Fl. & Frt. : July-Jan.

Common in moist shady places.

Pali : 19492; Lamni : 13245A.

2n = 34, 44.

India, Sri Lanka.

Used in ear troubles.

D. suffruticosus (Roxb.) Voigt, Hort. Suberb. Calc. : 483. 1845; *Ruellia suffruticosa* Roxb., Fl. Ind. 3 : 53. 1832; Haines, Botany 2 : 707. (*Chaulia*—Santal).

Perennial herbs, roots tuberous; stems with white hairs, sometimes stems absent. Leaves elliptic or oblong, rounded or obtuse at tip, hairy, 5-10 × 2.5-3.5 cm. Flowers solitary or a few together, in axils and terminal, subsessile, 4-5 cm long, bluish-white, subtended by two large, foliaceous bracteoles; sepals linear, puberulous or glabrate, 5 mm long; corolla tubular-ventricose, lobes rounded; stamens 4, didynamous, anther-cells parallel, not spurred. Capsules 2-2.5 cm long, glabrous, clavate with solid base.

Fl. : May-Sept. *Frt.* : Aug.-Oct

Common in leaf-litter on forest floors.

Pasan : 19114; Pasarkhet : 12940.

India, Sri Lanka, Burma.

Roots used in renal affections; also employed in the production of rice beer.

DYSCHORISTE Nees in Wall., Pl. Asiat. Rar. 3 : 75, 81. 1832.

LT. : *D. depressa* Nees (vide N. L. Britton et A. Brown, in Ill. Fl. N.U.S. ed. 2. 3 : 240. 1913).

Dyschoriste nagchana (Nees) Bennet in Indian Forester 109(4) : 220. 1983; *Dipteracanthus nagchana* Nees in Wall., Pl. As. Rar. 3 : 82. 1832; *Dyschoriste depressa* Nees, l.c. : 81; Haines, Botany 2 : 709; *D. cernus*

Nees, l.c. 81; *D. erecta auct., non* (N. Burm.) Kuntze 1891: Fl. Hassan: 547. 1976; *Calophanes nagchana* (Nees) Nees in DC., Prodr. 11 : 109. 1847; C. B. Clarke in Hook. f. FBI 4 : 410. 1884.

Prostrate herbs; stems 4-angled above, lineolate, sometimes obscurely scabrid. Leaves obovate or spathulate-elliptic, obtuse, base attenuate, densely, minutely lineolate above, 1.5-3.5 cm long. Flowers in axillary fascicles, 2-8 together, bluish violet, 0.5-0.7 cm long; calyx tubular, about 0.7 cm long, minutely strigillose or lineolate, sepals 5, with setaceous tip; corolla scarcely as long as calyx, puberulous, lobes 5, oblong-rounded; stamens 4, didynamous, anther-cells parallel, minutely spurred. Capsules 0.7 cm long, oblong, 4-seeded.

Fl.: Feb.-Mar. *Frt.*: May.

Occasionally found near canals, on slopes.

Khuria : 15488.

2n = 84 (as *D. depressa*).

India, Sri Lanka.

Note: Long (Jour. Arn. Arb. 51 : 295. 1970) has argued that *Ruellia erecta* N. Burm., based on Rheede's plate (t. 46. 1679) and description, is different from *D. nagchana-depressa-cernua* complex and is perhaps not even an Acanthaceous plant. Bennett's (1983) combination is based on C. B. Clarke's (1884) choice of *D. nagchana* Nees as the correct name of the three combined taxa.

Nicolson *et al.* (Reg. Veget. 119 : 39. 1988) identify Rheede, Hort. Malab. 2 : 80-90, t. 46. 1679 with *Ruellia ringens* L. [Linn. Herb. 804. 13 (LINN)] and with *Ruellia erecta* N. Burm., Fl. Ind. : 135, t. 41, f. 3. 1768) and treat *Hygrophilla angustifolia* R. Br. as conspecific with *Hygrophilla ringens* (L.) R. Br. ex Steudel, Nom. 1. : 418. 1821.

ERANTHEMUM L., Sp. Pl. : 9. 1753; Gen. Pl. ed. 5 : 9. 1754.

T.: *E. capensis* L.

Daedalcanthus T. Anderson, J. Linn. Soc. 8 : 485. 1860 : C. B. Clarke in Hook. f. FBI 4 : 417. 1884.

Note: Lectotype species of *Daedalcanthus* T. Anders. 1860 is conspecific with the type species of *Eranthemum* L. (1753) (cf. Nicolson *et al.*

l.c. : 38. 1988). Mabberley (The plant-book : 169. 1987) reduces, therefore, *Daedalcanthus* T. Anders. as a congeneric synonym of *Eranthemum* L.

Eranthemum purpurascens Nees in Wall., Pl. As. Rar. 3 : 106. 1832; Hara *et al.*, Enum. 3 : 140. 1982; *Justicia pulchella* Roxb., Pl. Corom. 2 : 41. t. 177. 1798; *Eranthemum pulchellum* (Roxb.) Roxb., Fl. Ind. 1 : 111. 1820, *non Andrews* 1800; *Daedalcanthus purpurascens* (Nees) T. Anders, in Jour. Linn. Soc. 9 : 488. 1860; C. B. Clarke in Hook. f. FBI 4 : 420. 1884; Haines, Botany 2 : 713.

Undershrubs; stems 4-angled, branches minutely pubescent. Leaves opposite, elliptic or ovate-acuminate, base decurrent, glabrous or pubescent beneath, sometimes crenate-dentate, 17-20 × 10-11 cm; uppermost much smaller, subsessile. Spikes many, axillary or terminal, dense, ternate, long peduncled, oblong, 2.5-6 cm long; flowers lilac or bluish, 3-5 cm long; bracts ovate, long acuminate, imbricate, prominently veined, pubescent beneath; 2.5 cm long; bracteoles linear-lanceolate, 5 mm long; calyx 6 mm long, lobed half-way down, sepals 5, obovate; stamens 2, anther-cells parallel. Capsules clavate, base solid, cylindric, 1-2 cm long, 4-seeded.

Fl. & Frt. : Jan.-June.

Common in shady places on slopes, near streams, edges of the forests.

Khondra : 12783; Achanakmar : 19536; Kabirchabutra : 13369.

2n = 84.

India, Sri Lanka.

GENDARUSSA Nees in Wall., Pl. As. Rar. 3 : 76, 103. 1832.

LT : *G. vulgaris* Nees [*Justicia gendarussa* N. Burm. (*sphalm* L. f.)] (vide Nees in DC., Prod. 11 : 410. 1874).

Note : While Mabberley (The plant-book. : 238. 1987) treats *Gendarussa* Nees as an alternate name for *Justicia* L., Nicolson *et al.* (1988 : 41) consider "*Vada-Kodi* Adanson, (1763, 2 : 201, 617) as a priorable synonym of *Gendarussa* Nees, 1832". Mabberley (l.c.) does not, however, list *Vada-Kodi* Adanson as 'good' generic name.

Gendarussa vulgaris Nees in Wall., Pl. As. Rar. 3 : 104. 1832; Bremek. in Dansk Bot. Arkiv. 20 : 81. 1961; Babu, Herb. Fl. Dehra Dun : 383.

1977; *Justicia gendarussa* N. Burm., Fl. Ind. : 10. 1768; L. f., Suppl. Pl. : 85, 1782; C. B. Clarke in Hook. f. FBI 4 : 532. 1885; Haines, Botany 2 : 725. Nicolson *et al.*, Regnum Veget. 119 : 41. 1988. *Vada-Kodi* Rheede, Hort. Malab. 9 : 79-80, t. 42. 1689. (*Nila-nirgundi*—Sansk.; *Kukurodonti*—Oriya).

Undershrubs; branches subterete. Leaves short-petioled, lanceolate or linear-lanceolate, glabrous, entire or undulate, 7.5-12.5 × 1.5-2 cm. Spikes terminal and on short lateral branches, interrupted, puberulous or glabrous, 5-12 cm long, terminal ones often forming a panicle; flowers white, purple-spotted within, clustered; bracts linear, about 2 mm long; calyx sub-5-partite, 4-5 mm long, segments linear; corolla 2-lipped, 1.2 cm long, nearly glabrous; stamens 2, lower anther-cell spurred; stigmas 2-fid. Capsules clavate, glabrous, 1.25 cm long, 4-seeded.

LT.: Rheede, l.c. : t-46. 1689 (selected here for *J. gendarussa* N. Burm.).

Fl.: Apr.-May. *Frt.*: July-Aug.

Often cultivated as hedge plant, growing also in waste places.

Lainga 15374.

2n = 28, 30. 30 + 2B, 32.

India, Sri Lanka.

Febrifuge, emetic, emmenagogues, diaphoretic. Infusion of leaves given in cephalgia, hemiplegia and facial paralysis. Juice of leaves stops internal haemorrhage. Plant is used in Kerala to cure rheumatism.

HEMIGRAPHIS Nees in DC., Prodr. 11 : 722. 1847.

T. : *non designatus*

Hemigraphis latebrosa (Heyne ex Roth) Nees in DC., Prodr. 11 : 723. 1847; C. B. Clarke in Hook. f. FBI 4 : 423. 1884; Haines, Botany 2 : 705; Fl. Hasan : 549. 1976; *Ruellia latebrosa* Heyne ex Roth, Nov. Pl. Sp. : 307. 1821.

Diffuse or erect herbs; stems 4-angled, patently hairy. Leaves opposite, petioled, ovate, crenate-serrate or coarsely toothed, acuminate, base suddenly contracted on petioles, sparsely hairy, 5-11 × 2.5-3.5 cm. Spikes

capitate or sub-capitate, bracteate, on axillary peduncles; flowers blue, 6 mm across; bracts foliaceous, ovate or elliptic, up to 8 mm long; bracteoles present; calyx 5-partite, sepals linear-lanceolate, hairy, pale, subequal, 3-5 mm long; corolla funnel-shaped or ventricose, 1.5-2 cm long, tubes pale or yellowish, lobes 5, rounded; stamens 4, longer filaments densely bearded; staminodes 0; ovules more than 2 in each locule. Capsules about 6 mm long, linear or linear-oblong, 4-angled, minutely patently hairy, 6-seeded.

Fl. & Frt: Nov.-Jan.

Common in rock crevices under shade.

Achanakmar: 13227: Kabirchabutra : 13366; Katghora : 3711, 3976.

2n = 56.

India.

HYGROPHILA R. Br., Prodr.: 479. 1810.

Type: *H. angustifolia* R. Br. [=**H. ringens** (L.) R. Br. ex Steudel; Nicolson *et al.*, Reg. Veg. 119 : 39. 1988].

1a. Inflorescences in axillary whorls, spinose; calyx-segments 4; stamens 4; seeds 4-6 per capsule — *H. schulli*

1b. Inflorescences in terminal spikes, not spinose; calyx segments 5; stamens 2; seeds 16-20 per capsule — *H. polysperma*

Hygrophila polysperma (Roxb.) T. Anders. in Jour. Linn. Soc. Bot. 9 : 456. 1867; C. B. Clarke in Hook. f. FBI 4 : 406. 1884; Haines, Botany 2 : 702; Hara *et al.*, Enum. 3 : 141. 1982; *Justicia polysperma* Roxb. (Hort. Beng. 3 : 1814, *nom. nud.*) Fl. Ind. ed. Carey 1 : 119. 1820; *Hamiadelphus polyspermus* (Roxb.) Nees in Wall., Pl. As. Rar. 3 : 80. 1832.

Procumbent-ascending herbs; stems puberulous. Leaves oblong, ovate or linear-oblong, glabrous or puberulous, tapering at both ends. Spikes dense, terminal, oblong, 1.5-2.5 cm long; bracts oblong or elliptic, foliaceous, pubescent; bracteoles linear, 5-7 mm long; flowers pale blue or white, sessile; calyx 4-5-partite, villous, lobes linear-subulate, 6 mm long; corolla bilabiate, pubescent, 8 mm long; stamens 2, upper reduced to teeth, 2 perfect, anthers of perfect ones oblong or sagittate. Capsules linear-oblong, pubescent towards apex, 7 mm long, 20-30-seeded.

Fl. & Frt.: Nov.-Feb.

Common in wet places, forming mats on the grounds.

Kota : 13069; Pasan : 15296; Katghora : 8677.

2n = 32.

Afghanistan, India, Nepal.

H. schulli (Ham.) M.R. & S.M. Almeida, J. Bombay Nat. Hist. Soc. 83 (Suppl.) : 221. 1986; Nicolson *et al.*, Regnum Vegetab. 119 : 40. 1988. *Barleria longifolia* L., in Torner, Cent. II Pl. 2 : 22. 1756, non *Hygrophila longifolia* Nees (1847); *Bahel schulli* Ham. in Trans. Linn. Soc. London 14 : 289. 1825; *Barleria auriculata* K. Schum. in Schum. & Thonn., Beskr. Guin. Pl. : 285. 1827. *Ruellia longifolia* (L.) Roxb., Fl. Ind. 3 : 50. 1832; *Asteracantha longifolia* (L.) Nees in Wall., Asiat. Rar. 3 : 90. 1832; Haines, Botany 2 : 704; *Hygrophila spinosa* T. Andera. in Thw., Enum. Pl. Zeyl. : 225. 1860; C. B. Clarke in Hook. f. FBI 4 : 408. 1884; *Hygrophila auriculata* (K. Schum.) Heine in Kew Bull. 16 : 172. 1956; *Hara et al.*, Enum. Pl. Nepal. 3 : 141. 1982. *Bahel-schulli* Rheede, Hort. Malab. 2 : 87-88, t. 45. 1679. (*Kokilaksha*—Sansk.; *Koilikhia*—Oriya).

Erect, hispid herbs, with dense whorls of spines. Leaves sessile, lanceolate, acute at both ends, sparsely hispid with long white hairs, 7-17×1-1.5 cm. Flowers in large, usually axillary, spiny whorls, blue with purple lips 3 cm long; bracts foliaceous, 1-2.5 cm long; bracteoles 5-8 mm long; calyx silky, 4-5-partite, sepals lanceolate, 0.8-1.2 cm long, upper rather largest, lower obtuse, emarginate or short-bifid; corolla-tubes 1-1.5 cm long, ventricose above, upper lip 2-lobed, lower lip 3-lobed, palate yellow with 2 orange ridges; stamens 4, didynamous, anther-cells parallel. Capsules linear-oblong, compressed, 4-8-seeded from base.

Fl. & Frt. : Oct.-Jan.

Common in ditches, marshy places.

Lamni to Achanakmar : 19533; Keonchi to Pendra; 15382; Katghora : 3988.

2n = 24, 32

Africa, India, Sri Lanka.

Roots, leaves, seeds diuretic; used in jaundice, dropsy, rheumatism, urino-genital diseases and anasarca. Seeds yield a semi-drying oil.

INDONEESIELLA Sreem., Phytologia 16 : 466. 1968.

T. : *I. echioides* (L.) Sreem.

Indoneesiella echioides (L.) Sreem. Phytologia 16 : 466. 1968; Nicolson *et al.*, Regnum Vegetab. 119 : 40. 1988. *Justicia echioides* L., Sp. Pl. : 16. 1753. *Andrographis echioides* (L.) Nees in Wall. Pl. Asiat. Rar. 3 : 117. 1832; Haines, Botany 2 : 734. *Neesiella echioides* (L.) Sreem. Phytologia 15 : 271. 1967. *Pee-tumba* Rheede, Hort. Malab. 9 : 87, t. 46. 1689. (*Birkubat*—Hindi).

Erect, hairy, annual herbs; stems 4-angled. Leaves sessile, oblong-rounded or sub-elliptic, obtuse, base cuneate, pubescent, pale purple spotted, 3.5 × 2-2.5 cm. Racemes numerous, axillary, divaricate or recurved, glandular hairy, 7-10 cm long; flowers sessile or sub-sessile, pink or white, 1-2 cm long; sepals linear, glandular hairy, 5 mm long, in fruiting, upto 1 cm long; corolla 0.8-1.25 cm long, tubular, pubescent, lower lip dark purple; stamens 2, anthers exserted, white, barbate, dark purple. Capsules ellipsoid-oblong, acute at both ends, compressed, 6-9 mm long.

LT. : Herb. Hermann No. 21 (BM) (vide Trimen 1887 : 134).

Fl. & Frt. : July-Jan.

Common in forest clearings, between rock boulders, cool shady places.

Madai : 19476; Katghora : 3997; Madai to Bilaspur : 12906.

2n = 38, 48.

India, Sri Lanka.

Juice of the plant is used as febrifuge (other properties as those of *Andographis paniculata*).

JUSTICIA L., Sp. Pl. : 15. 1753 & Gen. Pl. ed. 5; 10. 1754.

LT. : *J. hyssopifolia* L. (vide Hitchock & Green in Int. Bot. Cong. Cambridge, 1930; Nomenclature Sect Proposal Brit. Bot. : 116. 1924).

Comments regarding lectotypification are given under *Adhatoda* Mill. As stated, Nees (1832) had selected *Justicia echolium* L. as the lectotype (?) of *Justicia* L. *Stearn* (J. Arn. Arb. 52 : 636-637. 1971) advocated treating *Justicia* L. in a broad sense, unlike Nees (1832) and Bremekamp (Verh. Kon. Nederl. Akad. Wetensch., Afd. Natuurk., Tweede, Sect. 44(2) : 1-78. 1948) and he has been followed by Hara *et al.* (1982) and Malik & Ghafoor (1988), and by Mabberley, (*The Plant-Book* : 302. 1987), who reduces *Adhatoda vasica* Nees as *Justicia adhatoda* L. and *Rostellularia* Reichb. as *Justicia* L. Nicolson *et al.* (1988), as also Mabberley (1987), follow Stearn's (*l.c.*) broader concept of *Justicia* L.

Justicia betonica L., Sp. Pl. : 15. 1753; Haines, Botany 2 : 724; Nicolson *et al.*, Regnum Veget. 119 : 41. 1988. *Adhatoda betonica* (L.) Nees in Wall., Pl. Asiat. Rar. 3 : 103. 1832. *Bem-curini* Rheede, Hort. Malab. 2 : 33-34, t. 21. 1679.

Erect, suffruticose herbs or undershrubs; stems striate, swollen above nodes. Leaves ovate-lanceolate, short-attenuate on 1-2 cm long petioles, entire, glabrous or pubescent, 7-11 × 3-4 cm; upper smaller, sessile. Spike terminal, 1-3-nate, short-peduncled, 2.5-10 cm long; bracts and bracteoles foliaceous, membranous, ovate or elliptic, white with green veins, closely imbricate, 1-1.2 cm long; flowers small, white with rose-spots; calyx 5-lobed, 5 mm long, sepals subulate, or linear-lanceolate, pubescent; corolla 1.5 cm long, hairy, 2-lipped; stamens 2, lower anther-cells spurred; stigmas 2-fid. Capsules clavate, pubescent, 4-seeded, 6-10 mm long.

LT.: Ceylon, Herb. Hermann, Sp. no. 18 (BM) (vide Trimen 1887 : 134).

Fl. & Frt: Nov.-Mar.

Common in rock crevices, on slopes.

Keonchi : 13291 A; Khuria to Aurapani : 15475.

2n = 28, 34.

Tropical Africa, India, Sri Lanka, Malaya.

Plant used in application for boils and swellings, also in diarrhoea.

LEPIDAGATHIS Willd., Sp. Pl. 3(1) : 400. 1800.

T.: *L. cristata* Willd.

1a. Capsules 2-seeded, dehiscing irregularly; seeds ovate-lanceolate.

2a. Leaves 3-veined; spikes axillary, scattered on many-branches and a few clustered at base — *L. trinervis*

3a. Bracts elliptic-ovate or obovate, suddenly spinose-acuminate, densely softly hairy; sepals elliptic or obovate, thickened upwards; corolla densely hairy — *L. cristata*

3b. Bracts lanceolate, long spinous-acuminate, glabrescent but ciliate with long, stiff hairs on margins; sepals lanceolate, membranous; corolla with adpressed straight white hairs — *L. hamiltoniana*

1b. Capsules 4-seeded, distinctly 2-valved; seeds ovate or orbicular

4a. Stems green; bracts not striate, with about 2 mm long cilia; all anthers 2-celled — *L. incurva*

4b. Stems purple; bracts striate, with 0.3-0.8 mm long cilia; one pair of anther 1-celled — *L. purpuricaulis*

Lepidagathis cristata Willd., Sp. Pl. 3(1) : 400. 1800; C. B. Clarke in Hook. f. FBI 4 : 516. 1885; Fl. Hassan : 553. 1976. (*Bhuterada*—Marathi).

Procumbent herbs; stems 4-angled, puberulous. Leaves sessile, linear- or oblong-lanceolate, lineolate above, minutely scabrid pubescent on veins beneath, 2.5-4 × 0.5-0.8 cm. Spikes capitate, sub-radical, one or two smaller spikes rarely present on lower part of leafy branches; bracts pubescent, white margined, 9 mm long, spiniscent; bracteoles membranous, elliptic-ovate or obovate, hairy, spiniscent; flowers sessile, white, with brown or purple spots in palate; calyx sub-4-partite; sepals suddenly spinulose in fruits, one sepal bifid; corolla densely hairy, 8-9 mm long, tubular, suddenly ventricose in middle, bilabiate; stamens 4, didynamous inserted at base of corolla-tube. Capsules elongate, oblong, 5 mm long.

Fl. & Frt. : Dec.-Mar.

Occasionally found on hard soils, along forest roads.

Katghora : 6084.

2n = 22, 24.

India.

Leaves used as fodder; plant used as tonic in fevers; also applied to itchy affections of the skin.

L. hamiltoniana Wall. ex Nees in Wall., Pl. As. Rar. 3 : 96. 1832; C. B. Clarke in Hook. f. FBI 4 : 516. 1885; Haines, Botany 2 : 720; Nair in Rec. bot. Surv. Ind. 21 : 203. 1978.

Erect or diffuse herbs; stems 4-angled. Leaves linear- or narrowly oblong, acute, sub-sessile, nearly glabrous, 5-10 × 0.6-0.9 cm. Spikes unilateral; bracts lanceolate or ovate-lanceolate, acuminate, spiniscent, patently ciliate upwards; bracteoles lanceolate, spiniscent, membranous below, ciliate upwards; flowers white, 1.2 cm long; calyx 5-lobed, lobes lanceolate, spiniscent, tough-membranous, 8 mm long; corolla silky hairy

with adpressed white hairs, 5 mm to ventricose part, lower lip nearly 1 cm in diam.; stamens 4, didynamous, inserted at base of corolla-tube. Capsules about 6-7 mm long, narrowly conical, glabrous, acute, enclosed in enlarged fruiting sepals.

Fl. & Frt. : Dec.-Feb.

Common on hard soil, rocky slopes, rock-crevices.

Achanakmar : 15428; Ratanpur : 13014B.

India.

Used for skin troubles.

L. incurva Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.; 119. 1825; Babu, Herb. Fl. Dehra Dun : 386. 1977; *L. hyalina* Nees in Wall., Pl. As. Rar. 3 : 95. 1832; C. B. Clarke in Hook. f. FBI 4 : 521. 1885; *pro. part. excl. vars.*; Haines, Botany 2 : 721.

var. **incurva.**

Diffused herbs; branches pubescent. Leaves petioled, oblong, ovate or linear, decurrent on petioles, pubescent, 5-8 × 2-4.5 cm. Spikes oblong, dense, axillary and terminal, solitary or clustered, but not at base of stem, 1-3.5 cm long, unilateral; bracts 4-farious imbricate, ovate or lanceolate, awned or mucronate, 6-8 mm long; bracteoles linear-lanceolate, mucronate 8 mm long; flowers white, 6 mm long; calyx sub-5-partite, 8-10 mm long; segments linear-lanceolate, mucronate, ciliate or softly hairy; corolla 1-1.8 cm long, tubular, suddenly ventricose, upper lip brown, emarginate, 6-7 mm long, lower patent; stamens 4, didynamous, inserted at base of corolla-tube. Capsules oblong, beaked, 5-6 mm long, 4-seeded.

Fl. & Frt. : Dec.-Apr.

Common in damp rock crevices, in leaf-litters in 'Sal' forests, on slopes.

Lamni : 15410.

India, Burma, China.

Leaves chewed to relieve cough.

L. purpuricaulis Nees in Wall., Pl. As. Rar. 3 : 96. 1832; C. B. Clarke in Hook. f. FBI 4 : 519. 1885; Haines, Botany 2 : 721; Murti in Bull. bot. Surv. India 21 : 183. 1979.

Diffuse, suffruticose herbs; branches flexuous, 4-angled Leaves lanceolate or ovate-lanceolate, pubescent, attenuate at both ends, glabrate, 6-10 cm long, smaller subovate, pubescent. Spikes axillary, solitary or clustered, oblong, glandular, 1-3.5 cm long; bracts glandular-hairy, 6-7 mm long, oblong-lanceolate, acuminate, strongly veined; bracteoles 8-10 mm long; flowers white with purple spots; calyx sub-5-partite, glandular-hairy, sub-aristately acuminate; corolla 1-1.5 cm long, tubular below, ventricose above, upper lip rounded, notched, lower lip spreading, deeply 3-fid, hairy outside; stamens 4, didynamous, inserted at base of corolla-tube. Capsules elongate, oblong, 6-7 mm long.

Type: Tong Dong, 26 Nov. 1826, Wall. Num. List No. 2366g (K-WALL.).

Fl. & Frt: Feb.-May.

Occasionally found on slopes.

Kabirchabutra : 15217.

2n = 22, 84.

India, Burma.

L. trinervis Wall. ex Nees in Wall. Pl. As. Rar. 3 : 96. 1832; C. B. Clarke in Hook. f. FBI 4 : 517. 1885; Haines, Botany 2 : 720.

Diffused herbs. Leaves sessile, linear or linear-lanceolate, entire, 1.2-5.5 × 0.2-0.5 cm, smaller ones often oblong or elliptic. Spikes ovoid, often unilateral, 0.8-1.6 cm long, axillary and often aggregated at base of plants; bracts ovate or obovate, spinose-cuspidate, 1.2-1.9 cm long; bracteoles linear-lanceolate, membranous; flowers white with brown spots; calyx deeply 5-lobed, outer 3 lanceolate, acute, not spine-tipped, nearly glabrous outside, hairy within, inner 2 shorter, hairy on both sides; corolla white, 6 mm long, tubular below, ventricose above; stamens 4, didynamous, inserted at base of corolla-tube. Capsules elongate, ovoid-oblong, about 6 mm long, 2-seeded.

Fl. & Frt: Oct.-Feb.

Common in rock-crevices.

Ratanpur : 13014; Katghora : 6084.

India.

Considered as a bitter tonic.

NELSONIA R. Br. Prodr. : 480. 1810.

T. : *non designatus*

Nelsonia canescens (Lam.) Spring., Syst. Veg. 1 : 42. 1825; Bremek. in Reinwardtia 3 : 248. 1955; M. Hossain & T. Emumwen in Kew Bull. 36(3) : 565-568. 1981; Hara *et al*, Enum. 3 : 142. 1982, *Justicia canescens* Lam., Encycl. Meth. Bot. 1 : 41. 1791; *Nelsonia campestris* R. Br., Prodr. : 481. 1810; C. B. Clarke in Hook. f. FBI 4 : 394. 1884; Haines, Botany 2 : 700.

Diffused herbs; softly villous. Leaves opposite, subsessile upwards, petioled below, elliptic or elliptic-ovate, entire, subacute or obtuse, 3.5-15 × 3-7 cm. Spikes ovoid or cylindric, glandular-villous, 2-6 cm long, sessile, terminal on lateral branches; bracts ovate, obtuse, imbricate, herbaceous, 5-8 mm long; flowers bluish-white or purple; sepals 4, unequal, lanceolate, larger bifid, all green, striate, hairy or sub-scarious, 3-3.5 mm long; corolla-tubes slender, inflated below, limbs 2-lipped, lobes 5, spreading, throats and palate with curled villi; stamens 2, inserted on corolla-tube. Capsules oblong or ovoid, conical, 5-6 mm long, 8-12-seeded below, upper barren.

Type : Senegal, *Roussillon* 53 (P-LA)

Common in black humus soil inside forest.

Khondra : 16757; Kabirchabutra : 15232; Katghora : 8706.

Africa, India, Sri Lanka, S.E. Asia, China, Australia.

Fodder for goats and sheep.

PERISTROPHE Nees in Wall., Pl. As. Rar. 3 : 77. 112. 1832.

T. : *non designatus*

Peristrophe paniculata (Forssk.) Brummitt, Kew Bull. 38 : 341. 1983; Nicolson *et al.*, Regnum Vegetab. 119 : 42. 1988.

Dianthera paniculata Forssk., Fl. Aegypt.-Arab. : 7. 1775; *Dianthera bicalyculata* Retz., Act. Holm. 1775 : 279, t. 9. 1776, et Obs. Bot. 1 : 10. 1779. *Justicia fragilis* Dennst. Schlussel : 12, 22, 32. 1818. *Peristrophe bicalyculata* (Retz.) Nees in Wall. Pl. As. Rar. 3 : 113. 1832; Haines, Botany 2 : 730. *Justicia fragilis* Dennst., Schlüssel : 12, 22. 32. 1818. Type : *Katou-pulcolli* Rheede, Hort. Malab. 6 : 41, t. 23. 1686. (*Nasabhaga*—Beng.; Atrilal—Hindi).

Erect herbs; paniculately branched, with swollen nodes and angled stems, patently hairy. Leaves ovate or ovate-lanceolate, acuminate or acute, base decurrent on petioles, hairy, 3-10 × 2-4.5 cm; upper gradually passing into bracts. Cymes in copiously branched, lax, divaricate panicles; bracts linear-spathulate, 1.5 cm long, glandular hairy; bracteoles shorter, scarious margined; flowers pink or purple; calyx deeply 5-lobed, sepals linear-lanceolate, hairy, sub-aristate or setaceous upwards, 4-5 mm long; corolla-tubes slender, hairy, limbs 2-lipped, 1-1.5 cm long; stamens 2, exserted, filaments hairy below. Capsules ellipsoid-oblong, compressed, hairy beaked, stipitate, 1 cm long.

Fl. & Frt.: Dec.-Mar.

Common in hedges, waste places.

Palmi : 16717.

2n = 20, 30, 60 (as *P. bicalyculata* Nees).

Africa, India, Nepal, Burma.

Used as a fodder for horses; used as green manure; yields an essential oil with tuberculostatic activity in *vitro*.

PETALIDIUM Nees in Wall., Pl. As. Rar. 3 : 75, 82. 1832.
T.: *P. barlerioides* (Roth) Nees (*Ruellia barlerioides* Roth).

Petalidium barlerioides (Roth) Nees in Wall. Pl. As. Rar. 3 : 82. 1832; C. B. Clarke in Hook. f. FBI 4 : 416. 1884; Haines, Botany 2 : 710; Hara *et al.* Enum. 3 : 143. 1982; *Ruellia barlerioides* Roth, Nov. Pl. Sp. 310. 1821. 'Bhensa'.

Straggling undershrubs, young branches pubescent. Leaves ovate or narrowly oblong, toothed or crenate, acuminate, hairy, decurrent on petioles, 4-10 × 2-4 cm. Flowers white, 3-3.5 cm long, sessile or sub-sessile, solitary or in pairs, axillary, usually crowded in dense or sub-capitate spikes; bracteoles foliaceous, ovate, reticulate, ultimately, scarious; calyx glandular-hairy, 5-partite, sepals sub-equal, linear, 1-1.3 cm long; corolla narrow campanulate, tubes straight, ventricose from base; palate with long deflexed fulvous hairs within; lobes 5, rounded; stamens 4, didynamous, anther-cells parallel, spurred; stigmas 2-lobed. Capsules clavate, cuspidate, compressed, glabrous, 1.2-1.5 cm long, 2-seeded.

Fl.: Feb.-Apr. *Frt.*: Apr.-May.

Common on slopes, in waste places, inside 'Sal' forests.

Khondra : 16759.

2n = 32.

India, Nepal.

ROSTELLULARIA H.G.L. Reichb., Handb. 190. 1837.

LT. : *R. procumbens* (L.) Nees in Wall., Pl. As. Rar. 3 : 101. 1833; et Nees in DC. Prodr. 11 : 371. 1847 (*Justicia procumbens* L.) (vide Farr *et al.*, Ind. Nom. Generic. (1979).

Nicolson *et al.* (Regnum Veget. 119 : 41. 1988) continue to treat *Justicia procumbens* L. under *Justicia* L. and observe : "Those who treat *Justicia* in a narrow sense should carefully review the typification of the many generic names involved, particularly *Justicia*, perhaps first restricted to *J. echolium* L. by Nees (*l.c.*)", but Farr *et al.* (1979, 2 : 896) lecto-typified the genus by *J. adhatoda* L.

1a. Glabrous herbs or nearly so; leaves linear or lanceolate, sessile or subsessile; spikes linear; bracts, bracteoles and sepals obtuse; sepals glabrous — *R. quinquangularis*

1b. Hair herbs; leaves elliptic-oblong, ovate or orbicular, petioled; spikes cylindric; bracts, bracteoles and sepals acute; sepals hairy or scabrous

2a. Spikes slender, lax, 2-3 mm wide; bracts and bracteoles shorter than sepals; bracts linear-lanceolate or linear; sepals scabrous upwards — *R. prostrata*

2b. Spikes stout, dense, 8-15 mm wide; bracts and bracteoles as long as or longer than sepals; bracts elliptic-lanceolate; sepals hairy nearly to base — *R. mollissima*

Rostellularia mollissima (Nees) in DC., Prodr. 11 : 373. 1847; Babu, Herb. Fl. Dehra Dun : 391. 1977; *Rostellaria mollissima* Nees in Wall., Pl. As. Rar. 3 : 101. 1832, *pro. part.*; *Justicia simplex* D. Don, Prodr. Fl. Nepal. : 118. 1825; C. B. Clarke in Hook. f. FBI 4 : 539. 1885, *non Rostellularia simplex* Wight. 1850; Haines, Botany 2 : 727; *J. procumbens* L. var. *simplex* (D. Don) Yamazaki in Hara, Fl. East. Himalaya : 302. 1966; Hara *et al.* Enum. 3 : 142. 1982; *Rostellularia japonica sensu* Ellis in Bull. bot. Surv. Ind. 22 : 196. 1980. *non* (Thunb) Ellis 1980.

Erect herbs; stems angular, grooved, swollen above nodes, hairy. Leaves petioled, ovate or ovate-lanceolate-elliptic, tapering at both ends, sub-acute or sub-obtuse, lineolate and sometimes strigose, 2-8 × 1-3 cm. Spikes dense, hairy, axillary and terminal, 2-7 cm long; bracts narrowly obovate or lanceolate, scarious, strongly ciliate, 5 mm long; bracteoles

linear or oblong, membranous, ciliate, 5 mm long; flowers pale-purple or rose-coloured; calyx 4-partite, sepals 4 mm long, linear-lanceolate, hirsute or hairy; corolla hairy, 4-5 mm long, lower lip with 3 rounded lobes; stamens 2; stigmas 2-fid. Capsules elliptic-oblong, base solid, tip hairy, 3-4 mm long.

Fl. & Frt. : Oct.-Jan.

Common in slopes, in waste places, inside forests, in rock crevices.

Kabirchabutra to Chauradadar : 15211; Korba to Putka Pahar : 19454; Siang : 16833; Madai : 12907; Katghora : 7113; Achanakmar : 13227, 13224A.

2n = 18, 28, 36 (as *Justicia simplex* D. Don).

E. Africa, India, Malaysia.

Although *Rostellaria* Nees (1832), being a later homonym of *Rostellaria* Gaertn. (1791) is illegitimate, *R mollissima* Nees in legitimate (Art. 68.1, I.C.B.N., 1988).

R. prostrata (Roxb. ex C. B. Clarke) Majumdar in Bull. bot. Soc. Beng. 25 : 75. 1971; *Justicia diffusa* Willd. var. *prostrata* Roxb. ex C. B. Clarke in Hook. f. FBI 4 : 538. 1885; *J. prostrata* (Roxb. ex C. B. Clarke) Gamble, Fl. Madras : 1081. 1924.

Prostrate herbs; patently hairy. Leaves elliptic-ovate or orbicular, obtuse, entire, lineolate, 1.5-2.5 × 1-1.5 cm. Spikes slender, 2.5-14.5 cm long, sparsely hairy; in fruits somewhat wider owing to opening of capsules and spreading sepals; bracts and bracteoles linear-lanceolate to ovate, hispidly hairy, membranous, with green mid-vein; flowers pinkish or white, 6-8 mm across; calyx 4-5 mm long, sepals 4, membranous, with green mid-vein, linear or lanceolate, acute; corolla 5-6 mm long, hairy, 2-lipped, tubes equalling or shorter than limbs; stamens 2; stigmas 2-fid. Capsules ovate or ellipsoid-oblong, 3-4 mm long, base solid, 2.5-3.5 mm long, hairy.

Fl. & Frt. : June-Jan.

Common on hard soil, in waste places, forest clearings.

Korbi : 15335; Siang : 16833.

2n = 18 (as *Justicia diffusa* var. *prostrata* Roxb. ex Clarke).

India, Sri Lanka, Burma.

R. quinquangularis (Koenig ex Roxb.) Nees in DC., Prodr. 11 : 375. 1847; *Justicia quinquangularis* Koenig ex Roxb., Fl. Ind. ed. Carey 1. : 134. 1832; C. B. Clarke in Hook. f. FBI 4 : 536. 1885; Haines, Botany 2 : 726; Hara *et al.* Enum. 3 : 142. 1982.

Erect or ascending herbs; branches rigid, 5-angular. Leaves in distant pairs, linear or lanceolate, lineolate above, 1.5-7 × 0.5-0.7 cm. Spikes 2.5-10 cm long, terminal, lax; bracts 4 mm long, glabrous, scarious-margined; bracteoles similar; flowers white with pink spots, 6-8 mm long; sepals 4, linear-oblong, obtuse, herbaceous, 4-5 mm long; fruiting sometimes 6 mm long; corolla 2-lipped, tubes equalling or shorter than limbs; upper lip 2-lobed or sub-entire, lower 3-lobed; stamens 2; stigmas 2-fid. Capsules stout, oval or ellipsoid, 6 mm long.

Fl. & Frt. : Sept.-Nov.

Common in waste places, forest clearings, along forest-roads, on slopes.

Pasarkhet to Kartala : 19433; Keonchi : 13263A; Pasarkhet : 12947; Korba : 8720; Achanakmar : 19296.

2n = 18 (as *Justicia quinquengularis* Nees).

India, Nepal.

Leaves used as pot-herb.

RUNGIA Nees in Wall., Pl. As. Rar. 3 : 77. 109. 1832.

T. : *non designatus.*

1a. Bracts dimorphic, barren ones elliptic or oblong, sub-obtuse, striate, flowering ones obovate, scarious-margined, hairy; upper lip of corolla acute — *R. pectinata*

1b. Bracts uniform, round, apiculate, nearly glabrous, white margined; upper lip of corolla emarginate — *R. repens*

Rungia pectinata (L.) Nees in DC., Prodr. 11 : 469. 1847; Fl. Hassan : 559. 1976; *Justicia pectinata* L. in Torner, Cent. II. Pl. 3. 1756 et Amoen. Acad. 4 : 299. 1759; *Rungia parviflora* (Retz.) Nees var. *pectinata* (L.) C. B. Clarke in Hook. f. FBI 4 : 550. 1885; Haines, Botany 2 : 723. (*Bir lopong arak, hasaarak*—Santhal).

Prostrate or ascending herbs. Leaves linear-lanceolate to narrowly elliptic or ovate, nearly glabrous, narrowed at both ends, subsessile, lineolate, 1-5 × 0.2-1 cm. Spikes 2.5 cm long, terminal and axillary, clustered, sub-sessile, unilateral, secund, two rows of imbricate, barren bracts, 4-5 mm

long and two ventral rows of flowering bracts, 4 mm long; bracteoles elliptic, sub-acute, 2.5-3 mm long; flowers bluish violet or purple; calyx 5-fid, segments linear-lanceolate, pubescent, 2-2.5 mm long; corolla 3 mm long, hairy, upper lip short emarginate, lower lip 3-lobed; stamens 2, lower anther-cells spurred. Capsules glabrous, ovoid or oblong, 2 mm long.

Fl. & Frt. : Almost throughout the year; chiefly Nov.-Feb.

Common in waste places, forest clearing, along forest roads.

Korbi : 12858; Keonchi : 13258; Kabirchabutra : 13367, 13375, 13376; Katghora : 6059.

2n = 26, 50.

India, Sri Lanka, Burma.

Juice of leaves refrigerant and aperient; bruised leaves applied to confusions; roots febrifuge. Herb used as an adulterant of the drug Fumitory (*Fumaria* spp.).

R. repens (L.) Nees in Wall., Pl. As. Rar. 3 : 110. 1832; C. B. Clarke in Hook. f. FBI 4 : 549. 1885; Haines, Botany 2 : 724; Fl. Hassan : 559. 1976; *Justicia repens* L., Sp. Pl. : 15. 1753. (*Kharmor*—Hindi).

Procumbent herbs. Leaves subsessile, oblong-lanceolate, scabrid-puberulous, 0.5-4 × 0.4-1 cm. Spikes terminal, pubescent, 2.5-5 cm long; bracts closely imbricated, 4-farious, broadly elliptic, white margined, 4-6 mm long; bracteoles smaller, linear-lanceolate, minutely pubescent; flowers bluish or pinkish, 6 mm across; calyx 5-lobed, segments linear-lanceolate, pubescent, 4 mm long; corolla 6-10 mm long, hairy outside, upper lip emarginate; stamens 2, anthers blue, lower anther-cells spurred, filaments white. Capsules minutely thinly hairy, ovoid or oblong, 4-6 mm long.

Fl. & Frt. : Oct.-Feb.

Common in moist waste places forming clumps.

Bilaspur : 12979.

2n = 20.

India, Sri Lanka.

Herb dried and pulverised for use in cough and fever; also vermifuge and diuretic. Fresh bruised leaves mixed with castor oil and applied to scalp as a cure for *tinea capitis*, a scaly fungoid infection.

THUNBERGIA Retz. in Physiogr. Saelsk Handl. 1 : 163. 1780 ('1776') *nom. cons.*

T. : *T. capensis* Retz.

Thunbergia fragrans Roxb. var. **laevis** (Nees) C. B. Clarke in Hook. f. FBI 4 : 391. 1884; Haines, Botany 2 : 698; Fl. Hassan : 560. 1976; *T. laevis* Nees in Wall., Pl. AS. Rar. 3 : 77. 1832; Babu, Herb. Fl. Dehra Dun : 394. 1977; (*Chirmine*—Bombay).

Twining herbs; stems appressedly hairy. Leaves ovate-lanceolate to oblong, subcordate or hastate at base, obtuse, toothed, young ones pubescent, mature glabrate, 3-8 × 1-3 cm; petioles 1-2.5 cm long, not winged. Flowers solitary or 2, axillary, 2.5-3.5 cm long, bluish-white; calyx annular, divided half way down into 12-16 teeth, teeth lanceolate, 3-3.5 mm long in flowers, elongating in fruits; corolla-tubes ventricose, often greenish; limbs oblique; lobes 5, obovate, irregularly dentate, 2.5-3.5 cm long; stamens 4, didynamous, included, anther-cells parallel or slightly unequally placed, usually spurred below. Capsules grey puberulous, globose, beaked.

Fl. & Frt. : Oct.-Feb.

Occasionally found on bushes and hanging on slopes.

Achanakmar : 15443; Kabirchabutra to Chauradadar : 15217A.

Grown in hedges for its white ornamental flowers.

India, Nepal, Sri Lanka.

Note : *Thunbergia* Retz. belongs to the subfam. *Thunbergioideae* (ovules 4; jaculators 0) and comprises 100 species of the Old World tropics are climbers, erect herbs or shrubs with bracteoles enclosing calyx. *Thunbergia grandiflora* (Rottler) Roxb. (Bengal Clock-vine) is a liana with blue 2-lipped flowers and is grown as an ornamental arbour vine.

VERBENACEAE

Jaume Saint-Hillaire, Expos. Fam. Nat. 1 : 245. 1805.

Type : *Verbena* L.

Note : The limits of the family are debated, small groups with different gynaecium arrangements split off as *Avicenniaceae* Endlicher (nom. cons.), *Phrymaceae* Schauer (nom. cons.), *Stilbaceae* Kunth (nom. cons.) and *Symphoremataceae* Tieghem, *Nyctanthaceae* J. G. Agardh by some though admitting close alliance with the *Verbenaceae* and the taxonomic rank at which they should

be recognised, is purely a matter of 'taste' (Cronquist, 1981; Mabberley, 1987; Hutchinson, 1973). While Cronquist would include the family in the order *Lamiales*, Hutchinson creates a separate order *Verbenales* (included by him in his LIGNOSAE, transferring the *Lamiaceae* Lindl. (*Lamiales*) to his HERBACEAE. Airy Shaw, (1973), following Moldenke, recognises four subfamilies in the *Verbenaceae* :

A. Inflorescence racemose or spicate

I. *Verbenoideae* : *Verbena, Lantana, Lippia, Petrea* etc.

B. Inflorescence of cymose-type ; cymes often united into panicles, corymbs etc. ; if axillary, often reduced to solitary flower

II. *Viticoideae* (fruits drupaceous ; flowers sometimes regular) : *Callicarpa, Tectona, Vitex, Clerodendrum*).

III. *Nyctanthoideae* (fruit a 2-locular, 2-valved, 2-seeded capsules ; flowers regular or almost so : *Nyctanthes*).

IV. *Caryopteridoideae* (frts. capsule-like, 4-valved, the valves falling so as to task the stones with them : *Caryopteris*).

Yet, Moldenke (1983), a decade or so later, treated the *Avicenniaceae, Nyctanthaceae, Symphoremaceae* and *Verbenaceae* as distinct families.

1a. Flowers actinomorphic ; stamens 2 — NYCTANTHES

1b. Flowers zygomorphic ; stamens 4 or more.

2a. Inflorescences spicate or racemose ; lowest flowers opening first

3a. Racemes simple or panicled ; flowers pedicelled ; ovaries 8-celled ; drupes with 2-seed pyrenes — DURANTA

3b. Spikes simple ; flowers sessile ; ovaries 1-, 2- or 4-celled ; drupes with 1-seeded pyrenes

4a Calyx tubular, 5-dentate, 5-ribbed ; ovaries 4-celled ; styles 2-lobed ; fruits with four 1-seeded pyrenes — VERBENA

4b. Calyx 2-partite or-lobed, not ribbed ; ovaries 2-celled ; styles entire ; fruits with 2- or 1-seeded pyrenes

5a. Erect shrubs or undershrubs ; calyx truncate or obscurely 2-lobed ; fruits drupaceous, succulent, not enveloped by calyx — LANTANA.

5b. Creeping herbs ; calyx deeply 2-4-lobed ; fruits capsular, dry, enveloped by calyx — PHYLA.

2b. Inflorescences cymes; uppermost flowers opening first

6a. Cymes 3-9-flowered, capitate; bracts involucriform; stamens 6 or more — SYMPHOREMA

6b Cymes many-flowered, paniculate; bracts not involucriform; stamens usually 4, rarely 6

7a. Stamens equal; drupes enclosed in calyx — TECTONA

7b. Stamens didynamous; drupes not enclosed in calyx

8a. Drupes with 4 pyrenes, sometimes 1-3 suppressed — CLERODENDRUM

8b. Drupes with 1 pyrenes

9a. Leaves simple; flowers pedicelled — PREMNA

9b. Leaves digitate; flowers subsessile — VITEX

CLERODENDRUM L., Sp. Pl. : 637. 1753 & Gen. Pl. ed. 5 : 285. 1754.

T. : *C. infortunatum* L. ('*infortunata*').

1a. Corolla tube distinctly zygomorphic, the limb plainly bilabiate, the tube curvate, swollen; fruit not splitting into four separate pyrenes at maturity — *C. serratum*

1b. Corolla-tube practically actinomorphic, the limb actinomorphic, the tube usually straight, slender; fruit usually splitting into four separate pyrenes at maturity

2a. Leaf-blades small, mostly rhomboid or deltoid, 1.7-6.8 cm long and 1.2-6.0 cm wide; petioles 5-22 mm long — *C. phlomidis*

2b. Leaf-blades and petioles longer, the blades not rhomboid-deltoid

3a. Corolla regularly "doubled" — *C. fragrans*

3b. Corolla not "doubled"
(conspicuous discoid glands on calyx; persistent foliaceous bracts and leaf-blades; calyx deeply lobed — *C. viscosum*

Clerodendrum fragrans Willd., Enum. Hort. Berol. : 659. 1807; C. B. Clarke in Hook. f. FBI 4 : 589. *Volkamamia japonica* Jacq. Hort. Schoenbr. 3 : 48, pl. 338. 1798, non *Clerodendrum japonicum* (Thunb.) Sweet (1827); *C. japonicum* var. *pleniflorum* (Schauer) Maheswari, Taxon 15 : 43. 1966; *C. fragrans* Willd. var. *pleniflorum* Schauer, l.c. : 666. 1847;

C. philippinum Schauer f. *philippinum* Schauer in A. DC., Prodr. 11 : 667. 1847 ('*Clerodendron*') ; Howard & Powell in Taxon 17 : 54. 1968.

LT. : Philippines, *Cuming* 1096 (GH) (vide Howard & Powell, l.c.).

var. **fragrans.**

Erect shrubs or undershrubs, young parts pubescent. Leaves opposite or verticillate, broadly ovate, short-acuminate, rounded-acute, base truncate or cordate, remotely toothed, pubescent along veins beneath, chartaceous, 7-15 × 4-10 cm. Panicles corymbose, terminal, dense, about 10 cm across; flowers double, white-pink, fragrant; calyx divided to middle, segments 5-8, brownish, upto 6 mm long, acuminate; corolla with many segments, glabrous, 2.5 cm across; tubes slender, about length of calyx; stamens 4. Fruits not seen.

Fl. : Sept.-Nov.

Generally planted for its fragrant flowers; often found as escape in waste places along roads.

Kabirchabutra : 13346, 19172.

2n = 46, 52.

Probably native of Philippines; planted throughout India.

Note : Howard & Powell (Taxon 17 : 54. 1968) pointed out that *Volkamannia japonica* Thunb. (*Clerodendrum japonicum* (Thunb.) Sweet is a different single-flowered species not referable to either the single-flowered or double-flowered forms referable to the present taxon. *Volkamannia japonica* Jacq. represents the double-flowered taxon and on lectotypification by *Cuming* 1096 (Gm), is best known as *Clerodendrum philippinum* f. *philippinum*. They argued that under the present Code, *C. fragrans* Willd. 1809), a nom. nov. for *Volkamannia japonica* Jacq. (1798), nom. illeg. (Art. 64.1), is not available (cf. Moldenke & Moldenke, 1983 : 472). But the nomenclatural set-up provided by Moldenke & Moldenke is not explicit as to why *C. fragrans* Willd. is nom. illeg. Howard & Powell (l.c.) selection of the lectotype shows that the double-flowered form of the species becomes the nomenclatural type variety. If so, var. *fragrans* should replace var. *philippinum* sensu Howard & Powell, because Schauer's (1847) description asserts that the leaf-blades are entire or remotely serrate, corolla scarcely twice the length of the calyx tube, stamens and pistils long-exserted, fruits, baccate. Moldenke & Moldenke (l.c. : 472), therefore referred the single-flowered form to f. *subfertile*

Mold. (1983), and the double-flowered forms to f. *multiplex* (Sweet) Moldenke (1983 : 472). Since *C. fragrans* Willd., is a replacement name for *Volkamannia japonica* Jacq., nom. illeg., f. *multiplex* (Sweet) Mold. is to be treated as the same as *C. fragrans* Willd., f. *fragrans*.

The species is known as "Glory Bower" of the Eastern Asia; flowers pink, fragrant, often double.

C. phlomidis L.f., Suppl. Pl. : 292. 1782 : Willd. Enum. Pl. Hort. Berol. 2 : 659. 1809 ('*phlomoidis*'); Moldenke, in. Dassan. Rev. Handb. Fl. Ceylon 4 : 466. 1983. *Volkameria multiflora* N. Burm., Fl. Ind. : 137, Pl. 45, fig. 1. 1768, non *Clerodendrum multiflorum* G. Don (1824). *Clerodendrum multiflorum* (N. Burm.) O. Ktze., Rev. Gen. Pl. 2 : 506. 1891; Rao and Sastry. Bull. Bot. Surv. India 6 : 281. 1964. [as (Burm. f.) Kuntze ex Rao & Sastry] non G. Don (1824). (*Agnimantha*—Sans.; *Ami*—Hindi).

A large, often rambling evergreen shrub with a close short hoary pubescence. Leaves obovate, sub-rhomboid, rounded, fleshy, entire or coarsely crenate-dentate. Inflorescences axillary or terminal cymose panicle; flowers white; pedicels 4-12 mm long; calyx campanulate, bracts foliaceous, lanceolate or obovate, bracteoles numerous; with triangular caudate-acuminate lobes, slightly enlarged in fruit; corolla-tube 1-1.5 cm long and limb 18 mm in diam., glandular-pubescent, fragrant at night; stamens much exserted. Drupes broadly obovoid, 8-12 mm long, finally nearly dry, separating into 4 pyrenes.

Type : India. *Koenig* s.n. Linn. Herb. No. 810/3 (LINN).

Fl. : Sept.-March.

2n = 48, 52.

Commonly grown as a hedge plant in many parts and as an ornamental species.

Korba : 19450.

Native of Southern Asia, Pakistan, India and Sri Lanka.

Roots aromatic and astringent, decoction used as demulcent in gonorrhoea.

C. serratum (L.) Moon, Cat. Ceylon Pl. : 46. No. 382. 1824; D. Don. Prodr. Fl. Nepal. 103. 1825; Haines, Botany 2 : 757; Hara *et al.*, Enum.

Pl. Nepal. 3 : 146. 1982; Nicolson *et al.*, Regnum Veget. 119 : 260. 1988. *Volkameria serrata* L., Mant. Pl. : 90. 1767. *Tsjerou-thecka* Rheede, Hort. Malab. 4 : 61-62, t. 29. 1683. (*Bharangi*—Sansk.; *Barangi*—Hindi).

Erect shrubs or undershrubs; glabrate; branches 4-angled above. Leaves opposite or ternate, elliptic-obovate to oblong-oblanceolate, acuminate, coarsely serrate, base cuneate, glabrate-puberulous, 7-15 × 4-5 cm. Panicles terminal, pubescent, 15-20 cm long; bracts obovate or lanceolate, 1-3.5 cm long, often coloured; flowers bluish purple or white, 2-5 cm in diam.; calyx truncate, campanulate, dentate, pubescent, 6 mm long, slightly enlarged in fruits; corolla hairy at base; tubes 6-7 mm long, narrow-cylindric, mouth oblique, 2-lipped, lower lip deeper in colour than upper, with a nectary at base, lobes oblong or elliptic, 1 cm long; stamens 4, didynamous, long exserted. Drupes succulent, purple-black, 5-6 mm across; drupels 1-3, connate.

Type : India, Herb. Linnaeus 809.5. (LINN).

Fl. & Frt. : Aug.-Nov.

Common in damp places, along forest roads.

Khondra : 12718.

2n = 48.

India, Sri Lanka.

Roots used in rheumatism and dyspepsia; seeds aperient, used in dropsy; leaves used as febrifuge and applied externally for cephalagia and opthalmia.

C. viscosum Vent., Jard. Malm. Pl. t. 25. 1803; Santapau in Bull. bot. Surv. Ind. 3 : 14. 1961; Fl. Hassan : 488. 1976; *C. infortunatum auct. non* L. 1753; C. B. Clarke in Hook. f. FBI 4 : 594. 1885; Haines, Botany 2 : 756. (*Bhant*—Hindi).

Gregarious shrubs; yellow or white villous upwards. Leaves round-ovate to broad-oblong, serrulate-denticulate, base cordate or obtuse, acuminate, roughly hairy above, densely tomentose and gland-dotted beneath, 10-20 × 9.15 cm; petioles 2-8 cm long. Cymes rusty-pubescent, forming a terminal, lax panicle, up to 20 cm long; pedicels up to 2 cm long; bracts foliaceous, caducous; flowers white or pink; calyx pubescent, 1-1.5 cm long, 5-partite, segments broadly lanceolate, acute, red, accrescent and enlarging up to 3.5 cm across in fruits; corolla 3 cm long, pubescent without; tubes 1.5-2 cm

long, slender, lobes 5, 1-1.5 cm long; stamens 4, didynamous, exserted. Drupes 6-7 mm across, black, globose, succulent.

Type: Cultivated specimen from Malmaisan Garden (P).

Fl.: Feb.-May. *Frt.*: May-July.

Common on slopes, in moist places.

2n = 48, 52.

Achanakmar : 15436.

Pakistan, Northern India, Nepal, Burma, Thailand, S. China, Philippines, Indonesia.

Leaves used as bitter tonic, vermifuge, laxative, cholagogue; fresh leaf-juice introduced to rectum for removal of ascarids; leaves and root-paste applied externally on tumours.

Note: *Clerodendrum infortunatum* L. is diagnosed from *C. viscosum* Vent. (*C. infortunatum* auct.) as follows:

1a. Corolla-tube 3 to 4 times as long as the calyx-tube; leaves entire; calyx-lobes with a prominent midrib — *C. infortunatum*

1b. Corolla-tube about twice as long as the calyx-tube; leaf-blades distinctly dented; calyx-lobes without a prominent midrib — *C. viscosum*

DURANTA L., Sp. Pl. : 637. 1753 & Gen. Pl. ed. 5 : 284. 1754.

Lt.: *D. erecta* L. (vide M. L. Green in Hitchcock et M. L. Green, Prop. Brit. Bot. : 169. 1929 (= *D. repens* L.).

Duranta repens L., Sp. Pl. : 637. 1753; Fl. Hassan : 488. 1976; *D. plumieri* Jacq. Select. Stirp. Amer. Hist. : 186. Pl. 176, fig. 76. 1763. Haines, Botany 2 : 743.

var. **repens.**

An extremely variable and polymorphic shrub or small tree, to 7 m tall; usually armed with axillary thorns; branches drooping. Leaves opposite or whorled, obovate, elliptic or oblong-lanceolate, obtuse or acute, base cuneate, entire or coarsely serrate, attenuate into short petioles 3-4 mm long, finely pubescent or glabrous at length, 1.5-3.5 cm long. Racemes axillary and terminal, panicled, drooping, 5-30 cm long; flowers blue to

lilac or violet, or purple; bractlets minute, occasionally sub-foliaceous, pedicelled; calyx tubular or sub-campanulate, minutely 5-toothed, accrescent, fleshy and orange-yellow in fruits; corolla with straight or incurved tubes, tube surpassing the calyx by 2-3 mm, limbs 5-fid, less than 1.2 cm across, sweet-scented with odour of vanilla; stamens 4, didynamous, filaments short; stigmas obscurely 4-fid. Drupes globose, 0.6-1.2 cm across, orange-yellow, succulent, completely enclosed by the fruiting calyx and with four 2-celled and 2-seeded pyrenes.

Type: Habitat in America, Linn. Herb. No. 806.1 (LINN).

Fl. & Frt.: Almost throughout the year.

Commonly planted as a hedge, also as escapes along roads.

Pendra to Keonchi : 19147.

2n = 16, 24, 32, 34, 36.

Native of tropical and subtropical America and West Indies; now naturalized throughout the tropics of the Old World.

Fruits contain an alkaloid analogous to narcotine. Macerated fruits yield a juice, which even in dilutions of 1 : 100 parts of water, is lethal to mosquito-larvae. Seeds yield a fatty oil. Wood is suitable for turnery work.

Note: *D. repens* L. var. *alba* (Masters) Bailey has white corolla otherwise like the type variety.

n = 34.

LANTANA L., Sp. Pl. : 626. 1753 & Gen. Pl. ed. 5 : 275. 1754.

Lt.: *L. trifolia* L. (vide N. L. Green, Prop. Brit. Bot. : 168. 1929; accepted by Moldenke, 1983).

Note: N. L. Britton (Fl. Bermuda : 314. 1919) had selected *L. camara* L. as the lectotype species.

Lantana camara L., Sp. Pl. : 627. 1753; Haines, Botany 2 : 739; Meeuse in Blumea 5 : 69. 1942; Jafri & Ghafoor in Fl. West Pakistan No. 77 : 9. 1974. L. aculeata L., Sp. Pl. : 627. 1753. var. **aculeata** (L.) Moldenke, Torreya 34 : 9. 1934, et in Dassan. Rev. Handb. Fl. Ceylon 4 : 225. 1983.

Shrubs; stems, branches and branchlets conspicuously armed with stout recurved prickles, half-climbing or completely scandent, to 12 m; branches 4-angled, pilose. Leaves usually opposite, ovate, ovate-oblong to ovate-lanceolate, acute or acuminate, crenate, hispid-rugose above, 5-10 × 2-4 cm. Spikes short, axillary, capitate-ovoid, appearing subumbellate when young; bracts lanceolate, 3-5-veined; flowers yellow, orange, turning to rose, rose-pink or pink; peduncles upto 5 cm long; calyx membranous, truncate or sinuate-toothed, 1.5 mm long; corolla 8-10 mm long, salver-shaped, often pubescent; tube slender, pubescent, lobes 4-5, spreading, 5-6 mm across; stamens 4, didynamous. Drupes green, turning bluish-violet, succulent, globose, with two 1-seeded pyrenes or one 2-seeded pyrene, 5-6 mm long.

Type: Habitat in America calidiors; cultivated at the Uppsala Botanical Garden, Linn. Herb. No. 786.6 (LINN).

Fl. & Frt.: Almost throughout the year.

2n = 22, 23, 28, 33, 34, 36, 38, 44, 45, 55, 56, 77.

Common in wastelands, along roads, sometimes planted as hedge.

Kootaghat to Bilaspur : 19526; Bilaspur to Champa : 19369.

Native of tropical America, now naturalized throughout tropics.

Note: Schauer (in DC., Prodr. 11 : 606, 1847) combined *L. aculeata* L. and *L. camara* L., accepting *L. camara* L. as the correct name (Art. 57.1). However, Moldenke (1934, 1983) treats the former as varietally distinct. var. *camara* has branches and branchlets practically unarmed.

Although the plant is considered a pest, it improves the fertility of the rocky gravelly or hard lateritic soils. It provides good green-manure for forest areas and for paddy and coconut crops. The strong characteristic smell of the plant is due to a volatile oil containing a sesquiterpene, 1-α-phellendrene, aldehydes and alcohol, but is not of commercial value. The smell is not exactly pleasant.

NYCTANTHES L., Sp. Pl. : 6. 1753 et Gen. Pl. ed. 5 : 7. 1754.

T.: *N. arbor-tristis* L.

Note: This genus, long regarded as a member of the *Oleaceae* Hoffmannsegg et Link (1820), was transferred to *Verbenaceae* Jaume Saint-

Hilaire (1805) subfam. *Nyctanthoideae* Airy Shaw (Kew Bull. 1952 : 272. 1952). Stant (Kew Bull. 1952 : 273-276. 1952) supported this placement on morphological and anatomical features. Moldenke (*op. cit.* : 178. 1983) segregated this genus, as also *Dimetra* Kerr. to a separate family *Nyctanthaceae* and stated, "a small puzzling family.. perhaps belonging in the Loganiales between *Strychnaceae* and *Oleaceae*". But Mabberley (1987) continues to treat it as of *Oleaceae*, while Nicolson *et al.* (1988) follow Airy Shaw (1952).

A small genus of two known species of tropical Asia.

Nyctanthes arbor-tristis L., Sp. Pl. : 6. 1753; Nicolson *et al.*, Regnum Vegetab. 119 : 262. 1988.

Manjapumaram Rheede, Hort. Malab. 1 : 35-36, t. 21. 1678.

Large straggling shrub, upto 9 m tall, scabrid-pilose throughout, branches numerous, spreading in all directions. Leaves decussate-opposite; petioles 5-20 mm long, not articulate, leaf-blades ovate or oblong towards the flowering top, 3.5-13 cm long, 2-9 cm wide, acute or acuminate, cordate or rounded or cuneate at base, margin entire to glandular-dentate, very scabrous above with whitish bulbous-based hairs. Inflorescences axillary or forming a large terminal, leafy panicle, composed of small terminal involucrate corymbs or head-like umbels, each 2-7-flowered.; peduncle tetragonal, with a pair of pubescent bractlets below each furcation.; flowers sessile, pleasantly fragrant, opening at sunset; calyx campanulate, about 5 mm long, villous with appressed hairs; corolla, deciduous at sunrise, its tube red to orange-red, orange, cylindric, 1-3 times as long as calyx, corolla-lobes white, spreading, 5-8-parted, more or less contorted, imbricate in bud, exterior margin erose; stamens 2, inserted just below the mouth of corolla tube, anthers 2-lobed, with a small spur on the back near the apex; style as long or shorter than the corolla-tube, included; stigma capitate, glandular; ovary superior, ovate-globose, compressed. Capsule suborbicular, 2 cm long and wide, compressed, short-mucronate, 2-celled, 2-valved seeds 1 per cell, compressed.

LT. : Rheede, l.c. : t. 21.

Note : Moldenke (1983 : 161) selected *Grimm* 116 (LINN) ex Habitat in India, as the lectotype of this species, but Nicolson *et al.* (1988) comment, "It is not clear what specimen this could be".

Fl. : Sept.-Oct. *Frt.* : Dec.-Jan.; deciduous : Apr.-May; open in the evening and drop down next morning.

Common inside dry mixed deciduous forests on slopes.

Lafa : 13029.

2n = 44, 46.

India, Nepal, Burma.

The species is widely cultivated for its fragrant flowers, which yield an essential oil similar to jasmine; corolla-tube contain a colouring matter, nyctanthin, which is identical with α-crocetin from *Saffron* (*Cracus sativus* L.—a sterile 3n cultigen-derived from stigmas-*Iridaceae*). Moldenke (l.c.) reports that an orange or yellow impermanent dye is made from corolla-tubes for Buddhist robes in Sri Lanka. Roots, bark, leaves and flowers are used medicinally : wood is useful as a fuel.

PHYLA Lour., Fl. Cochinch. : 63, 66. 1790.

T. : *P. chinensis* Lour. [=*Phyla nodiflora* (L.) Greene].

Phyla nodiflora (L.) Greene, Pittonia 4 : 46. 1899; Nicolson *et al.* Regnum Vegetab. 119 : 262. 1988. *Verbena nodiflora* L., Sp. Pl. : 20. 1753; *Zapania nodiflora* (L.) Lam., Tabl. Encycl. 1 : 59 t. 17. f. 3. 1791. *Z. reptans* Spreng., Pl. Min. Cog. Pugill. 2 : 70. 1813. *Ana-coluppa* Rheede, Hort. Malab. 10 : 93. t. 47. 1690.

Creeping herbs; rooting from nodes; stems angled, strigose with short hairs. Leaves opposite, cuneate-obovate or spathulate, serrate, subsessile, obtuse, appressed hairy beneath, 1-3 × 0.6-0.8 cm. Flowers sessile, in small, axillary, solitary ovoid or cylindric, peduncled, centrifugal spikes 1-2 cm long, white; peduncles 4 cm long; bracts obovate, imbricate, 2 mm long, persistent; calyx minute, 2-fid, hairy 1.5 mm long; corolla 2.3 mm long, 2-lipped, tubes slender, upper lip rounded or emarginate, lower lip 3 lobed; stamens 4, didynamous; stigmas oblique. Fruits about 2 mm long, embraced by calyx and bracts, separating into two 1-seeded pyrenes.

LT. : Habitat in "Virginia" *Clayton* 448 (LINN).

Fl. & Frt : Almost throughout the year.

Frequently amidst grasses on wet ground near ponds, canals, and river banks; often in gregarious patches.

Khuria : 15485, 19304.

2n = 18, 34, 36.

Throughout the tropics.

Note : Moldenke (1983) recognises two vars. :

1a. Venation of leaf-blades very obscure on both surfaces — var. *nodiflora*

1b. Larger veins usually quite distinct and sub-prominent on the lower surface — var. *reptans* (Spreng.) Mold.

Leaves edible after cooking; herb diuretic and febrifuge; paste or poultice of fresh plant applied to boils; herb contains large quantity of potassium nitrate resulting in diuretic action.

PREMNA L., Mant. Pl. 2 : 154. 253, 1771. nom. cons.

T. : *P. serratifolia* L. (*typ cons.*).

Note : Moldenke (1941, 1983) treats *Pygmaeopremna* Merrill representing pyrogenous forms of *Premna* L., as generically distinct; while Airy Shaw (1973) lists the former as generically distinct, comprising 6 species in "India, S.E. Asia, Philippine Islands, E. Malaysia, Australia"; he comments : "probably pyrogenous forms of *Premna*". Mabberley (1987) merges the former genus in *Premna* L.

1a. Trees or shrubs; leaves petiolate, oblong or ovate, entire or very slightly serrate, tip acuminate; calyx sub-equally 4-toothed; corolla distinctly 2-lipped — *P. barbata*

1b. Small, almost stemless undershrubs; leaves almost sessile, obovate, coarsely serrate, tip obtuse or rounded; calyx sub-equally 5-toothed; corolla obscurely 2-lipped — *P. herbacea*

Premna barbata Wall. ex Schauer in DC., Prodr. 11 : 636. 1847; C. B. Clarke in Hook. f. FBI 4 : 579. 1885; Haines, Botany 2 : 751; Saxena in Bull. Bot. Surv. Ind. 12 : 56. 1970; Jafri & Ghafoor in Fl. West Pakistan No. 77 : 22. 1974.

Small trees or shrubs; branchlets pubescent. Leaves young pubescent, mature nearly glabrous, 7.5-15 × 3.5-6 cm; petioles 2.5-3 cm long. Corymbs terminal, villous, 3-7.5 cm in diam.; bracts small, linear, deciduous; flowers greenish white, about 5 mm across; calyx 2 mm long, teeth 4, linear or oblong-obtuse, not enlarged in fruits, pubescent, glabrate in fruits; corolla

3-4 mm long, hairy in throats; lobes obtuse; stamens 4, sub-didynamous; stigmas short-2-fid. Drupes 4.5 mm across, globose or pyriform, glabrous obscurely verucose, with one 4-seeded pyrene.

Type: Himalayas, Bhutan, *Wallich*, Num. List. No. 1768(K-W).

Fl.: Oct.-Nov. *Frt.*: May-July.

Occasionally found between rock boulders, on slopes.

Marwahi to Pasan : 19069.

Pakistan, India, Bhutan, Bangladesh.

P. herbacea Roxb. (Hort. Beng. 46. 1814, *nom. nud.*) Fl. Ind. ed Carey 3 : 80. 1832; Haines, Botany 2 : 753; Jafri & Ghafoor in Fl. West Pakistan No. 77 : 24. f. 5D-E. 1974; *Pygmaeopremna herbacea* (Roxb.) Moldenke in Phytologia 2 : 54. 1941, et in Dassan., Rev. Handb. Fl. Ceylon 4 : 345. 1983. *Premna acaulis* Wall., Num. List No. 86. 1829, nom. nud. (*Bhumi Jambu, Siriteku*—Sansk.; *Bharangi*—Hindi; *Bhui jam*—Beng).

Stout, perennial herbs with a woody root-stock; stems absent or very small forming a sort of underground, nodose runner. Leaves closely appressed to ground, pubescent beneath on veins, 5-12 × 3.5-7.5 cm. Panicles short, corymbose, peduncled, about 3.5 cm in diam.; peduncles 1-3.5 cm long; flowers greenish-white or pale yellow, about 5 mm across; calyx pubescent, cupular, slightly enlarged in fruits, 2.5 mm long, lobes ovate or obtuse; corolla 5 mm long, hairy in throat, lobes 4; stamens 4, didynamous; stigmas short-2-fid. Drupes globose, black when ripe, about 6 mm across.

Type: Bangladesh, Dinajpur, 1801, *W. Carey*; cultivated in Calcutta Bot. Garden (K).

Fl.: Feb.-July. *Frt*: July-Aug.

Common on forest-clearings; open grassy places, waste-grounds.

Marwahi : 19029.

Pakistan, India, Nepal, Bangladesh, Burma, Thailand, S. China, Philippines, Indonesia and Australia.

Note: It is a fire-resistant species and comes up after forest-fires; the underground runners produce flowering-shoots annually.

Roots and rhizomatous portion of stem medicinal; its juice is "hot, pungent and digestive" and has been used in the treatment dropsy, coughs, phlegm, asthma, fevers, rheumatism and cholera.

SYMPHOREMA Roxb., Pl. Corom. 2 : 46, t. 186. 1805 ('1798').

T. : *S. involucratum* Roxb.

Note : Airy Shaw (1973) and Moldenke (1983) include this genus as the type of *Symphorematacea*e Van Tieghem, comprising three genera, *Symphorema*, *Sphenodesma* and *Congea*. But Mabberley (1987) includes the genus in *Verbenaceae* and *Symphorematacea*e is not listed in App. II B. ICBN, (1988).

Symphorema polyandrum Wight, Icon. : t. 363. 1840; Haines, Botany 2 : 759; Patel, For. Fl. Melghat : 270. 1968.

Scandent, deciduous shrubs; branches grey-stellate-tomentose. Leaves opposite, ovate or broadly elliptic, base rounded or obtuse, repand or coarsely toothed, villously tomentose beneath, 10-15 × 5-6.5 cm. Cymes peduncled, contracted, almost capitate, 6-7-flowered; involucral bracts grey, elliptic-obovate, foliaceous, 2.5-3.5 cm long, accrescent in fruits; flowers white; calyx obovoid, 4-8-toothed, 0.6-1 cm long, accrescent and enlarging in fruits, tomentose; corolla-tubes cylindric, lobes 6-16, subequal, narrowly oblong; stamens as many as corolla-lobes, exserted, anther-cells parallel. Fruits 1-seeded, sub-globose, nearly glabrous, 4 mm across.

Fl. : Mar.-Apr. *Frt.* : June-July.

Occasionally found in dry deciduous forests.

Katghora : 3707, 8637.

India (South)

TECTONA L.f., Suppl. Pl. 20. 151. 1782 ('*Tekiona*'), *nom. cons.*

T. : *T. grandis* L.f.

Tectona grandis L.f., Suppl. Pl. : 151. 1782; Haines, Botany 2 : 744; Moldenke in Dassa., Rev. Handb. Fl. Ceylon 4 : 236. 1983; Nicolson *et al., op. cit.* : 265. 1988. *T. theka* Lour., Fl. Cochinch. : 137. 1790; *Theka grandis* (L.f.) Lam., Tab. Encycl. Meth. Bot. 2 : 111. 1797. *Theka* Rheede, Hort. Malab. 4 : 57-58, t. 27. 1683. (*Teak*—Eng.; *Saguan*, *Sagun*—Oriya).

Large deciduous trees; branchlets 4-angled, stellately tomentose. Leaves opposite or sometimes ternate, ovate, obovate or elliptic, cuneate at both ends, entire, scabrous above, closely stellate-tomentose beneath, 30-60 × 20-30 cm. Cymes dichotomous, many-flowered, in large terminal panicles about 50 cm or more across; bracts linear, 1.5 cm long, deciduous; flowers white, about 1 cm long, sessile; calyx; campanulate, stellately white-tomentose, 3-3.5 mm long, lobes 5-6; in fruits inflated, ovoid or urceolate, membranous, 2.5-3.5 cm in diam., accrescent; corolla about 1 cm long, tubes short, limbs 5-6-lobed, lobes spreading; stamens 5-6; stigmas bifid. Drupes with a thick spongy covering, 4-celled, enclosed in calyx.

LT.: "Prope Madras & aliis locis in hortis", *Koenig s.n.* (LINN). (vide Moldenke *l.c.*).

Fl.: July-Aug. *Frt.*: Nov.-Jan.

Occurring only as plantation crops; commonly planted in the areas where 'Sal' is felled.

Madai to Bijhra : 19484.

2n = 24, 36.

Native of Indomalaysia.

'Teak or Sagwan' is a very valuable timber; very sensitive to frost when young. On account of its resistance to chemicals, teak articles are used in chemical industries and for making Laboratory tops and for musical instruments. Leaves contain 60 per cent tannin and a dye.

VERBENA L., Sp. Pl. : 18. 1753; & Gen. Pl. ed. 5: 12. 1754.

LT.: *V. officinalis* L. vide N. L. Britton et A. Brown Ill. Fl. N.U.S. ed. 2. 3 : 94. 1913.

Verbena tenulsecta Briq. in Ann. Conser. et. Jard. Bot. Geneva 7-8 : 294-296. 1904; Jafri & Ghafoor in Fl. West Pakistan No. 77 : 6, f. 1 C-D. 1974. Moldenke in Dassan., Rev. Handb. Fl. Ceylon 4 : 208. 1983. *V. bipinnatifida* sensu Maheshwari, Fl. Delhi : 278. 1963, non Schauer (1847).

Prostrate or decumbent ascending herbs. Leaves opposite or ternately whorled, divided into linear segments. Spikes dense, terminal, in solitary heads; heads elongating in fruits; flowers lilac-purple; calyx tubular, short-5-toothed, lobes setaceous; corolla tubular; limbs oblique, sub-

2-lipped, 5-lobed, lobes spreading; stamens 4, didynamous, included. Fruits included in calyx, breaking up into 4 pyrenes.

Type: La Trinidad, Paraguay, 4 Oct. 1875, *Balansa* 1025(G).

Fl. & Frt.: Oct.-Feb.

Commonly planted; also occurring as escapes in waste places.

Khondra : 12717; Kabirchabutra : 15212.
2n = 10, 10-16.

A native of South America, now naturalised throughout India and elsewhere.

VITEX L., Sp. Pl. : 638 ('938'). 1753 & Gen. Pl. ed. 5 : 285. 1754.

LT.: *V. agnus-castus* L. (vide N. L. Britton et P. Wilson, Scient. Surv. Porto Rico 6 : 149. 1925).

Vitex trifolia L. ("*trifoliis*"), (Cara-nosi Rheede, *op. cit.* 2 : t. 11, 1679) is likely to occur in the district.

Vitex negundo L., Sp. Pl. : 638. 1753; Haines, Botany 2 : 746; Nicolson *et al.*, Regnum Veget. 119 : 266. 1988. *Bem-nosi* Rheede, Hort. Malab. 2 : 15, t. 12. 1679. (*Nirgundi*—Oriya).

Shrubs or small trees, covered with a fine hoary tomentum. Leaves opposite, usually digitately 5-foliolate or deeply trifid leaflets membranous, linear or narrow-linear, acuminate, entire or crenate, puberulous or glabrescent above, grey-pubescent beneath, 5-15 cm long. Cymes in terminal panicles, 5-20 cm long, tomentose; flowers white or light-blue; calyx campanulate, hoary, hairs closely and introrsely strigose, silky-white, about 3 mm long, short-toothed; corolla 6-7 mm across, tubular, puberulous or tomentose outside, limbs 2-lipped, 5-toothed, palate hairy, vivid purple or violet or magenta coloured; stamens 4, didynamous, exserted, anther-cells divaricate. Drupes globose, 3-6 mm in diam., supported by somewhat enlarged calyx, black.

LT.: Habitat in India, Linn. Herb. No. 811.8 (LINN).

(vide Moldenke, *op. cit.* : 373. 1983).

Fl. & Frt.: Almost throughout the year.

Common along roads, edges of forests.

Katghora : 3740; Marwahi : 19027.

2n = 24, 26, 28, 32, 34.

Throughout East Africa, West Asia, Madagascar, Pakistan, India, Sri Lanka, Burma, Southeast Asia, Malesia.

Roots and leaves are used for curing inflammatory swellings of joints, headache etc.; leaves fragrant, contain an essential oil and resin, smoked for relief of catarrah, as an anodyne, bitter tonic, febrifuge, antiparasitic. Leaves and roots possess tranquilising effect and form constituents of *Vishagarbha thaila*; leaves credited with anti-cancer activity against Ehrlich ascites tumour cells. The species is planted along water canals to check soil-erosion; it readily grows from cuttings.

LAMIACEAE

Lindley, Nat. Syst. Bot. ed. 2 : 275. 1836

Alt. name : LABIATAE. A. L. Jussieu, Gen. Pl. : 110. 1789.

T. *Laminum* L.

Shrubs or herbs, often with short-stalked epidermal glands containing ethereal oils and commonly storing carbohydrates as stachyose; young stems often 4-angled. Flowers bisexual, usually bracteolate and in verticillasters (compact axillary cymes) or single flowers in axils. Corolla (1) 2-labiate or less often more or regular with 4 lobes (Mentha; stamens 4 or 2 (- 2 staminodes), anther cells longitudinal slits, connective sometimes such that pollen-sacs separated (*Salvia*); usually nectary-disc annular to anterior at base of the gynaecium; carpels 2, syncarpous, carpel longitudinally divided in 2, style often bifid apically, 1 ovule in each of the four lobes. Fruit of 4 1-seeded nutlets.

"Genera are not readily grouped into higher natural units" (Hedge), but in the subfam. *Stachydoideae* (= *Lamioideae*) the style is perfectly gynobasic, nutlets dry, nut with small basal attachment, stamens ascending or spreading and projecting straight forwards (*Nepeta, Pogostemon, Salvia, Mentha* etc.). Many tropical genera belong to the subfam. *Ocimoideae* with characters similar as above, but anthers included (*Ocimum, Hyptis, Plectranthus* and *Solenastemon* (*Coleus*).

Mentha arvensis L., *Ocimum tenuiflorum* L. (*O. sanctum* L.), several species of *Salvia* and of *Solenostemon* Thonn. (*Coleus* Lour.) are cultivated in the gardens of the Bilaspur district. *Solenostemon rotundifolius* (Poiret) J. K. Morton (*Coleus rotundifolius*. Housa potato of the Old World),—its tubers eaten like potatoes; *S. scutellarioides* (L.) Codd (*Coleus blumei*, Coleus of New Guinea) is often cultivated as ornamental foliage as pot plants, the variegated leaves with purple dominant over green and both over patterned, which is expressed only in homozygous condition—some are true chimaears with green, yellow-green etc., while others with dark-edged yellowish leaves are apparently due to reversible hormonal bleaching initiated from mesophyll, another dominant character. (Mabberley, 1987) (See *Coleus Lour.*).

1a. Stamens declinate

2a. Anterior corolla-lobes scarcely longer than posterior, neither deeply concave, nor constricted at base

3a. Calyx sub-erect or declinate in fruits, margins not decurrent on tubes — ACROCEPHALUS

3b. Calyx deflexed in fruits, margins decurrent on tubes

4a. Corolla-tubes short, included or only slightly exserted; styles with 2, equal, subulate lobed stigmas — OCIMUM

4b. Corolla-tubes long, far exserted; styles undivided — ORTHOSIPHON

2b. Anterior corolla-lobes much longer than posterior, deeply concave in front, constricted at base

5a. Corolla obscurely 2-lipped, two upper lobes flat, lower lip deflexed, saccate — HYPTIS

5b. Corolla distinctly 2-lipped, upper lip obtusely 3-4-toothed, lower lip boat shaped, not saccate

6a. Filaments connate in a sheath at their base round styles — COLEUS

6b. Filaments free

7a. Calyx-mouths very oblique, 2-lipped; flowers in dense, many-flowered, 4-gonal or cylindric spikes — ANISOCHILUS

7b. Calyx subequally 5-toothed or obscurely 2-lipped; flowers in lax, panicled or racemed, 6-8-flowered cymes — PLECTRANTHUS

1b. Stamens not declinate, erect or spreading

8a. Stamens 2 perfect; calyx 2-lipped — SALVIA

8b. Stamens 4 perfect; calyx not 2-lipped

9a. Corolla-lobes 4, sub-2-lipped or equal; stamens suberect, diverging and distant, equal or sub-equal; anthers 1-celled

10a. Shrubs; calyx 5-partite, lobes plumose; stamens included — COLEBROOKEA

10b. Herbs; calyx 5-toothed; lobes not plumose; stamens exserted — POGOSTEMON

9b. Corolla-lobes 5, distinctly 2-lipped; stamens ascending, usually in unequal pairs, anthers 2-celled

11a. Posterior pair of stamens longer — NEPETA

11b. Anterior pair of stamens longer

12a. Calyx 13-veined — MICROMERIA

12b. Calyx 5-10-veined

13a. Calyx 5-toothed; upper lip of corolla short, nearly flat — ANISOMELES

13b. Calyx 6-10-toothed; upper lip of corolla hooked

14a. Flowers red; corolla-tubes exserted: lower lip of corolla shorter than hood — LEONOTIS

14b. Flowers white; corolla-tubes included; lower lip of corolla longer than hood — LEUCAS

ACROCEPHALUS Benth in Edward's Bot. Reg. 15 : sub. t. 1300. 1830.

Type : *A. scariosus* Benth.

Note : *A. robertii Robyn* is used as a copper indicator in Katanga (Africa).

Acrocephalus hispidus (L.) Nicols. & Sivadasan in Taxon 29 : 324. 1980; Nicolson *et al.*, Reg. Veget. 119 : 151. 1988. *Gomphrena hispida*

L., Sp. Pl. ed. 2 : 326. 1762, N. Burmann, Fl. Ind. : 73. 1768. *Prunella indica* N. Burm., Fl. Ind. : 130. 1768. *Ocimum capitellatum* L.f., Suppl. Pl. : 276. 1782 ('*Ocymum*'). *Ocimum capitatum* Roth, Nov. Pl. Sp. : 276. 1821 ('*Ocymum*') : *Acrocephalus capitatus* (Roth) Benth. in Edward's Bot. Reg. 15 : sub. t. 1300. 1830, et in Wall., Pl. As. Rar. 2 : 18. 1831; in Hook. f. FBI 4 : 611, 1885; Haines, Botany 2 : 768. *Acrocephalus indicus* (N. Burm.) Kuntze, Rev. Gen. Pl. 2 : 511, 1891; Hara *et al.*, Enum. Pl. Nepal. 3 : 149. 1982.

Erect herbs; branches ascending or decumbent, pubescent. Leaves ovate or lanceolate, coarsely serrate, narrowed into petioles, nearly glabrous, 1.5-3.5 × 0.7-1 cm. Heads terminal, often with two spreading leaves at base, 6-8 mm across; bracts obovate-rhomboid, 3-5 mm across; flowers monopetalous, minute, white, pink or pale-purple or sky-blue in whorls with imbricating bracts; calyx hairy, 2 mm long, 2-lipped, upper lip oblong, or ovate-rounded, lower linear, hispid, 4-lobed, in fruits tubular with gibbous base; corolla 3 mm long, sub-equally 4-lobed, lobes hairy at top; stamens 4, in 2 pairs; styles 2-fid. Nutlets 3-4, minute, oblong, glabrous, dark brown

Type : *Minangani* Rheede, Hort. Malab. 9 : 141, t. 72. 1689.

Fl. & Frt. : Oct.-Dec.

Common in damp shady places.

Achanakmar : 13203; Madai : 12887.

Indomalaysia.

Note : J. Hooker (Fl. Brit. India 4 : 732. 1885) dismissed Rheede's illustration as "unworthy of notice"; Sivadasan (1980) identified it as the type of *Gomphrena hispida* L.

ANISOCHILUS Wall. ex Benth. in Lindley, Bot. Reg. 15 : No. 1300. 1830.

T. : *non designatus.*

Anisochilus carnosus (L.f.) Wall., Num. List No. 2753. 1831; Benth. in Wall., Pl. As. Rar. 2 : 18. 1831; Haines, Botany 2 : 769; Panigrahi & Murti, Bangladesh Jour. Bot. 10(1) : 36. 1981. *Lavandula carnosa* L.f., Suppl. Pl. : 273. 1782. *Plectranthus strobilifer* Roxb., Hort. Beng. : 45. 1814, et Fl. Ind. 3 : 23. 1832. *P. carnosus* (L.f.) Smith in Rees, Cyclop. : 27, no. 7. 1819.

Erect herbs or undershrubs; stems 4-angled, glabrous or tomentose. Leaves long petioled, ovate-oblong or rounded, obtuse, crenate, more or less villous and with minute red glands, 5-11 × 4-7 cm. Spikes capitate, 2.5-3.5 cm long, pyramidal panicled, on peduncles 5-10 cm long, conspicuous in bud by 4-ranked bracts; fruiting spikes 4-gonous; flowers pale purple, about 8.5 mm long, pubescent and ciliate; calyx-tubes inflated, mouth oblique, 2-lipped; upper lip large, ovate, acuminate, entire, deflexed, concealing mouth, lower lip truncate, obscurely 4-toothed; corolla about 8 mm long, tubes slender, decurved, 2-lipped, upper lip erect, 3-4-fid, lower lip constricted at base, elliptic, concave, pubescent; stamens 4, declinate; disc lobed. Nutlets sub-orbicular, smooth, brown-coloured.

Fl. & Frt. : Oct.-Dec.

Common between rock-boulders, along streams.

Lafa : 13027; Pasan : 13276 A; Katghora : 3974, 3979.

2n = 34.

India, Sri Lanka, Burma.

Stimulant, expectorant and diaphoretic; juice is given in urticaria associated with liver disorders; mixed with sugarcandy, used for coughs and colds; leaves eaten as vegetable; yields an essential oil.

Notes 1. *Katu-kurka* Rheede, Hort. Malab. 10 : 179. t. 90. 1690 is the sole basis of *Plectanthus stribilifer* Roxb. (1814) ("*stribiliferus*"), later (1832) cited with *Lavendula carnosa* L.f. in synonymy.

2. The author citations and references for the genus *Anisochilus* and of the species *A. carnosus* as *Anisochilus* Wall. in Pl. As. Rar. 2 : 18. 1831 and *A. carnosus* (L.) Wall. or (L.f.) Wall. ex Benth. (Hara *et al.* 1982; Nicolson *et al.*, 1988) are wrong. Wallich is not the author of the text on page 18 of Pl. As. Rar. Vol. 2, but Bentham is the author. Further, the genus *Anisochilus* is not described for the first time in Pl. As. Rar. (l.c.) but earlier in 1830. Most of the names in Wallich's Num. List are *nom. nud.*, but by mere citing *Lavandula carnosa* L.f., a validly described taxon, the above combination becomes valid (Panigrahi & Murti, *l.c.*).

ANISOMELES R. Br., Prodr. : 503. 1810.

T. : *non designatus.*

Anisomeles indica (L.) Kuntze, Rev. Gen. Pl. 2 : 512. 1891; Haines, Botany 2 : 782; Nicolson *et al.*, Regnum Vegetab. 119 : 152. 1988. *Nepeta indica* L. Sp. Pl. 571. 1753. *Ballota disticha* L., Mant. Pl. : 83. 1767.

Type : "Surat" Linn. Herb. No. 737. 7 (LINN).

Nepeta-amboinica L.f., Suppl Pl. : 273. 1782. *Ajuga disticha* (L.) Roxb., Fl. Ind. 3 : 2. 1832. *Anisomeles ovata* Ait. f., Hort. Kew, ed. 2, 3 : 364. 1811, nom. illeg. superfl.; in Hook. f. FBI 4 : 672. 1885. *Tsjadean* Rheede, Hort. Malab. 10 : 175, t. 88. 1690.

Erect herbs, softly pubescent to tomentose, stems acutely 4-angled. Leaves ovate, acuminate, crenate-serrate, base rounded-cordate to cuneate, sparsely pubescent to woolly beneath, 2.5-7.5 × 1.5-5.5 cm. Whorls of cymes axillary, dense-flowered, in dense, terminal spikes or whorls laxly cymose, elongate; foliar bracts large; floral bracts linear-spathulate, 4 mm long; flowers purple or bluish, about 1.5 cm long; calyx ovoid or tubular, 10-veined, equally 5-toothed, hirsute, about 1 cm long, teeth triangular-lanceolate; corolla 1.5 cm long, 2-lipped; upper lip flat, entire, lower lip spreading, 3-4-lobed; stamens 4, didynamous, filaments bearded, anterior pair longest, exserted Nutlets ovoid or broadly oblong, black, polished, 1.5-1.7 mm long.

Type : "India"; Linn. Herb. No. 726. 28 (LINN).

Fl. : Sept.-Nov. *Frt.* : Dec.-Jan.

Common near streams, between rocks.

Lamni : 13237; Bilaspur : 12981; Kabirchabutra : 13336.

2n = 34, 40.

Indomalaysia, South China, Japan.

Herb is used as astringent and carminative; essential oil is useful in uterene affections and made into a syrup by Tamilians, also eaten in sago-cakes in Malay; a good bee-plant.

COLEBROOKEA J. E. Sm., Exot. Bot. 2 : 111. 1806.

T. : *C. oppositifolia* J. E. Sm.

1 species confined to India.

Colebrookea oppositifolia J. E. Smith, Exot. Bot. 2 : 111, t. 115. 1806 ('*colebrookia*'); Haines, Botany 2 : 777; Hara *et al.* 3 : 151. 1982. (*Binda, Pansari*—Hindi).

Erect shrubs or undershrubs; densely woolly to tomentose. Leaves opposite or 3-nate, petioled, rugose white tomentose, elliptic or elliptic-oblong, base rounded or acute, tip acuminate, crenate-serrate or crenulate, 10-20 × 5-12 cm. Spikes dense flowered, tomentose, panicled, 5-10 cm long; flowering spikes about 5 mm in diam.; fruiting spikes about 1.5 cm in diam.; bracts connate, linear-subulate, 2-2.5 mm long; flowers white, small; calyx about 0.5 mm long; tubes very short, grooved, villous, 5-lobed, lobes subulate, at length elongate, plumose; corolla minute, sub-equally 4-lobed; stamens 4; styles 2-fid. Nutlets hairy, obovoid.

Fl. : Dec.-Feb. *Frt.* : Feb.-Mar.

Common on slopes, between rock boulders, along edges of the forests.

Keonchi : 13297A; Kabirchabutra : 13358.

2n = 32.

India, Endemic.

Leaves applied to wounds and bruises. Root is used in epilepsy.

Pakistan, India, Burma.

COLEUS Lour., Fl. Cochinch. 2 : 372. 1790.

T. : *C. amboinicus* Lour.

Note : Mabberley (1987) reduces *Coleus* Lour. as a congeneric synonym of *Solenostemon* Thonn. and states: "Cultivated ornamental pot-plant, the variegated leaves with purple dominant over green and both over patterned, which is expressed only in homozygous condition; some are true chimaeras with green, yellow-green etc., while others with dark-edged yellowish leaves are apparently due to reversible hormonal bleachings initiated from mesophyll, another dominant character.

Mabberley (l.c.) also cites *Plectranthus* L'Heritier (1788), nom. cons. as the alternate name for *Solenostemon* Thonn. But Nicolson *et al.* (1988) follow Cramer (1981) in keeping *Coleus* and *Plectranthus* generically distinct, and none of them refer to

Solenostemon Thonn., the latter treated by Airy Shaw (1973) as a genus of 10 species restricted to tropical Africa.

Coleus scutellarioides (L.) Benth. in Wall. Pl. As. Rar. 2 : 16. 1830; Cramer. in Dasan. Rev. Handb. Fl. Ceylon 3 : 140. 1981. *Ocimum scutellarioides* L., Sp. Pl. ed. 2 : 834. 1763. *Coleus blumei* Benth., Lab. Gen. et Sp. : 56. 1832. Type : Java, *Blume* s.n. (L. ?). *Solenostemon scutellarioides* (L.) Codd. (cf. Mabberley. The Plant-Book : 545. 1987). *Plectranthus aromaticus* Roxb., Hort. Beng.; 45. 1814, non Roxb. (1932).

Perennial herbs or undershrubs; stems 4-angled. Leaves variegated, ovate, acute at base, tip acuminates, sharply toothed, 5-7 cm long. Racemes terminal, spike like, often branched, whorls secund; peduncles short or none; flowers dark blue, sometimes white; calyx 2-lipped, mouth oblique, upper lip broad, entire, lower with 4 unequal, narrow lobes hirsute, enlarged and deflexed in fruits; corolla-tubes exserted, 2-lipped, lower lip longer than upper and often enclosing stamens and pistils, entire, upper lip broad, 3-4-fid, recurved; stamens 4, exserted, filaments united at base into a short tube, free from corolla. Nutlets ovoid or oblong.

Type : Rumphian Illustration (Herb. Amboin. 5 : t. 101). (cf. Nicolson *et al.*, l.c. 1988).

Fl. & Frt. : February-May.

Commonly grown in gardens; often found as escapes in waste places.

HYPTIS N. J. Jacq., Collectanea 1 : 101, 103. 1787, *nom. cons.*

Type : *H. capitata* N. J. Jacq. (*typ. cons.*).

Hyptis suaveolens (L.) Poiteau in Ann. Mus. Natl. Hist. Nat. 7 : 472, t. 29, f. 2. 1806; Haines, Botany 2 : 772; Cramer in Dassn., Rev. Handb. Fl. Ceylon 3 : 155. 1981. *Ballota suaveolens* L., Syst. Nat. ed. 10 : 1100. 1759.

Herbs or undershrubs; stems hairy, 4-angled. Leaves petioled, broadly ovate, sinuate, serrulate or crenate-denticulate, base rounded or cordate, obtuse or acute, pubescent villous or tomentose, 5-7 × 2-4 cm. Flowers in dense, cymose whorls, arranged in panicled spikes or racemes; cymes often capitate; bracts 2-3 mm long, setaceous; flowers blue; calyx striate, compressed, campanulate, sub-2-lipped, tubes 6 mm long, mouth villous, teeth 5, subulate, aristate; corolla 5 mm long, upper lip shortly 2-lobed, lower 3-lobed; stamens 4, declinate, didynamous. Nutlets compressed, ovoid, oblong, emarginate at tip, pointed below, ribbed, about 3 mm long.

Type : *Brown s.n.*; Linn. Herb. No. 737.6 (LINN).

Fl. : Oct.-Nov. *Frt.* : Nov.-Jan.

Common in waste places, open grounds.

Katghora : 3971, 6050; Khuria : 15484; Hasdo river bank : 8633.

2n = 28, 32

Native of South America; naturalized throughout India and elsewhere (Murti, 1975).

Leaves used in the preparation of mint-flavoured beverages; roots chewed with betel-nuts as a stomachic and its decoction is used as an apetiser; plant yields an essential oil; seeds contain a fatty oil. Plant possesses anti-cancer properties and is said to be a mosquito-repellant.

LEONOTIS (Pers.) R. Br., Prodr. 504. 1810.

LT. : *L. leonitis* (L.) W. T. Aiton (*Phlomis leonitis* L.) vide N. L. Britton, Fl. Bermuda 324. 1918.

Leonotis nepetifolia (L.) R. Br., Prodr. : 504. 1810; W. T. Aiton, Hort. Kew. ed. 2.3 : 409. 1811; in Hook. f. FBI 4 : 691. 1885; Haines, Botany 2 : 789; Hare *et al.* Enum. 3 : 136. 1982; *Phlomis nepetifolia* L., Sp. Pl. : 586. 1753 ('*nepetaefolia*'). (*Hejurchei*—Hindi, Beng.).

Erect herbs or undershrubs; stems 4-angled, puberulous. Leaves membranous, ovate to lanceolate, crenate, acute, base cuneate, 10-20 × 5-12 cm; petioles 2.5-7 cm long, often winged above. Flowers orange coloured, in dense globose, distant whorls, 5-7 cm in diam., squarrose; bracts linear, spinescent, deflextd; flowers scarlet or orange-yellow; calyx 1.5-2 cm long, pubescent or villous, 10-ribbed, tubular, incurved, mouth oblique, 2-lipped, teeth 8, lower lips with 3 erect or recurved, spinescent teeth; corolla 2.5 cm long, tubes slender, exserted; upper lip long, concave with villous crown, lower lip 4-lobed; stamens 4, didynamous, anterior pair longest; styles unequally bifid. Nutlets linear, oblong, widening upwards truncate, glabrous.

Type : Surinam (?), *sine lect. s.n.* (BM).

Fl. : Oct.-Dec. *Frt.* : Dec.-Feb.

Common in waste places, in the outskirts of villages.

Keonchi : 13263; Kukdur : 16721.

2n = 28.

Tropical Asia, Africa; naturalized in America.

A very handsome plant, when in flower; dried plants after flowering are used for interior decoration. The ash of the flower-heads mixed with curd is applied to ringworms (Oommachan, 1977); used in skin affections; ashes of flowers applied to scalds and burns. Leaves used for rheumatism. Seeds yield a fatty oil similar to olive oil.

LEUCAS R. Br., Prodr. : 504. 1810.

T.: *L. flaccida* R. Br.

1a. Calyx straight, mouth not oblique; bracts minute, setaceous — *L. mollissima* subsp. *scaberula*

1b. Calyx turbinate, obconic or tubular; mouth very oblique; bracts as long as calyx

2a. Whorls of cymes only terminal, globose; calyx-teeth nearly equal — *L. cephalotes*

2b. Whorls of cymes terminal and axillary or only axillary; calyx-teeth unequal

3a. Leaves linear or oblong; whorls of cymes terminal and axillary; calyx-mouth glabrous, teeth very short, tubes only slightly curved — *L. aspera*

3b. Leaves ovate or ovate-lanceolate; whorls of cymes axillary; calyx-mouth villous with erect villi, teeth long, tubes sigmoidly curved — *L. martinicensis*

Leucas aspera (Willd.) Link, Enum. Pl. Hort. Berol. 2 : 113. 1822; Spreng., Syst. Veg. 2 : 743. 1825; Haines, Botany 2 : 788; Nicolson *et al.*, Regnum Veget. 119 : 154. 1988. *Phlomis aspera* Willd., Enum. Pl. Hort. Berol. 2 : 621. 1809 (?). *Phlomis plukenetii* Roth, Nov. Pl. Sp. : 261. 1821. *Leucas plukenetii* (Roth) Spreng, Syst. Veg. 2 : 743. 1825; J. R. Press in Hara *et al.*, Enum. Fl. Pl. Nepal. 3 : 157. 1982. *Leucas oblique* Ham. ex Dillwyn, Rev. Hort. Malab. : 57. 1839. *Tumba* Rheede, Hort. Malab. 10 : 181, t. 91. 1690. (*Bhutamari*—Oriya; *Chhota holkusa*—Hindi, Beng.).

Erect or diffuse, hairy herbs. Leaves linear or linear-oblong obtuse, entire or crenate-serrate, thinly pubescent, 2.5-7.5 cm long. Whorls of cymes terminal and axillary, about 2.5 cm in diam., hispid; bracts lanceolate, as long as the calyx, hispid-ciliate; flowers white; calyx 8-0 mm long in flower, tubular, smooth, membranous below, ribbed and scabrid above, mouth glabrous, very oblique, teeth 10; corolla-tube included, upper lip

erect, concave or hooded, villous on top, 3 mm long, lower lip spreading, 3-fid, mid-lobe 7 mm long; stamens 4, didynamous, anterior pair longer; styles subulate. Nutlets ovoid, 2-quetrous, obtuse.

Fl. & Frt. : July-Jan.

Common in waste places, cultivated fields, nurseries and forest-clearings.

Karidongri : 19327; Pasan to Korbi : 15315; Pasan : 13287; Katghora : 6053; Passarkhet : 19442.

2n = 22.

India, Java, Philippines.

Plants fragrant, as a pot herb in times of scarcity. Juice of leaves applied externally in psoriasis, chronic skin-eruptions and painful swellings. Flowers given with honey for coughs and colds. Herb is used as anti-pyretic.

L. cephalotes (Roth) Spreng., Syst. Veget. ed. 16, 2 : 743. 1825; Haines, Botany 2 : 787. *Phlomis cephalotes* Roth, Nov. Sp. Pl. : 262. 1821. *Leucas capitata* Desf., Mem. Mus. Paris 11 : 8, t. 4. 1824. (*Dronapusi*—Sansk.; *Barahalkusa*—Beng.).

Erect herbs; stems patently hairy, 4-grooved. Leaves ovate, ovate-lanceolate or elliptic-lanceolate, sub-acute, crenate-serrate, pubescent, 3-8 × 1.5-4 cm. Whorls of cymes sub-globose, terminal, 2.5-5 cm in diam.; bracts lanceolate or elliptic, acuminate-aristate, 1-1.5 cm long, rigidly ciliate, flowers white; calyx tubular, softly pubescent, 1.5-2 cm long, mouth bearded, oblique, 10-ribbed, 10-toothed; corolla-tubes exserted, 2-2.5 cm long, lower lip longer than densely white bearded upper lip; stamens 4, didynamous, anterior pair longer; styles subulate. Nutlets oblong, 3-gonous, smooth, 3-3.5 mm long.

Fl. & Frt. : Sept.-Feb.

Common in cultivated fields, waste places, along roads.

Katghora : 6052; Pasa to Korbi : 15313.

2n = 22, 28.

Afghanistan, India.

Used as a potherb; stimulant, diaphoretic, laxative and anthelmintic; syrup prepared from flowers used for coughs and colds; seeds yield an oil used as illuminant.

L. martinicensis (N. L. Jacq.) R. Br., Prodr. : 504. 1810; Haines, Botany 2 : 787. *Clinopodium martinicensis* N. J. Jacq., Amer. Hist. : 173. 1763.

Erect herbs; branches 4-gonous, hairy. Leaves membranous, petioled, lanceolate or ovate-lanceolate, base cuneate, obtuse, coarsely crenate-serrate, hispid-hairy, 2.5-7.5 × 1.5-3.5 cm. Whorls of cymes axillary or terminal, globose, 1.5-2.5 cm in diam.; bracts linear, spinulose-tipped, hairy; flowers white; calyx tubular, sigmoidly curved, mouth oblique, 1-1.8 cm long, enlarged in fruits, teeth 10, unequal, spinescent, ciliate; corolla tubular, 1-1.5 cm long, 2-lipped; stamens 4, didynamous. Nutlets obovate-oblong, 2 mm long, shining.

Fl. & Frt. : Oct.-Dec.

Occasionally found in waste places, mud-walls.

Pantropical.

Plant has mint-like odour and the leaves are eaten; infusion given for gastro-intestinal disorders; herbs insecticidal, burnt in rooms to expel mosquitoes.

L. mollissima Wall. ex Benth. subsp. **scaberula** (J. D. Hook.) S. K. Murti & Panigr., *comb. nov., stat. nov. L. mollissima* Wall. ex Benth. var. *scaberula* in Hook. f. FBI 4 : 682. 1885; Hara *et al.*, Enum. 3 : 157. 1982. *L. montana* var. *scaberula* (J. D. Hook.) Haines, Botany 2 : 786.

Diffuse herbs with woody rootstock; branches scabrescent. Leaves sub-sessile, ovate or ovate-lanceolate, acute, coarsely serrate, 1.5-3.5 cm long. Whorls of cymes axillary; bracts minute, setaceous; flowers white, sub-sessile or shortly pedicelled; calyx hispid 6-8 mm long, cylindric, straight, 10-dentate, mouth not oblique; corolla-tubes exserted, 1.3-1.5 cm long, 2-lipped; stamens 4, didynamous; styles subulate. Nutlets 2 mm long, ovoid, 3-quetrous.

Syntype: Khasia Mts., *Griffith s.n.*; Central India, Chota Nagpur, *C. B. Clarke s.n.*

Fl. & Frt. : Oct.-Dec.

Common in rock crevices, near streams, on slopes.

Katghora : 7108; Kabirchabutra : 13302, 13392; Achanakmar : 13229; Pasarkhet : 19436; Khondra : 12841.

2n = 28.

India to S. China, Malaysia.

Both J. Hook. (1885) and Hara *et al.* (1982) recognise 4 varieties in *Leucas mollissima* Wall. ex Benth. Of these, var. *scaberula* is more glabrous than var. *mollissima* (including the calyx) which is woolly tomentose.

Leaves eaten as pot herb.

MICROMERIA Benth. in Edwards Bot. Reg. Vol. 15(4). sub. t. 1282. 1829, *nom. cons.*

T. : *M. juliana* (L.) Benth. ex H.G.L. Reichenbach (*Satureja juliana* L.).

Note : Mabberley (1987) treats *Satureja* L. as an alternate name; whereas Airy Shaw (1973) assigns 200 species to *Satureja* L. *s. l.* and 30 species to *Satureja* L. *s. str.*

Micromeria biflora (Buch.-Ham. ex D. Don.) Benth. Lab, Gen. & Sp. 378. 1834; Haines, Botany 2 : 779. *Thymus biflorus* Buch.-Ham. ex D. Don. Prodr. Fl. Nepal. 112. 1825. *Satureja biflora* (Buch.-Ham. ex D. Don.) Briq. Pflanzenfam. 4. 3a : 299. 1894; Vautier in Candollea 17 : 50. 1959. (*Indian Wild Thyme*—Eng.).

Diffuse herbs; branches glabrous or puberulous. Leaves sessile or sub-sessile, elliptic, ovate or oblong, entire, base rounded-sub-cordate, sub-acute, with a thickened margin, gland-dotted, 4-5 mm long. Whorls of cymes axillary, 2-4-flowers about 7 mm long, pink or purple; calyx-tubes strongly ribbed, about 5 mm long, teeth 5, setaceous, fruiting slightly enlarged, hirsute; corolla hairy outside, 1-1.3 cm long, 2-lipped, upper lip straight, notched or 2-lobed, lower lip spreading, 3-lobed; stamens 4, lower 2 longer; styles 2-lobed. Nutlets reddish brown, smooth, 0.8-1 mm long, elliptic-oblong.

Fl. & Frt. : Apr.-July.

Occasionally found on rocky slopes.

Kabirchabutra to Amarkantak : 19163.

2n = 30.

Africa, Afghanistan, India.

Specimens from Bilaspur are referable to var. *biflora*. *M. biflora* var. *hispida* Kit. & Murata is restricted to the Himalayan tracts from Kashmir to Assam.

Used for worm infested wounds of cattle. Four physiological races (all yielding essential oils), *Camphorata*, *Citrata*, *Menthata* and *Pulegata* are known, the first one yielding camphor.

NEPETA L., Sp. Pl. : 570. 1753 & Gen. Pl. ed. 5 : 249. 1754.

LT. : *N. cataria* L. (vide N. L. Britton et A. Brown, Ill. Fl. North. U.S., ed. 2, 3 : 113. 1913).

Usually dry habitats; gynodioecy. Catmints, some species are irresistible to cats.

Nepeta hindostana (Roth)Haines, Botany 2 : 744. 1922; Babu, Herb. Fl. Dehra Dun : 414. 1977. *Glechoma hindostana* Roth, Nov. Pl. Sp. 258. 1821. *Nepeta ruderalis* Buch.-Ham. ex Benth. in Wall. Pl. As. Rar. 1 : 64. 1830; in Hook. f. FBI 4 : 661. 1885.

Erect or decumbent ascending herbs; finely pubescent, branches angled. Leaves petioled, broadly ovate-or orbicular-cordate, obtuse, coarsely crenate-serrate, hoary pubescent, 1-5 × 1-4 cm. Cymes stalked, axillary, aggregated at top of stem into dense spiciform thyrses 2 cm in diam., peduncles of lower cymes often 7 mm long; bracts setaceous, 2.5-3 mm long; flowers pedicelled, blue or blue-purple, 5-6 mm long; calyx villous, mouth oblique, 4 mm long, 3 upper teeth triangular, aristate, 2 lower filiform, subulate, fruiting calyx ribbed, 6 mm long; corolla 6-7 mm long, lower lip 5 mm long, 3-lobed, upper lip notched or 2-fid; stamens 4, upper pair longer; styles 2-fid. Nutlets oblong, brown with white spots, about 1.5 mm long.

Fl. & Frt. : Feb.-June.

Common in damp places, edges of the forests, on slopes.

Kabirchabutra : 13347, 15223.

2n = 36.

India, Afghanistan.

Cardiac tonic, used as a febrifuge; decoction also used as gargle. Leaves yield an essential oil similar to some lemon-grass oil.

OCIMUM L., Sp. Pl. : 597. 1753 & Gen. Pl. ed. 5 : 259, 1754.

LT.: *O. basilicum* L. (vide N. L. Britton et Millspaugh, Bahama Fl. : 380. 1920).

Ocimum tenuiflorum L., Sp. Pl. : 597. 1753 [*O. sanctum* L., Mant. Pl. : 85. 1767 (2n = 32, 34, 36, 64, 32 t 0 + 3B)], is widely cultivated as a sacred plant (cf. Nicolson *et al.*, Reg. Veget. 119 : 155. 1988) and is called *Tulasi*, *Krishnatulasi*, *Natlathulasi*.

1a. Fruiting calyx 4-5 mm long, upper lip recurved, often to nearly erect; corolla 5-7 mm long — *O. canum*

1b. Fruiting calyx 6-8 mm long, upper lip saucer-shaped; corolla 7-10 mm long — *O. basilicum*

Ocimum canum Sims., Bot. Mag. 51 : t. 2452. 1824; Haines. Botany 2 : 764; Cramer in Dassan., Rev. Handb. Fl. Ceylon 3 : 114. 1981. (*Ajaka*, *Kuthera*—Sans.; *Kala-tulasi*—Hindi).

Note: While Cramer (1981), in agreement with Morton (J. Linn. Soc. Bot. 58 : 234. 1962) and after examining the types, treats *Ocimum canum* Sims. as distinct from *O. americanum* L. (1755) (= *O. basilicum* L. 1753), Gandhi (in Fl. Hassan. : 505. 1976) accepts *O. americanum* L. as the correct name for *O. canum* Sims. Since both Morton and Cramer have examined the types, we choose to follow Cramer.

Erect herbs; stems 4-angled, pubescent. Leaves petioled, elliptic, elliptic-lanceolate or narrowly ovate, entire or shallowly serrate, 2.5-3.5 × 0.8-1.5 cm. Whorls of cymes 5-6-flowered, in terminal, elongating racemes 5-10 cm long; bracts ovate, awned, ciliate; pedicels erect, pubescent, 1-2 cm long, appressed to rhachis; flowers white or purple; calyx densely villose inside; pilose or villose outside, 2-lipped, toothed; corolla white or pale purple, tubes short; upper lip subequally 4-fid, lower oblong, obtuse, declinate, entire; stamens 4, declinate, filaments of upper 2 stamens toothed at base; stigmas 2. Nutlets oblong-ellipsoid, black, 1.2 cm long; seeds mucilaginous when wetted.

Fl. & Frt. : July-March.

Common in road side-ditches, near cultivated fields, as weeds in gardens, nurseries.

Karidongri : 19326.

2n = 22, 24, 26, 34, 64 + 0 + B, 64.

Palaeotropics.

Potherb; medicinal; yields a volatile oil used in soaps and cosmetics; seeds mucilaginous, yield a semi-drying fatty oil; seeds diuretic, tonic.

O. basilicum L., Sp. Pl. : 597. 1753; Lamarck., Encycl. 1 : 383. 1785; Haines. Botany 2 : 763; Nicolson *et al.*, Regnum Vegetab. 119 : 154. 1988. *O. americanum* L. in Jussenius, Cent. I Pl. : 15. 1755. *Soladi-tirtava* Rheede, Hort. Malab. 10 : 173, t. 87. 1690. (Sweet Basil; *Munjariki*—Sansk. *Dhala-tulasi*; *Kapur kanti*—Oriya).

Erect herbs; stems pubescent, hairy at nodes. Leaves ovate-lanceolate, base cuneate or rounded, acute or subobtuse, subentire, serrate, glabrate or thinly hairy, gland-punctate, 2-6 × 0.8-3 cm. Whorls of cymes 6-flowered, combined into racemes or panicles; bracts stalked, shorter than calyx, ovate, acute; flowers bluish-white or pale-purple; calyx 4 mm long, fruiting 5-8 mm long, hairy outside, 2-lipped, upper lip ovate-rounded, two lower teeth subaristate; corolla 7-8 mm long, 2-lipped, lower lip longer than upper, upper lip 4-lobed; stamens 4, declinate, upper filaments toothed at base. Nutlets oblong, slightly glandular, black, 0.5 cm long.

Fl. & Frt. : July-Dec.

Common weed near cultivated fields, ditches, in the gardens, nurseries; sometimes cultivated.

Marwahi to Parasi : 19039; Katghora : 6042.

2n = 16, 48, 64, 72, 84.

India, Sri Lanka, Burma.

Chopped leaves used in casseroles, sauces, pizza and liqueurs in Europe; leaf-decoction is used in cough and cold. Plant yields a volatile oil-Basil Oil, with clovelike scent, used both as a flavouring agent and perfume.

ORTHOSIPHON Benth. in Edward's Bot Reg. 15. sub. t. 1300. 1830, et Lab. Gen. & Sp. : 25. 1832.

T. : *non designatus.*

1a. Leaves petioled, 4-6 cm long, elliptic or ovate, obtuse or acute; corolla-tubes nearly as long as calyx — *O. pallidus*

1b. Leaves sessile or sub-sessile, 7-10 cm long, oblong or elliptic-oblong, rounded or subacute; corolla-tubes twice as long as calyx — *O. rubicundus*

Orthosiphon pallidus Royle ex Benth. in Hook., Bot. Misc. 3 : 370. 1833; in Hook. f. FBI 4 : 613. 1885; Haines, Botany 2 : 765.

Diffusely branched herbs, branches 4-angled, puberulous above. Leaves pale beneath, coarsely toothed or crenate, base cuneate; glabrous except on veins beneath, punctate with glands; petioles 6-9 mm long. Whorls of cymes 6-flowered, racemose, deflexed in fruits; flowers about 6 mm long, deflexed with pedicels; calyx tubular, 2-lipped, glabrous within, many-ribbed, hispidulous outside, 6 mm long in fruits, with 2-awned lower lip; corolla 2-lipped, tubes as long as or exserted from calyx-tubes; upper lip 3-4-lobed; lower lip entire; stamens 4, declinate, exserted. Nutlets pale, globose, smooth.

Fl. & Frt. : July-Oct.

Common near cultivated fields.

Bilaspur to Seput : 13013.

2n = 22, 24, 28.

Africa to India.

O. rubicundus (D. Don) Benth. in Wall. Pl. As Rar. 2 : 14. 1831; Haines, Botany 2 : 766; Hara *et al.*, *Enum.* 3 : 160. 1982. *Plectranthus rubicundus* D. Don, Prodr. Fl. Nepal. : 116. 1825 ('*Plectranthes rubicunda*') *Jikipota* (Mundari).

Erect herbs; roots often tuberous; stems 4-angled, pubescent or glabrate. Leaves crenate-serrate, base cuneate, puberulous or glabrate above, paler and glabrous or hispidulous on veins beneath. Whorls of cymes 6-flowered, distant on long, terminal racemes 10-30 cm long; bracts 2-3 mm long, pubescent; flowers violet-purple, or pink; calyx hairy,

2-lipped, 5 mm long in flower, 7 mm long in fruits, ribbed; upper lobe sub-petaloid, purple, lower 4 calyx-teeth subulate; corolla-tubes about 7 mm long, pubescent, throat funnel-shaped, 2-lipped; stamens 4, declinate, exserted. Nutlets sub-orbicular, compressed, punctulate.

Type: Nepal, *Buchanan-Hamilton s. n.* (BM).

Fl.: June-July. *Frt.*: Sept.-Oct.

Common as forest undergrowths on slopes.

Marwahi to Pasan : 19058, 19072; Lamni : 19255.

2n = 28.

India, Nepal, Burma.

Tubers eaten, also yield starch; given as a cure for colic.

PLECTRANTHUS L'Herit., Strip. Nov. 84. verso. 1788, *nom. cons.*

T.: *P. fruticosus* L'Heritier (*typ. cons.*).

Plectranthus mollis (W. T. Aiton) Spreng., Syst. Veg. 2 : 690. 1825; Nicolson *et al.*, Regnum Vegetab. 119 : 156. 1988. *Ocimum mollis* W. T. Aiton, Hort. Kew. 2 : 322. 1789. *Plectranthus incanus* Link, Enum. Hort. Berol. Alt. 2 : 120. 1822; Haines, Botany 2 : 771. *P. cordifolius* D. Don, Prodr. Fl. Nepal. : 116. 1825. *Perim-tolassi* Rheede, Hort. Malab. 10 : 167, t. 84. 1690, (*Lal-agada*—Bombay).

Erect herbs or undershrubs; pale hoary with fine pubescent, 4-angled stems. Leaves petioled, broadly ovate-cordate, acute, gland-punctate beneath, crenate, 5-12 × 4-10 cm. Cymes of 2-3 flowers, on a short common peduncle with pedicels 8-10 mm long, arranged in terminal racemes or panicles; flowers about 7 mm long, bluish or pinkish; calyx about 3.5 mm long, enlarged upto 1 cm in fruit, broady campanulate; upper lip broadly ovate, reflexed, short-2-toothed or entire; lower lip with 4 long subulate teeth; corolla-tubes exserted, 2-lipped, pubescent, lower lip hemispheric, boat-shaped, entire or notched; upper lip short, broad, 2-4-fid; stamens 4, included, declinate, didynamous, filaments toothed. Nutlets orbicular ovoid, 2 mm in diam.

Fl.: Aug.-Oct. *Frt.*: Oct.-Nov.

Common in open deciduous forests, in waste places.

Pasarkhet : 12975; Kabirchabutra : 13395.

2n = 28.

India, Nepal, Sri Lanka.

Crushed leaves applied to stop bleeding and as a febrifuge; used as a mosquito-repellant; leaves and flowering tops yield an essential oil which acts as a cardiac depressant, respiratory stimulant and vasoconstrictor.

POGOSTEMON Desf. in Mem. Mus. Hist. Nat. Paris. 2 : 154. 1815; Panigrahi in J. Orissa Bot. Soc. 6(1)-50-56. 1984.

T. : *P. plectranthoides* Desf.

Eusteralis Rafin., Fl. Tellur. 2 : 95. 1837. Panigrahi, Phytologia 32 : 473. 1976.

T. : *E. pumila* (Graham) Rafin. (*Mentha pumila* Graham).

Dysophylla Blume, Bijdr.. : 1826.

T. : *D. auricularia* Bl.

Note : 1. *Pogostemon cablin* (Blanco) Benth. (Patchouli)—its oil is used in scenting cosmetics, shampoos, in insecticides and as leech-repellant and to shoothe menstrual pains, but in commerce, often replaced by *P. heyneanus* Benth. (Indian Patchouli). *P. parviflorus* (Benth.) Benth. is an important honey-plant.

2. El-Gazzar & Watson (Taxon 16 : 186-189. 1967) transferred four species of *Dysophylla* Bl., including the type species, *D. auricularia* (L.) Bl., to *Pogostemon* Desf. As the rest of the species included under *Dysophylla* were without a generic name, Airy Shaw (Taxon 16 : 189. 1967) proposed a new name *Dysophylla* El-Gazzar & Watson (& Airy Shaw), non Blume, to include the Verticillate-leaved species of *Dysophylla* Bl. with *D. quadrifolia* Benth. as the type species and for its conservation against *Dysophylla* Bl. (1826). This proposal was rejected (Taxon 17 : 464. 1968). Bakhuizen & van Steenis (Taxon 17 : 235, 1968) noted that Airy Shaw failed to observe an earlier valid name, *Eusteralis* Rafin. Subsequently, Bakhuizen, Keng & van Steenis (Taxon 19 : 820. 1970) pointed out that the oldest name for the *Pogostemon-Dysophylla* complex is apparently *Alopecuro-Veronica* L. (Amoen. Acad. 4 : 143. 1759) and

proposed conservation of both *Dysophylla* Bl. and *Pogostemon* Desf. against *Alopecuro-Veronica* L. This proposal was also rejected (Taxon 23 : 819, 920. 1974). Panigrahi (Phytologia 32 : 473. 1976) resuscitated the earlier valid name *Eusteralis* Rafin. However, Press (1982), from his studies in Numerical Taxonomy, supported Keng (1978) that *Dysophylla* Bl. *Eusteralis* Rafin. and *Colebrookia* Sm. should be treated as congeneric synonyms of *Pogostemon* Desf. (1815). Thereupon, Panigrahi (1984) transferred 15 taxa of *Eusteralis* Rafin, (cf. Panigrahi, 1976) to *Pogostemon* Desf. sect. *Verticillati* (Benth.) Panigr. (Taxon 21 : 120. 1982).

Pogostemon Desf. sens. lat. is, therefore, represented in Bilaspur district by two species, and are diagnosed from each other as below :

1a. Leaves verticillate; cymes in slender, long continuous cylindrical spikes; calyx minute; corolla subequally 4-fid — *P. stellatus*

1b. Leaves opposite; cymes glomerate or capitate; calyx long-tubular; corolla 2-lipped — *P. benghalensis*

Pogostemon benghalensis (N. Burm.) Kuntze, Rev. Gen. Pl. 2 : 529. 1891; Merr. in Philipp. Jour. Sci. 19 : 379. 1921; Hara *et al.*, Enum. 3 : 162. 1982. *Origanum benghalense* N. Burm., Fl. Ind. 128. t. 38. f. 3. 1768. *Pogostemon plectranthoides* Desf. in Ann. Mem. Mus. Hist. Nat. Paris 2 : 155. t. 6. 1815; in Hook. f. FBI 4 : 632. 1885; Haines, Botany 2 : 773. (*Jui-lata*—Beng.; *Pokasunga*—Oriya).

Shrubs; hoary pubescent or suffruticose. Leaves petioled, ovate, acute or sub-acuminate, hairy, coarsely doubly serrate, 7.5-15 × 5-10 cm. Spikes capitate, secund, arranged in dense, secund, panicled, villous racemes; bracts ovate, elliptic-ovate or oblong-rhomboid, villous, exceeding calyx; bracteoles falcate-lanceolate, acuminate, pubescent, 5-7 mm long; flowers white or pale; calyx hirsute, 4 mm long, tubular, equally 5-toothed, teeth triangular-lanceolate, ciliate; corolla 6 mm long, usually exserted; upper lip with 3 rounded lobes, lower entire; stamens 4, straight or declinate, filaments exserted, bearded with purple hairs; styles 2-fid. Nutlets ellipsoid-ovoid, smooth, glabrous, minute.

Fl. : Jan.-Feb. *Frt.* : Apr.

Common on slopes, along streams in shady places.

Kaonshi : 8569; Kabirchabutra : 13359.

2n = 34, 64.

India, Nepal, Burma.

Ashes of stem used as a manure for paddy crop. Leaves yield an essential oil and used as a stimulant and styptic; their juice is used in colic and as a febrifuge.

P. stellatus (Lour.) O. Kuntze, Rev. Gen. 2 : 530. 1891 p.p.; Panigrahi, J. Orissa Bot. Soc. 6(1) : 65. 1984. *Mentha stellata* Lour., Fl. Cochinch. 2 : 361. 1790, non Buch.-Ham. ex Roxb. (1832) *Dysophylla verticillata* Benth. in Wall. Pl. As. Rar. 1 : 30. 1830; in Hook. f. FBI 4 : 639, 1885; Haines, Botany 2 : 775. *Mentha verticillata* Roxb., Fl. Ind. 3 : 5. 1832, non L. (1759) nec. D. Don (1825). T. : Bangladesh, Sylhet, Wall. Num. List No. 1554. (K-WALL.). *Dysophylla stellata* (Lour.) Benth. l.c. : 30, p.p includo typo, excl. descrip. et synon., non (Roxb.) Benth. (1833).

Erect, annual herbs; stems hollow, decumbent below. Leaves verticillate, linear, sessile, entire or obscurely toothed, glabrous, deciduous, leaving annular scars, 2.5-7.5 cm long. Spikes cylindrical, upto 6.5 cm long and 4 mm in diam., terminal; flowers minute, sessile, pinkish; calyx minute, tubular, 5-dentate, throat naked, teeth of fruiting-calyx stellately spreading, looking like holes in a solid spike and disclosing nutlets; corolla minute, tube exserted, subequally 4-fid; stamens 4, exserted, usually declinate, filaments, bearded; styles 2-fid. Nutlets pale brown, ovoid or oblong, minute.

Type : "Habitat loca humida inculta Cochinchina", *Loureiro* s.n. (BM).

Fl. & Frt. : Oct.-Feb.

Khondra : 12861; Keonchi to Pendra : 15380.

Common in marshy situations.

2n = 72 (as '*Dysophylla verticillata*').

India to Vietnam.

SALVIA L., Sp. Pl. : 23. 1753 & Gen. Pl. ed. 5 : 15. 1754.

LT. : *S. officinalis* L. (vide N. L. Britton & A. Brown, Ill. Fl. North. U.S. ed. 2, 3 : 129. 1913).

Cultivated ornamentals and medicinal (Latin : *Salvo*-I heal).

Salvia plebia R. Br., Prodr. : 501. 1810. Haines, Botany 2 : 780; Hara *et al.*, Enum. Fl. Pl. Nepal. 3 : 165. 1982. (*Bhuin-tulasi, Kaka-buradi*—Beng.).

Erect herbs; stems fastigiately branched, square. Leaves petioled, oblong, ovate or ovate-lanceolate, obtuse or upper ovate, acute, crenate, narrowed at both ends, rugose, glabrous, except hairy veins beneath, 2.5-7.5 × 1.5-3 cm. Whorls of cymes 6-flowered, combined into racemes, forming terminal panicles 5-10 cm long; bracts oblong or lanceolate; flowers bluish white; calyx 3-4 mm long, 2-lipped; upper lip decurrent on tubes, lower obtusely 2-toothed; corolla 4-5 mm long, upper lip concave, 2-toothed, lower spreading, 3-toothed, throat with ring of hairs within; stamens 2, perfect, cells widely separated by connectives- single fertile anther brought into contact with back of pollinating bees etc. by the other end of the versatile anther being pushed upwards by pollinator probing for nectaries, protrandry, position of anther being taken up by style and stigma later. Nutlets ellipsoid, glabrous, minute.

Fl. & Frt. : Feb.-July.

Occasionally found near streams, in nurseries.

Karidongri : 19333.

2n = 16, 16 + 1B.

India, Nepal, Malay Peninsula, Australia.

Seeds mucilaginous, useful in menorrhagia, diarrhoea and hemorrhoides; herb diuretic and anthelmintic; mucilage applied to impart gloss to the hair.

PLANTAGINACEAE

A. L. Juss., Gen. Pl. : 89. 1789 ('*Plantagines*').

T. : *Plantago* L.

PLANTAGO L., Sp. Pl. : 112. 1753 & Gen. Pl. ed. 5 : 52. 1754.

LT. : *P. major* L. (vide N. L. Britton & A. Brown, Ill. Fl. North. U.S. ed. 2, 3 : 245. 1913).

Plantago ovata Forssk. (Blood Psyllium, Ispaghul), (2n = 8) is cultivated in India; its dried seeds and husk are emollient, demulcent, and laxative; useful in chronic constipation, dysentery and diarrhoea.

Plantago exigua Juss. et Murr. in Comm. Soc. Reg. Scient. Gotting. 1 : 94. t. 5. f. 1-3. 1779; Panigrahi in Kew Bull. 30(4) : 671. 1975 *P. pumila* L. f., Suppl. Pl. : 125. 1782; in Hook. f. FBI 4 : 707. 1885.

Erect, ascending herbs. Leaves opposite, linear-filiform, base sheathing, 3-5 × 0.1-0.15 cm. Spikes capitate, ovoid or subglobose, puberulous, solitary, axillary, on 2-4 cm long, hairy peduncles; bracts leaf-like, ciliate; flowers white; calyx divided near to base, 3-3.5 mm long, segments 4, subequal, lanceolate, acute, persistent; corolla salver-shaped, lobes 4, ovate, finely acuminate; stamens 4, inserted on corolla-tubes. Capsules 1-4-celled, circumsciss, membranous, 1-or more-seeded.

Lectotype: East India (Pondichery), *Murray* l.c., plate 5. fig. 1-3 (vide Panigrahi l.c.).

Fl. & Frt.: Feb.-May.

Occasionally found as weeds in cultivated fields in waste places.

Kabirchabutra : 15259.

Egypt to South Iran, Afghanistan, Pakistan, India.

Seeds are used medicinally.

NYCTAGINACEAE

A. L. Juss., Gen. Pl. : 90. 1789 ('*Nyctagines*') *nom. cons.*

T. : *Nyctago* Juss. nom. illeg. (≡ *Mirabilis* L.).

Bougainvillea Comm. ex Juss., ("*Buginvillaea*") *nom. cons.* et *orth. cons.* with 14 species, is native of Central and tropical South America. Its flowers arise from persistent coloured bracts in groups of 3 resembling a flower. They represent spiny lianes and are widely cultivated for their ornamental value. The most popular taxa are : *Bougainvillea* × *buttiana* Holttum & Standley (*B. glabra* Choisy) (Brazil) × *B. peruviana* Bonpl. (a native of Columbia to Peru) and *B. spectabilis* Willd. (2n = 20, 34, 51) (Brazil). *B. spectabilis* Willd. cv. '*Perfection* has 2n = 51; cv. '*lateritia*' 2n = 34, cv. *Poultonii special*' has 2n = 51, whereas two other unnamed cvs. possess 2n = 32, 34, 68 and *B. spectabilis* × *glabra* hybrid, 2n = 34.

1a. Flowers minute, in heads or umbels, not within an involucre but subtended by minute bracts; perianth articulated with pedicels, 2.5-5 mm long — BOERHAVIA

1b. Flowers showy, large, 1-3 in a calyx-like involucre; perianth not articulated with pedicels, 4-6 cm long — MIRABILIS

BOERHAVIA L. Sp. Pl. : 3. 1753 & Gen. Pl. ed. 5 : 119. 1754.

LT. : *B. erecta* L. (vide Standley, Contr. U. S. Natl. Herb. 12 : 375. 1909).

Boerhavia repens L., Sp. Pl. : 3. 1753; Haines, Botany 2 : 795; Fosberg, Smith. Contrib. Bot. 39 : 8. 1978; Nicolson *et al.*, Regnum Veget. 119 : 196. 1988. *B. procumbens* Banks ex Roxb. Fl Ind. 1 : 148. 1820; Wight, Ic. Pl. : t. 874. 1844-1845. *B repens* L. var. *procumbens* (Roxb.) in Hook. f. FBI 4 : 709. 1885. *Talu-dama* Rheede, Hort. Malab. 7 : 105, t. 56. 1688. (*Punarnava*—Sansk., Beng., Telugu, Oriya).

Diffusely branched herbs; branches creeping, rusty puberulous. Leaves in unsymmetrical pairs, broadly ovate, obtuse or acute, usually cordate, subentire-undulate, glabrous, 2-6 × 1.5-4 cm. Inflorescences axillary, flowers sessile or subsessile in pedunculate cymes or umbels, peduncles 1-3 cm long, slender, bracts ovate, acuminate, 1 mm long; flowers rose or pinkish violet, 4-8 together; perianth campanulate, 6 mm long or less, tubes constricted above ovary and glandular, 5-lobed, lobes emarginate; stamens 1-3, exserted, filaments connate at base. Fruits c. 3 mm long, clavate to fusiform, 5-ribbed, glandular

LT. : Rheede, *l.c.* : t. 56 (vide Nicolson *et al.*, l.c.).

Fl. & Frt. : Oct.-Feb. and July-Aug.

Common in waste places, roadsides, dry open places, secondary forests.

Kota : 13098; Pasan : 19122; Khuria : 15495.

2n = 94.

Pantropics.

Note : 1. Fosberg (l.c.) discusses the taxonomy of *B. diffusa* L. and *B. repens* L., Nicolson *et al.*, (l.c.) distinguish "*B. repens* L. group" (axillary pedunculate cymes or umbels) from "*B. diffusa* L. group" (strictly terminal paniculate inflorescence) and identify Rheede's

t. 56 with the former and consider LINN 9.3, selected as lectotype of *B. diffusa* L. by Fosberg (l.c.), as a post- 1753 addition to Linn. Herb.
Nasir (1974) diagnoses *B. diffusa* L. from *B. procumbens* Banks ex Roxb. mainly by the fusiform fruits of the former vis-a-vis the turbinate to broadly clavate fruits in the latter. He also observed some subfusiform fruits in the latter, but considered them as immature. Roxburgh (1820), in describing *B. procumbens*, included *B. diandra* Burm. N., *B. erecta* Gaertn. and Rheede t. 56 (1688) in the protologue and stated, "this species, whatever it may be, whether *diffusa*, *erecta*, *repanda* or *diandra*, or all of them, is the only one I have found in India. .". Therefore, *B. procumbens* Roxb. is nom. illeg. (Art. 7. 13, Art. 63.1, ICBN, 1988). Nicolson *et al.*, (1988) identify Rheede l.c. : t. 56. 1688 as *B. repens* L.

2. The correct generic spelling is *Boerhavia*, not *Boerhaavia*, since Linnaeus used the former. (Art. 73.1).

3. The viscid perianth tubes containing the fruits are easily detached and distributed by animals.

Roots are used in skin inflammation and as purgative, diuretic, expectorant, febrifuge and anthelmintic and as antidote to snake-venom. Leaves are eaten as potherb. The PUNARNAVA provides rejuvinating tea (such as ginseng). Active constituent is an alkaloid (Punarnavine) isolated; intravenous injections of the alkaloid in cats produce a distinct and persistent rise in blood pressure.

MIRABILIS L., Sp. Pl. : 177. 1753; Gen. Pl. ed. 5 : 82. 1754.

T. : *Mirabilis jalapa* L.

Mirabilis jalapa L., Sp. Pl. : 177. 1753; Haines, Botany 2 : 794; Bernhardi in Candollea 18 : 271. 1963; Stemmerik in Fl. Males. Ser. 1(3) : 451. 1964; Nicolson *et al.*, Regnum Veget. 119 : 197. 1988. *Andi-Malleri* Rheede, Hort. Malab. 10 : 140-150, t. 75. 1690. (*Krishnakeli*—Sansk.; *Gulabas*—Beng.; *Rangini*—Or.); *'Four O'Clock Plant'*. *'Marvel of Peru'*.

Erect herbs; roots tuberous; stems fleshy, often tinged with purple, thickened on nodes. Leaves in unequal pairs, ovate-lanceolate, cordate or rounded at base, acute or acuminate, subentire-repand to sinuate, glabrous, 3-10 × 2-6 cm. Flowers clustered on branches of large, leafy panicles,

each surrounded by K-like involucres of 4-5 connate bracts, 1-1.3 cm long in flowers afterwards enlarged and cleft; calyx corolla-like, salver shaped to campanulate, usually red; tubes 3 cm long, glandular hairy, limbs 3 cm across; stamens 3-5. Fruits globose, or ellipsoid, ribbed or rugose, black, 6-8 mm long.

Fl. & Frt.: Aug.-Nov.

Kabirchabutra : 13304.

2n = 54, 58, 116.

Native of Peru; commonly cultivated in gardens throughout India near temples as a sacred plant, but also occasionally naturalized as an annual, but when perennial, its tuberous root grows up to 20 kg.

An ornamental herb with pretty brilliant, elongated flowers opening up at 4-0 p.m. in the evening and remain so until 10 a.m. next day. Mutants with large yellow or white flowers are also seen and are used in worship. Roots used as aphrodisiac and purgative; leaves applied to boils to lessen inflammation. Alkaloid *Trigonelline* isolated. Flowers in water give a crimson dye used for tinting seaweed cakes and jellies in China; powder from its ground seeds is used in cosmetics in Japan.

AMARANTHACEAE

A. L. Jussieu, Gen. Pl. : 87. 1789 ('*Amaranthi*').

T.: *Amaranthus* L.

Herbs (mostly) to climbers, shrubs or rarely trees with secondary thickening of concentric rings of vascular bundles; producing betalaïnes but not anthocyanins, nor tannins; leaves often with Krantz anatomy. Sepals 3-5, rarely 2 and rarely connate at base; corolla 0; anthers usually same number as K and opposite them, usually connate at base into a tube, often with lobes or teeth; nectary often a ring within the tube.

Amaranthaceae comprises two subfamilies:

Subfam. : *Amaranthoideae* (A 4-locular; 1-many ovules) : *Amaranthus, Celosia, Aerva, Allmania.*

Subfam. : *Gomphrenoideae* (A 2-locular; ovule solitary) : *Alternanthera, Gomphrena, Achyranthes.*

The family is close to the *Chenopodiaceae* where only solitary ovules are found.

1a. Leaves opposite; anthers 1-celled

2a. Staminal-tubes short, cup-shaped; stigma 1, capitate, subsessile; ovaries orbicular or ovoid — ALTERNANTHERA

2b. Staminal-tubes long; stigma 2-fid, on long styles; ovaries subglobose or turbinate — GOMPHRENA

1b. Leaves alternate; anthers 2-celled

3a. Ovaries 2-many-ovuled; fruits many-seeded — CELOSIA

3b. Ovaries 1-ovuled; fruits 1-seeded

4a. Staminodes absent; ovules erect

5a. Flowers bisexual, capitate; stamens 5, united below into a cup; ovaries ovoid; stigmas capitellate; fruits circumscissile utricles — ALLMANIA

5b. Flowers unisexual in axils, spikes clustered; stamens 1-5, free; ovaries compressed; stigmas filiform or subulate; fruits indehiscent utricles — AMARANTHUS

4b. Staminodes present; ovules suspended from a slender, basal funicle

6a. Flowers deflexed, in lax spikes; bracteoles and tepals pungent; sepals not woolly, shining, at length hardened and strongly ribbed, one or all spiniscent, ovaries oblong, sub-compressed; leaves opposite — ACHYRANTHES

6b. Flowers not deflexed; in dense spikes; bracteoles and tepals not pungent; sepals hyaline, woolly, not spiny; ovaries ovoid or subglobose; leaves alternate or fascicled or with opposite and alternate mixed — AERVA

ACHYRANTHES L., Sp. Pl. : 204. 1753 & Gen. Pl. ed. 5 : 96. 1754.

LT.: *A. aspera* L. (vide A. L. Juss., Dict. Sci. Nat. 6 : 132. 1805-1806; Hitchcock, Prop. Brit. Bot. 135. 1929).

Achyranthes aspera L., Sp. Pl. : 204. 1753; Haines, Botany 2 : 206; Nicolson *et al.*, Regnum Veget. 119 : 44. 1988. *A. obtusifolia* Lam., Encycl. 1 : 545. 1785. *Type* : *Cadelari* Rheede, Hort. Malab. 10 : 155. t. 78. 1690. (*Apamaranga*—Or.; *Apang*—Beng.).

Perennial erect herbs; stems often tinged with reddish purple, ribbed pubescent or velvety. Leaves elliptic, oblong to narrowly oval-elliptic, short-acuminate, base rounded or cuneate, with close appressed hairy beneath 3-10 (-15) × 2-6 cm. Spikes rigid, upto 40 cm long, simple or branched; bracteoles spinescent with basal wing adnate throughout length of spine; flowers 5-6.5 mm long, green, polished; tepals 5, subequal, ovate-lanceolate, acute; fruiting perianth detached together with bracteoles, leaving reflexed bracts; stamens 5, staminodes truncate, fimbriate, Utricles (fruits) broadly-oblong, 2-2.5 mm long, top circumsciss.

LT.: Ceylon, Herb. Hermann 2 : 69. 105, right hand specimen (BM) (vide Townsend, in Dassan., Rev. Handb. Fl. Ceylon 1 : 38. 1980).

Fl. & Frt.: Oct.-Jan.

Common in waste places, in drier situations.

Lamni : 13254; Kabirchabutra : 13400.

2n = 14, 21, 36, 42, 84.

Pantropical.

The fruits when ripe, become easily detached from the rachis, carrying with it the hardened perianth and spine-like bracteoles.

The ash of the plant is rich in salt and potash; seeds emetic, used in snake-bite and in hydrophobia and the decoction, in renal disorders. Plant pungent, purgative, diuretic, in dropsy, piles, boils, colic; infusion of roots astringent. Leaves are eaten as a pot-herb and branches, as toothbrushes.

AERVA Forsskal, Fl.-Aegypt-Arab. : cxxii, 170. 1775, *nom. cons.*

T.: *A. tomentosa* Forssk (*typ. cons.*) [= *A. javanica* (N. Burm.) Juss. ex Schult.].

1a. Leaves narrowly linear, in opposite fascicles; spikes cylindrical, terminal; perianth-lobes 4 — *A. monsonias*

1b. Leaves lanceolate, elliptic to orbicular-obovate, opposite and alternate; spikes globose, ovoid, oblong or sub-cylindric, axillary and terminal or only axillary; perianth-lobes 5

2a. Erect or prostrate herbs; leaves alternate; flowers in oblong, greenish-white spikes, not shining; spikes all axillary; mucro of outer tepals abrupt; stigma 2 — *A. lanata*

2b. Climbing herbs; leaves opposite and alternate; flowers in ovoid or globose, axillary and terminal on leafless elongate racemes; mucro of outer tepals attenuate; stigma 1 *A. sanguinolenta*

Aerva lanata (L.) Juss. ex J. A. Schultes in Roem. & Schult., Syst. Veg. ed. 5 : 564. 1819; in Hook. f. FBI 4 : 728. 1885 ('*Aerua*'); Haines, Botany 2 : 804; Nicolson *et al.*, Regnum Vegetab. 119 : 44. 1988. *Achyranthes lanata* L., Sp. Pl. : 204. 1753. *Illecebrum lanatum* (L.) L., Mant. Pl. 2 : 344. 1771. *Aerva tandalo* Ham. ex Dillwyn, Rev. Hort. Malab. : 51. 1839. ('*Aerua*'). *Type* : *Scheru-buda* Rheede, Hort. Malab. 10 : 57, t. 29. 1690.

Hoary tomentose, prostrate herbs; branching from base. Leaves petioled, flat, elliptic or orbicular-obovate, obtuse or acute, entire, hairy or villously tomentose, 1-2.5 × 0.8-2 cm. Spikes axillary, 1-4-together, oblong or subcylindric, densely woolly, 6-10 mm across, sometimes crowded and forming subglobose clusters; flowers 5-merous, white, minute, 2-sexual; tepals 5, membranous, outer tepals with a midrib excurrent in a distinct mucro, all or the inner ones woolly; stamens 5, connate below together with alternate staminodes into a cup. Utricles (fruits) indehiscent or coriaceous, crown circumsciss.

LT. : Rheede, *l.c.* : t. 29 (vide Nicolson *et al.*, 1988).

Note : Linn. Herb. No. 290.6 (LINN) was selected by Townsend (1980) as the lectotype, but it being certainly a post-1753 addition to LINN, is to be excluded from among the syntypes.

Fl. & Frt. : Oct.-Feb.

Common in open waste places, nurseries, gardens.

Belghana : 16766; Kalidongri : 19322.

2n = 16.

Tropical Africa to Indomalaysia.

The leaves are used as potherbs. Plant is anthelmintic, diuretic; root demulcent and also used in the treatment of headache.

A. monsonias (L. f.) Mart., Nov. Actorum Acad. Caes. Leop. Carol. Nat. Cur. 13 : 291. 1826; Haines, Botany 2 : 804; *Illecebrum monsoniae* L. f., Suppl. Pl. : 161. 1782.

Diffuse herbs; branches ascending from a long, flexuous, woody tap root; stems hoary tomentose or woolly, trichotomously branched, angled and grooved. Leaves opposite or in 3-nately whorled fascicles linear, setaceous, 3-veined, woolly, 1.5-2.5 cm long. Spikes axillary, solitary, cylindric, 0.5-1.5 cm long, on opposite, strict, horizontal peduncles, main stems also ending in a solitary spike, glistening; bracts many, lanceolate; flowers 4-merous, rose or pink, minute; perianth 2-3 mm long, woolly at base, tepals 4, lanceolate-subulate, acuminate; stamens 4; stigmas capitate, subsessile. Utricles (fruits) oblong, enclosed in large staminal-cup, top, circumsciss.

Fl. & Frt. : Nov.-Apr.

Common in open waste places, in drier situations.

Korba : 8708.

India, Sri Lanka, Burma.

A. sanguinolenta (L.) Bl., Bijdr. : 547. 1826; Townsend in Fl. West Pakistan No. 71 : 29. 1974. *Achyranthes sanguinolenta* L., Sp. Pl. ed. 2 : 294. 1762. *A. scandens* Roxb. Fl. Ind. 2 : 503. 1824. *Aerva scandens* (Roxb.) Moq. in DC., Prodr. 13(2) : 302. 1849; Haines, Botany 2 : 804.

Herbs or undershrubs; branches hoary-tomentose; stems woody below. Leaves occasionally opposite, ovate, elliptic-oblong or elliptic-lanceolate, obtuse or acute, tapering both ends, appressed silky or short-hairy beneath, 1.5-8 × 0.5-4 cm. Spikes densely woolly or tomentose, solitary or fascicled, sessile, 0.8-2.5 cm long; flowers minute, often 4-5 on short lateral branches of spikes each subtended by hyaline, short-awned bracts, 2-sexual or polygamous, bracts and bracteoles ovate, 1.3-1.5 mm long, hairy outside; tepals 5, densely white-villous, 2 mm long, outer white, inner with green centre; stamens 4-5, united below into a green cup. Utricles (fruits) 0.8-1 mm across.

Type : Herb. Linn. 290.3 (LINN).

Fl. & Frt. : Oct.-July.

Common in waste and rocky places in drier situations.

Achanakmar : 13099; Lamni : 19213; Kabirchabutra : 15206.

2n = 42, 44; 2n = 16, 26, 36, 52 (as *A. scandens*).

India to China and Malaysia.

ALLMANIA R. Br. ex Wight in Jour. Bot. (Hooker) ; 226. tt. 128. 1834.

T. : *A. nodiflora* (L.) R. Br. ex Wight (*Celosia nodiflora* L.). *Belluta* Raf., Fl. Tellur. 3 : 39. 1837. nom. illeg. (Art. 7.13).

Probably monotypic, distributed in tropical Asia.

Allmania nodiflora (L.) R. Br. ex Wight in Journ. Bot. (Hook.) 1 : 226, t. 128. 1834 ; Haines, Botany 2 : 797 ; Nicolson *et al.*, Regnum Veget. 119 : 44. 1988. *Celosia nodiflora* L., Sp. Pl. : 205. 1753. *Allmania nodiflora* (L.) R. Br. ex Wall., Num. List No. 6890. 1832 comb. invalid, *Tamara hemispherica* Ham. ex Dillwyn, Rev. Hort. Malab. : 47. 1839, nom. invalid (Arts. 41, 42, 43). *Pee-tardavel* Rheede, Hort. Malab. 9 : 153, t. 79. 1689. *Pee-coipa* Rheede, *ibid.* 10 : 133, t. 67. 1690.

Diffusely branched, sub-succulent, glabrous herbs; rarely with a few scattered hairs. Leaves alternate, oblong or linear-oblong to spathulate, sessile or short-petioled, acute or obtuse, 4-9 cm long. Heads in congested cymes, sessile, in axillary and terminal, globose, yellowish-green, changing to pinkish-yellow, 0.8-2 cm across; bracts linear, aristate, hispid; flowers subsessile; tepals 5, scarious, acuminate, striate, 5-6 mm long; stamens 5, connate below into a cup; utricles (fruits) membranous, circumsciss, 1-seeded.

Fl. & Frt : July-Nov.

Rare in coarse sandy soil near streams, edges of forests.

Pasan : 13289 ; Pasarkhet to Siang : 19418.

2n = 32, 96 ; 36 (as var. *roxburghii* J. Hook.).

Indomalaysia.

The specimens from Bilaspur are referable to var. *angustifolia* J. Hook., FBI 4 : 717. 1885.

ALTERNANTHERA Forsskal, Fl. Aegypt.-Arab. : 28. 1775.

T. : *A. triandra* Lam. [Forsskal published no species name other than an abbreviation "*Alternanthera achyranth*", in an INDEX]. cf. J. A. Miers, Taxon 29 : 89. 1980.

Note : Townsend (1980) cites *Alternanthera sessiles* (L.) DC. as the type species and reduces *Alternanthera achyrantha* (L.) Sweet (1818) as a synonym of *A. pungens* Kunth (1819), the latter with heads

spinescent and tepals very dissimilar both in length and form, is expected to occur in Bilaspur district.

Alternanthera sessilis (L.) R. Br. ex A.P. DC., Cat. Pl. Hort. Monsp. : 77. 1813; Haines, Botany 2 : 806; Nicolson *et al.* : Regnum Veget. 119 : 45. 1988. *Gomphrena sessilis* L., Sp. Pl. : 225. 1753. *Illecebrum sessilis* (L.) L., Sp. Pl. ed. 2 : 300. 1762. *Alternanthera triandra* Lam., Encycl. 1 : 95. 1783; Gamble, Fl. Madras : 1179 (825). 1925. LT. : Herb. Hermann (sp. no. 116) (BM) (vide Trimen, 1887 : 138). *Coluppa* Rheede, Hort. Malab. 10 : 21-22, t. 11. 1690. (*Madaranga*—Or.; *Ghardughi*, *Garundi*—Hindi).

Prostrate or procumbent ascending herbs. Leaves opposite, linear-oblong, lanceolate or elliptic, obtuse or subacute, narrowed at base, glabrous or pilose, 2-7 × 1-3 cm. Spikes globose-cylindric, axillary, not prickly, often clustered, white; bracts and bracteoles subequal, ovate, acuminate, 0.8-1.5 mm long; flowers sessile minute, white, 1-2 mm long, pinkish at base; tepals all similar, glabrous, rigid, acute, 2 mm long, 1-veined from base; stamens 5, of which only 2-3 perfect; stigma capitellate. Utricles (fruits) obcordate compressed, 1.5-2 mm long, usually broader than tepals.

LT. : Herb. Hermann vol. 2, p. 9 (vide Miers, Taxon 29 : 89. 1980), or Herb. Hermann vol. 2, p. 78 (vide Townsend, in Dassan., Rev. Handb. Fl. Ceylon 1 : 49. 1980).

Fl. & Frt. : July-Feb.

Common in waste places, road sides and cultivated fields.

Korba : 8611; Parssi : 19045.

2n = 34, 36, 60, 96.

Palaeotropics.

Young shoots and leaves nutritious and contain proteins (5%) and are eaten as potherbs; plants act as galactogogue, chalagogue and febrifuge.

AMARANTHUS L., Sp. Pl. 989. 1753 & Gen. Pl. ed. 5 : 427. 1754.

LT. : *A. caudatus* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2 : 1.1913).

Note : 1. The correct spelling of the generic name is *Amaranthus*, as spelt by Linnaeus in the protologue, not *Amarantus* (Art. 73.1 Ex. 1), although the latter spelling is philologically preferable

2. A genus of considerable difficulty taxonomically, especially the "grain amaranths", such as *A. caudatus* L. and *A. hybridus* L. which have been cultivated from ancient times. Within *A. hybridus*, two subspecies are recognised; ssp. *hybridus* (bracteoles much exceeding the perianth segments; capsules circumsessile with a moderately distinct or obscure 'neck'); ssp. *cruentus* (L.) Thellung (bracteoles 1-1.25 times longer than the perianth segments; capsules without a distinct 'neck').

3. Ssp. *hybridus* has two varieties : var. *hybridus* (inflorescence green; wild); var. *erithrostachys* Moq. (inflorescence red; cultivated as a crop or as ornamental). *A. hypocondricus* L., as also *A. paniculatus*, are reduced as synonyms of the latter variety and are known as RAMADANA in the Hindi belt and are widely cultivated as a crop.

1a. Armed herbs; tepals of male flowers acuminate, of female flowers obtuse, apiculate — *A. spinosus*

1b. Unarmed herbs; tepals of male and female flowers similar

2a. Tepals and stamens 5 each — *A. caudatus*

2b. Tepals and stamens 2-3 each

3a. Bracts and tepals awned; bracts equalling or exceeding tepals and utricles; utricles dehiscent — *A. tricolor*

3b. Bracts and tepals not awned; bracts shorter than tepals and utricles; utricles indehiscent — *A. viridis*

Amaranthus caudatus L., Sp. Pl. : 990. 1753; Haines, Botany 2 : 799; Townsend, *op. cit.* : 14. 1980. (*Ramadana*—Hindi; *Rana Tampala*—Sansk.); *Tumble weed*, "*Love Lies Bleeding*", *Inca Wheat*, *Cat-tail*.

Erect herbs; stems striate, tinged with purple, glabrous or thinly patently hairy towards apex. Leaves alternate, long-petioled, narrowly elliptic or ovate-lanceolate, tip obtuse, base cuneate and decurrent, 4-15 × 2-10 cm. Terminal spike of inflorescence long and pendulous; spikes dense, soft, with central ones and often lateral ones often longer and pendulous; perianth segments of female flowers broadly obovate or spathulate, overlapping each other; bracteoles terminating in rigid stout awns; flowers red, green or white, unisexual, male and female flowers intermixed throughout the spikes; perianth segments 5, 2.0-2.5 mm long, mucronate (female) or aristate (male flowers), stamens 3-5; styles/stigmas 3, erect or flexuose. Capsules 2-2.5 mm long, ovoid-globose, circumscissile. Seeds shining, compressed, black, almost smooth and shining.

LT. : Herb. Hort. Cliff. : 443 *Amaranthus* (BM) (vide Townsend. l.c.).

Fl. & Frt. : July-February.

Commonly cultivated as an ornamental; unknown in the wild.

Kabirchabutra : 15266 (garden escape).

2n = 32.

Seeds rich in protein (high in lysine) and edible after roasting and much used in the northern and central India, where it is cultivated as a cereal, as food/delicacies, tender leaves edible as a *sag*.

Note : Probably a cultivate derivative of the South American *A. quitoensis* Kunth in H.B.K.

A. spinosus L., Sp. Pl. : 989. 1753 ; Haines, Botany 2 : 799 ; Townsend in Dassan., Rev. Handb. Fl. Ceylon 1 : 9. 1980. (*Kanta-neutia*—Oriya).

Erect herbs; stems terete, glabrous, armed with axillary, straight paired spines. Leaves alternate, long-petioled, ovate lanceolate or oblong, obtuse, base cuneate, margin often crisped or wavy, 3-10 × 1.5-5 cm. Flowers in axillary clusters arranged in terminal, long dense or lax, spreading spikes, green, 1 mm long; bracts setaceous, short-awned, equalling or exceeding tepals; tepals 5, lanceolate-oblong, 2.2-2.5 mm long, of males acuminate, of females obtuse, apiculate; stamens 5; styles short or absent; stigmas 3. Utricles (fruits) rugose, nearly equalling sepals, top thickened, 1.5-1.8 mm long.

LT. : Herb. Linn. No. 117. 27 (LINN.) (vide Townsend, *l.c.*).

Fl. & Frt. : Almost throughout the year.

Common in waste places, cultivated fields, ditches, edges of forests; around building sites.

Kabirchabutra : 15254; Achanakmar : 19266, 15435.

2n = 32, 34; 2n = 49 (*A. spinosus* × *A. dubius*).

Cosmopolitan in warmer regions; of presumed American origin.

Leaves are eaten as *sag* and is said to cure night-blindness. The ash of the plant is used as a dye.

A. tricolor L., Sp. Pl. : 989. 1753; Townsend in Dassan., Rev. Handb. Fl. Ceylon 1 : 15. 1980; *A. tristis* L., Sp. Pl. : 989. 1753. *A. polygamus* L., Cent. Pl. 1 : 32 1755. *A. mangostanus* L., *l.c.*; Gamble, Fl. Presid. Madras : 1171 (820). 1925. *A. gangeticus* L., Syst. Nat. ed. 10 : 1268. 1759; Haines, Botany 2 : 800. (*Lal Sag*—Hindi; *Chaula Marisha*—Or.; *Joseph's Coat*—Eng.).

Erect, leafy herbs, glabrous. Leaves long-petioled, alternate, ovate-oblong, oblong-lanceolate or deltoid-ovate, obtuse or emarginate, base elongate-cuneate, 5-12 × 1-6 cm. Flower-clusters dense, crowded in lower axils and forming long terminal spikes; bracts 4 mm long, ovate, flowers green, unisexual; tepals usually 3 in male and 2 in female, much longer than utricles, oblong-obovate, 4-5 mm long; stamens 3; styles 2-3, united at base. Utricles (fruits) smooth, flask-shaped, 3-dentate at apex, circumsciss.

LT. : Herb. Linn. No. 117. 7 (LINN) (vide Townsend, l.c.).

Fl. & Frt. : Almost throughout the year.

Commonly cultivated ornamental; also in waste places, roadside-ditches.

Belghana : 16769; Pasarkhet : 16821; Lamni : 13236A; Pasan : 13272A.

2n = 34 (also as *A. gangeticus*).

Throughout the tropics of South and Southeast Asia; native area blurred by cultivation; introduced and/or cultivated in Africa, West Indies etc.

Note : Townsend (l.c.) disagrees with Allen (in Hegi, Illust. Fl. Mitteleuropa. ed. 2, Bd. 111/2 Lief. 1 : 494-496. 1959) who recognises three subspecies in *A. tricolor* L. and because of pantropic distribution and overlapping of diagnostic characters, treats all the four Linnean species as conspecific.

Leaves eaten as a *sag* akin to spinach; forms with purplish coloured leaves are often ornamental; plants are astringent, used in menorrhogia, diarrhoea, dysentery and in haemorage from bowels; rich in Vitamin A and fatty oil is present.

A. viridis L., Sp. Pl., ed. 2 : 1405. 1763, pro parte, excl. syn.; Haines, Botany 2 : 801; Townsend in Dassan., *op. cit.* : 19. 1980. *Amaranthus gracilis* Desf., Tabl. Ency. Bot. : 43. 1804 (*Jangli Chaulai*—Hindi, Oriya).

Erect, glabrous herbs; stems often tinged with purple. Leaves alternate, long-petioled, ovate, rhombic-ovate to oblong, base decurrent on slender

petioles or truncate, acute or obtuse, subentire-repand, glabrous, 2-7 × 1.5-4 cm. Flower-clusters axillary, often collected in dense, interrupted, terminal, panicled spikes; bracts ovate, acute, 0.5-0.7 mm long; flowers minute, 0.5 mm long; green; tepals 2-3, ovate-oblong or oblanceolate, hyaline with a green keel, acute or obtuse, 1.2 mm long. Utricles (fruits) ovoid, rugose, acute; seeds black.

LT.: Herb. Linn. No. 117.15 (LINN) (vide Townsend, l.c.).

Fl. & Frt.: Almost throughout the year.

Common in waste places, along roads.

Belghana : 16768.

2n = 34.

Throughout the tropics.

Linnaeus' (1763) reference to Bauhin and Tournforte represents *A. adscendens* Loisel.

Leaves eaten as a *sag*; acts as emulient and in scorpion sting.

CELOSIA L., Sp. Pl. : 205. 1753 & Gen. Pl. ed. 5 : 96. 1754.

LT.: *C. argentea* L. (vide Standley, N. Amer. Fl. 21 : 96. 1917).

C. argentea L. form. *cristata* (L.) Schinz. (2n = 35, 36) is the well-known 'Cock's comb', in which the upper part or almost the whole inflorescence produces long and plumose to shorter and rather sterile shoots with narrower bracts and bracteoles; inflorescences white to yellow, purple or red, variously plumed or fasciated; is much grown as pot plants in gardens.

Celosia argentea L., Sp. Pl. : 205. 1753; Haines, Botany 2 : 797; Townsend in Nasir and Ali, Fl. West Pakistan No. 71 : 5. 1974; Nicolson *et al.*, Regnum Veget. 119 : 45. 1988. *Belluta-adeca-manjen* Rheede, Hort. Malab. 10 : 75, t. 38. 1690. *Tsjeria-belluta-adeca-manjen* Rheede, l.c. : 77, t. 39, 1690. **Fig. 19.**

Erect, glabrous herbs; stems and branches angled and striate. Leaves alternate, linear or lanceolate, acuminate, base cuneate or tapering into slender petioles, 2-15 × 0.3-3 cm; upper ones sessile. Spikes cylindrical, dense, elongate, peduncled, sometimes oblong or ovoid, 1-20 cm long and 1.5-2.2 cm. white, shining pink or silvery-white; flowers densely imbricate, 0.8-1 cm long; bracts 0.3-0.6 cm long; tepals 5, scarious ovate-lanceolate,

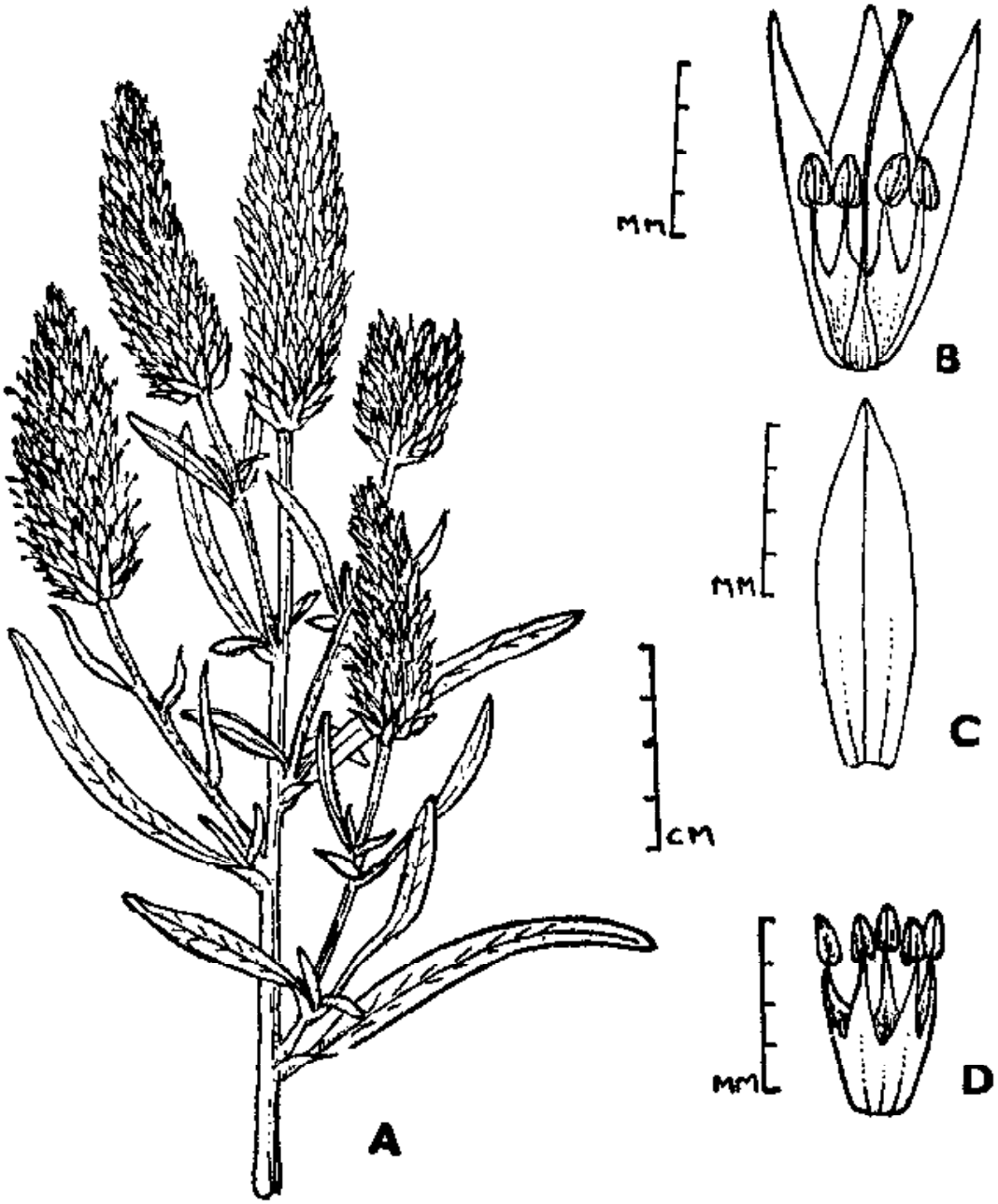

Fig. 19. *Celosia argentea* L.

A. A leafy branch with inflorescences. B. L. S. Flower. C. Tepal. D. Staminal tube with anthers.

0.8-1 cm long; stamens 5, connate below into a cup. Utricles (fruits) obovoid, 3.5 mm long, acute, circumsciss.

LT.: Herb. Linn. No. 288.1 (LINN) (vide Townsend, l.c. : 55. 1980).

Fl. & Frt.: July-Feb.

Common in cultivated fields, waste places, gardens, roadsides.

Achanakmar : 13207A, 15440; Khootaghat : 19516.

2n = 36, 36 + 0 + 1B, 72; polyploid complex, largely octoploid or tetraploid in Central India.

Throughout the tropics; probably originating in Central Africa (Hara *et al.* 1982).

Leaves used as spinach in East Africa.

GOMPHRENA L., Sp. Pl. : 224. 1753, pro parte & Gen. Pl. ed. 5 : 105. 1754; Miers in Taxon 29 : 85-95. 1980.

LT.: *G. globosa* L. (vide Standley, N. Amer. Fl. 21 : 147, 1917. Hitchcock & Green, Internat. Bot. Cong., Cambridge 1929/1930).

Note: *Gomphrena globosa* L. [Lt. : Herb. Hort. Cliffort (BM) Globe Amaranth] is an ornamental plant commonly cultivated in gardens, useful for bedding; its flower-heads subtended by leafy bracts are purple, orange, rose, white or variegated and was known to Linnaeus from 1737; it is a native of Tropical America.

Gomphrena celosioides Mart. in Beitr. Amar. : 93. 1825. et in Nov. Actorus Acad. Cass. Leop. Caral. Nat. Curr. 13 : 301. 1826; Townsend in Dassan., Rev. Handb. Fl. Ceylon 1 : 53. 1980. *Gomphrena decumbens* auct.; Gamble, Fl. Madras 1 : 1179 (825). 1925, non Jacq.

Diffuse herbs; appressed hairy. Leaves opposite, sub-sessile or short-petioled, lanceolate-oblong, or obovate-elliptic, obtuse, apiculate, glabrescent or hairy, 1.5-8 × 0.5-2 cm. Spikes sub-globose, sessile, silvery white, finally elongating into oblong spikes, 4-5 cm long; rachis woolly; bracts ovate, acute, 3-3.5 mm long; flowers bisexual; tepals 5, lanceolate, pilose on back, acute, keeled dorsally at apex, 5-5.5 mm long, outer 3 white, inner ones greenish; stamens 5, filaments united into a tube; ovaries with solitary ovules; stigmas 2. Utricles (fruits) compressed, indehiscent, 1.8-2 mm long.

Type : Brazil, *Sellow* (K. isotypes).

Fl. & Frt. : July-Feb.

Occasionally found amidst grasses, in wastelands and along dry, open roads.

Korba : 12936; Marwahi to Parassi : 1035; Khuria : 15496.

2n = 26.

Native of South America (South Brazil to Argentina); naturalized now throughout tropics (cf. Sandith, Kew Bull. 1946 : 29. 1946).

CHENOPODIACEAE

Ventenat, Tabl. Regne. Veg. 2 : 253. 1799 (*'Chenopadae'*).

T. : *Chenopodium* L.

Spinacia oleracea L. (*Palak*), *Beta vulgaris* L. ssp. *cicla* (L.) Koch (*Chukandar, Beet*) are commonly cultivated in the district for their edible leaves and red roots, respectively, the latter with high concentration of red betalains.

CHENOPODIUM L., Sp. Pl. : 218. 1753 & Gen. Pl. ed. 5. : 103. 1754.

LT. : *C. rubrum* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2 : 9. 1913).

Chenopodium album L., Sp. Pl. : 219. 1753; Haines, Botany 2 : 808; Murata in Acta Phyt. Geobot. 26 : 86. 1974. (*Bathua*—Hindi, Oriya; *Goose foot, Fat-hen*—Eng.).

Erect or ascending herbs; stems angular-ribbed, glabrous. Leaves variable, oblong-lanceolate, or ovate-lanceolate, narrowly cuneate at base, toothed or irregularly lobulate, upper narrower, entire, white mealy when young, 1-15 × 0.5-10 cm. Spikes in axillary clusters and often forming a terminal thyrse, mealy; flowers minute, green; tepals 5, ovate-rounded, keeled, connate at base, nearly covering utricle, 0.08-0.2 cm long; stamens 1-5; stigmas 2. Utricles (fruits) depressed-globose, membranous, 0.7-1.5 mm long.

Type : Described from Europe, Herb. Linn. 318.8 (LINN).

Fl. & Frt. : Nov.-Feb.

Commonly cultivated in winter months; also found in waste places.

Khondra : 16741.

2n = 18, 36, 42, 54.

Native of Europe.

Plant laxative, anthelmintic; contains carotene and Vitamin C; eaten as *sag*; fruits eaten by poultry; yields an essential oil. Photoperiodically, a day-neutral species (Samantarai & Panigrahi, 1954).

POLYGONACEAE

A. L. Jussieu, Gen. Pl. : 82. 1789 ('*Polygoneae*').

T. : *Polygonum* L.

Trees, shrubs, lianes or often herbs with unusual vascular structure and apparently swollen nodes, producing anthocyanins, not betalain. Absence of betalains, more or less 0 perisperm, S-type sieve-tube plastids and three-merous condition set *Polygonaceae* off from *Caryophyllales* to which Polygonaceae are closely allied. Pentamery is derived from a 3-mery here as there is a 'compound tepal' (Cronquist) with (frequently) 2 midveins rather than 1 in the 5-merous, suggesting amalgamation of 3 + 3.

Antigonon leptopus Hook. et Arn. (*Coral vine, coralita,* Mexico), with bright pink, scarlet or white flowers, is a common garden vine. Its tendrils are modified inflorescence-axes and its tubers are edible with nut-like flavour. *Homalocladium platycladium* (F. Muell.) L. Bailey (*Muehlenbeckia platyclados* Meissn.), (the Ribbon Bush), a native of Solomon, New Guinea and New Caledonia) is sometimes cultivated, in gardens for its flat ribbon-like jointed phylloclades with transverse bands. Its green leaves are rhomboid or hastate and drop off early, the plant becoming leafless when in flower.

1a. Flowers acyclic; perianth 3-5-lobed, not accrescent in fruit; stigma capitate, not fimbriate; fruits compressed or trigonous nutlets — POLYGONUM

1b. Flowers cyclic; perianth in 2 whorls, outer 2-lobed, inner 3-lobed, accrescent in fruit; stigma fimbriate; fruits triquetrous nutlets — RUMEX

POLYGONUM L., Sp. Pl. : 359. 1753 & Gen. Pl. ed. 5. : 170. 1754.

T. : *P. aviculare* L. (*typ. cons.*) (cf. Taxon 33 : 299. 1984) (based on Linn. Herb. No. 510.23-LINN).

Often segregated into several distinct genera (cf. Hedberg in Svensk Bot. Tiskr. 40 : 371-404. 1946), viz. *Aconogonum* (Meissn.) Reichb.; *Bilderdykia* Dum. (= *Fallopia* Adans.), *Bistorta* (L.) Adans, *Koenigia* L., *Oxyria* Hill., *Persicaria* (L.) Mill., *Pleuropteropyrum* Gross., *Polygonum* L. Of the five species collected from Bilaspur district, only *P. plebium* L. is a species of *Polygonum* L. s. str., the remaining four species have been transferred to *Persicaria* (L.) Mill. by Hara *et al.* (1982), but we follow Mabberley (The Plant-Book; 469. 1987) in treating them under *Polygonum* L. *s. lat.*

1a. Flowers in axillary clusters; styles minute, free; stipules cleft or torn — *P. plebeium*

1b. Flowers in terminal, spiciform racemes; styles long, usually connate below; stipules not cleft or torn

2a. Stipules membranous, ciliate; styles 2; nutlets biconvex — *P. glabrum*

2b. Stipules rigid, strigose, ciliate; styles 3; nutlets 3-gonous

3a. Leaves 5-7 cm long, rarely more; racemes filiform, interrupted; with lower bracts distant; perianth glandular — *P. hydropiper*

3b. Leaves 7.5-17 cm long; racemes dense, continuous; bracts close imbricate; perianth eglandular

4a. Branches above and peduncles glabrous; leaves glabrous except ciliate margin; bracts glabrous, margins setose; racemes 5-10 cm long, slender — *P. barbatum*

4b. Branches above and peduncles strigose; leaves strigosely pubescent on both surfaces; bracts more or less hairy; racemes 2-4.5 cm long, strict — *P. stagninum*

Polygonum barbatum L., Sp. Pl. : 362. 1753; Haines, Botany 2 : 816; Nicolson *et al.*, Regnum Veget, 119 : 211. 1988. *Persicaria barbata* (L.) Hara in Fl. East. Himal. : 70. 1966. *Polygonum rivulare* Koenig ex Roxb., Hort. Beng. : 29. 1814; Fl. Ind. 2 : 290, 1832. *Belutta-modela-muccu* Rheede, Hort. Malab. 10 : 159, t. 80. 1690. *Velluta-modela-muccu* Rheede, Hort. Malab. 12 : 145, t. 76. 1693.

Erect or decumbent ascending herbs. Leaves sessile, alternate, linear-lanceolate acuminate and tapering both ends, glabrescent but strigose on veins

beneath, 10-17 × 1-1.5 cm; ochreae. fimbriate, strigose, 1.5 cm long, with long cilia. Racemes panicled, terminal, 5 cm long; bracts close, ciliate; flowers minute, clustered, whitish; perianth 4-5, 2.8-3 mm long, segments oblong-rounded; stamens 5-8; ovaries compressed or 3-gonous; styles 3, elongate, 1-1.5 mm long. Nuts ovoid-ellipsoid, 3-gonous, 2 mm long.

Fl. & Frt. : Oct.-Feb.

Common in muddy situations; in banks of fresh-water ponds and rivers.

Khuria : 15492

2n = 20, 22, 40, 60.

Paleotropics.

Seeds used to relieve griping pains of colic; roots astringent, cooling.

Note : *Velutta-modella-mucca* Rheede, Hort. Malab. 12 : 145. t. 76. 1693, is the sole basis of *Polygonum rivulare* Koenig ex Roxb.

P. glabrum Willd., Sp. Pl. 2 : 447. 1799; Roxb., Hort. Beng. : 29. 1814; Wight, Icon. t. 1789. 1852; Haines, Botany 2 : 815; Nicolson *et al.*, Regnum Veget. 119 : 212. 1988. *Persicaria glabra* (Willd.) M. Gomez in Ann. Inst. Segunda Ensef. Habana 2 : 278, 1896. *Schovanna-modela-muccu* Rheede, Hort. Malab. 12 : 147, t. 77. 1693.

Erect herbs or undershrubs; swollen at nodes. Leaves alternate, petioled, lanceolate or linear-lanceolate, finely acuminate, tapering at both ends, 7-15(-20) × 1.5-2 cm; petioles sheathing; ochreae tubular, glabrous, not ciliate, 2.5-3 cm long. Racemes terminal, panicled, 4-10 cm long; bracts oblique-rounded, glabrous, close; flowers minute, pink, 5-6; perianth tubular-campanulate, 2.5 mm long, 4-5-partite; tepals elliptic, concave; stamens usually 7; styles 2. Nuts orbicular, black, shining, 2 mm long.

Fl. : July-Nov. *Frt.* : Nov.-Apr.

Common in marshy situations.

Katghora : 8651, 6044; Pali to Ratanpur : 19498; Ratanpur : 13018.

2n = 20, 40, 60, 66.

Pantropical.

Infusion of leaves used in colic pain; plant used as a febrifuge.

P. hydropiper L., Sp. Pl. : 361. 1753; Haines, Botany 2 : 817. *Persicaria hydropiper* (L.) Spach, Hist. Veg. 10 : 536. 1841; Hara *et al.*, Enum. Fl. Pl. Nepal 3 : 176. 1982. (*Water pepper*—Eng.; *Pachur-mul* —Beng.).

Decumbent ascending herbs; nodes below swollen; glabrous. Leaves alternate, subsessile, linear-lanceolate or oblong-lanceolate, gland-dotted, glabrous on margin, 3.5-7 × 1.5-2 cm; ochreae 2 cm long, tubular, glabrous, with a few deciduous cilia. Racemes lax, decurved, flexuous, leafy at the base, 4-7.5 cm long; bracts glabrous, gland-dotted or not, truncate, with small, often deciduous cilia; flowers pink, minute; perianth pinkish or white, glandular, 4-5-partite, 2.5 mm long; stamens 4-8, often alternating with glands; styles 3, rarely 2. Nuts opaque, granulate, sometimes one side flat, trigonous.

Fl. & Frt. : May-Dec.

Common in muddy situations, forming mat on the ground.

Kabirchabutra : 13342.

2n = 20, 22, 40, 44.

Throughout the tropics.

Herbs and leaves acrid, stimulant, diuretic, emmenagogue, used in amenorhogia and other urinary disorders; fish poison. Roots stimulant and bitter tonic. Leaves contain essential oil, oxymethyl-anthraquinones, also polygonic acid having irritant properties, a glycoside which promotes blood-coagulation and also a polygonone containing ethereal oil which lowers blood pressure.

P. plebeium R. Br., Prodr. 420. 1819 ('*plebium*'); Haines, Botany 2 : 813; Hara *et al.*, Enum. 3 : 178. 1982; *P. roxburghii* Meisn. in DC., Prodr. 14 : 93. 1856. (*Muthisag*—Oriya; *Raniphul*—Santhal.).

var. **plebeium.**

Diffusely branched, decumbent ascending herbs; stems often purple tinged. Leaves linear, linear-oblong, acute or obtuse, base narrowed, often with revolute margins, 0.5-2 × 0.2-0.3 cm; ochreae 3-4 mm long. Flowers 2-5, in axils of leaves, pink, 2 mm long, subsessile; bracts membranous; perianth-segments 4-5, rounded-oblong, acute or obtuse with a green mid-vein, 2 mm long; stamens 3-8; styles 3. Nuts rhomboid, 3-gonous, brown, shining, 1-2 mm long.

Fl. & Frt. : Feb.-July.

Common in marshy situations, cultivated fields, moist waste places.

Pasan : 19107, 19108, 19109; Khoota Ghat to Khaira : 19520; Pondu to Ratanpur : 16780; Pali : 8578; Katghora : 3733.

2n = 20, 22, 40.

Paleotropics.

Roots given in bowel-complaints; fresh leaves cooked and eaten as a *sag*; plants dried and powdered taken in pneumonia.

Note : The spelling-change from *plebejum* to *plebium* is covered by Art. 73.5 (ICBN, 1988), the '*j*' being used as a vowel must be changed to '*i*'; in this case, it is a part of the *dipthong* '*ei*'.

Saldanha (Fl. Karnataka 1 : 179. 1984) recognises four varieties, distinguished from each other on 'flowers pedicelled' or 'flowers sessile' or 'subsessile' and on leaf-shape and margin.

P. stagninum Ham. ex Meisn. in Wall., Pl. Asiat. Rar. 3 : 56. 1832; Haines, Botany 2 : 816.

Erect or ascending herbs. Leaves lanceolate or linear-lanceolate, hispid, acuminate, base tapering into strigose petioles, 7-12 × 1.5-2 cm; ochreae strigose, tubular, membranous, 2.5 cm long, ciliate. Inflorescences in terminal panicles, pubescent; bracts usually coloured, pectinately ciliate, tubular, mouth rounded; flowers greenish or pale-white, minute; perianth 4-5-partite, campanulate, 2 mm long; tepals rounded; stamens usually 8; disc-glands oblong, connate at base; styles 3. Nuts black, trigonous, with subacute angles, about 1 mm long.

Fl. & Frt. : Oct.-Feb.

Common in muddy situations.

Lamni : 13238, 19237; Achanakmar : 15431, 19276; Kabirchabutra : 13341; Pasan to Pendra : 19140; Khuria : 19352.

India, Burma.

This species is much allied to *P. barbatum* L. and is sometimes treated as conspecific with it.

RUMEX L., Sp. Pl. : 333. 1753 & Gen. Pl. ed. 5 : 156. 1754

LT. : *R. patientia* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.1 : 653. 1913).

Rumex dentatus L. subsp. **klotzschianus** (Meissn.) Reichb. f., Beih. Bot. Centralb. 49(2) : 19, 1932. *R. klotzschianus* Meissn. in DC., Prodr. 14 : 57.1856. *R. dentatus* sensu in Hook. f. FBI 5 : 59. 1886. non L. (1771); Haines, Botany 2 : 820. (*Ambabati*—Hindi; *Changeri*—Sansk.).

Erect herbs; stems angled and ridged. Leaves 5-10 cm long; lower ones oblong-obtuse, long-petioled, base cordate-truncate; upper ones short-petioled, lanceolate-oblong; uppermost linear or lanceolate; stipules tubular, often disappearing with age. Flowers in whorls, arranged in simple or panicled, leafy racemes; tepals 6, pale green, 2-seriate, outer tepals 2-3 mm long, inner fruiting tepals ovate or oblong-ovate, acute or obtuse, reticulate-veined, with an oblong, smooth tubercle at base of midvein and broad, toothed wings 3-6 mm long; stamens 6; ovary 3-gonous; styles 3; stigmas fimbriate. Nuts 3-gonous.

Fl. & Frt. : Feb.

Common near streams, cultivated fields, in marshy places.

Khuria : 15490.

2n = 40.

India, Iran and China.

LAURACEAE

A. L. Jussieu, Gen. Pl. : 80. 1789 ('*Lauri*').

T. : *Laurus* L.

Cassythaceae Bartling ex Lindley, Nix. Pl. : 15. 1833 ('*Cassytheae*'), *nom. cons.*

T. : *Cassytha* L.

Mabberley (1987) refers to Kostermans, reduces *Cassythaceae* Lindley nom. cons. as a subfamily of the *Lauraceae* Juss. and recognises five tribes in the subfam. *Lauroideae*. *Litsea* Lam. assigned to the tribe *Laureae* (umbels surrounded by involucre of bracts; fruits more or less embedded in a cupule). *Cassytha* L. (parasitic twiners with normal well-developed

embryo unlike other parasitic groups) is the sole genus of the subfam. *Cassythoideae.*

The family represent aromatic evergreen trees and shrubs (*Cassytha*—a parasitic twiner) usually with spherical ethereal oil-cells in parenchymatous tissues.

x = 12.

1a. Twining herbs; leafless, filiform, parasite with suckers; inflorescences spicate or capitate, flowers bisexual; stamens 9, anthers 2-celled — CASSYTHA

1b. Trees with well-developed leaves; not parasitic; inflorescences 4-6-flowered umbels; flowers dioecious; stamens 9-12, anthers 4-celled — LITSEA

CASSYTHA L., Sp. Pl. : 35. 1753 & Gen. Pl. ed. 5. 22. 1754.

T. : *C. filiformis* L.

Cassytha filiformis L., Sp. Pl. : 35. 1753; Haines, Botany 3 : 838; Nicolson *et al.*, Regnum Vegetab. 119 : 157. 1988 *Acatsja-valli* Rheede, Hort. Malab. 7 : 83-84, t. 44. 1688. (*Akashvalli*—Sansk.; *Amarbeli*—Hindi).

Twining mucilage-bearing herbs climbing over bushes; stems glabrous or pubescent, attached to host by suckers. Spikes lax or dense, pubescent, 2-4 cm long, in axils of scale-leaves; bracts 3, ovate, imbricate, deciduous; bracteoles 3, persistent, subtending calyx; flowers minute, sessile, white; perianth-tubes short, globose; segments 6, 3 outer small, rounded, ciliate; 3 inner oblong-ovate, longer; stamens 9, in 3 series; first series petaloid; second series smaller, similar, dilated below; third series hastate, with 2 glands on short filaments; staminodes 3. Berries globose, smooth, glabrous, enclosed in enlarged, succulent perianth-tubes, 6-8 mm in diam.

LT. : Rheede, *l.c.* : t. 44 (vide Nicolson *et al.* 1988).

Fl. & Frt. : Almost throughout the year.

Occasionally found over bushes in dry deciduous forests near streams.

Korbi : 15330; Madai : 19481; Champa to Bira : 8746.

2n = 24, 48.

Native to Australia; naturalized throughout the tropics (Murti, 1975).

Plants tonic, alterative, in bilious affections, chronic dysentery, arthrites, insecticidal. Powdered and mixed with gingelly oil, it is used as a hair tonic; mixed with butter and ginger, it is used for cleaning invertebrate ulcers. Juice of the plant mixed with sugar, is considered a specific in inflamed eyes. Plant contains alkaloid, laurotetanine, which produces cramps and in large doses, may even cause death. The species is a source of brown dye in East Africa.

In appearance, it is similar to *Cuscuta*, but it is greener in colour, whereas *Cuscuta* is pale yellow. It is noticeable that *Cassytha* and *Cuscuta* are seldom found in the same locality.

LITSEA Lam., Encycl. Meth. Bot. 3 : 574. 1792. *nom. cons.*

T. : *L. chinensis* Lam.

1a. Leaves without strong tertiary veins, usually pale when dry; umbels corymbose or racemose, usually on long peduncles; perianth much reduced or absent; pedicels clavately thickened in fruits — *L. glutinosa*

1b. Leaves with strong tertiary veins, usually rusty brown when dry; umbels clustered and sub-corymbose, on short peduncles; perianth well-developed with 4-5 sub-equal tepals; pedicels not clavately thickened in fruits — *L. monopetala*

Litsea glutinosa (Lour.) C. B. Robinson in Philipp. Jour. Sci. Bot. 6 : 321. 1911; Baker & Bakh. f., Fl. Java 1 : 125. 1963; *Sebifera glutinosa* Lour., Fl. Cochinch. 638. 1790; *Litsea sebifera* (Willd.) Pers., Syn. Pl. 2 : 4. 1807; in Hook. f. FBI 5 : 157. 1886, *pro part. excl. vars.*; Haines, Botany 3 : 832. (*Maida-lakri*—Hindi; *Jaisanda*—Oriya).

Evergreen trees. Leaves alternate, usually elliptic-lanceolate or elliptic-ovate to oblong, tip acute, obtuse or rounded, sometimes acuminate, coriaceous or chartaceous, glabrescent, 7-20 × 4-10 cm. Umbels a few or many, 4-6-flowered, 0.8-2 cm in diam.; pedicels clustered on a stout or slender, common peduncle 0.6-2 cm long and clavately thickened in fruits; bracts 4-6, concave, orbicular, tomentose, deciduous; flowers yellowish, dioecious; male flowers; perianth funnel-shaped, tubes short, lobes 6, often incomplete; stamens 9-12, 3-4-seriate, filaments villous; female flowers; perianth as in male; staminodes 9-12, 3-4-seriate, outer 2 whorls linear, eglandular, inner subulate, glandular; styles thick; stigma dilated. Fruits globose, black, on small, thickened perianth-tubes, 7-10 mm in diam.

Fl. : June-July. *Frt.* : Sept.-Nov.

Common near streams inside forests in cooler habitats.

Pali to Ratanpur : 19496.

2n = 48.

Indomalaysia.

Bark demulcent, astringent, aphrodisiac, anodyne, local antidote for bites of venomous animals; oil from berries used in rheumatism. Leaves mucilaginous, considered antiseptic and emolcent. Alkaloid, laurotetanine is present. Wood is durable and is not attacked by insects.

Hook. f. (1886) and Haines (1924) recognise a number of varieties in *L. sebifera* Pers., var. *tomentosa* Hook. f., var. *glabraria* Hook. f. and var. *normalis* Haines, the first two with wider distribution and var. *normalis* endemic to Bihar and Orissa. The species in Bilaspur is ascribed to var. *sebifera*.

L. monopetala (Roxb.) Pers., Syn. Pl. 2 : 4. 1807; Hara *et al.* Enum. 3 : 185. 1982; *Tetranthera monopetala* Roxb., Pl. Corom. 2 : 26. t. 148. 1798; *Litsea polyantha* Juss. in Ann. Mus. Nat. Hist. Paris 6 : 211. 1805; in Hook. f. FBI 5 : 162. 1886; Haines, Botany 3 : 833. (*Gajapipali*—Sansk.; *Meda*—Hindi; *Baghoari*—Oriya).

Evergreen trees; branchlets brown-pubescent. Leaves alternate, usually broadly or narrowly oblong-ovate, obovate or elliptic-oblong, tip obtuse, rounded or apiculate, base acute, rounded or cordate, glabrous above, pubescent beneath, chartaceous, 8-22 × 6-11 cm. Umbels 5-6-flowered, densely tomentose; bracts 4-5, concave, tomentose; flowers dioecious, white; male flowers; perianth-tubes ovoid, campanulate, segments 5, linear-oblong; stamens 9-12, 3-4-seriate, filaments hairy; female flowers : perianth as in males; staminodes glandular; styles thick; stigma dilated. Fruits globosely ellipsoid or ovoid, on small, thickened perianth-tubes, 2-5 mm in diam.

Iconotype : Roxburgh, Pl. Corom. t. 148. 1798.

Fl. : Apr.-May. *Frt.* : July-Aug.

Occasionally found near streams inside the forests.

Pali : 8728.

2n = 24.

India, Bangladesh, Burma, S. W. China.

The bark is mildly astringent and powdered bark and roots are used externally against bruises and pains. Seeds contain 21.2% fatty oil and kernel 33%; oil is used in medicines. Wood is used for agricultural implements.

LORANTHACEAE

Juss., Ann. Mus. Natl. Hist. Nat. (Paris) 12 : 292. 1808 ('*Lorantheae*').

T. : *Loranthus* N. L. Jacquin, nom. cons.

1a. Flowers unisexual; calyculus (calyx) absent; styles short or absent — VISCUM

1b. Flowers bisexual; calyculus present; styles long

2a. Young shoots and inflorescences white or rusty tomentose; leaves mealy or scurfy; flowers irregular, greenish with bright red filaments; corolla 4-fid, tubes split half-way on one side; fruits pyriform — LORANTHUS

2b. Plants glabrous throughout, racemes rarely puberulous; leaves glabrous; flowers regular, scarlet and orange; corolla 5-fid; tubes not split on one side; fruits oblong — DENDROPHTHOE

Photosynthetic hemiparasites, typically brittle shrublets on tree-branches, less often terrestrial shrubs or lianes. Haustorium 1, or several at ends of epicortical roots, plant rarely *Cuscuta*-like, the haustoria promoting gall-like host growth. Stem often dichasial, but nodal construction 0. x = 8-12 (reducing series from 12).

Viscaceae Miers was formerly included in *Loranthaceae* Juss., but segregated by Cronquist (1981) as distinct. The family comprises 8 genera and 450 species; photosynthessing hemiparasites; haustoria penetrating and ramifying in host tissues, aerial branching often pseudodichotomous and jointed. x = 10-14.

But, following the traditional treatment, *Viscum* Miers is included here in the *Loranthaceae* Juss. (vide App. IIB, ICBN, 1988).

DENDROPHTHOE Mart. in Flora 13 : 109. 1830.

T. : *non designatus.*

Dendrophthoe falcata (L.f.) Etting., Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl. 32 : 52. 1872; Nicolson *et al.*, Regnum Vegetab. 119 : 165. 1988. *Loranthus falcatus* L.f., Suppl. Pl. : 211. 1782. *Loranthus*

longiflorus Desr. var. *falcatus* (L.f.) Kurz, For. Fl. 2 : 321. 1877. *L. longiflorus* Desr. in Lam. Encycl. 3 : 598. 1792. *Walli-itti-canni* Rheede, Hort. Malab. 10 : 5 [not 7], t. 4. 1690.

Evergreen undershrubs; hemi-parasite on branches of trees, attached to their hosts by haustoria. Leaves opposite, sessile or short-petioled, ovate to lanceolate, acute, cordate-amplexicaul to cuneate at base, coriaceous, 3-15 × 2-10 cm. Racemes axillary and extra-axillary, secund, erect, 2.5-10 cm long; bracts lateral, small; flowers pedicelled; 2.5-4 cm long; calyculus cupular, truncate, entire or faintly toothed, 0.5-0.8 mm long; corolla-tubes 2.5-5 cm long, lobes reflexed; stamens 5, opposite and usually adnate to perianth-lobes. Fruits glabrous, 6-7 mm long, crowned with calyculus, ovoid.

Fl. & Frt.: Oct.-Apr.

Common hemi-parasite on trees.

Pasarkhet : 12943; Kabirchabutra : 15218; Pali : 8588.

2n = 18.

Indomalaysia.

Bark astringent, narcotic,; used for wounds and in menstrual troubles and also as a remedy for consumption, asthma and mania; substitute for betel-nut.

LORANTHUS N. J. Jacq., Enum. Strip. Vindob. 55 : 230, t. 3. 1762. *nom. cons.*

T.: *L. europaeus* N. J. Jacq.

Loranthus parasiticus (L.) Merr. in Philip. Jour. Sci. 15 : 232. 1919. *Scurrula parasitica* L., Sp. Pl. : 110. 1753; Fl. Hassan : 309. 1976. *Laranthus scurrula* L., Sp. Pl. ed. 2 : 472. 1762, nom. illeg. superfl.; Haines, Botany 3 : 841. (*Banda*—Oriya, Hindi).

Undershrubs; hemi-parasite on branches of trees; branches terete, lenticellate. Leaves opposite, ovate-oblong or ovate-elliptic, obtuse or sub-acute, base cuneate and somewhat decurrent on petioles upto 1 cm long, 3-8 × 2-5 cm. Flowers in axillary, short sub-racemose fascicles, pedicelled, tomentose, subtended by a single ovate, minute bract; calyx-tubes attenuate towards base, produced above ovary as a rim; corolla-tubes curved, inflated, upto 1.2 cm long, lobes 4(-5), linear, 1-2 mm long; stamens 4-5, adnate to corolla-lobes filaments red. Fruits tomentose, 6 mm long.

Fl. : Oct.-Dec. *Frt.* : Jan.-Apr.

Common parasite on trees.

Keonchi : 8554; Kabirchabutra : 15221.

2n = 24 (as '*Loranthus scurrula* L.').

South Asia, Indomalaysia.

Note : *Loranthus* Jacq. (1762) is conserved against *Scurrula* L. (1753) and *Loranthus* L. (1753) (= *Pistacanthus* Mart.), the latter endemic to Tropical America (Airy Shaw, 1973).

In the first edition of Linnaeus's (1753), Sp. Pl., there are two generic names, viz. *Scurrula* L. (p. : 110) with a single species, *S. parasitica* L. and *Loranthus* L. (p. : 331), also with a single species, *L. americana* L. In the 2nd edition (1762) of *Sp. Pl.*, Linnaeus merged *Scurrula* L. in *Loranthus* L., changing *S. parasitica* L. to *Loranthus scurrula* L. (1762), nom. illeg. superfl. (Art. 7.11; Art. 63.1).

VISCUM L., Sp. Pl. : 1023. 1753 & Gen. Pl. ed. 5 : 448. 1754.

LT. : *V. album* L. (vide M. L. Green, Pro. Brit. Bot. 191. 1929).

Viscum articulatum N. Burm., Fl. Ind. 311. 1768; in Hook. f. FBI 5 : 226. 1886; Haines, Botany 3 : 843; Rao in Jour. Ind. Bot. Soc. 36 : 126. 1957; *V. nepalense* Spreng., Syst. Veg. 47. 1827; Danser in Blumea 4(2) : 283. 1941; Fl. Hassan : 311. 1976. (*Kamini*—Sansk.; *Pudu*—Hindi; *Madanga*—Oriya).

Shrubs; parasite on branches of trees; pendulous; stems flattened, striate and furrowed, contracted at nodes, yellow or black when dry; internodes usually 2.5-5.5 cm long and 2-6 mm broad; twisted near base. Leaves absent or minute scale-like. Flowers minute, fascicled at nodes, 1-3, rarely 5; bracts connate, cupular; flowers monoecious; lateral flowers usually male, central flowers female; male flowers with reflexed, deciduous perianth-lobes; female flowers with erect, deciduous perianth-lobes, 2 bracteolate; stamens 3-4, anthers sessile, adnate to tepals; stigmas large, pulvinate. Fruits sub-globose or globose, green, changing to light yellow, usually 3-4 mm in diam.

Fl. & Frt. : Oct.-Apr.

Common parasite on trees, common on *Diospyros*.

Pasan : 19119; Pali : 8593; Katghora : 3734; Kota : 13076; Pasan to Korbi : 15324.

2n = 24.

Indomalaysia.

Plant—a preparation from it is given in fever attended with aching limbs. Leaves sold as a paste for fractures and bruises in Sikkim.

Note Danser (l.c.) distinguished *Viscum nepalense* Spreng. (with internodes stout, 5-10 mm wide and fruits darker in colour) from *V. articulatum* N. Burm. (internodes slender, not more than 5 mm wide and fruits white or yellowish white), and treated them as specifically distinct, but he also observed that the size of the internode is not a dependable character, and there is some variation in size, shape and colour of the fruits, as well.

EUPHORBIACEAE

A. L. Juss., Gen. Pl. : 384. 1789 ('*Euphorbiae*').

T. *Euphorbia* L.

Key to the subfamilies

1a 2 ovules per locule — PHYLLANTHOIDEAE

1b. 1 ovule per locule

2a. Latex absent; leaves often with petiolar or laminar glands — ACALYPHOIDEAE

2b. Latex present; leaves without such glands

3a. Latex reddish, or yellowish, rarely white; leaves often palmately-veined, lobed or compound; indumentum of simple or often stellate hairs; usually corolla present — CROTONOIDEAE

3b. Latex often white and caustic or poisonous; leaves simple (rarely lobed), pinnately-veined or 3-veined; indumentum of simple hairs or absent; corolla absent — EUPHORBIOIDEAE

1. Phyllanthoideae—7 genera : *Antidesma, Bridelia, Cleistanthus, Drypetes, Glochidion, Phyllanthus, Securinega*

2. Acalyphoideae : 6 genera : *Acalypha, Crozophora, Mallotus, Ricinus, Tragia, Homonoia.*

3. Crotonoideae : 6 genera : *Croton, Baliospermum, Jatropha, Codiaeum, Manihot, Sebastiana.*

4. Euphorbioideae : 2 genera : *Euphorbia, Pedilanthus.*

Euphorbia pulcherrima Willd. ex Klotzsch, *E. nivulia* Buch.-Ham., *E. tirucalli* L., *Acalypha wilkesiana* Muell.-Arg., *A. hispida* N. Burm. and *Codiaeum variegatum* (L.) Bl. are commonly grown in the gardens.

1a. Inflorescences (cyathia) contained in 4-5-lobed, calyx-like involucres; flowers monoecious, naked; perianth absent — EUPHORBIA

1b. Inflorescences not contained in an involucre i.e. not a cyathium; flowers monoecious or dioecious; perianth of sepals always present and sometimes also petals

2a. Cells of ovaries 2-ovuled

3a. Calyx-lobes valvate; petals present

4a. Ovaries 2-celled, glabrous; styles 2; fruits 1-2-locular drupes, indehiscent — BRIDELIA

4b. Ovaries 3-celled, hairy; styles 3; fruits 3-locular capsules, dehiscent — CLEISTANTHUS

3b. Calyx-lobes imbricate; petals absent

5a. Flowers in spikes or racemes, often panicled; ovaries 1-celled — ANTIDESMA

5b. Flowers, at least males, in axillary clusters; ovaries 3- or more-celled

6a. Styles confluent in a column or cone; disc none in either sex — GLOCHIDION

6b. Styles separate or if partially connate, then style-arms and stigmas free; disc present in female and often in male flowers

7b. Flowers dioecious, pistillodes in male flowers absent — PHYLLANTHUS

7b. Flowers dioecious, pistillodes in male flowers present, 2-3-fid — SECURINEGA

2b. Cells of ovaries 1-ovuled

8a. Filaments inflexed in buds; pistillodes absent — CROTON

8b. Filaments erect in buds, rarely inflexed but then pistillodes present

9a. Calyx in male flowers valvate

10a. Calyx stellate hairy; petals present in male flowers — CHROZOPHORA

10b. Calyx not stellate hairy; petals absent in male flowers

11a. Leaves not plininerved; filaments much branched

12a. Leaves entire; flowers dioecious; male and female in axillary or infra-axillary spikes; female-calyx not spathaceous, fruits smooth capsules; seeds with thin coat — HOMONOIA

12b. Leaves palmatilobed; flowers monoecious, in terminal, subpanicled racemes upper ones male and crowded, lower female; female-calyx spathaceous; fruits prickly capsules; seeds with firm coat — RICINUS

11b. Leaves 3-7-plininerved filaments not branched

13a. Plants with stinging hairs; calyx of female flowers accrescent; styles connate — TRAGIA

13b. Plants without stinging hairs; calyx of female flowers not accrescent; styles free or only slightly connate

14a. Female-calyx of 3-4 minute, imbricate lobes; stamens usually 8, rarely more; anthers vermiculiform or linear, styles lanciniate — ACALYPHA

14b. Female-calyx spathaceous or 3-5 valvately lobed; stamens 20-30 or more; anthers not vermiculiform or linear; styles pulmose — MALLOTUS

9b. Calyx in male flowers imbricate

15a. Herbs; calyx of male flowers 3-lobed; stamens 2-3; disc absent — SEBASTIANA

15b. Shrubs or trees; calyx of male flowers 4-5-lobed; stamens 10-20; disc present

16a. Leaf-base 3-5-veined; perianth monochlamydeous i.e. petals absent — BALIOSPERMUM

16b. Leaf-base 7-veined; perianth dichlamydeous i.e. calyx and corolla both present — JATROPHA

ACALYPHA L., Sp. Pl. : 1003. 1753 & Gen. Pl. ed. 5 : 436. 1754

LT. : *A. virginica* L. (vide J. K. Small in N. L. Britton et A. Brown. Ill. Fl. N.U.S. ed. 2. 2 : 457. 1913).

Mostly monoecious or dioecious shrubs; stigmas much-branched; anther lobes vermiform, twisted. *Acalypha wilkesiana* Muell.-Arg. (Beefsteak plant, Copper leaf; Jacob's coat, Pacific) is a widely cultivated tropical ornamental with mottled leaves.

Acalypha ciliata Forssk., Fl. Aegypt.-Arab. 162. 1775; in Hook f. FBI 5 : 417. 1887; Haines, Botany 1 : 117.

Erect herbs. Leaves alternate, long-petioled, ovate or ovate-lanceolate, acuminate, serrate, base rounded or cuneate, 5-7.5 × 2-6 cm. Spikes axillary, sessile, 2 cm long, androgynous, with 4-8 female bracts at base, tubular, each with 1-2 female flowers and male flowers in upper parts, minute, cluster-like or spiciform, all flowers greenish; male flowers: ebracteate; perianth-segments 4, valvate, disc absent; stamens 8-many on a convex receptacle; pistillodes absent; female flowers : bracts 2 mm long, almost pectinate, with long, hispid teeth, patent hairy, ribbed, accrescent in fruits; perianth-segments 3, imbricate; styles filiform. Capsules glabrous, of 3 minute, 2-valved, crustaceous cocci.

Fl. & Frt. : July-Dec.

Common along forest roads, between rocks, cultivated fields.

Khuria : 19301; Karidongri : 19328.

2n = 20.

Africa, India, Sri Lanka.

ANTIDESMA L., Sp. Pl. : 1027. 1753. & Gen. Pl. ed. 5 : 451. 1754.

Type : *A. alexitaria* L.

Because of the presence of small drupaceous fruits, with their foveolate-reticulate, often flattened, endocarps, *Antidesma* L. differs from all other genera of the *Euphorbiaceae* and has no close relatives in the latter family and appears intermediate between *Icacinaceae* and *Euphorbiaceae*. Airy Shaw (1971, 1973, 1975), therefore, reinstates *Stilaginaceae* C. A. Agardh, to include *Antidesma* L., which, however, is not listed in Appendix IIB, ICBN, 1988 as *nom. fam. cons.*; neither Cronquist (1981), nor Mabberley (1987) recognise the family as distinct.

Timber and fruit trees, monoecius (flowers unisexual), calycine tepals (no petals); stamens 2-4 (in male flowers) and styles 2-4 (in female ones); cultivated ornamental. *Antidesma bunius* (L.) Spreng. (Chinese Laurel) has fruits bitter to some but sweet to others; preserved flowers smell of powdered fish.

1a. Leaves acute or acuminate, base strongly cuneate; inflorescences glabrous; flowers all pedicelled; calyx 4-lobed or-toothed; stamens 2; ovaries glabrous — *A. acidum*

1b. Leaves very obtuse, base cordate; inflorescences tomentose; flowers all sub-sessile, calyx 5-7-partite; stamens 4-7; ovaries pubescent — *A. ghaesembilla*

Antidesma acidum Retz., Obs. Bot. 5 : 30. 1789; C.E.C. Fischer in Kew Bull. Misc. Inf. 1932 : 65. 1932; Airy Shaw in Kew Bull. 26(2) : 352. 1972; *A. diandrum* (Roxb.) Roth, Nov. Pl. Sp 369. 1821; Hook. f. in FBI 5 : 361. 1887, *pro part.*; Haines, Botany 1 : 142; Babu. Herb. Fl. Dehra Dun : 455. 1977; *Stilago diandra* Roxb., Pl. Corom. 2 : 35. t. 166. 1798. '*Amla*'.

Large shrubs or small trees. Leaves alternate, obovate-oblong to obovate-lanceolate or rhomboidely-elliptic, stipulate, entire, short-petioled, 3-10 × 2-6 cm; stipules linear, longer than petioles, caducous. Racemes slender, usually solitary rarely 2-3-nate, 2-5 cm long or female upto 7 cm long in fruits, flowers minute, pedicelled, green, dioecious; rachis glabrous; calyx 0.8-1 mm long, lobes usually 4, ovate, obtuse, glabrous outside; petals absent; stamens 2, at base of glabrous, lobed disc; ovaries usually 1-celled; stigmas 2-4, 2-fid or 2-partite. Fruits red, ovoid or sub-globose, acute, 4-5 mm long.

Fl. : May-June. *Frt.* : Oct.-Jan.

Common in 'Sal' forests on the slopes.

Khondra 12849; Lamni : 13248A; Pasarkhet : 12970.

India, Burma, N.E. Malaysia.

The pinkish-grey wood is hard and close-grained. Leaves which have a pleasantly acid taste, are eaten as *Sag*; fruits are also edible.

A. ghaesembilla Gaertn., Fruct. 1 : 189, t. 39. 1788; Haines, Botany 1 : 144; Airy Shaw in Kew Bull. 26 : 353. 1972; Nicolson *et al.*, Regnum Veget. 119 : 193. 1988. *Vidingi* (Maharastra).

Large shrubs or small trees; branches densely tomentose. Leaves alternate, broadly elliptic or orbicular or elliptic-oblong, grey, or hoary tomentose when young, pubescent or villous beneath when old, 5-10 × 3-7 cm; petioles 8-12 mm long, tomentose; stipules about as long as petioles, lanceolate, acute, downy. Spikes panicled, tomentose; flowers greenish-yellow, dioecious; male flowers : sepals woolly; disc 5-partite, pubescent; stamens 4-5, at base of disc; female flowers : disc annular; ovaries one-celled; hairy stigmas 2-4, minute, recurved. Fruits subglobose, reddish or black, 5 mm in diam.

Fl. : May-July. *Frt.* : Sept.-Oct.; deciduous before flowering.

Common in drier localities in mixed forests, edges of forests.

Marwahi : 19002; Keonchi : 19150; Pasan to Korbi : 19077; Achanakmar : 19283.

India, Sri Lanka, S. China, Malaysia, N. Australia.

Fruits are edible.

BALIOSPERMUM Blume, Bijdr. : 603. 1825.

T. : *B. axillare* Bl.

Baliospermum solanifolium (J. Burm.) Suresh in Nicolson *et al.*, Regnum Vegetab. 119 : 106. 1988. *Croton solanifolius* J. Burm., Fl. Malab. : 6 1769 ('*solanifolium*'). *Croton solanifolius* Geisler, Croton. Monogr. : 74. 1807, non J. Burm. (1769). *Baliospermum montanum* (Willd.) Muell.-Arg. in DC., Prodr. 15(2) : 1125. 1866; Haines, Botany 1 : 119, *Jatropha montana* Willd., Sp. Pl. 4 : 563. 1805. *Baliospermum axillare* Bl., Bijdr. : 604. 1825; in Hook. f. FBI 5 : 461. 1887. *Naga-danti* Rheede, Hort. Malab. 10 : 151, t. 76. 1690.

Undershrubs or shrubs, branched from base. Leaves alternate, upper lanceolate, lower oblong-ovate or elliptic-lanceolate, base acute, obtuse or cordate, sometimes hairy beneath, sinuate dentate, 5-25 × 2-15 cm; stipules of 2 glands. Racemes axillary, interrupted, terminal flowers pedicelled, males with a few subsessile females below; flowers small, greenish, 4 mm across; male flowers : perianth-lobes 4-6, orbicular, concave, imbricate, membranous, white-margined; disc-glands 4-6, soft, lobulate; stamens 15-20; female flowers : perianth-lobes 5, ovate, acute, disc entire, cupular; ovaries densely strigose; styles 2-fid or -partite. Capsules subglobose, 8-12 mm long, 3-dymous, of three, 2-valved, crustaceous cocci.

Type : Rheede, *l.c.*; t. 76.

Fl. : Dec.-Feb. *Frt.* : Apr.-May.

Frequently at the edge of the forests, in damper localities.

Achanakmar : 19535.

2n = 44 (as '*B. montanum*').

India, Vietnam, Laos, Cambodia, Malaysia.

Seeds are used as drastic purgatives and as fish poison.

BRIDELIA Willd., Sp. Pl. 4(2) ; 978. 1806 ('1805').

Type : non designatus.

Some species provide timbers; some are locally medicinal; tanbark. *Bridelia* spp. in Africa provide food for certain species of silkworms giving African wild or Anape silk.

Bridelia airyshawii P.T. Li in Acta Phytotax. Sin. 20(1) : 117. 1982. *Clutia retusa* L., Sp. Pl : 1042. 1753. *Bridelia retusa* (L.) Spreng, Syst. Veg. 3 : 48 1829. non A. Juss. (1824) ; in Hook. f. FBI 5 : 258. 1887 p.p.; Haines, Botany 1 : 123 ; Nicolson *et al.* ; Regnum Vegetab. 119 : 107. 1988. (*Kassai*—Oriya ; *Khaja*—Hindi ; *Kasi*—Trade name).

Deciduous trees; younger plants with thorns. Leaves alternate, coriaceous, elliptic-oblong, ovate or obovate, tip acute or obtuse, base rounded or cordate, grey or glaucous beneath, secondary veins 15-20, 5-20 × 3-12 cm. Flowers dioecious, in axillary or spicate clusters, greenish, males and females usually intermixed; male flowers : pedicelled; sepals 5, ovate-lanceolate, acute; petals orbicular, angular or coarsely-toothed; disc patelliform, pulvinate; stamens 5, united below into a column; female flowers : subsessile, sepals same as in male; petals spathulate-oblong, entire, persistent; disc annular, with an inner, sub-petaloid limb, entire or 5-lobed; ovaries usually 2-celled; styles 2-partite. Fruits greenish-yellow, globose, 5-6 mm in diam. a drupe.

Fl. : July-Sept. *Frt.* : Oct.-Feb.

Common near streams, inside mixed forests.

Pasarkhet : 12944; Korba to Kudmura : 16812; Katghora : 6058.

2n = 26, 28.

India, Nepal, Sri Lanka, Malaysia, Indonesia.

Wood is used as timber, for rafters, posts and floor-boards; for agricultural implements. Bark contains tannin (16-40 %). In pharmacological trials, it exhibited antiviral, hypoglycaemic, and hypotensive properties. Leaves used as fodder. Fruits edible.

CHROZOPHORA A. H. L. Jussieu, Euphorb. Gen. : 27. 1824. ('*Crozophora*') *nom. cons., ortho. cons.*

Type : *C. tinctoria* (L.) A. H. L. Jussieu (*Croton tinctorius* L.).

Note : Airy Shaw (1973) cites "*Chrozophora* Neck. ex Juss. corr. Benth. & Hook. f.", but this is contrary to Art. 14.10, Ex. 8.

1a. Prostrate herbs; leaves eglandular at base, 1-2.5 cm long, strongly wrinkled, covered with stalked stellate hairs; racemes short, a few-flowered; capsules nearly black with grey stellate tomentum, short-stalked, not tinctorial — *C. prostrata*

1b. Erect herbs; leaves 2-glandular at base, 3-7 cm long, undulate, crenate, covered with sessile stellate hairs; racemes elongated, many-flowered; capsules with reddish stellate tomentum, peduncles often 3.5-4.5 cm long, tinctorial when wetted — *C. rottleri*

Chrozophora prostrata Dalz. in Dalz. & Gibs., Bomb. F. 233. 1861 : Haines, Botany 1 : 107; Nair in Rec. Bot. Surv. Ind. 21 : 234. 1978; *C. plicata* (Vahl) Sprengel forma 3, sensu in Hook. f. FBI 5 : 410. 1887.

Herbs; branches often compressed to ground, stellate tomentose. Leaves alternate, radical and cauline, ovate or sub-orbicular, tip rounded, 1-2.5 × 0.6-2 cm. Flowers yellowish in sessile, axillary, bracteate racemes, monoecious, males above, subsessile; females below, pedicelled; male flowers : sepals 5, ovate, 2 mm long; petals 5, obovate, 3 mm long, externally lepidote; stamens 5-15, filaments connate below; disc obscure; female flowers : sepals narrower than males; petals narrow or obsolete; disc of 5 glands; ovaries 3-celled, stellate tomentose; styles 3, 2-fid. Capsules of three 2-valved cocci, 5-6 mm in diam.

Fl. : Jan.-May. *Frt.* : July-Aug.

Common in dried up ditches along roads.

Khami to Panderia : 16711 ; Bilaspur to Champa : 19358

2n = 22.

Africa, Pakistan, India.

Ch. rottleri (Geisler) A. Juss. ex Spreng., Syst. Veg. 3 : 850. 1826; Haines, Botany 1 : 107. *Croton rottleri* Geisler, Crot. Monogr. : 54. 1807. *Chrozophora plicata* (Vahl) Spreng. forma 1, sensu in Hook. f. FBI 5 : 410. 1887 p.p. quoad. "*C. Rottleri* Thwaites"

Herbs; branches stellate-tomentose. Leaves alternate, cauline, broadly ovate-orbicular, rounded-acute, base truncate to subcordate, margins undulate-crenate, rugose or plaited, 3-7 (-10) cm across. Stipules subulate. Flowers yellow, in axillary, bracteate, 2-5 cm long racemes; males above, subsessile; females below, pedicelled; male flowers : sepals 5, linear-lanceolate, 2 mm long; petals 5, ovate, 3 mm long, externally lepidote; stamens 5-15, filaments connate below; disc obscure; female flowers; sepals narrower than males; petals 5, narrow or obsolete; disc of 5 glands; ovaries 3-celled, stellate tomentose; styles 3, 2-fid; stigmas red. Capsules of three 2-valved cocci, 6-8 mm in diam.

Fl. & Frt. : Almost throughout the year.

Common in waste places, dried up ditches and cultivated fields.

Parasi : 19043; Karidongri : 19329.

2n = 22

Indomalaysia, westward to Africa.

Note : The combination, *Ch. rottleri* is sometimes wrongly attributed to "A. Juss. in Tent. Euph. : 28. 1824", but he, there, had merely observed "*Croton rottleri* Geisler" might belong to *Chrozophora* (Art. 33. 1, Ex. 2).

Usually an annual herb but sometimes lasts for more than one sesson in dry waste places. When perennial and shrubby, the leaves become smaller.

The ashes of roots are given in cough; seeds used as cathartic and purgative; capsules yield a blue colour; plants are acrid and poisonous.

CLEISTANTHUS J. Hook. ex Planchon in Hook., Icon. Pl. 18(16) t. 779, 1848

Type : *C. polystachyus* J. Hook.

Cleistanthus collinus (Roxb.) Benth. (Gen. Pl. 3 : 268. 1882) ex J. Hook. in FBI 5 : 274. 1887; Haines, Botany 1 : 126; *Clutia collina* Roxb., Pl. Corom. 2 : 37. t. 169. 1802. '*Karra, Gurari*'.

Trees. Leaves alternate, bifarious, coriaceous, orbicular-obovate or elliptic, tip rounded or retuse, base rounded or cordate, glaucous beneath, 3-10 × 2.5-7.5 cm. Flowers in small axillary, spicate clusters, silky villous; clusters 3-6-flowered; bracts minute; flowers monoecious, greenish; male flowers : calyx 5-cleft, sepals ovate-lanceolate, 5 mm long; petals 5, ovate-lanceolate, 5 mm long, fleshy, sometimes absent; disc flat or pulvinate; stamens 5, filaments united in column; pistillode pyromidal or 3-lobed; female flowers; calyx and corolla as in male; disc conical, turbinate; ovaries ovoid, glabrous; 3-celled; styles 3, 2-fid. Capsules dark brown, shining, wrinkled when dry, rounded-3-gonous, woody, 2-2.5 cm in diam.

Fl. : Mar.-May. *Frt.* : Mar.-Apr. of the following year.

Common element of the dry forests.

Khondra : 12765; Khunia : 19311; Pali : 8591; Achanakmar to Kota : 15445; Pendra to Keonchi : 19148.

2n = 22.

India, Sri Lanka,

The wood is hard and dark-coloured and is used for posts and poles. Dried fruits are used in criminal poisonings, since these, as also leaves and roots, act as violent gastro-intestinal irritant.

CROTON L., Sp. Pl. : 1004. 1753; Gen. Pl. ed. 5 : 436. 1754.

LT. : *C. tiglium* L. (vide J. K. Small in N. L. Britton et A. Brown, Ill. Fl. N.U.S ed. 2.2 : 454. 1913).

Note : *Croton tiglium* L. of tropical Asia, is the source of croton-oil expressed from seeds, one of the most purgative subtances known.

The often cultivated plant, known as 'Croton' does not belong to this genus, but is *Codiaeum variegatum* (L.) Blume, (*Croton variegatus* L.)

long selected by people of Papuasia and West Pacific for ornamental purposes, now being used for hedging also; many named cvs., some with twisted leaves, pitcher-leaves or 2-blades separated by a common midrib, or variously lobed, variegated or spotted.

1a. Small erect herbs; leaves 2.5-4 cm long, stellate hairy; stamens 15; ovaries stellate hairy, capsule 3-gonous, stellate hairy — *C. bonplandianus*

1b. Large shrubs: leaves 10-25 cm long, scaly when young, glabrous when old; stamens 12; ovaries lepidote; capsules slightly 3-lobed, scaly — *C. roxburghii*

Croton bonplandianus Baillon in Adansonia 4 : 339. 1864; Hara *et al*, Enum. 3 : 195. 1982; *C. sparsiflorus* Morong in Ann. N.Y. Acad. Sci. 7 : 221. 1893; Haines, Botany 1 : 109.

Woody herbs; branches ribbed with stellate hairs. Leaves alternate, lanceolate or ovate-lanceolate, wavy and toothed, 3-veined and 2-glandular, 2.5-4 × 1.5-2 cm. Spikes 5-7 cm long, with female flowers in lower parts and male flowers in upper part; flowers pale white, 3 mm across; male fascicled in axils of minute bracts; female solitary, with large gland; calyx 5-partite, imbricate or sub-valvate, lobes obovate in males, lanceolate in females; petals of males 5, linear-oblong, absent in females; stamens 10 or more, on villous receptacle, filaments free; ovaries usually 3-celled; styles 3, 2-4-cleft; stigmas bifid. Capsules trigonous.

Fl. & Frt. : Almost throughout the year.

Common in waste places along roads.

Bilaspur to Champa : 19360.

2n = 16, 20, 40, 50.

Native of Brazil; now naturalized in the tropics.

Leachate allelopathic to weedy associates; seeds yield a fatty oil with satisfactory drying properties. Seed-cake useful as a manure.

C. roxburghii Balakrishnan in Bull. bot. Surv. Ind. 3(1) : 39. 1961; *C. oblongifolius* Roxb. (Hort. Beng. 69. 1814, *nom. nud.*) Fl. Ind. 3 : 685. 1832, *nom. illeg., non* Delil. 1814, *nec.* Siebr. ex Spreng. 1826; in Hook. f. FBI 5 : 386. 1887; Haines, Botany 1 : 108.

Large shrubs; rarely small trees. Leaves alternate, young ones lepidote, older ones glabrous, coriaceous, oblong, elliptic-oblong or ovate-lanceolate,

acute or acuminate, narrowed below, repand-toothed or serrate, 10-25 × 4-9 cm. turns red before falling. Racemes 12-20 cm long, often fascicled, with many linear or sub-foliaceous oblanceolate bracts at base; flowers solitary or clustered in axils of bracts, 6-7 mm across, pale white; male densely villous within, outside lepidote; female ciliate; male flowers : calyx 5-cleft, sepals lepidote, broadly oblong or ovate; petals oblong, obtuse, woolly; stamens 10-12, woolly below; disc of 5 glands; female flowers : calyx as in male; petals linear, ciliate; disc depressed, annular or of glands; ovaries oblong, 3-gonous. Capsules scaberulously lepidote, 7-10 mm long, splitting into 2-valved cocci.

Fl. : Jan.-Feb. *Frt.* : Apr.-May.

Common in the mixed dry deciduous forests.

Pasan to Korbi : 15319; Korba to Kudmura : 16809.

2n = 20.

India, Nepal, Sri Lanka, Indo-China

EUPHORBIA L., Sp. Pl : 450. 1753 & Gen. Pl. ed. 5 : 208. 1754.

LT. : *E. antiquorum* L. (*vide* Millspaugh, Publ. Field. Columbian Mus. Bot. ser. 2 : 306. 1909).

Note : Second largest angiosperms genus with c. 1600 species. Monoecious or dioecious, herbs, shrubs or trees with milky latex; stems often spiny, the plants cactoid (but latex and paired spines distinguishing them at once). Flowers in cyathia without petals; the males reduced to staminodes to stamen 1, (jointed, representing pedicel below), surrounding 1 female with G(3), mature before males, the whole surrounded by a 'whorl' of green P-like bracts and between them, 4 horn-shaped glands probably representing stipules of bracts. The succulent species occupy the same position in Africa as the *Cactaceae* in America. Leaves fall in dry season or stem fleshy and green and leaves present only in wet season as in *Euphorbia neriifolia* L. (India), where the leaves soon fall, the principal photosynthesis being due to stems. The inflorescences in some leafy species are surrounded by brightly coloured bracts, apparently attractive to pollinating birds as in *E. pulcherrima* ('*poinsettia*). The latex of all species is toxic and can bring out skin allergies; it has been used to stupefy fish. Many are cultivated as succulent curiosities or as hardy border plants etc. *Euphorbia milii* Des Moul. (*E. bajeri* Hook.; Crown of Thorns, Madagascar) with bright red or yellow bracts, is often

grown as house-plants, esp. var. *splendens* (Bojer ex Hook.) Ursh & Leandri with brilliant red bracts. *E. pulcherrima* Willd. ex Klotzsch (*Poinsettia*, Mexico), with coloured bracts attracting pollinating birds, is also cultivated in the gardens. Mabberley (1987) comments "It is the basis of multi-million pound Christmas industry in the Western countries". *E. tirucalli* L. (Zangiber) with thin cylindrical branched stems and abortive leaves, is a promising source of hydrocarbons for fuel (in latex, almeidens may be tapped) and is used for charcoal including fireworks. It is generally planted in gardens, sometimes running wild.

1a. Armed shrubs with stipular spines, fleshy; leaves over 10 cm long, fleshy; involucres usually 3 in a cyme — *E. neriifolia*

1b. Unarmed herbs; not fleshy; leaves under 10 cm long, not fleshy; involucres many in a cyme or solitary

2a. Leaves alternate or upper opposite, usually exstipulate; glands of involucres 2-horned

3a. Plants not umbellately branched; involucres with a single, large, stalked gland — *E. heterophylla*

3b. Plants umbellately branched above; involucres with subsessile glands

4a. Final ramifications of inflorescences forming a sympodium on which solitary involucres are axillary; involucre-lobes broadly oblong, not ciliate — *E. perbracteata*

4b. Inflorescences umbellate or dichasial throughout; involucre-lobes ovate, ciliate — *E. dracunculoides*

2b. Leaves opposite, usually stipulate; glands of involucres often with a petaloid limb or appendaged, not 2-horned

5a. Involucres solitary or 2 in axillary clusters; capsules ripening within cyathia — *E. thymifolia*

5b. Involucres many in a cyme, cymes axillary and terminal; capsules ripening outside cyathia

6a. Hispidly pubescent herbs; cymes capitate, capsules 1-1.5 mm in diam., appressedly hairy — *E. hirta*

6b. Glabrous or thinly pubescent herbs; cymes not capitate; capsules about 2 mm in diam., pubescent or glabrous — *E. hypericifolia*

Euphorbia dracunculoides Lam., Encycl. Meth. Bot. 2 : 428. 1786; in Hook. f. FBI 5 : 262. 1887; Haines, Botany 1 : 150; Hara *et al*, Enum. 3 : 195. 1982.

Erect annual herbs; branches opposite and repeatedly dichotomous. Leaves sessile, linear, linear-lanceolate or linear-oblong, subacute, base acute, rarely rounded or subcordate, 2-3.5 cm long. Cyathia solitary at forks, turbinate or campanulate, subsessile, glabrous without, hairs within, about 1.5 mm long; glands semi-lunate; perianth absent; male flower—a stamen, filaments pubescent; female flower—a solitary, pedicelled, 3-celled, 3-ovuled ovary; styles 3, 2-fid. Capsules smooth, 3-5 mm in diam., of three, 2-valved cocci.

Fl. & Frt.: Nov.-Mar.

Common in grassy places, between rocks near cultivated fields.

Pendra : 15284.

2n = 16, 40.

Trop. Africa, Arabia, Nepal, India.

E. heterophylla L., Sp. Pl. : 453. 1753; Hara *et al.* Enum. 3 : 195. 1982; *E. geniculata* Orteg. (Nov. Rar. Pl. Hort. Matr. Decad. : 18. 1797, *nom. nud.*) ex Boiss. in DC., Prodr. 15(2) : 72. 1866; in Hook. f. FBI 5 : 239. 1886, *in obs.*; Haines, Botany 1 : 149.

Erect herbs; stems fistular, ribbed. Leaves long-petioled, lanceolate to oblong-obovate, shallowly denticulate, obtuse or acute, base narrowed, glabrous or hairy, lower ones alternate, upper ones opposite, 4-10 × 1-3 cm. Cyathia 2-4 mm long, campanulate, in corymbose cymes, 2-2.5 cm diam., with subtending leaves whitish or pale near base; involucre-lobes 5, broadly oblong-ovate, lacerate; male flower of a pedicelled stamen; female flower a pedicelled, glabrous, 3-celled, 3-ovuled ovary; styles 3, short-connate, 2-fid. Capsules glabrous, 4-5 mm in diam., of 3, 2-valved cocci. Seeds truncate at lower end, tuberculate.

Fl. & Frt.: July-Oct.

Common in plant-nurseries, cultivated fields, in waste grassy places.

Bilaspur : 12985; Ompur Nursery, Pasarkhet : 19438.

2n = 28, 38, 54, 56.

Native of tropical America, naturalised throughout India and elsewhere.

E. hirta L., Sp. Pl. : 454. 1753; Haines, Botany 1 : 152. *E. pilulifera* L., Sp. Pl. : 454. 1753. *Chamaesyce hirta* (L.) Millspauch, Publ. Field Mus. Nat. Hist. Bot. ser. 2 : 303. 1909.

Note : Mabberley (1987) reduced *Chamaesyee* Gray as a congeneric synonym of *Euphorbia* L.

Erect or decumbent herbs; stems with yellowish hairs. Leaves alternate, unequal-sided, elliptic-oblong, obovate or oblong-lanceolate, tip acute or cuneate, base narrow and obliquely cordate, serrulate, 2-4 × 0.5-1 cm. Cyathia minute, 1 mm long, crowded in capitate, finally peduncled, axillary cymes, hairy, campanulate, with 4 short-stipitate, red-tipped glands, with or without a limb, lobes ovate-triangular, ciliolate; perianth absent; male flower a pedicelled stamen; female flower a solitary, pedicelled, 3-celled, 3-ovuled ovary; styles 3, 2-fid. Capsules depressed-globose, hairy.

Fl. & Frt. : Almost throughout the year.

Common weed in cultivated fields, in waste places.

Pasan to Samra 15363 : Marwahi to Parasi : 19037.

2n = 12, 18, 20.

Pantropical but native to trop. America.

Plant is credited with medicinal properties.

E. hypericifolia L., Sp. Pl. : 454. 1753; Haines, Botany 1 : 151; Nicolson *et al.*, Regnum Vegetab. 119 : 110. 1988. *Euphorbia indica* Lam., Encycl. 2 : 423. 1786. *E. androsaemoides* Dennst., Schlüssel : 14, 21, "*androsaemifolia*" 36. 1818. *E. ovalifolia* Kostel., Allg. Med.-Pharm. Fl. 5 : 1724. 1836, nom. illeg. *Chamaesyce hypericifolia* (L.) Millsp., Publ. Field. Mus. Nat. Hist. Bot. ser. 2 : 302. 1909. *Nir-Cottam-pala* Rheede, Hort. Malab. 10 : 101. t. 51. 1690.

Erect ascending or decumbent herbs. Leaves obliquely broadly or narrowly oblong or obovate, obtuse or rounded, serrulate, base rounded, cordate, 1-3 × 0.3-0.7 cm. Cyathia minute, in peduncled, many-flowered cymes, with subulate bracts, often subtended by 2 floral leaves, rarely solitary, entire, 1 mm long, lobes 5, lanceolate-ovate, acuminate, ciliate; glands 4-5, disciform; perianth absent; male flower a pedicelled stamen; female flower a pedicelled, 3-celled, 3-ovuled ovary, glabrous or appressed hairy; styles 2. Capsules sub-globose of 3, 2-valved cocci.

Fl. & Frt. : Almost throughout the year.

Common in open grassy places, roadsides, waste places in gardens and cultivated fields as weeds.

Khami to Pandaria : 16712, 16710; Kabirchabutra : 19199; Khondra : 12825; Lamni : 19227; Khuria to Pandaria : 19343.

2n = 16, 28, 56.

Pantropical.

Note : *Nir-cottam-pala* Rheede, l.c. : t. 51 is the sole basis (type) of *E. androsaemoides* Dennst.

E. neriifolia L., Sp. Pl. : 451. 1753; Haines, Botany 1: 147; Nair, Rec. Bot. Surv. Ind. 21 : 237. 1978.

Erect, fleshy shrubs with green angular stems, branches jointed, with five or spirally twisted ribs, with pairs of stipular spines on tubercles. Leaves obovate-oblong or sub-spathulately obovate, acute, narrowed into a very short petiole, 10-25 × 3-6 cm in wet seasons, but caducous or abortive. Cyathia yellowish, in dichotomous, short-peduncled cymes, hemispheric; lateral ones with short and thick pedicel; central ones sessile; male, 2-bracteate; glands 5, transversely oblong, without a petaloid limb; ovaries 3-celled, styles connate high up, undivided. Capsules sharply 3-lobed, about 1 cm across; lobes compressed, glabrous.

Fl. & Frt. : Feb.-Apr.

Common in waste places, outskirts of the villages.

Palmi to Neur : 16718.

India, Burma.

Sometimes confused with the closely allied *E. nivulia* Ham., a common hedge plant, which differs from *E. neriifolia* L. in having terete branches not ribbed or angled, spines not on prominent tubercles but inserted on flat corky bases and arranged in vertical lines and obtuse-retuse leaves.

E. perbracteata Gauge in Kew Bull. 1914 : 238. 1914; Haines, Botany 1 : 150; Croizat in Jour. Bomb. nat. Hist. Soc. 41 : 575. 1940; Raizada, Suppl. Duthie's Fl. Upp. Gang. Pl. : 249. 1976.

Erect herbs; pale green when dry. Leaves sessile, narrow-oblong or linear, membranous, 3.5-5 cm long, deciduous. Bracts surrounding cyathia

ovate to orbicular, ribbed, united at their bases. Cyathia solitary in upper forks and cymosely sub-spicate, one in each pair of bracts, alternately on each side of rachis (sympodium), short-pedicelled, tubular-campanulate, about 4 mm in flower; lobes membranous, 2-toothed, glands 4, truncate, broadly oblong, without a petaloid limb; stamens a few, without hairs or bracteoles; styles connate at base, 2-lobed. Cocci smooth, about 5 mm across.

Fl. & Frt. : Feb.-Apr.

Rare; collected only once in a ditch along road sides on black cotton soil.

Khuria to Khami : 16781.

Sedgwick (Jour. Bomb. nat. Hist. Soc. 26 : 500. 1919) and Croizat (l.c.) consider it endemic to Maharashtra (around Bombay and Concan), but Gauge (l.c.) gives United and Central Provinces as its range of distribution.

E. thymifolia L., Sp. Pl. : 454. 1753; Haines, Botany 1 : 152; Mabb., Taxon 26 : 531. 1977. *Euphorbia foliata* Ham. ex Dillwyn., Rev. Hort. Malab. : 52. 1839. *Chamaesyce thymifolia* (L.) Millsp., Publ. Field Columb. Mus. Bot. ser. 2 : 412. 1916. *Caicotten-pala* Rheede, Hort. Malab. 10 : 65. t. 33. 1690.

Prostrate herbs; hispidly pubescent. Leaves opposite, petioled, obliquely oblong-obtuse, base obliquely truncate, crenulate, glabrous or pubescent beneath, distichously spreading, 4-8 mm long. Stipules elongate, subulate, fimbriate. Cyathia in small, axillary clusters, green or pinkish, turbinate, pubescent, 0.8 mm long; lobes short-ciliate; glands 4-5, minute, stipitate; male flower a pedicelled stamen; female flower a 3-celled, 3-ovuled ovary; styles 3. Capsules erect, obtusely keeled, pubescent, short-stipitate, of 3, 2-valved cocci.

Fl. & Frt. : Almost throughout the year.

Common in moist places, waste places, near streams, cultivated fields.

Achanakmar : 13202A; Korbi : 19100; Hasdo river bank : 8608; Kota : 13066; Khuria : 15458; Marwahi to Parasi : 19033.

2n = 18, 19.

Throughout the tropics, but probably a native of tropical America.

GLOCHIDION J. R. Forster & G. Forster, Pl. Chart. Gen. : 57. 1775, *nom. cons.*

T. : *G. ramiflorum* J. R. Forster & G. Forster.

Some species provide local timbers and are medicinal containing alkaloids.

1a. Leaves softly tomentose beneath; anthers 3, connectives very long — *G. velutinum*

1b Leaves glabrous beneath; anthers 4 or more, connectives very short

2a. Stipules triangular-ovate; cuspidate; styles furrowed; capsules orbicular, distinctly lobed; base and apex deeply introded; ovaries 10-15-celled — *G. multiloculare*

2b. Stipules falcate, acuminate; styles conical, cleft at tip; capsules globose, terete, not lobed, often beaked, later depressed; ovaries 4-7-celled — *G. zeylanicum*

Glochidion multiloculare (Roxb. ex Willd.) Muell.-Arg. in Linnaea 32 : 59. 1863; in Hook. f. FBI 5 : 307. 1887; Haines, Botany 1 : 135; *Agyneia multilocularis* Roxb. ex Willd. in Neue Schr. Ges. Naturf. Freunde, Berlin 4 : 206. 1803.

Trees; branches drooping. Leaves thinly coriaceous, linear-oblong, lanceolate or narrowly obovate, glaucously purplish beneath, petioled, 5-12 × 1.5-3 cm. Flowers monoecious, in axillary clusters, apetalous, eglandular; male flowers : yellowish, about 2 mm long short-pedicelled; sepals 6, 2-seriate, oblong, spreading; stamens 4-12, connivent; female flowers; larger, stoutly pedicelled; sepals 6, short-tubular, 2-seriate, revolute, spreading, 9 mm in diam., in fruit; ovaries glabrous or villous; styles a depressed cone or umbo with a hollowed top, rayed. Capsules 2-2.5 cm in diam., 10-15-lobed, orbicular, base and apex intruded.

Fl. & Frt. : Feb.-Oct.

Common in the mixed forests, at the edges of the forests, evergreen.

Nonbira to Pasarkhet : 16814; Pasarkhet to Siang : 19412; Korba : 8693.

India, Nepal, Burma.

G. velutinum Wight, Icon. Pl. 5 : 29. t. 1907. 1852; in Hook. f. FBI 5 : 322. 1887; Haines, Botany 1 : 135; Hara *et al*, Enum. 3 : 197. 1982. 'Kolya'.

Trees; branches pubescent or tomentose. Leaves coriaceous, orbicular to ovate-elliptic or oblong, obtuse or subacute, base cuneate, 5-15 × 3-9 cm. Flowers monoecious or sometimes dioecious, in axillary clusters; male

flowers : yellow, 4-5 mm across, pedicelled; sepals and petals sub-equal, 6 each, narrowly oblong-lanceolate, obtuse, outside pubescent; stamens 3, connivent, connectives produced into a broad subulate white point; female flowers; densely clustered, subsessile, green, sepals 6, pubescent, linear to oblong; ovary 4-7-celled, tomentose; stylar column broad, longer than sepals, pubescent; stigmas 4-6. Capsules globose, 0.7-1 cm in diam., flattened at both ends; usually 10-lobed, pubescent.

Fl. : Apr.-May; also in July. *Frt.* : June-Aug.

Frequently at the edges of the forest, valleys.

Kabirchabutra : 19166.

2n = 52.

India, Nepal, N. Burma.

G. zeylanicum (Gaertn.) A. Juss,, Tent. Euphorb. : 107, t. 3. 1824; Haines, Botany 1 : 136; Nicolson *et al.*, Reg. Veg. 119 : 112. 1988. *Bridelia zeylanica* Gaertn., Fruct. 2 : 128, t. 109. 1790. *Pevetti, Pee-vetti* Rheede, Hort. Malab. 4 : 113, t. 55. 1683

Shrubs or small trees. Leaves coriaceous, petioled, ovate-lanceolate or oblong, base often unequal, 10-22 × 5-10 cm. Stipules deflexed flowers monoecious, in supra-axillary, subsessile or peduncled clusters; male flowers; about 6 mm across, yellowish-green, pedicelled; sepals 6, 2-seriate, about 3 mm long, broadly elliptic-oblong, recurved; stamens 5-7, connivent, filaments hardly any, pistillodes small; female flowers : reddish, pedicel shorter and stouter than male; sepals 6, about 3 mm long, 2-seriate, outer ones erect, sub-orbicular; inner ones larger, oblong; styles a cone, 6-8-toothed, dilated into ovaries, globose. Schizocarps short-stalked, obscurely 5-6-angled, glabrous or pubescent, 6-8 mm in diam., beaked by stylar column.

Fl. : Feb.-May. *Frt.* : Apr. of the following year.

Frequently seen in mixed forests.

Katghora : 8704

Indomalaysia.

HOMONOIA Loureiro., Fl. Cochinch. : 601, 636. 1790.

T. : *H. riparia* Lour.

Homonoia riparia Lour., Fl. Cochinch. 637. 1790; Haines, Botany 1 : 114. *Adelia neriifolia* Roth, Nov. Pl. Sp. : 375. 1821.

Rigid evergreen shrubs; branches with prominent leaf-scars, tomentose above. Leaves alternate, linear, linear-lanceolate or linear-oblong, wavy or serrulate towards tip, pubescent beneath, obtuse, acute or acuminate, base acute or rounded, 7-17(-25) × 0.7-2 cm. Flowers usually dioecious, subtended by a bract and 2 bracteoles, in axillary spikes, bracts ovate, acuminate; male spikes 3.5-10 cm long with tomentose rachis, female spikes 5-8 cm long, with grey tomentose rachis; male flowers : perianth globose, lobes 3, valvate, elliptic-oblong, pink, glabrous, 3 mm long; stamens numerous, connate below; female flowers : perianth-lobes 5-8, lanceolate, brown, imbricate, pubescent, caducous, 1.5 mm long; ovaries tomentose; styles 3, papillose or fimbriate; stigmas 3, sessile, laciniate. Schizocarps 8 mm in diam., globose, tomentose, of 3, 2-valved cocci.

Fl. : Mar.-Apr. *Frt.* : June-Nov.

Common in rocky river-beds, between rock boulders near streams; a typical rheophyte.

Lamni : 13252.

2n = 44.

Indomalaysia.

Planted as erosion retardant in Sumatra; rope is made from bark in China and used as a skin medicine in Malaya.

JATROPHA L., Sp. Pl. : 1006. 1753 & Gen. Pl. ed. 5 : 437. 1754.

LT. : *J. urens* L. (vide N. L. Britton in Fl. Bermuda : 218. 1918).

Note : 1. M. L. Green (Prop. Brit. Bot. : 189. 1929) selected *J. curcas* L. as the lectotype).

2. *Jatropha podagrica* Hook. (Central America) with stems grotesquely swollen, flowers red and locally medicinal, is sometimes cultivated in the gardens of India.

1a. Trees; leaves orbicular-cordate, entire or 3-5-lobed or-angled, margins not glandular ciliate; petals connate to middle or above it, greenish-yellow; capsules sub-globose or ellipsoid — *J. curcas*

1b. Herbs or shrubs; leaves palmately 3-5-partite, margins with stipitate, viscid glands; petals free or nearly so, red or purple; capsules 3-gonous — *J. gossypifolia*

Jatropha curcas L., Sp. Pl. : 1006. 1753; in Hook. f. FBI 5 : 383. 1887; Haines, Botany 1 : 105 (*Physic nut, Purging nut, Pulza; Dhalajahaji*—Oriya; *Baghherenda*—Hindi).

Shrubs; branches with large leaf-scars; branchlets hairy. Leaves long-petioled, lobes obtuse or acute, 10-15 cm in diam. Flowers in glabrous or pubescent, cymose panicles, monoecious, central ones in cyme or its fork usually female; sepals 5, nearly free, 7 mm long; corolla campanulate, 7-8 mm long, 5-lobed, somewhat hairy within; stamens 10, 5 inner connate; ovaries 2-4-celled, glabrous; styles 3, connate below, 2-fid. Capsules sub-globose or ellipsoid, 2-3.5 cm long, of 2-4, 2-valved cocci, yellow, turning black, schizocarps or drupes.

Fl. : May-Aug. *Frt.* : Oct.-Dec.

Common in waste places, along roads; also planted as hedge.

Ratanpur : 13016; Marwahi : 19022; Pasan to Korbi : 15316.

2n = 22, 44.

Native of tropical America; naturalised throughout India and elsewhere.

Wood, leaves, fruits and seeds are used medicinally. Seeds contain curcin and used as purgative and fish-poison. Seeds yield an oil used for candle illumination, soap-making, purgative and is also shown to have anti-tumour activity. The species is cultivated as a boundary hedge.

J. gossypifolia L., Sp. Pl. : 1006. 1753; Haines, Botany 1 : 105; '*Lal Bherenda*'.

Large herbs or shrubs; branches tinged with dark purple. Leaves 5-10 cm in diam.; petioles with branched, glandular hairs, 5-10 cm long. Stipules well-developed, glandular. Bracts glandular-ciliate. Flowers small, red, in terminal, glandular, corymbose cymes, monoecious; peduncles hairy; sepals 5, ovate-acute; petaloid, 7 mm long; petals 5, 7 mm long; stamens 10-12, connate; ovaries 3-celled, globose-ellipsoid; styles 3, connate at base. Capsules oblong, 3-gonous, truncate at both ends, 8 mm long.

Fl. & *Frt.* : July-Sept.

Common in waste places.

Khuria : 19303.

2n = 20, 22.

Native of Brazil, naturalised throughout India and elsewhere.

MALLOTUS Lour., Fl. Cochinch. : 601, 635. 1790.

T. : *M. cochinchinensis* Lour.

Mallotus philippensis (Lam.) Muell.-Arg. in Linnaea 34 : 196. 1865, ('*philippinensis*') ; Haines, Botany 1 : 110. Airy Shaw in Kew Bull. Addit. ser. 8 : 170. 1980; Nicolson *et al.*, Regnum Vegct. 119 : 112. 1988. *Croton philippensis* Lam., Encycl. Math. Bot. 2 : 206. 1786. *Croton coccineus* Vahl, Symb. 2 : 97. 1791. ("*Coccineum*") *Rottlera tinctoria* Roxb., Pl. Corom. 2 : 36, t. 168. 1802. *Rottlera tinctoria* var. *monstrosa* Ham. ex Dillwyn, Rev. Hort. Malab. : 22. 1839. *Ponnagam* Rheede, Hort. Malab. 5 : 41-42. t. 21. 1685. *Tsjerou-ponnagam* Rheede, *l.c.* : 43, t. 22 : *Re-ponnagam* Rheede, *l.c.* : 37, t. 24. '*Rori*', *Sinduri*, *Kamala*.

Evergreen trees; branchlets rusty or tawny pubescent. Leaves alternate, ovate or obovate-oblong or lanceolate, acuminate, base narrowed, acute or obtuse, entire or sinuate-toothed, petioled, hoary beneath with stellate tomentum and scarlet glands, 7-15 (-22) × 4-9 cm. Flowers usually dioecious, apetalous, sessile or subsessile, 3 mm across; males clustered in panicled racemes, 15-25 cm long, pale-brownish or yellowish, females solitary, rarely 2 together in simple or panicled spikes or racemes, 4.5-7.5 cm long; male perianth 3-5-partite; stamens many, connective produced; female perianth 4-fid; ovary tomentose and red-glandular; stigmas 3. Capsules covered with crimson powder, 8-15 mm in diam., of 3, 2-valved cocci.

Fl. : Oct.-Nov. *Frt.* : Feb.-Mar.

Common in damp places inside forests.

Lafa : 13020; Lamni : 15417, 13231A.

2n = 22.

India, Sri Lanka, China, Indomalaysia to Australia.

It coppices well and is frost-hardy. A purplish-red dye is obtained from the red glands of the capsules. Wood is used as fuel.

PHYLLANTHUS L., Sp. Pl. : 981. 1753 & Gen. Pl. ed. 5 : 422. 1754.

LT. : *P. niruri* L. (vide J. K. Small in N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2, 2 : 453. 1913).

Monoecious, tree, shrubs or herbs, often with flattened leaf-like organs bearing flowers on margins or branches with leaves so arranged that the branches appear like pinnate leaves; alkaloids present; some species are nickel-accumulators. *Phyllanthus acidus* (L.) Skeels (Otaheiti gooseberry, S. Asia) yields fruits used as pickles and preserved.

1a. Trees; male flowers without disc — *P. emblica*

1b. Herbs or undershrubs; male flowers with prominent disc

2a. Stamens 5, ovaries 5-8-celled; fruits a berry, indehiscent — *P. reticulata*

2b. Stamens 3; ovaries 3-celled; fruits capsular, dehiscent

3a. Anthers erect, cells dehiscing vertically

4a. Leaves cuneatly obovate; sepals of males and females rounded or obcuneate; anthers apiculate; capsules smooth — *P. maderaspatensis*

4b. Leaves oblong or linear-oblong; sepals of males orbicular, of females oblong; anthers not apiculate; capsules verrucose — *P. urinaria*

3b. Anthers sub-globose, cells dehiscing transversely or on a slant

5a. Stipules peltate, subsagittate; filaments free — *P. virgatus*

5b. Stipules not peltate, subulate or lanceolate; filaments connate in a column

6a. Cymules bisexual, consisting of 1 male and 1 female flower; calyx lobes acute — *P. amurus*

6b. Cymules unisexual; calyx lobes obtuse — *P. debilis*

Phyllanthus amurus Schumach & Thonn. in Kengl. Dansks Vid. Saalak. Skr. 4 : 195. 1829; Webster in Journ. Arn. Arb. 38 : 170-171. 1957; Nicolson *et al.*, Regnum Vegetab. 119 : 116-117. 1988. *P. niruri* auct. non L. (1753); Haines, Botany 1 : 130.

Erect herbs. Leaves alternate, distichous, membranous, elliptic-oblong, base obtuse, not oblique, glaucous beneath, 0.5-2.0 × 0.3-0.6 cm. Cataphyllary stipules broad; branchlet stipules not involute. Flowers monoecious, apetalous, short-pedicelled or female subsessile, green or greenish-white, 2-3 males and one female in an axil; male flowers : less than 1 mm across, perianth lobes 5-6, disc glands 6; stamens 2, or 3, anthers with transverse dehiscence, filaments free, pollen grains ellipsoidal, 3-colporate; female flowers : c. 1.5 mm across, pedicels 5-6 mm long in fruits; perianth lobes 5-6, obovate-oblong with broad white margins; disc papilliform, lobed; styles 3, 2-lobed. Capsules depressed, globose, 2-3 mm across, forming a row on underside of branchlets, glabrous, pedicelled, densely verrucose; seeds striate or ribbed.

Note : *Phyllanthus niruri* L. differs from *P. amurus* in having cataphyllary stipules linear-lanceolate, branchlet stipules subinvolute, leaves conspicuously oblique at base, stamens 3, filaments free or united below, pollen grains prolate, 4-colporate, seeds verrucose.

Fl. & Frt. : July-Nov.

Common weed in cultivated fields, waste places, roadsides, edges of the forests.

Khuria : 15461 ; Karidongri : 19315.

2n = 14, 26, 28 (as '*P. niruri*').

Throughout the tropics excluding Australia ; a native of West Indies.

P. debilis Klein ex Willd., Sp. Pl. 4 : 582. 1805 ; Haines, Botany 1 :131 ; Webster in Journ. Arn. Arb. 38 : 307. 1957; Nicolson *et al.*, Regnum Vegetab. 119 : 117. 1988.

Erect herbs with smooth branchlets, stems often angled. Leaves alternate, distichous, membranous, elliptic or elliptic-obovate, base acute or cuneate, glaucous beneath, 0.8-2.0 × 0.2-0.5 cm, narrowed to a point at the tip. Stipules membranous, lanceolate, 2 mm long. Flowers monoecious, apetalous, short-pedicelled, in small, bracteate, axillary clusters, or sometimes on distinct peduncles ; greenish white ; male flowers : 2 mm across, campanulate ; perianth-lobes 6, subequal, margin membranous ; stamens 3, anthers with transverse dehiscence ; female flowers : on clavate pedicels longer than males ; 2 mm across ; perianth-lobes 6, oblong-spathulate or obovate-oblong, spreading, margins membranous, disc subentire ; styles 3, 2-fid, spreading and appressed. Capsules smooth, 3 mm in diam., coriaceous ; seeds striate or ribbed.

Fl. & Frt. : July-Oct.

Common on shady forest floor.

Madai to Korba : 12933 ; Lamni : 19217.

2n = 14, 24.

Africa, India, Nepal.

P. emblica L., Sp. Pl. : 982. 1753 ; Airy Shaw in Kew Bull. 36 : 337. 1981 ; Nicolson *et al.*, Regnum Vegetab. 119 : 114. 1988. *Emblica officinalis* Gaertn., Fruct. 2 : 122. 1791 ; Haines, Botany 1 : 132. *Nilicama-ram* Rheede, Hort. Malab. 1 : 69-70, t. 38. 1678. (*Aonla*—Oriya).

Trees ; bark greenish-grey or reddish, branchlets pubescent. Leaves distichously close-set, subsessile, oblong-elliptic, mucronate or obtuse, glabrous or puberulous beneath, 8-10 × 2 mm. Stipules scarious, lacerate. Flowers fascicled along branchlets, yellow, minute ; males pedicelled ; females

subsessile; male flowers : perianth-lobes 5-6, obovate-oblong, in 2 series; stamens 3, filaments, columnar; disc absent, female flowers : perianth as in males; disc a lacerate, cupular cup; styles 3, twice branching, connate below. Fruits depressed-globose berries, obscurely 6-lobed, fleshy, light green when young, yellow or pinkish when ripe, about 3 cm in diam.

Syntypes : Species no. 333, Herb. Hermann (BM) ; Specimen (LINN) ; Rheede *l.c.* t. 38 (no lectotype selected yet).

Fl. : Feb. *Frt.* : Oct.-Apr.

Common in dry deciduous mixed forests; also planted.

Madai : 12904; Pasan to Korbi : 15320; Korba : 8648.

2n = 28, 94, 104, 196 (as "*Emblica officinalis*").

Paleotropics.

It is a very important medicinal plant, the fruits are the richest source of Vitamin C. The fruits are boiled and the decoction is used for cooling effect in treating insanity. The wood is much used for agricultural implements and used in Kerala in wells for its reputation in purifying water.

P. maderaspatensis L. Sp. Pl. : 982. 1753; Haines, Botany 1 : 129.

Erect herbs; stems often decumbent below. Leaves subsessile, obovate, rounded or subacute, base acute or cuneate, glaucous beneath, 0.5-2.5 × 0.2-1.5 cm. Stipules lanceolate, acuminate, scarious, basifixed or peltate, 2 mm long. Flowers small, monoecious, apetalous, greenish-white, numerous on underside of branchlets, in axils; male flowers subsessile, 1.5 mm across; usually fascicled with one larger female flower 2.5-3.5 mm across; perianth-lobes 5-6, rounded or obcuneate in males, obovate or oblong-obovate in females, with white margins; disc of glands; stamens 3, filaments united in a column; styles 3, free, minutely 2-lobed. Capsules depressed, globose, smooth, 2.5-3.5 mm in diam.

Fl. & Frt. : July-Oct.

Common in waste places, along roads.

Bilaspur : 12988; Bilaspur to Champa : 19365.

2n = 26, 52.

Paleotropics.

P. reticulatus Poir. in Lam., Encycl. Meth. Bot. 5 : 298. 1804; Airy Shaw in Kew Bull. 26 : 322. 1972; Nicolson *et al.*, Reg. Veget. 119 : 115. 1988. *Phyllanthus oblongifolius* Dennst., Schlüssel. : 12, 24, 31. 1818. *Kirganelia reticulata* (Poir.) Baill., Etude Gen. Euphorb. : 613. 1858; Haines, Botany 1 : 134; Fl. Hassan : 343. 1976. *Katou-nirouri* Rheede, Hort. Malab. 5 : 87, t 44. 1685.

Sarmentose shrubs. Leaves pinnately arranged on branchlets, petioled, elliptic-orbicular or oblong, tip rounded obtuse or acute, base rounded, acute or subcordate, pale beneath, dark green above, 2-4.5 × 1.5-3 cm. Stipules ovate-subulate, often hardened and reflexed. Flowers monoecious, in axillary, a few-flowered clusters, usually one male and one female in each axil, subsimilar, creamy-white or greenish-purple, campanulate, 1.5 mm across; perianth-lobes 5-6, 3 inner 1.3-1.6 mm long, elliptic, sub-petaloid, outer 2 larger, broader and often orbicular; disc of 5 fleshy glands; stamens 5, outer 2 smaller, inner connate, filaments fleshy; ovaries 5-8-celled, globose. Fruits black 5 mm in diam.

Type : Rheede l.c. t. 44 of *P. oblongifolius* Dennst.

Fl. & Frt. : Almost throughout the year, chiefly Feb.-May.

Common near streams, along roads at the edges of the forests.

Khondra : 12725, 16753; Korba : 19449.

2n = 26, 28.

Paleotropics.

Note : *Phyllanthus* L., *Emblica* J. Gaertn. and *Kirganelia* A. Juss. are closely allied genera and are distinguished from each other (cf. Flora Hassan : 329, 1976).

1a. Stamens 5, 3 united, 2 free; pistillode 0; fruit fleshy — *Kirganelia*

1b. Stamens 3

2a. Leaves narrow; fruit fleshy — *Emblica*

2b. Leaves ovate or obovate; fruit dry — *Phyllanthus*

But all the three genera are monoecious, have apetalous flowers arranged in axillary clusters and sepals 4-6.; disc is present and calyx spreading and lobes obtuse to acute. In consideration of such similarities, the three genera are treated as congeneric (cf. Mabberley, 1987).

P. urinaria L., Sp. Pl. : 982. 1753; Haines, Botany 1 : 129; Hara *et al.*, Enum. 3 : 198. 1982; Nicolson *et al.*, *op. cit.* : 116. 1988.

Erect or decumbent-ascending herbs; stems terete. Leaves sessile or subsessile, oblong-elliptic, tip rounded or apiculate, base unequal, margins minutely ciliolate, glaucous hispidulus beneath, 0.5-1.5 × 0.2-0.5 cm. Stipules lanceolate, peltate. Flowers monoecious, reddish, apetalous, axillary, but secund and appearing to be brone in a continuous row on undersurface of branchlets; male flowers : pedicellate, 1-1.5 mm across; perianth-lobes 6, disc of 6 glands; stamens 3, filaments connate; female flowers : sessile, about 2.5 mm across, developing after males; perianth-lobes 6, ovary bullate-rugose; styles 3, free, stigma 2-fid, with hooked arms. Capsules depressed, globose, verrucose, 2.0-2.5 mm in diam. Seeds transversely ribbed and often foveolate on the sides.

Fl. & Frt. : July-Dec.

Common in waste places, grassy localities, edges of the forests, along roadsides.

Khondra : 12831; Bilaspur : 12990.

2n = 14, ? 52.

Throughout the tropics.

P. virgatus G. Forster Fl. Ins. Austr. Prodr. : 65. 1786; Nicolson *et al.*, Regnum Vegetab. 119 : 115. 1988. *P. simplex* Retz., Obs. Bot. 5 : 29. 1789; Haines, Botany 1 : 130. *Phyllanthus pedunculatus* Kostel., Allg. Med. Pharm. Fl. 5 : 1769. 1836. *P. depressus* Ham. ex Dillwyn, Rev. Hort. Malab. : 51. 1839, nom. illeg. *Macraea rheedei* Wight, Icon. 5 : 27, t. 1901. 1852 ('*rheedii*'), nom. illeg. *Phyllanthus macraei* Muell.-Arg. in Linnaea 32 : 29. 1863, nom. illeg.

Diffuse herbs. Leaves distichous, linear to oblong-obovate or elliptic-lanceolate, tip acute or obtuse and mucronulate, base rounded or sub-cordate, coriaceous and glaucous beneath, 0.8-3 × 0.5-0.6 cm. Stipules peltate, reddish-brown, sagittate at base, 1-1.5 mm long. Flowers apetalous, usually 2 males and 1 female in axillary clusters, greenish-white; male flowers : less than 1 mm across; perianth-lobes 5-6, broadly oblong; disc 5-6 lobes or glands; stamens 3, anthers with vertical dehiscence; female flowers : on 4-5 mm long pedicels, clavate above and enlarging up to 7.5 mm in fruits, 1.5-1.7 mm across; perianth-lobes 5-6, ovate-oblong; disc annular, wavy. Capsules depressed, globose, smooth, 3 mm across.

Type : Rheede, Hort. Malab. 10 : 53, t. 27. 1690 (of *P. pedunculatus* Kostel.).

Fl. & Frt. : July-Nov.

Common in open grassy places, forest clearings, cultivated fields.

Achanakmar : 15427, 19279; Khootaghat : 19513; Katghora : 8642; Marwahi to Parasi : 19040.

2n = 24, 26.

South Asia to Pacific Islands.

RICINUS L., Sp. Pl. : 1007. 1753 & Gen. Pl. ed. 5 : 437. 1754.

Type : *R. communis* L.

Ricinus communis L., Sp. Pl. : 1007. 1753; Haines, Botany 1 : 116; Airy Shaw, Kew Bull. Add. Ser. 4 : 191. 1975; Nicolson *et al.*, Regnum Vegetab. 119 : 118. 1988. *R. viridis* Willd., vide Nicolson *et al.* l.c. *Avanacu, Citavanacu, Pandi avanacu* Rheede, Hort. Malab. 2 : 57-60, t. 32. 1679. (*Castor oil plant; Palma-christ*).

Evergreen shrubs to 4 m with regular pseudo-n-chotomous branching; stems fistular, often red-suffused, branches glaucous. Leaves alternate, peltate, orbicular, 30-50 cm in diam ; lobes ovate-lanceolate to oblong, caudate-acuminate, coarsely serrate; petioles 15-30(-40) cm long. Flowers in terminal, sub-panicled racemes, monoecious, apetalous; creamy-white or yellowish-green; male flowers at base, much-branched, 8-12 mm in diam., on 5 mm long pedicels; perianth membranous, lobes 3, ovate-lanceolate. disc absent; stamens many; female flowers at apex, on 5 mm long pedicels; perianth caducous; lobes 5; ovaries 3-celled, styles 3, 2-fid, 2-partite, arms papillose; stigmas red, protogynous; extra-floral nectaries present. Capsules globosely oblong, green, often tinged with red, muricate, 1-2.5 cm in diam., of 3, 2-valved cocci.

Fl. & Frt. : September-June.

Common in waste places; also cultivated.

Pasan to Semera : 15350.

n = 10; 2n = 20.

A fast-growing colonist shrub to 4 m.; many alkaloids and toxic principles including ricin, a toxalbumin (recently used with a sharpened umbrella-ferrule in a political assasination in London and suggested use in cancer-treatment); 2-6 seeds being a fatal dose. Cultivated for at least 6,000 years (one of the few major crops with an African origin); the

seed-oil is used as an illuminant, but most familiar as purgative; different fractions used in soap, paint, varnish, candles, crayons, carbon paper and in dyeing textiles, preserving leather, and water-proofing fabrics. 'Rilson' is a nylontype polyamide fibre prepared from oil; residue used for fertilizer and stems for fibre and beard; some forms are cultivated ornamentals, esp. red-leaved 'Gibsenii'. Silkworms (Eri) fed on leaves.

SEBASTIANA Spreng., Neue Entdeck 2 : 118. t. 3. 1820 ('1821').

T.: *S. brasiliansis* Spreng.

Sebastiana chamaelea (L.) Muell.-Arg. in DC., Prodr. 15(2) : 1175. 1866; Haines, Botany 1 : 122; Nicolson *et al.*, Regnum Vegetab. 119 : 118. 1988. *Tragia chamaelea* L., Sp. Pl. 981. 1753. *Codi-avanacu* Rheede, Hort. Malab. 2 : 63, t. 34. 1679.

Erect or ascending herbs. Leaves alternate, linear, obtuse, finely serrulate, base acute, 2-7.5 × 0.6-0.8 cm. Stipules ovate, fimbriate. Flowers apetalous, greenish-white, in short terminal and leaf-opposed spikes, 6-10 mm across, 1-3 in axils of bracts; females below, males above or female solitary at base of male or lateral on branches; bracts minute, with a stipitate gland on each side; male perianth-lobes 3, ovate, acute, ciliate; stamens 3, filaments free; female perianth 3-lobed or -partite, lobes obovate, acute, lacerate and ciliate, 2-glandular within, persistent and enlarged in fruits; ovaries 3-celled, exserted. Capsule sub-globosely oblong, thinly crustaceous, about 4 mm in diam., 3-lobed, lobes each with two lines of short spines.

LT.: Herb. Hermann (Sp. No. 335) (BM) (vide Trimen, 1887 : 150).

Fl. & Frt.: October-December.

Common between rock crevices, near cultivated fields, waste places.

Katghora : 3704, 6093; Pasarkhet : 12953.

2n = 28, 34

Paleotropics.

SECURINEGA Commerson ex A. L. Jussieu, Gen. Pl. : 388. 1789, *nom. cons.*

Type: *S. durissima* J. F. Gmelin (typ. cons.).

Securinega virosa (Roxb. ex Willd.) Baill. in Adansonia 6 : 334. 1886; Pax & Hoffm. in Engl. & Prantl. Pflanzenfam. ed. 2. 19C : 60. 1931; Fl. Hassan : 348. 1976; *Phyllanthus virosus* Roxb. ex Willd., Sp. Pl. 4 : 578. 1805; *Fluggea microcarpa* Bl., Bijdr. 580. 1825; in Hook. f. FBI 5 : 328. 1887; *F. obovata sensu* Haines, Botany 1 : 127, *non* Baill. 1874.

Erect or straggling undershrubs. Leaves alternate, distichous, elliptic-ovate, obovate or orbicular, tip rounded or acute; base cuneate or cuneate rounded; sub-glaucous beneath, green above, 2-7 × 1.5-4 cm. Flowers green or greenish-white, pedicelled, apetalous, in dense fascicles from a crown of minute bracts; 2 mm across, on 4-10 mm long pedicels; males numerous in a cluster, females 2-5 or sometimes solitary; perianth-lobes 5, rounded or oblong, sub-petaloid; stamens 5, alternating with disc glands; female-disc annular, toothed; ovary ovoid, styles 3, connate in lower half. Fruits globose, 3-4(-5) mm in diam., white.

Fl. : Apr.-June. *Frt.* : July-Sept.

Frequent in forest clearings, edges of forests. Seeds germinate better after passage through baboon gut.

Lamni : 19230; Bilaspur to Champa : 19367.

2n = 26, 48; 2n = 16 (as *Fluggea virosa*).

Paleotropics.

The combination *S. virosa* is sometimes wrongly acredited to Pax & Hoffm. (1931), but it was Baillon (1886) who first made this combination.

Roots and leaves are used in medicines; plant is also used as a fish-poison.

TRAGIA L., Sp. Pl. : 980. 1753 & Gen. Pl. ed. 5 : 421. 1754.

LT. : *T. volubile* L. (vide J. K. Small in N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2 : 458. 1913).

Tragia involucrata L., Sp. Pl. : 980. 1753; Haines, Botany 1 : 119. Nicolson *et al.*, Reg. Veget. 119 : 118. 1988. *T. involucrata* var. *rheedeana* Muell.-Arg. in DC., Prodr. 15(2) : 943. 1866 ('*rheediana*'). *Schorigenam* Rheede, Hort. Malab. 2 : 73-74. t. 39. 1679.

Diffuse herbs or undershrubs; with hispid, stinging hairs. Leaves alternate, linear-oblong to broadly ovate-cordate, acuminate serrate, base acute, young tomentose beneath, old hairy and setose, 2-10 × 1.5-4.5 cm. Racemes leaf-opposed, sub-spicate, 24 cm long; males several, above and females solitary or a few below; flowers yellow or yellowish-green, monoecious, about 1.5 mm across; male perianth-lobes 3, broadly ovate, valvate, 1.5 mm long, disc absent; stamens 3; pistillodes 3-fid; female perianth lobes 6, imbricate, upto 7 mm long; fruiting perianth rigid, stellately spreading, oblong; ovaries hispid; styles 3-fid. Fruits oblong, 3-gonous, of 3-2-valved, cocci, hispid or strigosely tomentose, 7-8 mm in diam.

LT. : Herb. Hermann (Sp. no. 334) (BM) (vide Trimen 1887 : 204).

Fl. & Frt. : Dec.-Apr.

Frequent amidst rock boulders in stream-beds, waste places.

Khootaghat : 19511.

2n = 20.

India, Sri Lanka, Burma, China.

Note : Ooststroom (1937 : 204) cited Herb. Hermann, folio 115(L) as the lectotype.

URTICACEAE Juss., Gen. Pl. : 400. 1789 (*Urticae*).

T. : *Urtica* L.

Pouzolzia pentandra (Roxb.) Benn. is expected to occur in the district.

1a. Plants with stinging hairs; female perianth consisting of 3 tepals connate into a 3-dentate sheath, and one tepal free, linear and inconspicuous — GIRARDINIA

1b. Plants without stinging hairs; female perianth 3-5-partite, lobes subequal or perianth tubular, lageniform, compressed, sometimes ventricose, often oblique with 2-4-dentate mouth, rarely perianth absent

2a. Shrubs; stipules usually lateral and free; flowers larger, in axillary or spiked, racemed or panicled clusters, not involucrate; female perianth tubular, lageniform, compressed, often oblique with 2-4-dentate mouth or subentire; staminodes in female absent; stigmas filiform — BOEHMERIA

2b. Herbs; stipules axillary and connate; sometimes absent: flowers minute, crowded on sessile or peduncled, fleshy, involucrate receptacles; female perianth 3-5-partite or absent; staminodes in female present; stigmas penicillate — ELATOSTEMA

BOEHMERIA Jacquemont, Enum. Pl. Craib. 9 : 1768.

Type : *B. ramiflora* Jacquemont.

Boehmeria macrophylla Hornem., Hort. Reg. Bot. Hafn. 2. 890. 1815, *non* D. Don 1825 *nec.* (Thunb.) Sieb. & Zucc. 1844; Fries & Marais in Kew Bull. 37(1) : 164. 1982; *B. platyphylla* D. Don, Prodr. Fl. Nepal. 60. 1825; in Hook. f. FBI 5 : 578. 1888; Haines, Botany 3 : 855; Fl. Hassan : 87. 1976.

Spreading shrubs; branches strigose. Leaves mostly opposite, petioled, elliptic-ovate to rounded, base often oblique, eglandular, caudate-acuminate, coarsely crenate-serrate, sparsely hispid or pubescent, 10-20 × 7-15 cm. Flowers monoecious; male perianth 3-5-lobed or -partite, valvate; segments ovate, subacute, hairy, 1-1.5 mm long; stamens 3-5; pistillodes minute; female perianth narrowly ellipsoid or obovoid, 0.7 mm long; styles 1.2 mm long; stigmas filiform, persistent. Achenes brown, compressed, ovoid, closely invested by perianth at first, later free, hairy at tip, 1.2 mm long.

Type: Cultivated in Copenhagen Bot. Garden (C).

Fl. & Frt.: July-Feb.

Common on slopes near streams, in ravines, shady places.

Kabirchabutra : 13301, 13319, 15243.

2n = 28, 56 (as '*B. platyphylla*').

Note: The genus is assigned to the tribe *Boehmereae* and yields *ramie* fibres.

Africa, Asia.

Hara (1982) treats *B. macrophylia* D. Don as a good name, unaware of the fact that it is a later homonym of *B. macrophylla* Hornem (Fries & Marais, *l.c.*). The next available valid name for the former species is *B. pendulifera* Wedd. (in Ann. Sci. Nat. Ser. 4.1 : 199. 1854) based on Wall. Num. List No. 4595 (K-WALL as the type) cited by Hara as a synonym of *B. macrophylla* D. Don.

Again, Hara lists under *B. platyphylla* D. Don, two varieties, var. *platyphylla* and var. *canescens* Wedd. Since *B. platyphylla* D. Don is a synonym of *B. macrophylla* Hornem. (1815), var. *canescens* Wedd. is transferred here to *B. macrophylla* Hornem. as a subspecies as set out below:

B. macrophylla Hornem. subsp. **canescens** (Wedd.) Panigr. & S. K. Murti comb. nov & stat. nov.; *B. platyphylla* D. Don var. *canescens* Wedd. in DC., Prodr. 16(1) : 213. 1869, *pro part. excl. syn. B. ternifolia* D. Don 1825; Hara *et al.*, Enum. 3 : 202. 1982.

Distribution: Himalaya, Nepal and Sikkim.

ELATOSTEMA J. R. Forster & G. Forster, Char. Gen. Pl. : 53. 1775. *nom. cons.*

T.: *E. sessile* J. R. Forster & G. Forster (*typ. cons.*).

Elatostema cuneatum Wight, Icon. 6 : 35, t. 2091, f. 3. 1853 ('*cuneata*'); Mitra in Bull. Bot. Surv. India 9 : 279. 1968 (1967).

Small erect herbs. Leaves a few, alternate, sessile or subsessile, falcately cuneate or hatchet-shaped, tip rounded or subacute, base subauricled, crenate-serrate in upper part, glabrous or pubescent, membranous, 0.7-3.5 × 0.5-2 cm. Flowers white, monoecious, capitate, arranged on axillary, involucrate receptacles; involucral bracts rounded oblong or ovate; of female, confluent below in a fleshy disc, acuminate, ciliate; bracteoles densely crowded; of males oblong, of females spathulate, 2 mm long, ciliate; male flowers : a few, restricted to topmost or next lower receptacles; sepals 4, ovate, obtuse, glabrous, 0.5-0.7 mm long; stamens 4; pistillodes minute; female flowers; sepals 3, much shorter than ovary. Achenes reddish brown, ovoid-ellipsoid, ribbed, 0.4-0.5 long.

Fl. & Frt. : Aug.-Nov.

Frequently seen in shady-humid places, on moist slopes.

Achanakmar : 13228.

2n = 26.

Indomalaysia.

Note : The original spelling of the generic name is *Elatostema*, not *Elatostoma* as given in Wight, (l.c.), nor *Elatostemma*. Shaw (1973) lists *Elatostema* Gaudich. as nom. cons. and equates "*Elatostema* J. R. & G. Forst. (as to type 1) = **Procris** Comm. ex Juss. ." but ICBN 1988, App. III A, item no 1988 cites *Elatostema* J. R. Forst. & G. Forst., nom. cons.

GIRARDINIA Gaud. in Freyc. Voy. Monde, Uranie Physicienne Bot. : 498. 1830 ('1826').

LT. : *G. leschenaultiana* Decne. (vide Farr *et al.*, Index Nominum Genericorum (Plantarum). 1979 (as 'Jacq.').

Girardinia diversifolia (Link) Friis in Kew Bull. 36(1) : 145. 1981 ; Nicolson *et al.*, Reg. Veget. 119 : 258. 1988. *Urtica palmata* Forssk., Fl. Aegypt.-Arab. : 159. 1775, non *Girardinia palmata* Bl. (1855) ; *U. heterophylla* Vahl, Symb. Bot. 1 : 76. 1790, nom. illeg. superfl. (Art. 63.1). *U. diversifolia* Link, Enum. Pl. Hort. Bot. Berol. alt. 2 : 385. 1822. *Girardinia heterophylla* Decne. in Jacquem.., Voy. Ind. 4 (Bot.) : 151. 1844. *G. leschenaultiana* Decne. in Jacq. l.c. : 152. *Girardinia zeylanica* Decne. in Jaquem.

l.c. : 152; Haines, Bot. 1 : 853. *Girardinia palmata* Bl., Mus. Bot. Lugd.-Bat. 2 : 158. 1855, (non *Urtica palmata* Forssk.), nom. illeg. (incl. type of *G. leschenaultiana* Decne. 1844). *Ana-Schorigenam* Rheede, Hort. Malab. 2 : 77-78, t. 41. 1679.

Stinging Nettle; Nilgiri Nettle.

Erect herbs or undershrubs with stinging hairs. Leaves alternate, petioled, broadly ovate-cordate, acuminate, coarsely dentate-serrate, entire or upper often palmately 3-5-lobed; 10-25 × 8-20 cm. Stipules 2-fid, 8-10 mm long. Male flowers mostly in short axillary spikes, hairy; female flowers dense, capitate panicles with fleshy, cymose branches; male flowers: perianth-lobes usually 4; stamens 4; pistillodes globose; female; flowers; perianth tubular, ventricose, tubes 2-3-toothed; stigmas subulate, papillose. Achenes broad, compressed, seated on perianth, ovate or subcordate, punctate 3-3.5 mm long.

Type: Plant from India, cultivated in the Berlin Botanical Garden, not preserved.

Neotype: India, Sikkim, 5-7,000 ft., *Hooker s.n.* (K; isoneotype B. C. CAL, L) vide Friis, l.c.

Note: *Ana-schorigenam* was cited in the protologue of *Urtica heterophylla* Vahl, an illegitimate re-naming of *Urtica palmata* Forssk. (1775).

Fl. & Frt.: Sept.-Nov.

Common between rocks, on slopes in upland forests.

Kabirchabutra : 13296 A.

2n = 20.

Palaeotropics.

It stinging hairs on the leaf-blades bother even elephants. But in dry season in Java, the deer eat the stinging leaves just before fighting for mates. The bark of stems is used to make cloth.

ULMACEAE Mirbel, Elém. Phys. Veg. Bot. 2 : 905. 1815.

T.: *Ulmus* L.

1a. Leaves glabrous or softly pubescent; flowers distinctly pedicelled; female flowers solitary or a few-flowered fascicles; sepals in female and bisexual flowers caducous; male-sepals imbricate — CELTIS

1b. Leaves scabrous; flowers subsessile; female flowers in axillary, subsessile cymes; sepals in female and bisexual flowers persistent; male-sepals induplicate-valvate — TREMA

CELTIS L., Sp. Pl. : 1043. 1753 & Gen. Pl. ed. 5 : 467. 1754.

LT. : *C. australis* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.1 : 626. 1913).

Hackberries. Nettle trees, Sugarberries, often with edible fruits; a yellow dye from bark and timber for good charcoal.

Celtis tetrandra Roxb. (Hort. Beng. : 21. 1814, nom. nud.) Fl. Ind. 2 : 63. 1832; Haines, Botany 1 : 848.

Large deciduous trees; bark white or pale. Leaves alternate, 2-farious, obliquely ovate or ovate-lanceolate, caudate, subentire, palmately veined, crenate or serrate usually above the middle, glabrous or slightly pubescent beneath, 3.5-7 × 2-3.5 cm. Flowers all cymose, male and bisexual cymes usually at base of shoots, female in upper axils; tepals 4-5, imbricate; stamens 4, introrse surrounding a woolly torus; ovary sessile; style-arms plumose; fruiting peduncles simple, nearly always solitary, 6-8 mm long. Fruits a drupe, broadly ellipsoid or ovoid, orange when ripe, 5-6 mm long, glabrous with ovoid ridges.

Fl. : Feb.-Mar. *Frt.* : Oct.-Nov.

Occasionally found on slopes, along roads.

Kabirchabutra : 15270.

2n = 20.

Indo-malaysia.

TREMA Lour., Fl. Cochinch. 539. 562. 1790.

T. : *T. cannabina* Lour.

Trema orientalis (L.) Blume, Mus. Bot. Lugd. Bat. 2 : 62. 1856. Haines, Botany 3 : 848; Nicolson *et al.*, Reg. Veget. 119 : 258. 1988. *Celtis orientalis* L., Sp. Pl. : 1044. 1753. *Mallam-toddali* Rheede, Hort. Malab. 4 : 83-84, t. 40. 1683.

Large shrubs or small trees with spreading crown, branchlets with appressed silky pubescence. Leaves alternate, rigid, obliquely ovate- lanceolate to lanceolate or oblong-lanceolate, caudate or acuminate, crenate, to crenate-serrulate, white or silvery silky beneath, 7-15 × 3-6.5 cm. Cymes axillary, lax, spreading upto 2.5 cm long, bracteate; flowers green, dioecious, 1-sexual or polygamous; tepals 4-5, of male narrow oblong, concave, deciduous, of female flat, imbricate, persistent; torus woolly; stamens 4-5; pistillodes of hairs; ovary sessile, papillose. Drupes seated on persistent perianth, 3 mm long, ovoid or sub-globose, yellow turning, black, glabrous.

LT.: Herb. Hermann (Sp. No. 369) (BM) (vide Trimen 1887).

Fl.: Oct.-Feb. *Frt.*: Apr.-May.

Common near streams, along forest roads, edges of forests. This is one of the pioneer tree species to colonise clear-felled areas in moist forests.

Achanakmar : 19297; Pasarkhet to Siang : 19411; Achanakmar to Kota : 13226 A, 15439.

2n = 20, 40.

Wood is used to make charcoal for gun-powder, and leaves used for tanning fish-nets.

Indo-malaysia.

The species is often confused, in the field, with *Debregeasia longifolia* (N. Burman) Weddel (*Urticaceae*).

MORACEAE

Link, Handbuch 2 : 444. 1831 ('*Moriformes*').

Type: *Morus* L.

Morus indica L. is commonly planted for fruits and for rearing up silkworms.

1a. Flowers all exposed, in naked or bracteate, globose-oblong or cylindric heads; flowers only male and female, monoecious — ARTOCARPUS

1b. Flowers enclosed and attached to inner wall of swollen, globose or ellipsoid, fleshy receptacles; flowers of 4 kinds—male, female, neutral (without stamens) and gall (ovary) empty — FICUS

ARTOCARPUS J. R. Forster & G. Forster, Char. Gen. Pl.; 1775, *nom. cons.*

T.: *A. communis* J. R. & G. Forster.

Artocarpus heterophyllus Lam., Encycl. Meth. Bot. 3 : 210. 1789; Corner in Dassan., Rev. Handb. Fl. Ceylon 3 : 217. 1981; Nicolson *et al.*, Reg. Veget. 119 : 182. 1988. *Artocarpus integrifolia* auct., non Linn. f. (1782); Haines, Botany, 3 : 865. *Tsjaka-maram* Rheede, Hort. Malab. 3 : 17-20, t. 26-28. 1682. (*Panash*—Oriya; *Kathal*—Beng.; *Jack-fruit*—Eng.).

Evergreen trees; laticferrous. Leaves alternate, coriaceous, shining, elliptic-oblong or obovate, subrotund, obtuse to short-acuminate, base cuneate, decurrent, 10-25 × 3.5-12 cm. Stipules 1.5-8 cm long, sheathing, caducous. Flowers densely crowded on globose, usually axillary, solitary receptacles embraced by spathaceous, deciduous, stipular sheaths; monoecious; male receptacles cylindric, 5-15 × 2-5 cm; perianth tubular, dioecious; 1-1.5 cm long, tepals 2, oblong or spathulate, tips pubescent; stamen 1; female receptacles with simple, spathulate styles, exserted to 1.5 mm; perianth tubular, confluent below the receptacles; stigma 1. Fruits fleshy, oblong-cylindric syncarp, or sorosis 30-10 × 25-50 cm; echinate, covered by closely set, firm anthocarps. Seeds large, embedded in head and covered with waxy or pulp layer (enlarged) calyx tube; strap-shaped parts between seeds being undeveloped female flowers.

Fl.: Dec.-Feb. *Frt.*: July-Aug.

Commonly planted; frequently found in the outskirts of deserted villages, also naturalised.

Belghana : 16767.

2n = 56.

India Nepal, Burma, Sri Lanka; cultivated elsewhere.

The fleshy, yellow perianth is edible. Unripe fruit and large seeds (jack-nuts) are cooked as vegetables; wood is excellent timber; leaves are used in religious ceremonies by Hindus.

FICUS L., Sp. Pl : 1059 1753 & Gen. Pl. ed. 5 : 482. 1754.

LT.: *F. carica* L. vide N. L. Britton, Fl. Bermuda : 101. 1918.

F. religiosa L. is a common roadside tree.

1a. Leaves glabrous or tomentose but never hispid; receptacles never hispid; male, female, gall flowers in the same receptacles

2a. Male flowers diandrous — *F. racemosa*

2b. Male flowers monandrous

3a. Aerial roots present: leaves tomentose or pubescent beneath, at least when young; receptacles pubescent

4a. Aerial roots growing into stems; leaves obtuse at apex, pubescent beneath when young; petioles up to 5 cm long; mid-veins not glandular; receptacles scarlet, puberulous, 1.5-2 cm in diam.; male flowers numerous — *F. benghalensis*

4b. Aerial roots not growing into stems; leaves bluntly apiculate, persistently tomentose; petioles up to 2.5 cm long; midveins with an elongated gland at base; receptacles white or grey, tomentose, 5-10 mm in diam., male flowers a few — *F. mollis*

3b. Aerial roots absent; rarely a few may be present in *F. microcarpa*; leaves glabrous; receptacles glabrous

5a. Lateral and secondary veins almost as strong as intermediate ones, close

6a. Lateral basal veins spreading, parallel to secondary veins; receptacles yellow when ripe, large 1.5-2 cm in diam.; sepals of all flowers lanceolate, acuminate — *F. benjamina* subsp. *comosa*

6b. Lateral basal veins oblique; receptacles purple or white, about 1 cm in diam.; sepals of male and gall flowers spathulate — *F. microcarpa*

5b. Lateral veins not closed and parallel, intermediate ones not resembling the secondary ones

7a. Leaves broadly ovate, abruptly caudate, base cordate, 6-7-veined at base; receptacles subsessile — *F. arnotiana*

7b. Leaves elliptic or oblong, abruptly acuminate, base rounded, 3-veined at base; receptacles sessile — *F. tsjakela*

1b. Leaves hispid or scabrid; receptacles hispid; male and gall flowers in separate receptacles to females

8a. Male flowers with large pistillodes; tepals 5-6; receptacles paired or fascicled, axillary and from below leaves — *F. tinctoria* subsp. *parasitica*

8b. Male flowers without pistillodes; tepals 3; receptacles on special leafless branches from near base of stems or subhypogeal on tubercles of trunks

9a. Leaves opposite, ovate-oblong, base rounded or subcordate, fruiting branches from stem above ground — *F. hispida*

9b. Leave alternate, elliptic to oblong-lanceolate, very unequal-sided, base semisagittate; fruiting branches from base of stems, creeping, above ground — *F. semicordata*

Ficus arnottiana (Miq.) Miq. in Ann. Mus. Lugd. Bot. 3 : 287. 1867; Haines, Botany 3 : 874; Corner in Gard. Bull. Singapore 21 : 11. 1965; *Urostigma arnottiana* Miq. in Hook., Lond. Jour. Bot. 6 : 564. 1847.

Trees; latex milky. Leaves alternate; subconiaceous, cusps 3 cm long, 7-15(-18) × 5-11 cm; petioles 6-14 cm long. Stipules membranous, ovate-lanceolate, caducous, 1.5-3.5 cm long. Receptacles mostly from leaf-scars, in pairs or clusters from tubercles, depressed globose, white or reddish and verrucose, finally purple-black with greenish dots, 6-10 mm in diam.; basal bracts 3; male flowers a few, near mouth of receptacles, sessile; tepals 3; stamen 1; female and gall flowers sessile or pedicelled; tepals 3, inverting ovary. Fruit an achene, attached to inner walls of receptacles.

Fl. & Frt.: Oct.-July; deciduous about Mar.-Apr.

Common in moist deciduous forest amidst rocky boulders.

Kabirchabutra : 13362, 19157.

India, Sri Lanka.

F. benghalensis L., Sp. Pl. : 1089. 1753; Haines, Botany 3 : 874; Corner, Gard. Bull. Singapore 17(3) : 381. 1960, et in Dassan., Rev. Handb. Fl. Ceylon 3 : 251. 1981; Nicolson *et al.*, Reg. Veget. 119 : 184. 1988. *F. indica* L., Amoen Acad. ed. 3, 1 : 27, no. 6. 1753 pro parte; Roxb., Fl. Ind. ed. 2. 3 : 539. 1832. *Peralu* Rheede, Hort. Malab. 1 : 49-50, t. 28. 1678. *Bargad, Baragachha,* (Oriya); *Banyan tree.*

Evergreen trees initially epiphytic. Leaves alternate, coriaceous, ovate or orbicular-ovate to elliptic, entire, base rounded, subcordate or slightly

narrowed, lateral veins less than 6 pairs, glabrescent above, glabrous or minutely pubescent beneath, 10-20(-25) × 5-12 cm; petioles 2-5 cm long. Stipules coriaceous, sheathing, 2-2.5 cm long. Receptacles pubescent, in axillary pairs, sessile, supported by 3 broad, rounded bracts, bright red when ripe; male flowers near mouth of receptacles; tepals 4; stamen 1, anther apiculate; gall flowers with 4 tepals; styles shorter than those of female flowers; female flowers with 4 tepals. Fruit an achene, attached to inner walls of the syconus.

Fl. & Frt.: Receptacles found almost throughout the year; ripe chiefly in Apr.-July and Dec.-Feb.

Commonly planted and also grow in waste places, along roads, on slopes.

Pasarkhet : 19437.

2n = 26, 28.

India, Pakistan, Nepal.

Latex has medicinal properties, applied in rheumatism and lumbago. Infusion of bark oonsidered tonic and astringent, used in dysentery and diabetes. Leaves tonic and cooling. Wood suitable for paper pulp; aerial roots made into coarse rope. Leaves lopped for fodder. Sacred tree of the Hindus; cv. *Krishnae* DC. with cup-shaped leaves

F. benjamina L. ssp. **comosa** (Roxb.) Panigr. et S. K. Murti, comb. nov. & stat. nov.; *F. comosa* Roxb., Pl. Corom. 2 : 14. t. 125. 1798; Haines, Botany 3 : 868; *F. benjamina* L. var. *comosa* (Roxb.) Kurz. For. Fl. 2 : 446. 1877; in Hook. f. FBI 5 : 508. 1888.

Evergreen trees; branches pendulous. Leaves alternate, broadly ovate to elliptic-ovate, abruptly short-acuminate, base rounded or subacute, entire, 5-8 × 2.5-5 cm; petioles 1.5-2 cm long, grooved. Stipules lanceolate or linear-oblong, 8-10 mm long. Receptacles sessile, in axillary pairs or solitary, globose, smooth, narrowed at base, supported by 3 broad, rounded bracts, 1.5-2.5 cm in diam; male flowers a few, pedicelled; tepals 2-4, flat; stamen 1; gall flowers pedicelled, tepals 3-4; female flowers sessile, tepals 3-4. Fruit an achene, attached to inner walls of receptacles.

Fl. & Frt.: Feb.-July.

Occasionally found near streams inside forests in shady situations.

Siang : 16840.

2n = 26, 52.

India, Nepal, Burma.

The subsp. **benjamina** (*F. nitida* Thunb.) based on cultivated materials is distinguished from subsp. **comosa**, the only known wild taxon (J. D. Hook. l.c.), in having smaller (6-8 mm in diam.) and deep red receptacles which often turn purple.

F. hispida Linn. f., Suppl. Pl. : 442. 1782; Haines, Botany 3 : 878; Nicolson *et al.*, Reg. Veget. 119 : 185. 1988. *F. oppositifolia* Roxb., Pl. Corom. 2 : 14. 1798. *F. daemonum* Koenig ex Vahl, Enum. 2 : 198, 1806. *Perin-teregam* Rheede, Hort. Malab. 3 : 81, t. 61. 1682. (*Dimri*—Oriya).

Small trees; branches hispid; internodes hollow. Leaves 3-5-veined at base, lateral veins 5-7 pairs, acute or short-acuminate, toothed, rarely entire; 10-22 × 5-15 cm; petioles 2-4.5 cm long. Stipules 1 cm long, pubescent. Receptacles fascicled on trunks and branches, often on leafless, drooping branches, forming racemes, peduncled, pubescent, globose, turbinate ovoid or subpyriform, yellowish and faintly ribbed when ripe, base narrowed, 2.5 cm in diam., subtended by 3 persistent, hispid bracts; male flowers near mouth of receptacles; tepals 3, broad; stamen 1; perianth of gall and female flowers tubular and short. Fruits or achenes attached to inner walls of receptacles the syconus developing from hypanthodium or coenanthium inflorescence.

LT. : Rheede, *l.c.* : t. 61 of *F. oppositifolia* Roxb. (vide Nicolson *et al.*, 1988).

Fl. & Frt. : Almost throughout the year; receptacles ripe in Jan.-Feb.

Common on slopes, in roadside ditches, along streams.

Ratanpur : 19502; Kabirchabutra to Chauradadar : 15201; Khondra : 16749.

2n = 26, 28.

Indo-malaysia.

Receptacles edible, when cooked as a vegetable.

F. microcarpa Linn. f., Sp. Pl. : 442. 1782; Corner in Gard. Bull. Singapore 17(3) : 397. 1960; Nicolson *et al.*, Reg. Veget. 119 : 186. 1988.

F. retusa sensu in Hook. f. FBI 5 : 511. 1888, non Linn. (1767); Haines, Botany 3 : 869. *F. nitida* sensu auct., non Thunb. (1786). *Itty-alu* Rheede, Hort. Malab. 1 : 45-46, t. 26. 1678.

Evergreen trees. Leaves alternate, broadly ovate-obovate to oblanceolate or rhomboid, obtusely cuspidate or sub-acute to short-acuminate, base cuneate, lateral veins 6-9 pairs, coriaceous, 5-10 × 2.5-6 cm; petioles 1 cm long. Stipules lanceolate, acuminate, 1 cm long. Receptacles sessile, in axillary pairs, divaricate, sub-globose, succulent, glabrous, supported by 3 broadly ovate, obtuse, spreading, persistent bracts; flowers sessile or short-pedicelled; tepals 3; stamen 1; female tepals shorter than male or gall. Fruits or achenes attached to inner walls of receptacles.

Fl. & Frt. : Feb.-Apr.

Common on slopes, near streams.

Kabirchabutra : 15253.

2n = (?) 24.

Indo-malaysia.

Figs are edible.

F. racemosa L., Sp. Pl. : 1060. 1753; Corner in Gard. Bull. Straits Settlem. 21. 34. 1965. Nicolson *et al.*, Reg. Veget. 119 : 187. 1988. *F. glomerata* Roxb., Pl. Corom. 2 : 13, t. 123. 1799; Haines, 3 : 880. *Atty-alu* Rheede, Hort. Malab. 1 : 43-44, t. 25. 1678.

Large trees; trunks often buttressed. Leaves alternate, ovate or ovate-lanceolate to obovate-oblong or elliptic-lanceolate, membranous, subacute or obtuse, acute at base, lateral veins 5-6 pairs, 10-18 × 3-6 cm; petioles upto 3 cm long. Stipules ovate-lanceolate, pubescent, 1-2.5 cm long. Receptacles in paniculate clusters on special short cauline and rameal, leafless branches, occasionally also axillary, subglobose or pyriform, peduncled, pubescent, red or orange when ripe, 2-4 cm in diam., basal bracts 3, small triangular-ovate; male flowers sessile, near mouth of receptacle, tepals 3-4, stamens 2-3, filaments connate; perianth of gall and female flowers tubular, toothed.

Holotype : Rheede, *l.c.* : t. 25 (vide Nicolson *et al.*, 1988).

Fl. & Frt : Feb.-July.

Common in ravines, river banks, shady moist slopes.

Achanakmar : 13208A : Pasan : 19115; Pali : 8584.

2n = 22, 26.

Indo-malaysia.

F. semicordata Buch.-Ham. ex J. E. Sm. in Rees, Cyclop. 14. n. 71. 1810, *non* Miq. 1867; Corner in Gard. Bull. Singapore 17(3) : 449. 1960 et Gard. Bull. Straits. Settlem. 21 : 62. 1965; *F. cunia* Buch.-Ham. ex Roxb., Fl. 3 : 561. 1832; Haines, Botany 3 : 877.

Trees; bark dark grey. Leaves short-petioled, acuminate, serrate or entire, base semi-sagittate, scabrid above, pubescent beneath, 15-25 × 5-12 cm. Stipules linear-lanceolate, puberulous, 2-2.5 cm long. Receptacles in pairs or clusters, on long, mostly leafless, drooping scaly branches, often crowded near roots, globose or pyriform, red-brown and ribbed when ripe, very short-pedicelled, 1.5-2 cm in diam.; basal bracts 3; male tepals 3; stamen 1; gall and female tepals 4, united below, lanceolate. Fruit a synconium of tiny achenes.

Fl. & Frt. : Most of the year but receptacles usually ripe in Apr.-June.

Common on moist shady slopes, ravines, edges of the forest.

Lamni : 13244; Kabirchabutra : 15244, 19167.

2n = 26 (as '*F. cunea*').

India, Nepal, Burma, China, Malaya.

Ripe figs are edible.

F. tinctoria G. Forst. subsp. **parasitica** (Koenig ex Willd.) Corner in Gard. Bull. Singapore 17(3) : 476. 1960; Corner in Dassan., Rev. Handb. Fl. Ceylon 3 : 276. 1981; Nicolson *et al.*, Reg. Veget. 119 : 187. 1988. *F. excelsa* vahl, Enum. 2 : 195. 1805. *F. gibbosa* auct., non Blume. *Ficus parasitica* Koenig ex Willd., Mem. Acad. Roy. Sci. Hist. (Berlin) 2 : 102. 1798; Haines, Botany 3 : 876; *F. gibbosa* Bl. var. *parasitica* (Koenig. ex Willd.) King in Ann. Roy. Bot. Gard. Calc. 1 : 6. 1887; *Tsjerou-meer-alou* Rheede, Hort. Malab. 3 : 71, t. 56. 1682. *Atti-meer-alou* Rheede, l.c. : 75-76, t. 58. 1682.

Evergreen trees; often epiphytic or climbing over other trees, stem branches whitish-grey. Leaves alternate, elliptic-obovate to broadly sub-rhomboid, acute, base oblique, obtuse, lateral veins 5-6 pairs, 4-13 × 2.5-8 cm. Stipules ovate-lanceolate, convolute, 8-10 mm long. Receptacles axillary, in pairs, stalked, globose or pyriform, umbonate, yellowish when

ripe, 7-10 mm in diam.; male flowers near mouth of receptacles, sessile, tepals linear, acute, minutely papillose or puberulous; stamen 1; gall flowers with 5-6 tepals; female tepals 4, hyaline, linear, puberulous. Achenes slightly papillose, attached to inner walls of receptacles.

Fl. & Frt.: Almost throughout the year but receptacles ripe in Feb.-Apr.

Common in mixed open forests.

Lainga : 15371; Pasan to Pendra : 19146; Katghora : 6063.

India, Sri Lanka, Thailand to Vietnam.

F. mollis Vahl, Symb. Bot. 1 : 82. 1790; Enum. 2 : 192. 1806; Corner, Gard. Bull. Singapore 21 : 14. 1965, et in Dassn. *op. cit.* : 249. 1983. *Ficus tomentosa* Roxb. ex Willd., Sp. Pl. 4 : 1136. 1806; Haines, Botany 3 : 875.

Trees; branchlets tomentose. Leaves alternate, elliptic-ovate or obovate, base cordate or rounded, entire, tomentose beneath, glabrescent above, 5-15(-19) × 2-8 cm; petioles 1-4.5 cm long. Stipules 8-10 mm long, woolly outside, margins broad scarious, glabrous. Receptacles sessile, hirsutely white- or grey-tomentose, in axillary pairs, globose, supported by 3, large, spreading, orbicular, tomentose bracts; male flowers near mouth of receptacles; tepals 4, lanceolate; stamen 1, anther muticous; gall flowers: tepals 4; female flower tepals 4, shorter than ovary. Achenes tubercled, attached to inner walls of receptacles.

Fl. & Frt.: Receptacles appear in Apr.-June and remain throughout the year.

Common on slopes in drier situations, along roads.

Khootaghat : 19508.

2n = 26.

India, Sri Lanka.

F. tsjakela N. Burm., Fl. Ind. : 227. 1768; Corner, in Dassan, Rev. Handb. Fl. Ceylon 3 : 237. 1981; Nicolson *et al.*, Reg. Veget. 119 : 168. 1988. *Ficus infectoria* Roxb. Hort. Beng. : 66. 1814, et Fl. Ind. 3 : 551. 1832. non Willd., (1806); Haines, Botany 3 : 871. *Tsjakela* Rheede, Hort. Malab. 3 : 87, t. 64. 1682. 'Pakar, Pakare'.

Trees, often epiphytic when young; bark smooth, pale or greenish-grey. Leaves alternate, abruptly short-acuminate, entire, sub-undulate, rather membranous, basal veins 3-5, lateral veins 6-8 pairs, 8-15 × 3-7 cm; petioles

4-6 cm long. Stipules broadly ovate, acute, pubescent, 1 cm long. Figs in axillary pairs, globose, 5-10 mm in diam., whitish, flushed with red and dotted when ripe, on 5 mm long pedicels, supported by 3 minute, ovate-round bracts; male flowers a few, sessile, near mouth of receptacles; tepals 4-5 linear; stamen 1; tepals of gall flowers 3-4; female flowers often sessile; tepals 3-4, linear.

Fl. & Frt.: Dec.-June.

Common at the edges of forests, slopes.

Khondra : 12847; Marwahi : 19009; Katghora : 7104; Kabirchabutra : 13361, 13377; Khuria : 15467.

2n = 26, 28, 32.

Indo-malaysia.

Note: *Tsjakela* Rheede appeared in the protologue of *F. infectoria* Willd., (1806), typified by an element now called *F. virens* Aiton (teste Corner in Gard. Bull. Singapore 21 : 9. 1965). King (Ann. R. Bot. Calcutta 1 : 61-62. 1887) gave a good discussion of the confusion between *F. tjsakela* N. Burm. and "*F. infectoria* Roxb." (= *F. virens* Aiton). Nicolson *et al.*, (1988) is followed here.

SALICACEAE

Mirbel, Elem. Phys. Veg. Bot. 2 : 905. 1815 ('*Salicineae*').

Type: *Salix* L.

SALIX L., Sp. Pl. : 1015. 1753 & Gen. Pl. ed. 5 : 447. 1754.

Type: *Non designatus.*

Salix tetrasperma Roxb., Pl. Corom. 1 : 66, t. 97. 1795; Haines, Botany 3 : 881; Jacobs in Steenis, Fl. Males. Ser. 1.5 : 107. 1954.

Deciduous trees, 6-13 m with subercct branches. Leaves alternate, petioled, ovate-lanceolate, acuminate, serrulate, green above, white-silky beneath, 6-12 × 1-2.5 cm. Flowers in catkins on short lateral shoots, 3.5-10 cm long, hairy, dioecious; male flowers : sessile; bracts ovate to obovate, hairy; perianth absent; disc of 2 yellow glands; stamens 4-12, free; female flowers : short-pedicelled, bracts smaller, oblong hairy; disc small; ovary 1-celled; stigmas 2. Capsules stipitate, glabrous or puberulous, ovoid, 3 mm long, 2-4-valved.

Fl. & Frt.: Oct.-Feb.

Common along the streams and rivers, edges of the forests.

Siang : 16839.

2n = 38, 76.

Indomalaysia.

CERATOPHYLLACEAE

S. F. Gray, Nat. Arr. Brit. Pl. 2 : 395, 554. 1821. ("*Ceratophyllae*")

T. : *Ceratophyllum* L.

2 species, variable (up to 30 species recognised by some authors); cosmopolitan, Hornworts, so-called from old translucent horny leaves. Plant decays as it grows apically, releasing laterals, the plant sinking in autumn, rising in spring. Water-pollinated, the anthers breaking off and floating up through water, the pollen with the same density as water. The floating vegetative parts provide shelter for young fish, but also for bilharzia-carrying snails and malarial mosquito-larvae; it can rapidly choke water-ways.

Both *C. demersum* L. (frts. spiny) and *C. submersum* L. (frts, smooth to warty) used as aquarium plants; often confused with *Myriophyllum*, *Najas* and *Chara*, when sterile, but readily recognised by the forked leaves

x = 12.

CERATOPHYLLUM L., Sp. Pl. : 992. 1753 & Gen. Pl. ed. 5 : 428. 1754.

LT. : *C. demersum* L.

Ceratophyllum demersum L., Sp. Pl. : 992. 1753 ; Haines, Botany 3 : 883.

Submerged herbs; much-branched; collapsing in a tassel when removed from water. Leaves 6-10 in a whorl, dichotomously branching, segments filiform, minutely-toothed, 1-3.5 cm long. Flowers minute, solitary, axillary, sessile, monoecious; male flowers in axil separate from females; perianth irregularly 10-12-fid, persistent segments narrow, sub-valvate, 2-fid; staminate flowers with 12-30 stamens; pistillodes absent; pistillate flowers without staminodes; ovary sessile, ovoid, 1-celled. Fruit a warty nutlet, tipped by a style and with 2 horn-like spines near base, compressed, 4.5mm long, coriaceous, ovoid or ellipsoid, laterally compressed, pedicelled, furnished with one terminal and 2 subbasal appendages, about 3 mm long.

Type : "Habitat in Europe maritimis", Hort. Cliff. (BM).

Fl. & Frt. : Almost throughout the year.

Common in the ponds.

Khuria : 19351.

2n = 24, 38, 48.

Cosmopolitan.

Rootless floating submerged herbs, sometimes with root-like branches, anchoring plants.

The plant is used as a cooling agent for biliousness and against scorpion sting. Hairs contain microphyllin.

HYDROCHARITACEAE

A. L. Jussieu, Gen. Pl. : 67. 1789. ("*Hydrocharides*").

T. : *Hydrocharis* L.

Usually, the fresh water-genera of the family belong to the subfam. *Hydrocharitoideae*, which of course includes *Enhalus* Rich. (marine) and have pollination at or above surface of water; K_3 & C_3 usually present; vessels only in roots; flowers regular (slightly irregular in *Vallisneria*), usually unisexual, solitary or in a few-flowered cymes : inflorescences subtended by (1) 2 distinct, more or less connate bracts forming a spathe; pollen grains globose; x=7-12.

1a. Stems present, branched; leaves in whorls or scattered; spathe sessile

2a. Leaves in whorls, rarely lower ones opposite; male flowers solitary in a subglobose, muricate spathe; perianth double; stamens 3; styles entire; pistillode present; fruits 2-3-seeded — HYDRILLA

2b. Leaves scattered, alternate; male flowers many, in an ovoid, 2-fid, axillary spathe; perianth single; stamens 2; styles notched; pistillode absent; fruits many-seeded — LAGAROSIPHON

1b. Stems absent or stoloniferous; leaves radical; spathe on long scapes or peduncled

3a. Leaves petioled; spathes winged; flowers bisexual; styles 6, 2-fid — OTTELIA

3b. Leaves sessile; spathes not winged; flowers unisexual or rarely bisexual in *Blyxa*; styles 3, simple

4a. Perianth double; peduncles of female flowers not coiled; stamens 3-9; pistillodes 3 — BLYXA

4b. Perianth single; peduncles of female flowers spirally coiled; stamens 1-3; pistillodes absent — VALLISNERIA

BLYXA Noronha ex L.M.A.A. Du Petit Thouars, Gen. Nov. Madag 4. 1806.

T.: *non designatus.*

1a. Leaves serrulate; flowers bisexual; spathe 1-flowered, rarely 2-flowered; stamens 3; capsules 2.5-5 cm long — *B. auberti*

1b. Leaves not serrulate; flowers dioecious; male spathe many-flowered, female spathe 1-flowered; stamens 8-9; capsules 6-10 cm long — *B. octandra*

Blyxa auberti L. C. Rich., Mem. Cl. Sci. Math. Inst. Natl. Paris 12.2 : 19-23, 77. t. 4. 1812; Hartog in Fl. Males. Ser. I. 5 : 385; 1957; Subramanyam, Aquat. Angiosp. : 59, fig. 40. 1962. *B. oryzetorum* (Decne) J. D. Hook. in FBI 5 : 661. 1888; Haines, Botany 3 : 896; *Diplosiphon oryzetorum* Decne. in Jacq., Voy. Bot. 167. 1844; *Blyxa ceylanica* J. D. Hook, in FBI. 5 : 661. 1888.

Annual, submerged, tufted, scapigerous herbs. Leaves sheathing at base, linear, usually broad at base, acute, 10-15 cm long. Flowers white, bisexual, peduncle 1 or more, 10-40 cm long; spathe tubular, 2-toothed, upto 10 cm long; sepals 3, linear, 7-10 mm long; petals 3, 10-12 mm long, with yellowish twisted ends; stamens 3, one stamen often rudimentary; pistillodes 3; ovaries slender, beaked, as long as spathe, with a rostrum 5-8 cm long; stigmas 3, filiform. Capsules linear, 2-2.5 cm long, included in ribbed, narrow, ventricose spathe. Seeds with 8 rows of ± tubercled ribs without filiform processes.

Fl. & Frt.: July-February.

Common in marshy places, ditches, ponds, etc.

Siang : 16834; Pasarkhet : 19400.

Madagascar, India, Japan, Malaysia, Korea, N. Australia.

The leaves are variable in size and shape. Plants growing in shallow water, are more compact with broad base, but plants growing in deeper water are with longer ribbon-like leaves, narrowed at the base; the peduncle is also longer.

B. octandra (Roxb.) Planch. ex Thw., Enum. Pl. Zeyl.; 332. 1864, *pro part. excl. spec.*; Haines, Botany 3 : 895; Hartog in Fl. Males. Ser.

I. 5 : 392. 1957; Subramanyam. *op. cit.* : 60, fig. 41. 1962. *Vallisneria octandra* Roxb., Pl. Corom. 2 : 34. t. 165. 1802; *Blyxa roxburghii* L.C. Rich. in Mem. Cl. Sci. Math. Inst. Natl. Paris 2 : 19-23. 77. t. 5. 1812; in Hook. f. FBI. 5 : 660. 1888.

Annual, submerged, tufted, scapigerous herbs. Leaves sheathing at base, linear, broad at base, acute, 25-60 cm long. Peduncles 20-120 cm long. Spathes 6-10 cm long, tubular, 2-toothed. Flowers unisexual, white; male flowers pedicellate, several in spathes; stamens 9; female flowers sessile; sepals 3, linear, reddish tinged, 9-10 cm long, apex cucullately contracted; petals 3, 20-25 cm long, recurved; stamens 8; ovaries slender, beaked, 6-9 cm long, with a rostrum; stigmas 3. Capsules linear, fusiform, included in ventricose, ribbed spathe; seeds with 8 rows of spines.

Fl. & Frt. : Sept.-Oct.

Occasionally found in ditches, ponds.

Kota : 13045.

India, Sri Lanka, Malay Peninsula, Australia.

HYDRILLA L.C. Rich., Mem. Cl. Sci. Math. Inst. Natl. Paris 12(2) : 9, 61. 76. 1884.

T. : *H. ovalifolia* L. C. Rich. *nom. illeg.* [*Serpicula verticillata* L.f.; *Hydrilla verticillata* (L.f.) Royle].

One Old World species, introduced to Central America. Submerged aquatic male flowers floating to surface, opening and floating to female, sometimes cultivated in aquaria.

Hydrilla verticillata (L.f.) Royle, Ill. Bot. Himal. : 376 (*sphalm.* t. 376). 1839; Haines, Botany 3 : 893; den Hartog in Fl. Males. Ser. 1, 5 : 385. 1957; Nicolson *et al.*, Reg. Veget. 119 : 293. 1988. *Serpicula verticillata* Linn. f., Suppl. Pl. : 416. 1782 : Roxb., Pl. Corom. 2 : 33, t. 64. 1802. *Ene-pael* Rheede, Hort. Malab. 9 : 159, t. 81. 1689.

Aquatic herbs, forming large masses suspended beneath water surface. Leaves linear, 3-4-nately whorled, spinulously serrulate, tip recurved, 5-8 mm long; flowers unisexual, white, 4-6 mm long; male short-pedicelled, female above males, if monoecious or in separate terminal branches, usually solitary, sometimes 2, sessile in a tubular 2-toothed spathe; sepals 3, green, ovate or obovate; petals 3, oblong or cuniform; ovaries produced beyond spathe, 1-celled; stigmas 3, pink, fimbriate. Fruits muricate, subulate, 7 mm long.

Fl. & Frt. : July-Oct.

Common in ponds.

Pasan : 15294.

South and East Europe, Africa, South and East Asia to Australia.

Used in aquaria; good oxygenator, also eaten by some types of fish; used in the Laboratory to demonstrate photosynthesis; may be used as green manure.

For the combination, *H. verticillata* (L.f.) Royle reference is usually cited as 'Royle Illust. t. 376'. This is wrong, because the total number of plates in Royles (l.c.) is limited to 100. Royle made the combination at page : 376 basing it directly on *Serpicula verticillata* Roxb., Pl. Corom. t. 64. 1802, and only indirectly, on L.f. (1782).

LAGAROSIPHON Harvey in Hook., Journ. Bot. 4 : 230, t. 22. 1842.

T. : *L. muscoides* Harv.

Nechamandra Planch. in Ann. Sci. Nat. Bot. Ser. III. 11 : 78. 1849.
T. : *N. roxburghii* Planch. *nom. illeg.* [*Vallisneria alternifolia* Roxb; *N. alternifolia* (Roxb.) Thw.].

Lagarosiphon alternifolia (Roxb.) Druce in Rep. Bot. Exch. Club. Brit. Is, 1916 : 630. 1917; Haines, Botany 3 : 894. 1924. *Vallisneria alternifolia* Roxb. (Hort. Beng. : 71. 1814, nom. nud.) Fl. Ind. ed. 2, 3 750. 1832. *Nechamandra alternifolia* (Roxb.) Thwaites, Enum. Pl. Zeyl. : 332. 1864; Subramanyam & Balakrishnan in Bull. Bot. Surv. India 3 : 23-24, 1961 Subramanyam, Aquatic Angios. : 56; fig. 38. 1962. *Nechamandra roxburghii* Planch. in Ann. Sci. Bot. Paris, ser. 3, 11 : 78. 1849, nom. illeg. *Lagarosiphon roxburghii* Benth., Gen. Pl. 3 : 451. 1880; in Hook. f. FBI 5 : 659. 1888.

Submerged aquatic herbs; stems filiform. Leaves scattered, alternate sometimes sub-verticillate and lower opposite, sessile, linear-lanceolate, serrulate, acute, 2-8 cm long. Flowers unisexual, white, on short spadix; male flowers in an ovoid, 2-fid. axillary, sessile spathe, minute; sepals petaloid, stamens 3, staminodes 2 or 3; female flowers solitary, sessile, in a narrow-oblong, scarious, 2-fid spathe; sepals petaloid, 3, short-oblong, pink; petals rather shorter, 3; ovaries lanceolate, beaked; styles 3, notched. Fruits an utricle, ovoid-oblong, many-seeded.

Fl. & Frt. : Aug.-Nov.

Common in ponds, ditches.

Lamni : 13249 ; Katghora : 8726.

India, Sri Lanka.

The 2-fid, scarious female spathe wraps round the lower portion of the flower ; the perianth at the end of the long hypanthium floats on the water.

Although *Nechamandra roxburghii* Planch. is nom. illeg. for *Vallisneria alternifolia* Roxb., *Lagarosiphon roxburghii* Benth. is legitimate (Art. 72.1). Mabberley (1987) follows Airy Shaw (1973) and accepts *Lagarosiphon* Harvey as the correct generic name.

OTTELIA Pers., Syn. Pl. 1 : 400. 1805.

T. : *O. alismoides* (L.) Pers.

Damasonium Schreber. Gen. Pl. ed. 8 : 242. 1789. non Miller (1754).

Ottelia alismoides (L.) Pers., Syn. Pl. 1 : 400. 1805 ; den Hartog in Fl. Males. Ser. I, 5 : 398. 1957 ; Subramanyam *op. cit.* 61, fig. 43. 1962 ; C.D. Cooke *et al.*, Aquatic Bot. 20 : 133. 1984 ; Nicolson *et al.*, Reg. Veget, 119 : 293. 1988. *Stratiotes alismoides* L., Sp. Pl. : 535, 1753. *Damasonium indicum* Willd., Sp. Pl. 2 : 276. 1799. nom. illeg. superfl. *Ottel-ambel* Rheede, Hort. Malab. 11 : 95, t. 46. 1692. **Fig. 20.**

Partially submerged aquatic herbs. Leaves orbicular, oblong-cordate or ovate-reniform, base cordate or truncate, obtuse or rounded, membranous, undulate, 5-15 cm long ; petioles 8-50 cm long, sheathing ; flowers solitary, bisexual, white, 3-5 cm across, sessile in a tubular, 2-fid or -toothed spathe ; spathe 2.5-3.5 cm long, wings 5-6, wavy ; sepals 3, linear or oblong, green, 1.5 cm long ; petals 3, obovate or orbicular, 2-3 cm long, base with fleshy appendages, white with yellow blotch at base ; stamens 6-15, in 3 whorls ; ovaries oblong, beaked ; styles 6, linear, 2-fid ; stigmas fimbriate. Fruits oblong, crowned with withered perianth, 6-grooved, enclosed in spathe, 2.5-3.5 cm long.

LT. : Linn. Herb no. : 703.2 (LINN) (vide Cook *et al.*, Aquatic Bot. 20 : 133. 1984).

Fl. & Frt. : July-Dec.

Common in ditches and ponds.

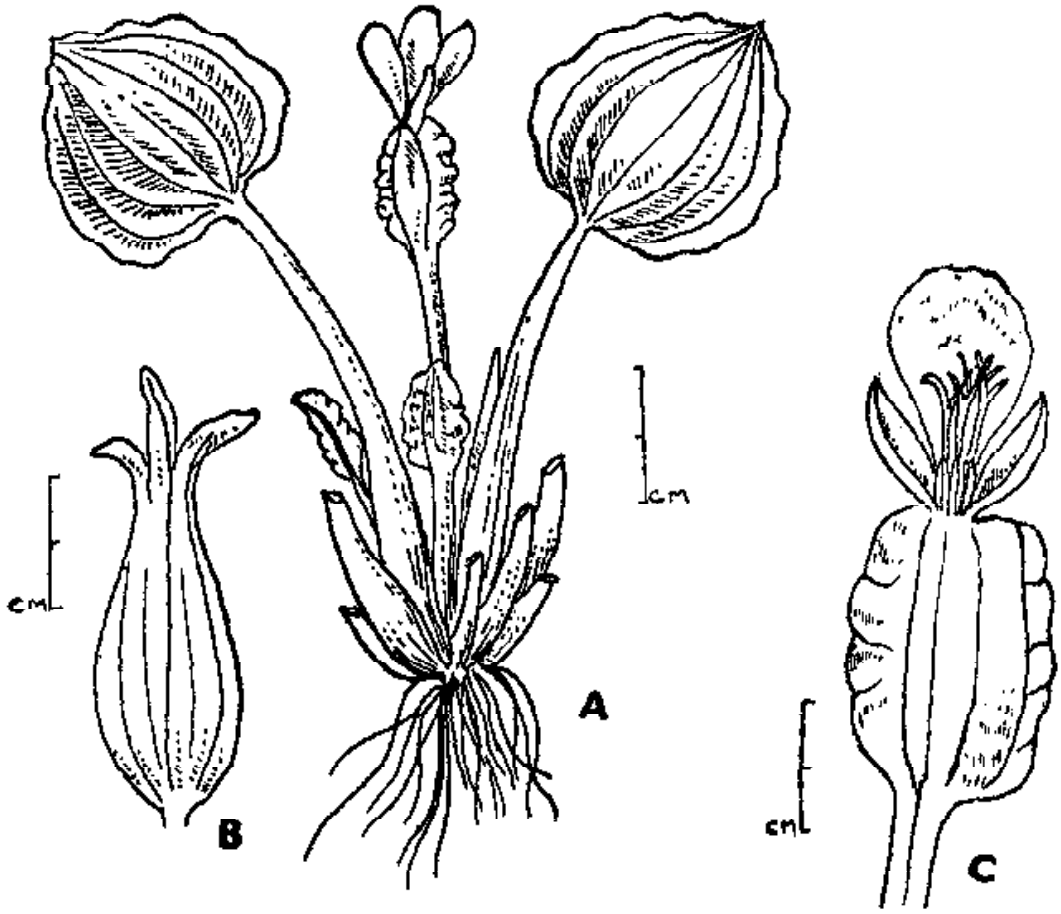

Fig. 20. *Ottelia alismoides* Schreber.

A. Habit. B. Flower bud. C. Flower.

Keonchi : 13260; Korba : 8683.

N.E. Africa, India, S.E. Asia, China, Japan, Australia.

Cultivated ornamental; used as green vegetable, the leaves possess excellent flavour; fruits edible; plants rubefacient; leaves used in tropicals to cure hemorrhoides.

VALLISNERIA L., Sp. Pl. : 1015. 1753 & Gen. Pl. ed. 5. 446. 1754.

T. : *V. spiralis* L.

Submerged aquatic grass-like herbs; male flowers in head subtended by a spathe, breaking off and floating to open on surface; female flowers solitary and sessile in tubular spathe on long peduncle, tightly spiralling in fruit and fruit maturing at bottom.

Vallisneria natans (Lour.) Hara in Jour. Jap. Bot. 49 : 136. 1974; Hara *et al.*, Enum. 1 : 29. 1978; *Physkium natans* Lour., Fl. Cochinch. : 663, 1790; *Valisneria spiralis auct. non* L. 1753; in Hook. f. FBI 5 : 660. 1888, *pro part.*; *V. gigantea* Graebner in Bot. Jahrb. 49 : 68. 1912; Hartog in Fl. Males. Ser. I. 5 : 388. f. 4. 1957; *V. asiatica* Miki in Bot. Mag. Tokyo 48. 329. f. 4. 1934.

Submerged, tufted, stoloniferous herbs. Leaves tufted at base, grass like, linear, flaccid, obtuse or acute, wavy, base sheathing, 7-30 cm long. Flowers dioecious; male flowers numerous, clustered on a short peduncle, minute, in an ovoid, 3-lobed or -fid, short-peduncled spathe projecting from base of leaf-sheaths, breaking off at base when flowers emerge and float on surface of water; female flowers solitary, in a tubular, 3-toothed spathe on a long, spirally coiled, filiform scape; sepals 3, petaloid; petals absent; stamens 1-3; pistillodes absent; staminodes 3, 2-fid; ovaries narrow; styles 3; stigmas 3-lobed. Fruits linear, included in spathe or exserted, 7 cm long.

Fl. & Frt. : Jan.-May.

Common in the ponds.

Pali : 8681.

Indo-malaysia.

Note : Hara (1974), following Hartog (l.c.), separated the Asiatic species from *Valisneria spiralis* L., as *V. natans* (Lour.) Hara, *V. gigantea*

Graebner with larger leaves (over 1 cm broad), faintly dentate and with 5-9 nerves, also occurs in India. The specific diagnostic characters between these three taxa need further careful study on the living materials.

Stomachic, refrigerant and demulcent; also used in leucorrhoea; young leaves eaten as salads. Leaves of *V. gigantea*, when young, boiled and eaten as a vegetable; rich in phosphorus, calcium and iron. Both the species used extensively in aquaria for ornamental purposes.

BURMANNIACEAE

Bl., Enum. Pl. Javae 1 : 27. 1827.

T.: *Burmannia* L.

Included in the Orchidales, the family comprise three tribes, of which trib. *Burmannieae* are characterised : Annual or perennial, often saprophytic herbs, often with rhizomes or tubers and without chlorophyll (those with, sometimes with scalariform vessels); leaves spiral, often scale-like, colourless to yellowish or reddish, sometimes green, simple; flowers terminal, 1 or in inflorescence, bisexual, epigynous, perianth tubular or campanulate, inner with elongate terminal appendages; stamens 3 (6) on tube, sometimes connate by anthers forming a tube round the style and opening by longitudinal or lateral slits; fruits a capsule often winged; seeds minute with tiny embryo with as few as 4 cells when seed shed.

x = 6, 8.

BURMANNIA L., Sp. Pl. 287. 1753 & Gen. Pl. ed. 5. 139. 1754.

LT.: *B. disticha* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 1 : 547. 1913.

Burmannia coelestis D. Don, Prod. Fl. Nepal. : 44. 1825; in Hook. f. FBI 5 : 665. 1888; Haines, Botany 3 : 1175; Fl. Hassan : 809. 1976.

Small, erect, annual herbs to 15 cm; stems leafy only towards base and terminating in flowers. Leaves lanceolate or subulate, tip filiform, 5-20 mm long. Flowers solitary or 2-3 on branches of a forked cyme, blue or purple, 6-12 mm long, oblong-obcordate or orbicular, prominently winged; calyx-tubes 3-winged, limbs 3-lobed, petaloid; petals minute or absent; stamens 3, sessile or subsessile, cells separated by a broad connective,

dorsally crested; ovary inferior, 3-celled; styles 1, 3-lobed; stigmas 3-lobed. Fruits capsular, many-seeded.

Fl. & Frt. : Oct.-Dec.

Occasionally found in wet grassy places.

Katghora : 3987.

India, Malaysia, Thailand to Vietnam, S. China.

ORCHIDACEAE

A. L. Jussieu, Gen. Pl. : 64. 1789 ("*Orchideae*"), nom. cons.

T. : *Orchis* L.

Included in *Orchidales*, the last order in Cronquist's (1981) system and comprise three subfamilies; subfam. *Apostasioideae* [*Apostasiaceae* Lindley, nom. cons.; T. : *Apostasia* Bl.]; *Cypripedioideae*; and subfam. *Orchidoideae*, the last one comprising four tribes : *Neottieae*, *Orchideae*, *Epidendreae* and *Vandeae* (cf. Mabberley, The Plant-Book : 414. 1987). But Panigrahi & Dubey (1988), following Dressler (1981) split up the subfam. *Orchidoideae* sensu Mabberley (l.c.) into four subfamilies : *Spiranthoideae*, *Epidendroideae*, *Vandoideae* and *Orchidoideae* s. str.

The 10 genera of the *Orchidaceae* collected from Bilaspur belong to the three subfamilies, subfam. *Orchidoideae*, *Epidendroideae* and *Vandoideae*, which are diagnosed from each other, as also from the subfam. *Spiranthoideae* (not represented in our collections) as :

1a. Pollinia generally hard and waxy, 2-8; leaves distichous, usually jointed basally

2a. Anthers erect in early bud and bending down over apex of column; pollinia 2, 4, 6 or 8, usually laterally flattened or clavate, with or without caudicles/viscidia, usually with a stipe — subfam. *Epidendroideae* (*Oberonia*)

2b. Anthers usually operculate on apex of column, but not bending during development; pollinia 2 or 4, usually dorsiventrally flattened; if 4, with reduced caudicles, always with viscidium and usually with a stipe or stipes — Subfam. *Vandoideae* (*Aerides*, *Rhyncostylis*, *Vanda*, *Eulophia*, *Pelatantheria*, *Geodorum*, *Cymbidium*

1b. Pollinia generally soft and mealy, sectile or not; leaves usually spiral, convolute, not jointed basally

3a. Rostellum subequal to anther; viscidium at the apex of anther and attached to the apex of pollinia or caudicles; plants never with root-stem tuberoids — subfam. *Spiranthoideae* (*Goodyera, Zeuxine, Spiranthes*)

3b. Rostellum usually shorter than the anther, anther usually projecting beyond rostellum; viscidium, if present, usually at base or middle of pollinia; plants often with root-stem tuberoides — subfam. *Orchidoideae* (*Peristylus, Habenaria*)

Key to the 10 Genera

1a. Epiphytic herbs

2a. Leaves equitant, ensiform; pollinia 4, free from rostellum — OBERONIA

2b. Leaves not equitant, not ensiform; pollinia attached to a gland or process of rostellum

3a. Foot of column distinct, usually long — AERIDES

3b. Foot of column absent or indistinct

4a. Spur vertically septate almost to mouth; pollinia 4 — PELATANTHERIA

4b. Spur not septate; pollinia 2

5a. Spur distant from base of lip, compressed laterally; side-lobes of the lip none, lip deeply cleft at tip — RHYNCHOSTYLIS

5b. Spur at base of lip not compressed; lip trilobed, side-lobes large, mid-lobe crenulate at apex — VANDA

1b. Terrestrial herbs

6a. Flowers without spur or mentum

7a. Lips 3-lobed; column long; anthers 1- or imperfectly 2-celled; roots creeping, branched not tuberous; leafless herbs — CYMBIDIUM, MACRORHIZON

7b. Lips entire with saccate base; column short; anthers 2-celled; roots tuberous; leaves well-developed — GEODORUM

6b. Flowers with a scrotiform, conical or vermiform spur or a mentum

8a. Leaves plaited; inflorescences lateral on separate shoot from leafy-stem; pollinia waxy — EULOPHIA

8b. Leaves not plaited; inflorescences terminal on leafy shoot, pollinia granular

9a. Flowers patent or erecto-patent; sepals unequal, not connivent, the laterals spreading or reflexed; spur long cylindric; stigmatic bilobed, more or less extended with clavate or papillose processes; ovaries and capsules spreading — HABENARIA

9b. Flowers erect; sepals subequal and more or less connivent; spur scrotiform, conical or vermiform; stigma sessile, united to base of lip and auricles of the column; ovaries and capsules appressed to flowering axis — PERISTYLUS

AERIDES Lour., Fl. Cochinch. 2 : 525. 1790.

T.: *A. odorata* Lour.

Aerides multiflora Roxb., Pl. Corom. 3 : 68 t. 271. 1820; in Hook. f. FBI 6 : 44. 1890; Haines, Botany 3 : 1234; Hara *et al.*, Enum. 1 : 31. 1978. **Fig. 21.**

Epiphytic herbs without pseudobulbs; stems 10-25 cm long. Leaves linear, coriaceous, deeply channelled, keeled, imbricate, emarginate or 2-lobed, 15-20 cm long. Racemes 15-30 cm long, axillary, short-peduncled; flowers 2-3 cm across, white, pale-violet or rose-purple, often spotted with darker purple; sepals 3, broad, lateral adnate to base or foot of column; petals 3, oblong, rounded; lip 3-lobed, mid-lobe hastately ovate or triangular, side-lobes short, inconspicuous, base thick and with a retrorse callus: spur shorter than mid-lobe; column beaked; antner 1, long-beaked, pollinia 2, globose, sulcate. Capsules 1.5-5 cm long, subclavate, stoutly pedicelled, sharply 3-keeled.

Fl.: May-July. *Frt.*: Aug.-Nov.

Common orchid associated with *Vanda* R. Br. on 'Sal' and other trees.

Achanakmar : 13219A.

India, Nepal, Burma.

CYMBIDIUM Swartz in Nov. Act. Reg. Soc. Sci. Upsal. Ser. 2. 6 : 70. 1799.

T.: *non designatus.*

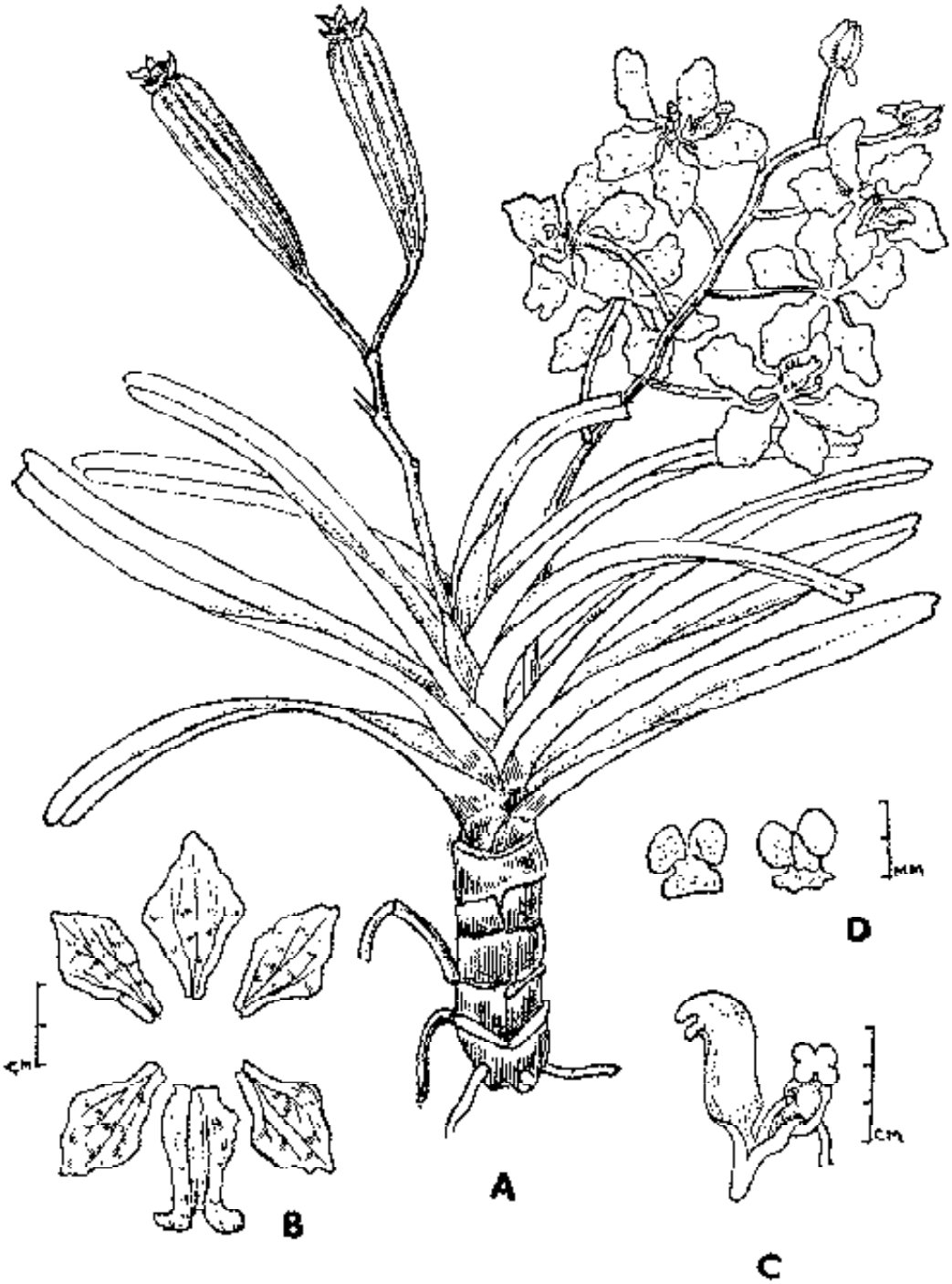

Fig. 21. *Aerides multiflora* Roxb.

A. Habit. B–C. Different views of the flower ; D. Pollinia (2 views).

Cymbidium macrorhizon Lindl., Gen. Sp. Orch. 162. 1833; in Hook. f. FBI 6 : 9. 1890; Babu, Herb. Fl. Dehradun : 481. 1977; Murti in Bull. Bot. Surv. India 24 : 236. 1983. **Fig. 22**

Terrestrial, leafless herbs; rootstock creeping, branched. Scape with raceme 10-22 cm long, ascending, 2-6-flowered; basal sheaths short and narrowly sub-foliaceous; bracts 6-12 mm long, narrow, membranous; flowers whitish-pink or pinkish-purple, 3-4.5 cm across; sepals 3, linear-lanceolate, acute, patent or reflexed, pale-yellow, tinged with pink; petals 2, broader than sepals; lip pinkish-white, spotted with crimson, side-lobes narrow, erect with inflexed margins, mid-lobe ovate-oblong, acute at apex; disc with 2 thick ridges between side-lobes; anther 1, papillose; pollinia 4, sub-hemispheric; pedicels with ovary 2.5 cm long.

Fl. : July-Aug.

In leaf litters on the slopes in humid conditions.

Sonmuda : 19173.

India, Thailand.

A very rare finding in M.P.; collected at this spot near the emerging-place of the river Son at a height of about 1200 m; generally occurring between 1800-2000 m elevation in the Himalaya. Probably a leafless parasite or saprophyte and is the only terrestrial species of *Cymbidium* Sw.

EULOPHIA R. Br. ex Lindl. in Bot. Reg. 8, : t. 686. 1823, *nom. cons.*

T. : *E. guineensis* Lindley

Terrestrials usually; tubers of some species provide Indian salep.

1a. Flowers golden yellow, 7 cm in diam., lateral sepals inserted on foot of column; lip as long as sepals, saccate, side-lobes distinct — *E. flava*

1b. Flowers greenish or purple, upto 5 cm in diam.; lateral sepals inserted on spur of lip; lip shorter than sepals, not saccate, side-lobes obscure — *E. spectabilis*

Eulophia flava (Lindl.) Hook. f. in FBI 6 : 7. 1890; Haines, Botany 3 : 1222; *Cyrtopera flava* Lindl. (in Wall. Num. List No. 7364. 1832, *nom. nud.*), Gen. Sp. Orch. Pl. : 189. 1833.

Tall herbs; flowering before leafing. Rhizome a chain of flattened tubers. Leaves about 3, forming a short pseudostem by their sheathing

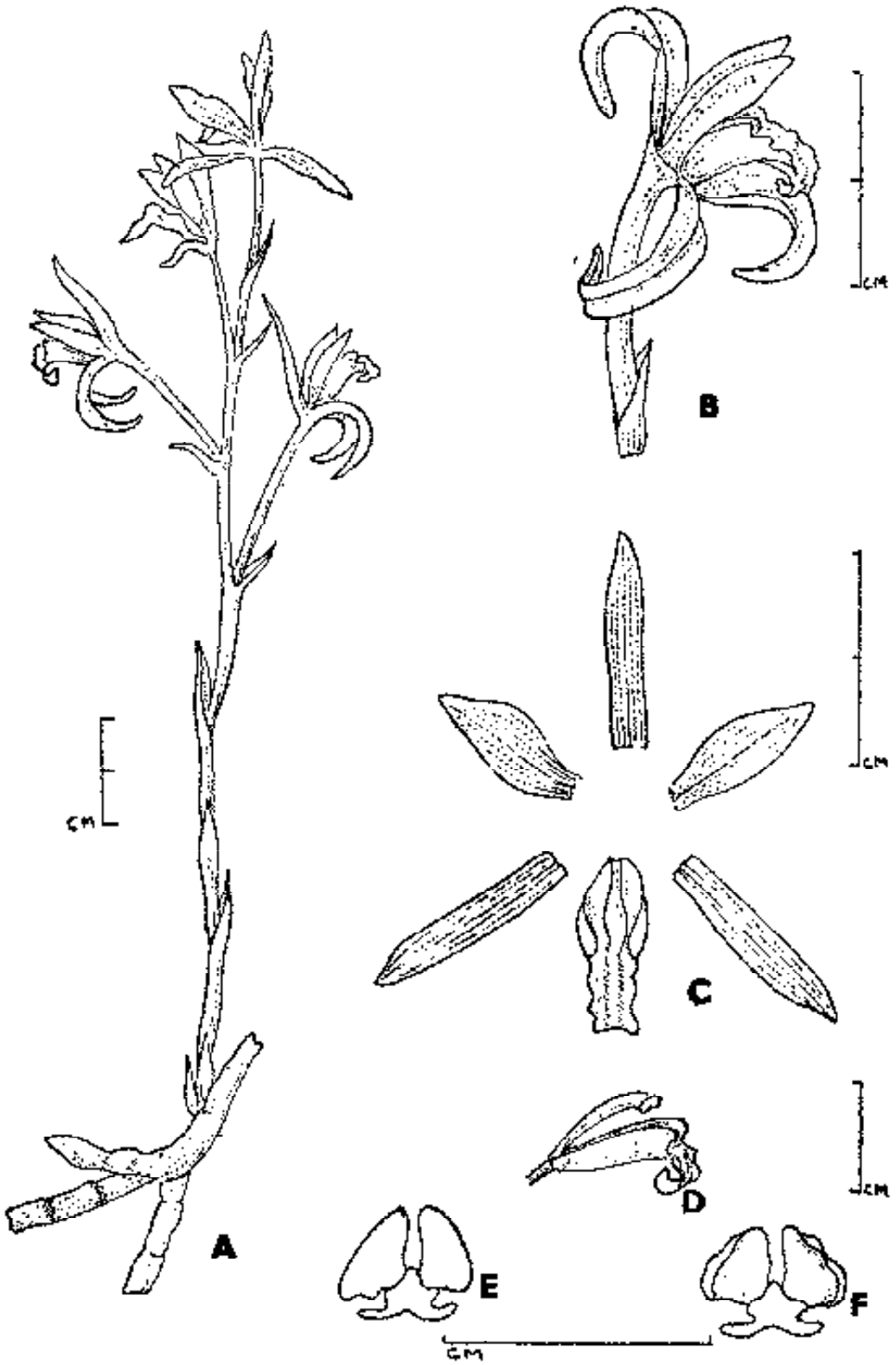

Fig. 22. *Cymbidium macrorhizon* Lindl.
A. Habit. B. Flower. C. Petals and sepals spread out. D. Lip and the gynaestegium. E–F. Pollinia (two views).

bases, lanceolate, about 60 cm long. Scape stout, unbranched, 60-150 cm long, with a few distant sheaths at base. Racemes 30-60 cm long, 12-15-flowered; bracts 1.5-2 cm long; flowers showy, golden-yellow, about 7 cm across; sepals 3, oblong-lanceolate, acute spreading, 2.5-3 cm long; petals 3, narrowly elliptic-obovate, obtuse, broader than sepals; lip 2.5-3 cm long, saccate, erect from foot of column, side-lobes rounded, mid-lobes orbicular, projecting beyond side-lobes, throat with 3 lamellae; column with a short foot; anther with a long anterior process; pollinia obtuse.

Fl. : June-July. *Frt.* : Aug.-Sept.

Common at the edge of the forest in leaf-litters in moist conditions.

Lamni : 19207.

India, China.

E. spectabilis (Dennst.) Suresh in Nicolson *et al.*, Regnum Veget. 119 : 300. 1988. *Wolfia spectabilis* Dennst., Schlüssel : 11, 25, 38. 1818. *Eulophia nuda* Lindl. (in Wall., Num. List No. 7371, 1832, *nom. nud.*) Gen. Sp. Orch. Pl. : 180. 1833; Haines, Botany 3 : 1223. Joseph, Orchids Nilgiris : 28, pl. 10. : 1987. *Ela-pola* Rheede, Hort. Malab. 11 : 71, t. 36. 1692. (*Balakanda*—Sansk.; *Amarkanda*—Hindi; *Budbar*—Beng.).

Tall herbs; flowering before leafing. Rhizome a chain of flattened tubers; leaves forming a short pseudostem by the sheathing bases, elliptic-lanceolate, 20-35 cm long. Scapes stout, 30-70 cm long, with dense sheaths below. Racemes 5-6-flowered, about 40 cm long, arising from the side of the pseudostem; bracts 1.5 cm long; flowers showy, greenish-white, about 5 cm across; sepals 3, 2-2.5 cm long, linear-oblong, acute, crimson-green or yellowish, base forming a mentum with forked foot of column; petals 3, elliptic-oblong, hooded over column; lip 3-lobed, midlobe oblong-obovate, rounded or obtuse, with wavy, crenulate crisped margins; column 7 cm long, rose-purple, produced into a forked-foot, 5 mm long; spur conical; pollinia 2, large, waxy, sessile on a broad caudicle. Capsules fusiform, 3.5 cm long.

Holotype : Rheede, Hort. Malab. 11 : 71, t. 36. 1692.

Fl. : June-July. *Frt.* : Aug.-Sept.

Common in leaf-litters of forest undergrowth in moist conditions.

Achanakmar : 19270.

India, Sri Lanka, Burma.

Tubers used for tumours, scrofulous glands of the neck and bronchites; also used as vermifuge.

GEODORUM G. Jackson in H.C. Andr., Bot. Rep. 10 : t. 626. 1811.

T. : *G. citrinum* G. Jackson.

Geodorum densiflorum (Lam.) Schlecht. in Fedde, Repert. Beih. 4 : 259. 1929; Seidenfaden, Opera Bot. 72 : 61. 1983; Joseph, Orchids Nilgiris : 59, plate 28. 1987. Nicolson *et al.*, Reg. Veget. 119 : 301. 1988. *Limodorum densiflorum* Lam., Encycl. Meth. Bot. 3 : 516. 1792. *Malaxis cernua* Willd., Sp. Pl. : 93. 1805. *Cistella cernua* (Willd.) Blume, Bijdr. 7 : 293. 1825. *Bela-pola* Rheede, Hort. Malab. 11 : 69-70, t. 35. 1692.

Stout terrestrial herbs, pseudobulbs persistent. Stem short, stout, arising laterally from the underground root-stock, with tubular sheaths at base. Leaves 1, 2 or 3 forming a pseudostem about 16 cm long, subplicate, elliptic-lanceolate, acute, entire, 11-40 × 5-10 cm. Inflorescence about 15 cm long, flowers forming a crowded raceme, arising from the side of fresh offshoot covered by sheaths, scape erect. Flowers 2.5 cm across, pinkish-white, short-pedicellate; bracts lanceolate, acuminate; sepals 3, oblong, subacute, 12 mm long; lateral petals 2, obovate-oblong, 12 mm long, broader than sepals; lip subpanduriform, 8 mm long, purple-streaked within, with a broad median chanelled oblong yellow ridge, ventricose at base, rim involute, more or less truncate with a median sinus, pollinia 2, stigmatic surfaces broad, white; ovary and pedicel c. 1 cm long, clavate, ribbed, not twisted.

Holotype : *Bela-pola* Rheede, l.c. : t. 35. 1692.

Fl. : June-Aug.

Common in 'Sal' forests, on slopes, in leaf-litters.

Pasan to Korbi : 19085.

India, Sri Lanka, Malaysia.

Rootstocks contain a gummy substance and are employed in the preparation of glue used for joining together parts of musical instruments.

HABENARIA Willd., Sp. Pl. 4 : 44. 1805.

LT. : *H. macroceratitis* Willd. (*Orchis habenaria* L.) (vide Kraenzlin, Bot. Jahrb. Syst. 16 : 58. 1892).

1a. Flowers 1-2 cm across, green ; petals truncate, 2-partite ; all the three segments of lip linear ; spur equalling ovary ; capsules 1.5 cm long, fusiform — *H. digitata*

1b. Flowers 2-2.5 cm across, white ; petals linear-oblong, entire ; side-lobes of lip broad and mid-lobe narrow ; spur longer than ovary ; capsules 2.5 cm long, beaked — *H. dentata* subsp. *ecalcarata*

Habenaria dentata (Sw.) Schlecht. subsp. **ecalcarata** (King & Pantl.) Panigr. & S. K. Murti, comb. nov. ; *H. geniculata* D. Don var. *ecalcarata* King & Pantl. in Ann. Roy. Bot. Gard. Calcutta 8 : 310. t. 405. f. 4-5. 1898 ; *H. dentata* forma *ecalcarata* (King & Pantl.) Tuyama in Hara, Fl. E. Himal. : 438. 1966 ; Hara *et al.*, Enum. Fl. Nep. : 45. 1978.

Herbs with tubers ; stems with many slender sheaths above. Leaves oblong-lanceolate, sessile, base sheathing, 4.5-12 cm long. Spikes about 20 cm long, 4-20-flowered ; bracts as long as ovary ; sepals 3, lateral sepals acute, 1.2 cm long ; petals 3 ; lip deeply 3-lobed or -partite, suborbicular, side-lobes fimbriate or crenate, petaloid ; anther 1, adnate to very short column ; stigmatic processes clavate, incurved, rostellum low, broad. Capsules 2.5 cm long, short-pedicelled, beaked, deeply grooved and thickly ribbed.

Fl. : Sept.-Oct.

Occasionally found in the 'Sal' forest.

Achanakmar : 13221.

India, Burma, Thailand, Vietnam, China, S. Japan.

According to Seidenfaden & Arora (Nord. Jour. Bot. 2 : 18. 1982) *H. dentata* (Sw.) Schlecht. comprises two distinct forms, the north-west Himalayan plants with one-flowered inflorescence, with a large flower and the eastern Indian materials with many-flowered inflorescences.

Bilaspur plants belong to the latter form.

H. digitata Lindl., Gen. Sp. Orch. Pl. : 307. 1835 ; Haines, Botany 3 : 1206 ; Joseph, Orchids Nilgiris : 75, pl. 37(1-3). 1987. *H. trinervia* Wight, Ic. Pl. Or. 5(1) : 12, t. 1852.

Herbs 23-35 cm tall. Tubers 1 or 2, ellipsoid or globose-ovoid, giving forth one aerial stem with leaf-sheaths below, the latter tubular with oblique mouth. Leaves alternate, elliptic-lanceolate, acute or acuminate, distant, 3-10 × 2.5-4 cm. Racemes about 12 cm long, several-flowered; flowers green or greenish-white; bracts lanceolate, foliaceous, exceeding flowers; sepals 5, lateral sepals ovate, acute, dorsal suborbicular; petals 2, distinctly bipartite up to the base, posterior upper lobe sub-falcate, acute, curved towards the dorsal sepal; anterior one filiform; lip 3-lobed or partite, mid-lobe slightly longer than side-lobes, green; spur obtuse, sub-clavate; anther 1, pollinia obovoid; stigmatic processes clavate, 1.5-2 mm long; rostellum erect, triangular. Capsules short-pedicelled, 1.5 cm long, fusiform, with thick ribs.

Fl.: July-Sept. *Frt.*: Aug.-Oct.

Common in the leaf-litters in the 'Sal' forest.

Kabirchabutra : 19191; Lamni to Achanakmar : 19264.

India, Nepal, Burma.

Seidenfaden & Arora (1982) cite *Habenaria graveolens* Duthie (1920) as a synonym under *H. digitata* Lindl. (1835) and remark "these entities belong to quite a complicated group, where the taxonomy is still much in need of study; as long as this is not undertaken, we list the plants from the area (N.W. Himalaya) under the older name". We have, however, preferred to follow Duthie (1920) in treating the two taxa as distinct.

OBERONIA Lindley, Gen. Sp. Orch. Pl. : 15. 1830. *nom. cons.*

T.: *O. iridifolia* Lindl. *nom. illeg.* [*Malaxis ensiformis* J.E.Sm., =*O. ensiformis* (J.E.Sm.) Lindl.], [cf. Panigrahi & Dubey, Taxon 33 : (2) : 333. 1984].

Note: Panigrahi & Dubey (l.c.) proposed *Oberonia iridifolia* Lindley (1830) as nom. illeg. (Art. 7.11; Art. 63.1) for *Malaxis ensiformis* J. E. Smith (1812) [= *Oberonia ensiformis* (J. E. Smith) Lindley (1859)] and their proposal was approved by the Spermatophyta Committee, IAPT and subsequently, the corresponding entry of the type species of *Oberonia* Lindley (1830), *nom. cons.* (vide 1558, App. III A, ICBN, 1988), was amended.

Panigrahi & Dubey (Proc. 8th Ann. Conf., Orissa Bot. Soc. : 2. 1983) suggested, on the authority of J. D. Hooker (1888), that the next available name at the species rank, was *Oberonia denticulata* Wight (1852) (*O. iridifolia* auct. mult., non Lindley (1830) and raised three varieties recognised by Hooker (l.c.) as subspecies of *O. denticulata* Wight. Subsequently, Sarat Misra (1989, 1990) restored the varietal status to the infraspecific taxa, following J. D. Hooker's concept, without any argument or comment.

A careful reading of the diagnostic characters and their geographical distribution, as also on the basis of examination of specimens in CAL, convinced me (G.P.) that three distinct species and one variety can be diagnosed in this species complex, as follows :

1a. Leaves 5-20 cm long ; scape and spike short ; lip longer than broad, lip-tip bifid, glabrous

2a. Leaves 5-10 cm long, 12-18 mm broad, falcate — *O. brevifolia* (endemic to Burma)

2b. Leaves 7-20 cm long, 18-25 mm broad ; ensiform ; (scape flattened, spike to 30 cm long) — *O. denticulata* (endemic to South India)

1b. Leaves 15-25 cm long ; scape and spike to 30 cm long ; lip sessile broader than long ; lip deeply toothed

3a. Leaves 18-25 mm broad ; ensiform ; lip quadrate, glabrous or pubescent — *O. smisrae* (Eastern India)

3b. Leaves to 12 mm broad ; straight ; lip short with a small square mid-lobe, glabrous — *O. smisrae* var. *angustifolia* (endemic to Meghalaya)

1. **Oberonia denticulata** Wight, Ic. Pl. Ind. Or. 5(1) : t. 1625. 1851. *O. iridifolia* var. *denticulata* (Wight) J. D. Hooker, FBI 5 : 676. 1888 ; Fischer, Fl. Madras 3 : 983 (reprint edn.). 1928 (1967).

South India (Nilgiri & Pulney hills, Western Ghats, Vizagapatnam).

Note : Neither J. Joseph (1987), nor Saldanha (1976) record this species from Nilgiri/Hassan Districts.

2. **O. brevifolia** (J. D. Hooker) Panigr., comb. nov.

O. iridifolia var. *brevifolia* J. D. Hooker, FBI 5 : 676. 1888.

Syntypes : Burma (Moulmein), *Griffith* s.n, *Parish* s.n.

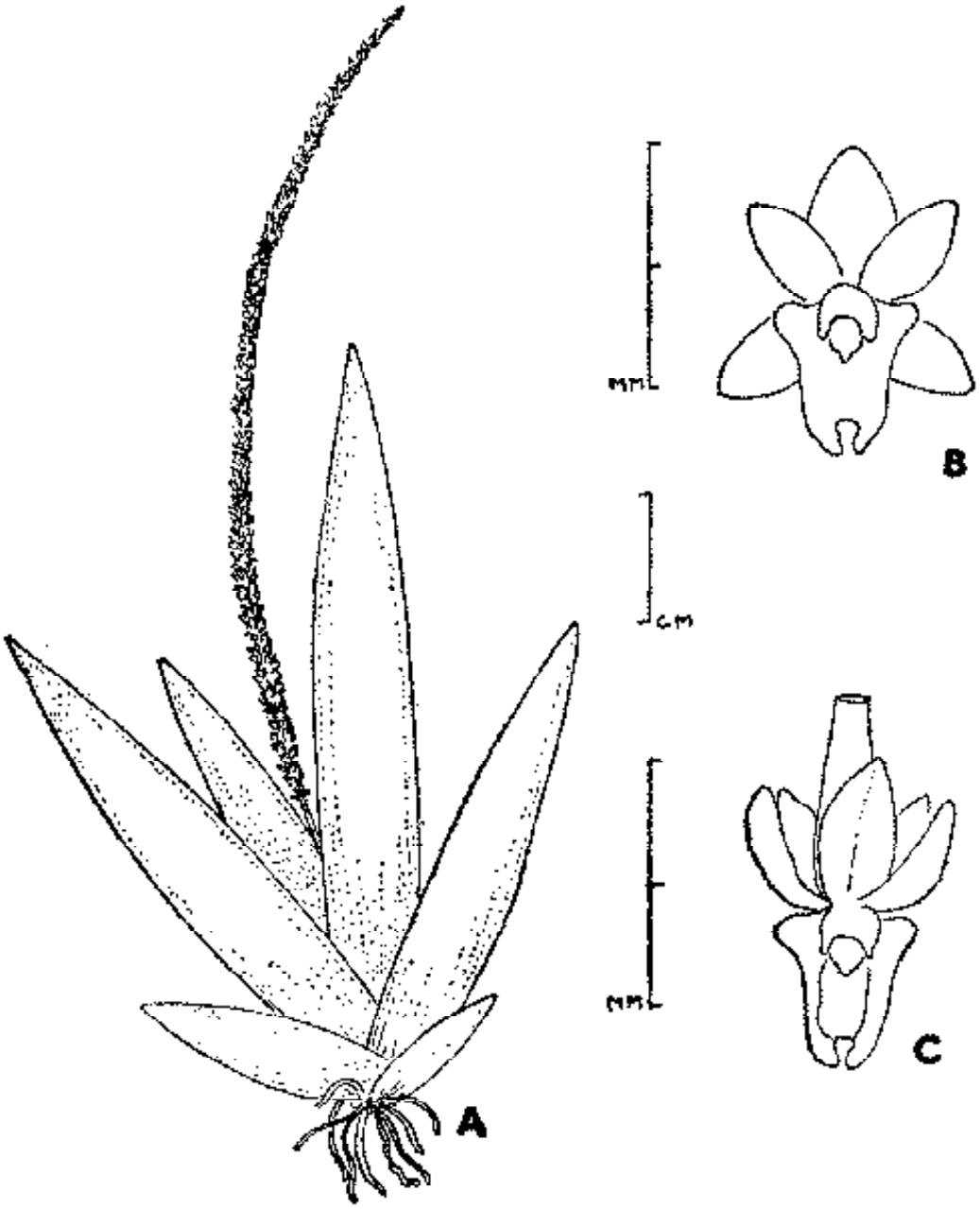

Fig. 23. *Oberonia falconeri* J. Hook.

A. Habit. B. Flower (frontal view) and C. Another view of the flower.

3. **O. smisrae** Panigr., nom. nov.

Cymbidium iridifolium Roxb. (Hort. Beng. : 63. 1814, nom. nud.), Fl. Ind. 3 : 458. 1832.

O. iridifolia sensu Lindley (in Wallich, Num. List No. 1948, 1829, nom. nud.) Gen. et Sp. Orch. Pl. : 15, p.p., excludo typo. et syn. *Malaxis ensiformis* J. E. Smith tantum; sensu J. D. Hook., FBI 5 : 676. 1888, p.p. includo "*O. iridifolia* proper".

O. iridifolia sensu Mooney, Suppl. Bih. & Or. : 209. 1950, p.p. excl. var. *angustifolia* J. D. Hook., in OBS.

O. denticulata Wight subsp. *iridifolia* (Roxb.) Panigr. et Dubey in Proc. 8th Ann. Conf. Orissa Bot. Soc. : 2. 1983.

India (Sikkim, Uttar Pradesh, Orissa), Bangladesh, Nepal.

Note: The species is named after Sri Sarat Misra, whose contributions on the Orchids of Orissa, are immense.

4. **O. smisrae** var. **angustifolia** (J. D. Hook.) Panigr., comb. nov. *Oberonia iridifolia* var. *angustifolia* J. D. Hook. in FBI 5 : 676. 1888. *O. denticulata* ssp. *angustifolia* (J. D. Hook.) Panigr. et Dubey, *op. cit.* India (Meghalaya, type loc.) endemic.

O. falconeri J. D. Hook., Icon. Pl. 18 : t. 1780. 1888, et in FBI 5 : 678. 1888; Haines, Botany 3 : 1216; Hara *et al.*, Enum. 1 : 50. 1978. **Fig. 23**

Tufted, epiphytic herbs; stems short. Leaves distichous, broadly oblong-lanceolate, ensiform, acute, straight or falcate, coriaceous, 2-9 × 0.5-1 cm. Scape shorter than leaves, slender, bracteate. Racemes 2-14 cm long, spiciform; bracts ovate-lanceolate or oblong, hyaline, serrulate; flowers about 1.5 mm across, greenish-yellow, short-pedicelled, spiral to subverticellate; sepals 3, obtuse, broadly ovate or oblong; petals 3, oblong-ovate, subfalcate; lip sessile, oblong or subfalcate, 3-lobed, not toothed, lateral lobes rounded, mid-lobe with two small incurved lobes; column transversely oblong, yellow; anther 1, white, terminal; pollinia 4, waxy. Capsules short-pedicelled, 4 mm long, ovoid, ribbed.

Fl.: Sept.-Oct. *Frt.*: Oct.-Feb.

Common on dead tree-trunks.

Kabirchabutra : 19194.

India, Thailand to Vietnam.

PELATANTHERIA Ridley in Jour. Linn. Soc. Bot. 32 : 371. 1896.

LT. : *P. ctenoglossum* Ridley [vide Butzin, Taxon 32(4) : 632. 1983].

Pelatantheria insectifer (Reichb. f.) Ridley, l.c. 371. *Sarcanthus insectifer* Reichb. f. in Bot. Zeit. 159. 1857; J. D. Hook. in FBI 6 : 68. 1890; Haines, Botany 3 : 1231.

Epiphytic herbs; stems creeping. Leaves 2-farious, sub-imbricate, amplexicaul, oblong, obliquely obtusely 2-lobed, coriaceous, keeled, 1.5-3.5 cm long. Racemes short, sessile or short-peduncled, a few-flowered; bracts small, deciduous; flowers greenish-yellow, 1.2 cm across; sepals 3, ovate-oblong, obtuse, adnate to base of column; petals 3, oblong-lanceolate, adnate to base of column; lip 3-lobed, saccate, sac septate; spur broadly conical, mouth with a pubescent ridge with 2-lobed, dorsal callus; column broad and thick, 2-horned; anther 1, truncate, pollinia round, waxy, globose, didymous, in broad, short-quadrate caudicle.

Fl. : June-July.

Occasionally found on *Diospyros* and other trees along streams.

Pasarkhet to Madanpur : 19432.

India, Burma.

PERISTYLUS Blume, Bijdr. 6 : 404. June-Dec. 1825, *nom. cons.*

T. : *P. grandis* Bl.

Note : Mabberley (1987) lists *Peristylus* Blume as an alternate name for *Herminium* L. And, J. D. Hooker (FBI 6 : 180. 1890) states : "The *Herminia* will, with a saccate base of the lip, differ in no way from *Habenaria*", although, he (FBI 5 : 675. 1888) diagnosed the two genera as :

Lip not spurred, (Low small-flowered herbs)	*Herminiam* L.
Lip spurred	*Habenaria* Willd.
1a. Slender herbs; tubers glabrous; spikes slender, lax-flowered; 5-6 mm across, lateral sepals 3 mm long, not mucronate	*P. lawii*
1b. Stout herbs; tubers hairy; spikes stout, dense-flowered, flowers 8-18 mm across, lateral sepals 5-6 mm long, mucronate at back below apex	

2a. Flowers not secund; perianth 7-15 mm long; lip longer than sepals, lobes narrowly lanceolate — *P. constrictus*

2b. Flowers sub-secund; perianth 4 mm long; lip as long as sepals, lobes broad, subobtuse or obtuse — *P. goodyeroides*

Peristylus constrictus (Lindl.) Lindl., Gen Sp. Orch. Pl. : 300. 1835; Hara *et al.*, Enum. 1 : 52. 1978; *Platanthera constricta* Lindl. in Wall., Num. List. 240. No. 7043. 1832, *nom. nud.*; *Herminium constrictum* Lindl. in Edward's Bot. Reg. 18 : sub. t. 1499. 1832; *Habenaria constricta* (Lindl.) J. D. Hook. in FBI 6 : 161. 1890; Haines, Botany 3 : 1211.

Erect herbs; tubers oblong; stems with large leaf-sheaths below; sheaths inflated at mouth. Leaves 5-6, ovate-elliptic, acute or acuminate, aggregated near middle of stem, 10-14 × 5.5-9.5 cm. Spikes cylindric, 10-22 cm long; bracts acuminate, puberulous, 1.5-1.8 cm long; flowers yellowish or greenish; sepals 3, subequal linear-lanceolate, 5-6 mm long; petals 3, ovate-oblong, gibbous on lower side, 7-8 mm long; lip 3-lobed to middle; column short, broad; spur greenish; anther 1, cells parallel, pollinia 2, clavate, caudicles short with large glands; stigmatic processes clavate; rostellum 2-fid, erect. Capsules fusiform.

Fl. : June-Aug. *Frt.* : Aug.-Oct.

Common in open places, in leaf-litters.

Lamni : 19257.

India, Nepal, Burma.

P. goodyeroides (D. Don) Lindl., Gen. Sp. Orch. Pl. : 299. 1835; Joseph, Orchids Nilgiris : 97, pl. 49. 1987. *Habenaria goodyeroides* D. Don, Prodr. Fl. Nepal. : 25. 1825; Haines, Botany 3 : 1211; Tuyama in Ohasi, Fl. E. Himal. 3 : 150. 1975. **Fig. 24**

Erect herbs to 90 cm tall; tubers 1-2, ellipsoid; stems with sheaths below, with 3-6 leaves, spirally clustered at middle. Leaves sessile, sheathing, ovate-elliptic, acute, 10-25 × 4-5.5 cm. Spikes cylindric, 7-15 cm long; bracts ovate-lanceolate, acuminate; flowers yellowish-green; sepals 3, unequal, lateral sepals linear or ovate-oblong, obtuse, mucronate, dorsal ovate-oblong; petals 3, gibbously ovate; lip 3-lobed, recurved; spur minute, stipitate, bulbous; anther 1; pollinia 2, clavate, caudicles hardly any; glands small; stigmatic processes short, clavate; rostellum erect, toothed. Capsules 1.2 cm long, sessile, oblong or fusiform.

Fl. : July-Aug. *Frt.* : Sept.-Oct.

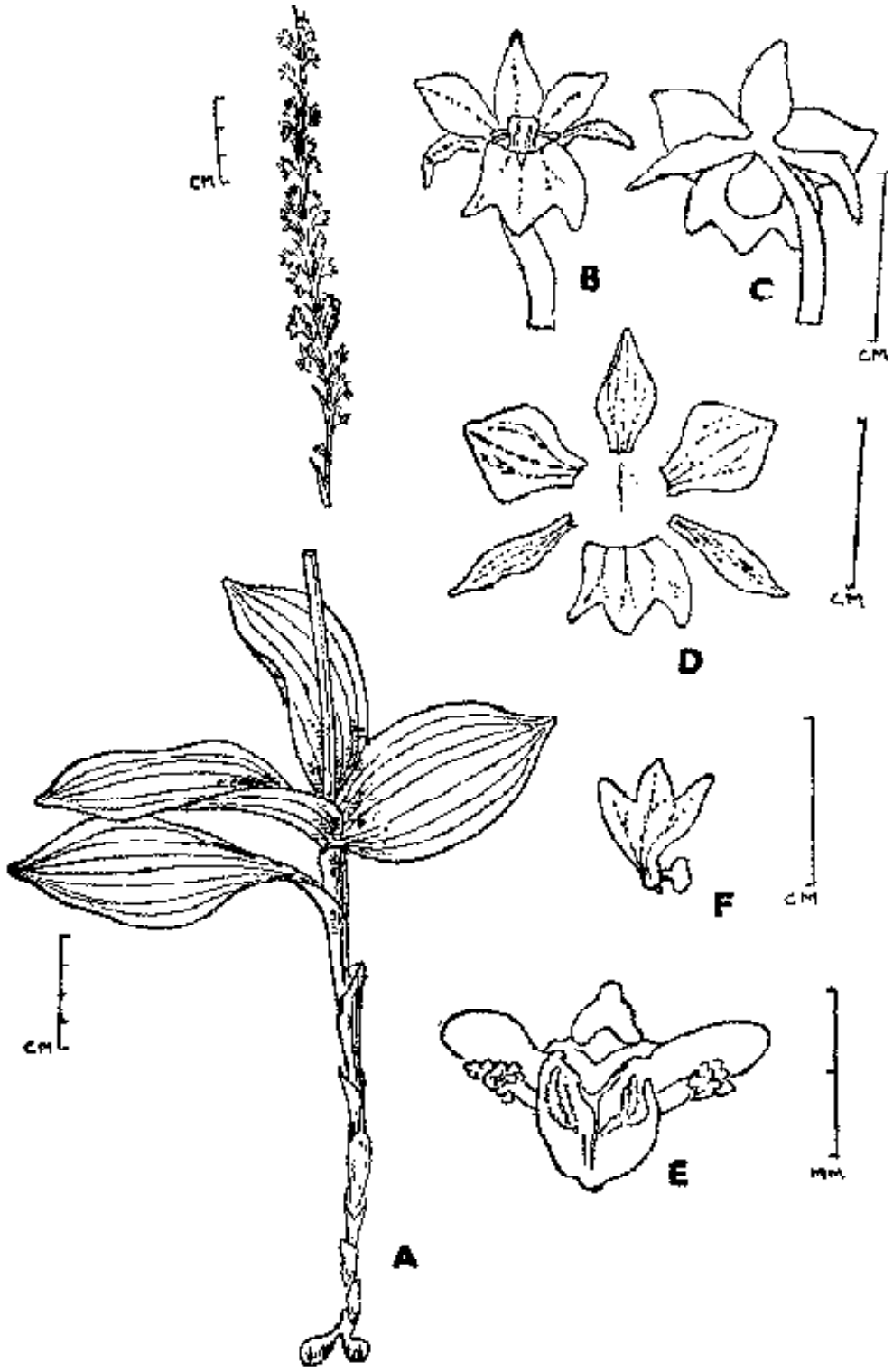

Fig. 24. *Peristylus goodyeroides* (D. Don) Lindl.

A. Habit. B–C. Two views of the flower. D. Sepals and petals (dissected). E–F. Lip with gynaestegium.

Common on humus soil in leaf-litters on slopes.

Kabirchabutra : 19160.

India, Burma, Thailand, Vietnam and Malaysia.

Note : This species differs from *Peristylus plantagineus* (Lindl.) Lindl. in having smaller leaves and flowers and a very small globose spur.

P. lawii Wight, Icon. 5 : 12. t. 1695. 1852; Joseph. Orchids Nilgiris : 101, pl. 50 (1, 2). 1987. *Habenaria lawii* (Wt.) J. D. Hook. in FBI 6 : 162. 1890; Haines, Botany 3 : 1211.

Small erect herbs below 30 cm; tubers oblong-obovate; stems terete, with inflated leaf-sheaths below. Leaves 3-5, clustered about middle of stem, narrowly oblong-lanceolate, sheathing, acute, 7-9 × 2-4 cm. Spikes narrow, 5-10 cm long, lax-flowered; bract linear, acuminate; flowers sessile, white, tinged with yellowish-green, 4-5 mm across; sepals 3, lateral sepals without mucro, oblong or linear-oblong, dorsal broadly ovate, forming a hood with petals; petals 3, thick, obovate, retuse or rounded; lip as long as sepal, broadly obtusely 3-lobed; spur globose or clavate; anther 1, cells parallel; pollinia 2, clavate; stigmatic processes clavate; rostellum short, acute. Capsules fusiform, ribbed, 1-1.5 cm long.

Fl. : July-Aug. *Frt.* : Sept.-Oct.

Occasionally found on humus-covered soil.

Katghora to Madai : 19461.

India, Nepal.

RHYNCHOSTYLIS Bl., Bijdr. 6 : t. 49, 8 : 285. 434. 1825 ('*Rhychostylis*').

T. : *non designatus.*

Rhynchostylis retusa (L.) Bl., Bijdr. : 286, t. 49, 1825; Haines, Botany 3 : 1230; Seidenfaden in Mathew, Fl. Tamilnadu Carnatic 3(2) : 1597, 1983; Nicolson *et al.*, Reg. Veg. 119 : 302. 1988. *Epidendrum retusum* L., Sp. Pl. : 953. 1753. *Aerides retusa* (L.) Sw., J. Bot. (Schrader) 2 : 233. 1799 ("*retusum*"). *Aerides praemorsa* Willd., Sp. Pl. 4 : 130. 1805, non *E. praemorsum* Roxb. (1795). *Epidendrum indicum* Poir. in Lam., Encycl. Suppl. 1 : 384. 1810. *Sarcanthus guttatus* Lindl., Bot. Reg. 17 : t. 1443. 1831. *Saccolabium guttatum* (Lindl.) Lindl., Gen. Sp. Orch. Pl. : 220. 1833. *Saccolabium rheedei* Wight, Icon. 5(1) : 19, t. 1745-1746. 1851

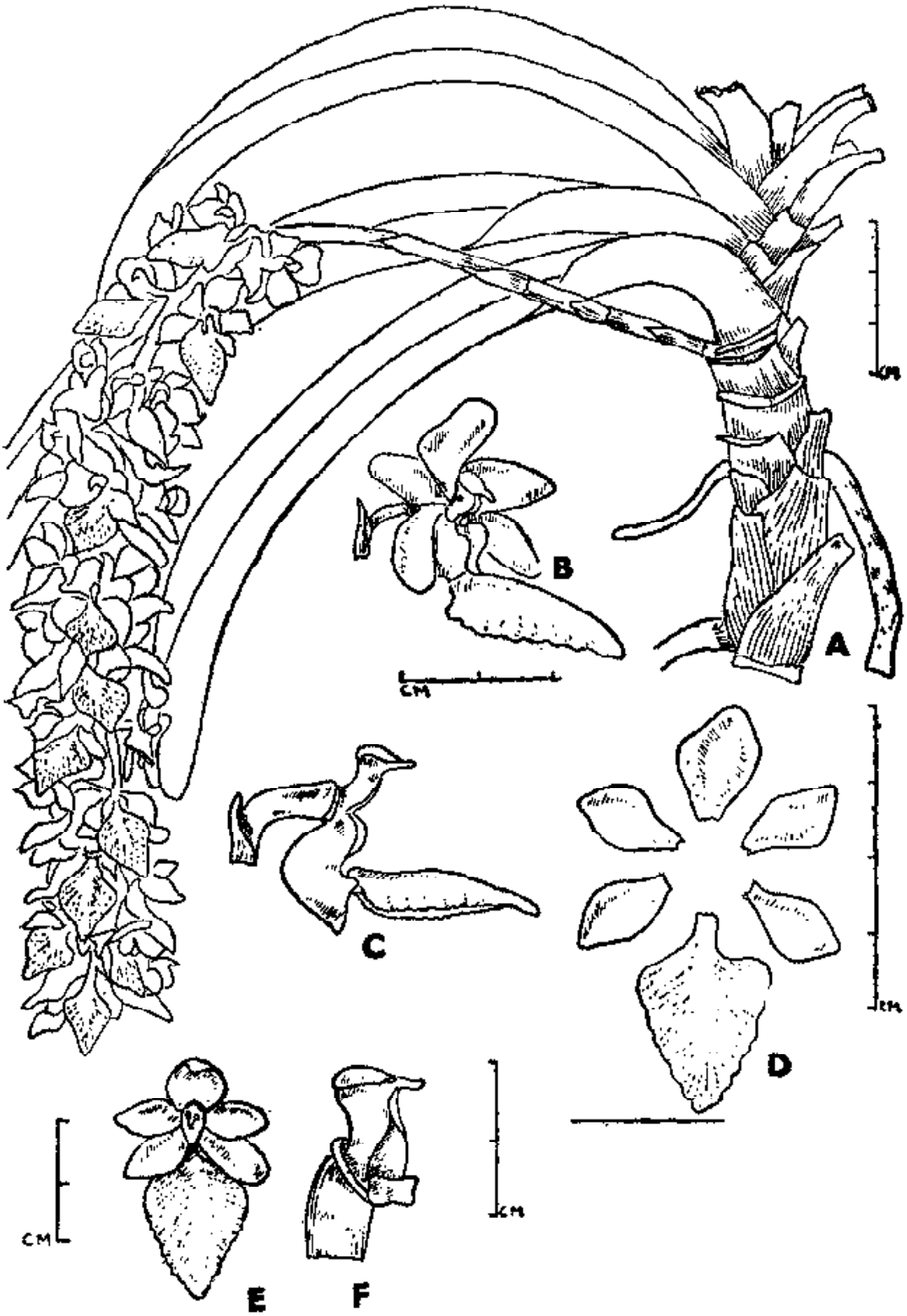

Fig. 25. *Rhyncostylis retusa* (L.) Bl.

A. Habit. B. Flower. C. Lip with gynaestegium. D. Sepals and petals spread out. E. Flower (frontal view). F. Column with gynaestegium.

('*rheedii*') *Ansjeli-maravara* Rheede, Hort. Malab. 12 : 1.4, t. 1. 1693. *Biti-maram-maravara* Rheede, l.c. : 5. t. 2. 1693. **Fig. 25**

Epiphytic herbs; without pseudobulbs; stems stout, creeping, covered with leaf-sheaths. Leaves thick, linear, deeply channelled, keeled, curved, praemorse or retuse at apex, 15-45 cm long. Racemes pendulous, cylindric, dense-flowered, 10-40 cm long; bracts broad, obtuse, membranous, 3-4 mm long; flowers white, blotched with pink or violet, 1.2-2 cm across; sepals 3, lateral sepals gibbously orbicular-ovate, obtuse or apiculate, decurrent on column-foot, dorsal oblong; petals 3, elliptic, obtuse, 7 mm long; lip pink-purple, curved, 1 cm long; spur laterally compressed; column short, stout, rostellum short-beaked; anther 1; pollinia 2, subglobose, 2-cleft. Capsules obovoid, winged, 1.5-3 cm long, clavate.

Type: Rheede, *l.c.* : t. 1. 1693 (vide Seidenfaden, 1983).

Fl.: May-July. *Frt.*: Sept.-Oct.

Common on *Diospyros* and other trees.

Pasan to Korbi : 19088.

India, Sri Lanka, Burma.

Used as an emolient.

Note: Rheede, *l.c.* : t. 2 is the sole basis of *Aerides praemorsa* Willd. (1805) [*Epidendrum indicum* Poir. (1810), non *E. praemorsum* Roxb. 1795].

VANDA W. Jones (in Asiat. Res. 4 : 302 1795) ex R. Brown, Bot. Reg. 6 : t. 506. 1820.

T.: *V. roxburghii* R. Brown.

35 species from Himalaya to Malaya; cultivated ornamentals epiphytes with extrafloral nectaries, esp. 'Miss Joaquim' [*Vanda teres* Lindley (Burma) × *V. hookeriana* Reichb. f., (West Malaya)], raised in 1893 and very much widely cultivated in tropics.

1a. Racemes suberect; flowers 5 cm across, slate, pink or blue, lateral lobes of lip acute, tessellated; perianth clawed, obovated and without conspicuous veins from base, margins wavy; spur conical, papillose within; fruiting pedicels 1.0-1.5 cm long *V. tessaellata*

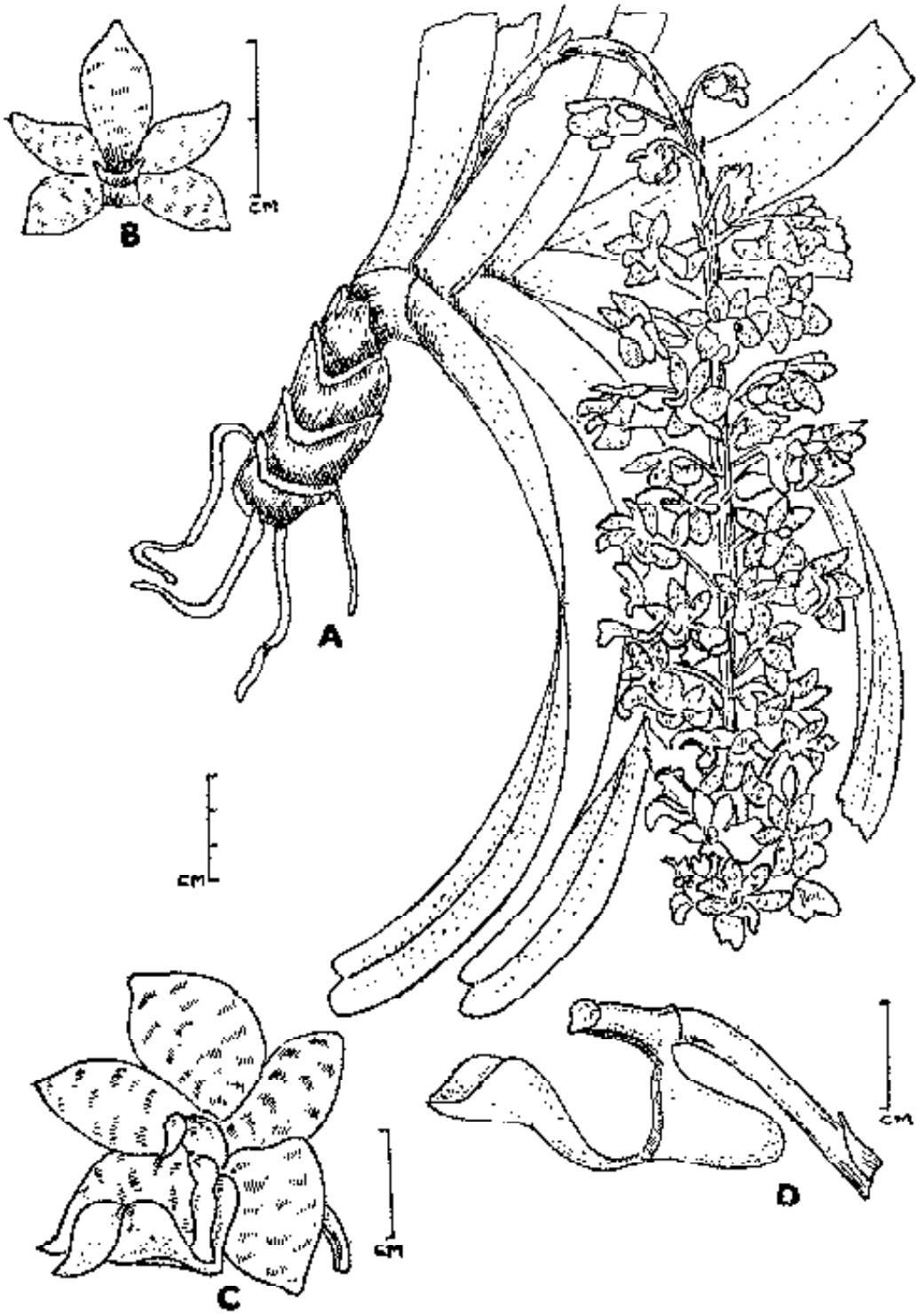

Fig. 26. *Vanda testacea* (Lindl.) Reichb. f.
A. Habit. B. Flower. C. Sepals and petals (dissected.). D. Column and lip.

1b. Racemes strict, erect; flowers 1.8 cm across, light yellow; lateral lobes of lip obtuse; not tessellated; perianth oblong-spathulate with a number of parallel veins from base of sepals and lateral petals, margins not wavy; fruiting pedicels 4-5 cm long; spur short, vermiform at tip, naked within *V. testacea*

Vanda tessellata (Roxb.) Hook. ex G. Don in Loud., Hort. Brit. : 372. 1830; Haines, Botany 3 : 1233; Jayaweera in Dassan., Rev. Handb. Fl. Ceylon 2 : 218, fig. 96. 1981; Joseph, Orchids Nilgiris : 175, pl. 89(1, 2) 1987. *Epidendrum tessellatum* Roxb., Pl. Corom. 1 : 34. t. 42. 1795; *Vanda roxburghii* R. Br. in Bot. Reg. 6 : t. 506. 1820; Hara *et al.*, Enum. 1 : 58. 1978. *Cymbidium tesselloides* Roxb., Fl. Ind. 3 : 463. 1832. (*Atirasa, Rasna*—Sansk., Beng., Oriya; *Banda, Rasna*—Hindi).

Epiphytic herbs without pseudobulbs. Leaves patent, recurved, linear, strap-shaped, unequally obtusely 2-lobed, 10-15 cm long. Racemes simple, 6-10-flowered, axillary; peduncles 15-20 cm long, longer than leaves and with 4-5 sterile sheathing bracts; flowers showy; 3.5-5.0 cm across; sepals 3-3, subequal, clawed, obovate, wavy; petals 3; lip 3-lobed, nearly as long as sepals, side-lobes erect, small acute, mid-lobe panduriform, fleshy, with a dilated 2-lobed tip; spur conical, pubescent within; column oblong, clavate with a short foot; anther 2-celled; pollinia 2, didymous. Capsules oblong, sharply ribbed.

Fl. : Apr.-July. *Frt.* : Oct.

Common on *Madhuca, Diospyros, Shorea robusta* etc.

Marwahi to Pasan : 19056; Khondra : 12777.

India, Nepal, Sri Lanka.

Juice of the leaves dropped in the ear in otitis and other inflammatory conditions. Roots used in dyspepsia, bronchitis, rheumatism and fevers; they possess antibacterial and antitubercular properties. Roots form a constituent of medicated oils, used externally on rheumatic swellings and nervous troubles.

V. testacea (Lindl.) Reichb. f., Gard. Chron. 2 : 166. 1877; Joseph, Orchids Nilgiris : 177, pl. 90(1, 2). 1987. *Aerides testaceum* Lindl., Gen. Sp. Orch. Pl. : 238. 1833; *Vanda parviflora* Lindl. in Edward's Bot. Reg. 30. Misc. : 45. 1844; Haines, Botany 3 : 1233; Jayaweera, *op. cit.* : 215, fig. 95. 1981. **Fig. 26**

Epiphytic herbs without pseudobulbs. Leaves fleshy, distichous, chanelled above, keeled beneath, margins upturned, unequally obtusely 2-lobed, 7-12 cm long. Racemes simple, 3-12-flowered, 6-12 cm long erect; flowers showy, about 2 cm across, light yellow; bracts scarious; sepals 3, 6 mm long; petals 3, broadly ovate-oblong, obtuse, lip 3-lobed, pink with a pronounced mentum and spur, mid-lobe with a dilated, truncate, 2-lobed tip and 2 blue-lilac, caruncled ridges; disc with fleshy blue ridges; spur conical, yellow; column with a short foot, pale yellow; anther 1, 2-celled; pollinia 2, didymous, waxy. Capsules 2.5-3.5 cm long, clavate.

Fl. : Apr.-May. *Frt.* : Feb.-Aug.

Common on many trees and dead tree-trunks.

Kabirchabutra : 15220.

India, Nepal, Burma, Sri Lanka.

Crushed leaves applied to cuts and wounds; their decoction used in ear-ache.

ZINGIBERACEAE

Lindl., Key Bot. : 69. 1835.

T. : *Zingiber* Boehmer, nom. cons.

Note : *Zingiberaceae* Lindl. (*Zingiberidae-Zingiberales*), which here includes *Costaceae* Nakai, comprise two subfamilies : *Costoideae* (aerial parts not aromatic; leaves spirally arranged, or 4-ranked with closed sheaths; labellum of 5-stamen origin (?) : 4-genera including *Costus* L.), and subfam. *Zingiberoideae* (aerial parts aromatic; leaves distichous; labellum of 3-stamen origin) comprise four tribes :

tribe *Hedychieae* (G 3-locular; leaves parallel to rhizome; style not far exserted beyond anther) include *Curcuma*, *Hedychium*).

tribe *Zingibereae* (G 3-loc.; leaves parallel to rhizome; style exserted beyond anther and enveloped by elongate process (anther crest) : *Zingiber* Boehmer (only).

tribe *Globbeae* (G 1-loc.; anther usually long-exserted on arched ascending filament) ; 4 genera including *Globba* L.

tribe *Alpinieae* (G. usu. 3-loc.; leaves at right angles to rhizome) : 7 genera including *Alpinia* Roxb., *Amomum* Roxb., *Elettaria* Maton etc.

Many important spice-plants include *Aframomum*, *Amomum*, *Curcuma* (turmeric), *Elettaria* (cardamom), *Zingiber* (ginger); scent (*Hedychium*) and cultivated ornamentals (cf. Mabberley, 1987 : 624).

1a. Leaves spirally arranged; sheaths tubular; lateral staminodes, epigynous glands and aromatic oil cells, all absent — COSTUS

1b. Leaves distichously arranged; sheaths usually open on one side; lateral staminodes often present as petaloid outgrowths; epigynous glands and aromatic oil cells always present

2a. Flowers in panicles: filaments longer than lip; ovary 1-celled; placentas parietal — GLOBBA

2b. Flowers in spikes; filaments shorter than lip; ovary 3-celled, placentas axile

3a. Spikes surmounted by a coma of barren, coloured bracts; staminodes free from lip; anther-crest absent; corolla-tubes funnel-shaped; stems absent — CURCUMA

3b. Spikes not surmounted by coma of barren, coloured bracts; staminodes adnate to lip; anther prolong into a long, narrow crest enfolding style; corolla-tubes cylindric; stems well developed — ZINGIBER

COSTUS L., Sp. Pl. : 2. 1753 & Gen. Pl. ed. 5 : 2. 1754; Burtt & Smith in Dassan, Rev. Handb. Fl. Ceylon 4. : 491. 1983.

T. : *Costus arabicus* L.

Note : Sometimes *Costus* L. is segregated from the *Zingiberaceae* to form a monogeneric family, *Costaceae* (K. Schum.) Nak. (Jour. Jap. Bot. 17 : 199. 1941). But, neither the ICBN 1988. Appendix II B, nor in the Cronquist's (1981) system, *Costaceae* (K. Schum.) Nakai is listed as a separate family.

Costus speciosus (Koenig) J. E. Smith in Trans. Linn. Soc. Lond. 1 : 249. 1791; Haines, Botany 3 : 1196; Nicolson *et al.*, Regnum Veget. 119 : 316. 1988. *Banksea speciosa* Koenig in Retz., Obs. Bot. 3 : 63, ("75") 1783. *Amomum hirsutum* Lam., Encycl. 1 : 135. Dec. 1783; et in Tabl. Encycl. 1 : 5, t. 134. 1791. *Hellenia grandiflora* Retz., Obs. Bot. 6 : 18. 1791, nom. illeg. *Tsiana speciosa* (Koenig) J. F. Gmelin, Syst. Nat. 1 : 9.

1791. *Planera speciosa* (Koenig) Giseke, Prael. Ord. Nat. : 244. 1792. *Tsjana -Kua* Rheede, Hort. Malab. 11 : 15-16, t. 8. 1692.

Erect herbs; rhizome fleshy, creeping; stems upto 2 m tall, spirally twisted. Leaves subsessile, alternate, elliptic-oblong to obovate-oblanceolate, acute, thinly silky beneath, white margined, 15-35 × 6-10 cm; sheaths tubular, upto 4 cm long, with an obliquely truncate, hairy mouth. Spikes terminal, dense-flowered, ovoid or oblong, 3-10 cm long; bracts red, ovate-lanceolate, keeled, 2-3 cm long; flowers white, irregular; calyx-tubes infundibular, teeth 3; corolla-tubes as long as calyx, 3-lobed; lobes oblong or obovate-oblanceolate; lip sub-orbicular, white outside, yellow at centre, crispy-serrate, throat hairy; stamen 1, filaments forming an oblong, petaloid process; stigma with a crescent shaped, marginally ciliate depression. Capsules 3-gonous, globose, red, 2.5 cm long, irregularly dehiscent.

LT.: Rheede, l.c. : t. 8 (vide Nicolson *et al.*, 1988).

Fl. : July-Sept. *Frt.* : Oct.-Nov.

Common in waste moist places, near streams, along forest floors.

Kabirchabutra : 19189; Madai to Korbi : 19480.

India, Sri Lanka, Thailand to Vietnam, Malaysia, New Guinea and Australia; cultivated throughout the tropics.

Rhizomes and leaves are used medicinally, especially as a rich source of diosogenin used as a family-planning drug.

Note : 1. Burtt & Smith (1983) cite "Type : Malaya, *Koenig*, specimen lost".

2. *Hellenia* Retz., (Obs. Bot. 6 : 18. 1791) is a substitute name for *Banksea* Koenig [in Retz., Obs. Bot. 3 : 63 ("75"). 1783], non *Banksia* J. R. & G. Forst, 1775, (Thymel.) nom. rej., nec. Linn. f., 1782, nom. cons. *Proteaceae Tsjana* J. F. Gmelin (Syst. Nat. 2 : 9. Sept -Nov. 1791) is an illegitimate renaming of *Hellenia* Retz., (July-Nov. 1791). *Planera* Giseke (Prael. Ord.-Nat. : 205, 244. 1792) is not only another illegitimate renaming of *Hellenia* Retz. 1791, but is a later homonym of *Planera* J. F. Gmelin (1791).

CURCUMA Linnaeus, Sp. Pl. : 2. 1753, *nom. cons.*

T. : *C. longa* L. (*typ. cons*).

Note: *Curcuma longa* L. (LT. : Rheede, Hort. Malab. 11 : 21, t. 11. 1692) (*C. domestica* Vahl, 1818), the yellow-dye-turmeric-yielding species, is found in cultivation.

1a. Tubers sessile; leaves oblong-elliptic, oblong or oblanceolate; spikes rising from centre of leaf-tuft and develop while leafy; coma pale pink, white or yellow — *C. amada*

1b. Tubers at end of long fibres; leaves narrowly lanceolate or elliptic-lanceolate; spikes lateral to leaf-tuft and usually developed before leaves appear; coma red or pink — *C. angustifolia*

Curcuma amada Roxb., in Asiat. Res. 11 : 341. 1810, et Fl. Ind. 1 : 33. 1820; Haines, Botany 3 : 1185; Schum. in Engl. & Prantl, Pflanzenreich, Heft 20. 4 : 108. 1904. (*Mango ginger*—Eng.; *Ban haldi*—Oriya; *Am-haldi*—Hindi; *Am-ada*—Beng.).

Erect herbs; rootstock pale yellow. Leaf ending in short, fine, twisted cusps, margin white or hyaline 30-50 × 12-15 cm; petioles as long as blade; scape 15-30 cm long; spikes 10-15 cm long; bracts white or pale green; flowers pale yellow, about 4 cm long; calyx about 1.2 cm long, split above into 3 rounded, shallow lobes, puberulous; corolla-tubes about 2 cm long, ventricose, 3-lobed, anterior lobes oblong-ovate, rounded, nearly as long as lip, posterior hooded, entire or slightly emarginate; lip pale-yellow; lateral staminodes petaloid, obliquely oblong, rounded and as long as corolla and connate with short broad filament; stamen 1, anther reclinate, with 2 long declinate spurs; ovaries villous. Capsules ovoid, appressed hairy, 1 cm long, 3-valved.

Fl. & Frt.: July-Oct.

Common inside forest on the forest floor in leaf-litters.

Madai : 12900; Pali : 19408.

Indomalaysia, China.

Rhizomes carminative and stomachic; used in pickles; also used in confusions and sprains; contain an essential oil.

C. angustifolia Roxb. in Asiat. Res. 11 : 338. t. 3. 1810, et Fl. Ind. 1 : 31. 1820; Haines, Botany 3 : 1182; Ghazanfar in Fl. West Pakistan No. 146 : 4. 1982. East Indian Arrowroot; Travancore starch. (*Tavakshira*—Sansk.; *Tikhur*—Hindi).

Erect herbs; leafy stems very short. Leaves gradually acuminate to a fine point, blade 50-60 × 4-12 cm; petioles 15-20 cm long. Scape

5-10 cm long; spikes 4-9 cm long; bracts green, ovate, 2.5 cm long; coma of 5-9 bracts; flowers pale yellow, far-exserted, about 4 cm long, 3 or 4 in axil of each bract, opening in succession; calyx 3-lobed, hairy, 1.5 cm long; lobes ovate-triangular; corolla-tubes about 1.5 cm long; lobes pale yellow, oblong, dorsal somewhat pubescent; lip yellow, rounded, deeply 2-fid or emarginate, 1.5-2 cm long; lateral staminodes petaloid, yellow, partly connate with short, broad filament, free portion 1.25 cm long, oblong; stamen 1, anther puberulous, reclinate, with long basal spurs and short basal knobs; ovaries villous. Capsules ovoid, hairy, about 1 cm long, opening by 3 valves.

Type: Cult. Bot. Gard. Calcutta; Coll. *Colebrooke*, R. Sone to Nagpur; no specimen known.

Fl. & Frt.: June-Aug.

Common on moist forest-floor in leaf-litters.

Lamni : 19225.

India, Nepal.

Tubers yield 'The East Indian arrow-root'. Rhizomes used for bruises, confusions and sprains. In medicine, they are used as a substitute for turmeric, but not as a condiment, as a demulcent.

GLOBBA L., Mant. Pl. Alt. : 170. 1771.

T.: *Globba marantina* L.

Globba marantina L., Mant. Pl. Alt. : 170. 1771; Burtt & Smith in Dassan, Rev. Handb. Fl. Ceylon 4 : 499. 1983. *Globba bulbifera* Roxb. in Asiat. Res. 11 : 358. 1810, et Fl. Ind. 1 : 78. 1820; Haines, Botany 3 : 1180. *T.* : Roxburgh imperfect sketch lost (?). *Globba marantinoides* Wight, Ic. Pl. Ind. Or. 6 : 15, t. 2001. 1853. *T.* : South India Annamally Forest, *Wight* s.n.

Decumbent herbs; rhizome creeping. Leaves distichous, lanceolate to elliptic, acuminate, alternate at base, pubescent beneath, base sheathing, 7.5-15 × 3-5 cm. Inflorescences simple, lax, 5-10 cm long; flowers yellow, tube 1 cm long, pedicelled, 2 to a bract; bracts folded, ovate, broad-based, ascending, persistent, 1.5 cm long; lower bracts usually bearing a solitary, ovoid bulbil in place of flower; calyx 3-lobed, funnel-shaped, 1-1.5 cm long; corolla-tubes longer than calyx; petals ovate, reflexed; lip linear,

longer than petals, bifid; lateral staminodes longer than petals, oblong, petaloid, labellum deeply bifid; stamen 1; filament with 2 dorsal spreading appendages, incurved, anther winged; ovaries globose, 1-locular, sometimes 3-locular at base. Fruits a oblong, smooth capsule, tardily dehiscent.

Type: Linn. Herb. 45.1 (LINN).

Fl. & Frt.: July-Oct.

Common in shady, damp places inside forest, near streams.

Achanakmar : 13227A; Kabirchabutra : 19171.

Indo-malaysia.

Note: Lower leaves are usually replaced by bulbils. Bulbils spicy, eaten as a seasoning.

ZINGIBER Boehmer in Ludwig, Defin. Gen. Pl. ed. 3 : 89. 1760, nom. cons.

T.: *Z. officinale* Roscoe (Trans. Linn. Soc. London 8 : 358. 1807) (*Amomum zingiber* L.).

Note: *Zingiber officinale* Rosc. (Adrak) is commonly cultivated for the root-ginger of commerce.

1a. Inflorescence terminal on leafy stem; corolla-tubes 4 cm long; segments pale yellow; lip pale yellow; basal auricles large, bright red, oblong-obtuse — *Z. capitatum*

1b. Inflorescence lateral from leafy stem, arising directly from rhizome; corolla-tubes 5 cm long, segments pale red; lip whitish; basal auricles very small, yellow, rounded — *Z. roscum*

Zingiber capitatum Roxb. in Asiat. Res. 11 : 348. 1810. et Fl. Ind. 1 : 55. 1820; Haines, Botany 3 : 1195; Hara *et al.*, Enum. 1 : 62. 1978.

Erect, aromatic herbs; leafy stems 90-120 cm long. Leaves distichous, erecto-patent, stiff, linear, ascending, pubescent beneath, sessile, 30-45 × 2.5-3.5 cm. Spikes sessile, dense-flowered, erect, oblong or oblong-cylindrical, 7-12 cm long; bracts imbricate, ovate or oblong, sub-coriaceous, 2.5-3.5 cm long; flowers pale yellow; calyx spathaceous, 3-dentate, pubescent, 1-1.5 cm long; corolla-tubes cylindric, as long as bract; lobes 3, lanceolate, 2.5 cm long; lip emarginate; lateral staminodes oblong-obtuse, adnate to lip, red; stamen 1, anther appendaged, yellow. Capsules oblong, bright red, pubescent, 2 cm long, tardily dehiscent.

Fl.: July-Aug. *Frt.*: Sept.-Oct.

Common at the edges of the forests in damp places.

Madai to Korba : 12920.

India, Nepal.

Z. roseum (Roxb.) Roscoe in Trans. Linn. Soc. Lond. 8 : 348. 1807; Haines, Botany 3 : 1193; Babu, Herb. Fl. Dehra Dun : 504. 1977; *Amomum roseum* Roxb., Pl. Corom. 2 : 15. t. 126. 1799 et 1800.

Erect herbs; leafy stems 100-125 cm long. Leaves distichous, ascending, lanceolate-oblong or elliptic, pubescent beneath, 40-50 × 8-10 cm. Spikes dense-flowered, oblong, 8-10 cm long; bracts bright red, outer ones ovate, inner ones lanceolate, hairy, 3.5-4 cm long; flowers red, about 5 cm long; calyx spathaceous, purple-tinged at top, 1.5-2.5 cm long; corolla-tubes whitish, segments 2.5 cm long; lip oblong, obtuse or oblong-cuneate, margins recurved, about 2 cm long; lateral staminodes yellowish, subulate, 0.5 cm long; stamen 1; anther 1.5 cm long. Capsules ovoid-ellipsoid, 3-gonous, red.

Fl. : July-Aug. *Frt.* : Sept.-Oct.

Common in Sal forests in moist shady places.

Lamni to Achanakmar : 19531.

India.

MUSACEAE

A. L. Jussieu, Gen. Pl. : 61. 1789 ('*Musae*')

T. : *Musa* L.

Large pachycaul herbs with massive subterranean corms and hapaxanthic shoots, glabrous; roots with scattered vessel elements and phloem strands. Aerial shoots (pseudostems) largely the rolled sheathing leaf-bases; the leaves simple and spirally arranged with long petiole and expanded lamina rolled from one side to the other in bud, with prominent midrib and pinnate-parallel venation, the laterals incurved only at margin and between which tears may form under windy conditions. Inflorescence-axis arising from corm and growing up through the pseudostem and emerging at plant-apex, where bearing spirally arranged leathery keeled bracts, each subtending a few-flowered cymes of unisexual flowers, the apical males. Flowers irregular with much nectar from septal nectaries. Perianth 6, petaloid in

two distinct whorls, but outer and two inner merely teeth or lobes of the perianth-tube split along one side, the third (adaxial) inner free. Stamens 5 or 6, the 6th opposite the free perianth, but often a staminode or 0, anthers with longitudinal slits. Gynaecium 3, inferior, syncarpous trilocular, with terminal style and with many anatropous, bitegmic ovules per locule. Fruit usually a fleshy berry with a few to many seeds with rudimentary arils with straight or (*Ensete* Horan) curved embryo with copius starchy and mealy endosperm and perisperm. (cf. Mabberley, 1987 : 384).

x = 9-11, 16, 17.

2 genera, *Ensete* and *Musa* (important fruit- and fibre-plants).

Musa L. with 35 species of tropical Asia. Bananas, like *Ensete* Horan., but with a distinct petiole between blade and sheath and not hapaxanthic, while stamens usually five, (not six). Fruit a berry, the clonal parthenocarpic forms edible and major carbohydrate source; the desert bananas derived from triploid forms of *Musa acuminata* Colla. *Musa acuminata* Colla, the diploid species, both seeded (wild) and seedless (edible) forms (banana) provide the edible fruits, when ripen.

Musa balbisiana Colla, a more disease-resistant species, with which hybrids have been formed : *M* × *paradisiaca* L. (*M* × *sapientum* L.) (plantain) the major cooking banana (*Kela*—Hindi; *Mocha*—Beng. & Hindi—for inflorescence also used as a vegetable); *Thor*—Core of pseudo-stems eaten after cooking.

CANNACEAE

A. L. Jussieu, Gen. Pl. : 62. 1789 ('*Cannae*').

T. : *Canna* Linn.

Monogeneric with 25 species; Tropical and warm America.

Glabrous herbs with starchy rhizomes. Leaves spirally arranged with a sheath passing into petiole, simple lamina with a prominent midrib and numerous lateral veins, but no ligules or pulvinus. Inflorescences terminal often with short 2-flowered cymules axillary to principal bracts. Flowers large, bisexual, obliquely oriented. Calyx 3, spiral, persistent in fruit. Petals 3, one smaller than the other two, joined in a basal tube with functional stamen (middle of inner stamens-cycle), petaloid with pollen-sac along more nearly median edge and at least one staminode. Gynaecium 3, inferior syncarpous, 3-locular with axile placentation; style petaloid; ovules

many per locule. Fruit a capsule; seeds exarillate with thin starchy endosperm and copious hard, starchy perisperm. (cf. Mabberley, 1987 : 98).

x = 9.

Canna indica L. (Indian; naturalized throughout tropics) is commonly cultivated in gardens. Black seeds used as beads; *C. edulis* Ker-Gawler—a form of *C. indica* L., is selected for its starchy rhizome, suited for infants and invalids.

IRIDACEAE

A. L. Jussieu, Gen. Pl. : 57. 1789 ('*Irides*').

T. : *Iris* Linn.

Usually geophytic herbs (sympodial rhizome, corms or bulbs); usually with crystals of Calcium oxalate in some cells; alkaloids 0, but sometimes poisonous. Leaves usually distichous, parallel-veined with sheathing base and narrow blade. Flowers bisexual, in terminal inflorescences or solitary.

Iris L. with 300 species, mostly North temperate, and *Gladiolus* L., with 180 species; some species are usually cultivated in gardens. *Iris* × *germanica* L. represents the common flag iris of gardens and is of complex history involving the European species, *I. pumila* L., *I. variegata* L. etc. *Gladiolus* × *hortulanus* I. Bailey (Florists' gladiolus) is also a complex hybrid involving as many as four species and is commonly cultivated in gardens (cf. Mabberley, 1987 : 243, 295).

AGAVACEAE

Endlicher, Ench. Bot. : 105. 1841 ('*Agaveae*').

T. : *Agave* Linn.

Furcraea foetida (L.) Haw. (*F. gigantea* Vent.) Mauritius hemp is sometimes grown in gardens or as hedge plants.

1a. Leaves with margins spiny; scape 3-5 m long, stout, woody; inflorescences paniculate; perianth funnel-shaped, tube short, not swollen at base, segments not spreading, equal; ovaries inferior — AGAVE

1b Leaves with margins not spiny; scape 40-50 cm long, slender; inflorescences simple racemes; perianth tubular, tube usually swollen at base, segments spreading, somewhat unequal; ovaries superior — SANSEVIERIA

AGAVE L., Sp. Pl. : 323. 1753 & Gen. Pl. ed. 5 : 150. 1754.

L.T. : *A. americana* L. (vide N. L. Britton et P. Wilson, Scient. Surv. Porto Rico 5 : 156. 1923).

Agave cantala Roxb., (Hort. Beng. 25. 1814 *nom. nud.*) Fl. Ind. ed. 2. 2 : 167. 1832; Haines, Botany 3 : 1154 (as '*cantula*'); Hara *et al.*, Enum. 1 : 67. 1978; Mabberley, The Plant-Book : 14. 1987 (as 'Roxb. ek Salm-Dyck') *Agave americana sensu* J. D. Hook. in FBI 6 : 277. 1892, *non* L. 1753.

Perennial, scapigerous herbs; rhizomes short. Leaves in lax rosette at base, 90-150 × 7-12 cm, obliquely flattened at base; apical spine acicular, 1.5-2 cm long, reddish or dark brown, marginal spines falcate pointing forward, 5-7 mm long. Primary branches of scape almost horizontal, fascicles of flowers crowded at ends of subsidiary branches, fascicles 1-3-flowered; flowers 5-6 cm long, greenish-yellow; tepals 6, linear-lanceolate or linear-oblong, obtuse, connate at base, 2.5-3 cm long; hypanthium produced into a beak above ovary; stamens inserted at base of tepals, exserted; ovaries 3-locular. Capsules bluntly 3-gonous or oblong-cylindrical. Bulbils present.

Fl. : July-Aug. *Frt.* : Oct.

Commonly planted as hedge plant near cultivated fields, grown in gardens.

Achanakmar : 19273; Katghora : 3741.

Manila maguey, Bombay aloe; (?) native of Mexico.

The inflorescences are produced at the maturity of the plant, at the age of 10 years or more, whereupon the plant dies but usually leaves suckers at the base.

SANSEVIERIA Thunberg, Prodr. Pl. Cap. [xii] : 65. 1794, *nom. cons.*

T. : *Sansevieria thyrsiflora* Thunb., *nom. illeg. Aloë hyacinthoides* Linn.; *S. hyacinthoides* (L.) Druce (vide Wijnands, Taxon 22 : 112. 1973).

Sansevieria hyacinthoides (L.) Druce, Rep. Bot. Exch. Cl. Brit. Isles 1913(3) : 423. 1914 ('*Sanseviera*'); Wijnands in Taxon 22 : 113, figs. 2 & 3. 1973; Nicolson *et al.*, Reg. Veget. 119 : 271. 1988. *Aletris hyacinthoides* (L.) L., β *guineensis* (L.) L. Sp. Pl. ed. 2 : 456. 1762. *Aloe hyacinthoides* L. β *guineensis* L., Sp. Pl. : 321. 1753 *Sanseverinia thyrsiflora* Petagna, Instit.

Bot. 3 : 643. 1787, *Sansevieria guineensis* (L.) Willd., Sp. Pl. 2 : 159. 1799. *nom. illeg.* (*South African Bowstring hemp*—Eng.).

Perennial herbs; rootstock creeping, sometimes stoloniferous. Leaves in a basal rosette, cartilaginous, with large bracts at their bases, lanceolate, acute or obtuse, both sides marked with pale green transverse bands, yellow margined, tapering into a channelled petiole, 40-50 × 6-7.5 cm. Scape bracted; flowers 2-6 together in a spike-like raceme, greenish-white, on jointed pedicels; perianth with 6 linear, revolute lobes; tubes about 1.8 cm long; stamens 6, attached on throat, usually curved and exserted; ovaries free, 3-celled; stigma capitate and usually exserted. Fruits a 1-3-seeded berry.

Type: *Aloe guineensis, radice geniculata, foliis e viridi & atro undulatim variegatis* C. Commein, Praelud. Bot. : 84, t. 33. 1703.

Fl. & Frt. : Feb.-Mar.

Commonly grown in the gardens, also found naturalised in waste places.

Lamni : 15401.

Leaves yield a fibre used for ropes, sails and paper; cultivated ornamentals, pot-plants; extra-floral nectaries present. Used medicinally; some species used against snake-bite and planted around households as snake-repellant.

TACCACEAE

Dumortier, Anal. Fam. Pl. : 57, 58. 1829. ('*Tacceae*'; p. 58).

T.: *Tacca* J. R. Forster et G. Forster, nom. cons.

Monogeneric. Tuberous herbs without secondary growth, vessels restricted to roots.

TACCA J. R. & G. Forster, Char. Gen. Pl. : 35. 1775, *nom. cons.*

T.: *T. pinnatifida* J. R. Forster et G. Forster.

Flowers pollinated by flies and may act as traps. Tubers a source of starch used for bread etc. once the bitter the *taccalin* is removed.

Tacca leontopetaloides (L.) Kuntze, Rev. Gen. Pl. 2 : 704. 1891; Drenth, Blumea 20 : 375. 1972; Nicolson *et al.*, Reg. Veget. 119 : 314.

1988. *Leontice leontopetaloides* L., Sp. Pl. : 313. 1753. *Podophyllum trilobatum* J. Burm., Fl. Malab. : 6. 1769. *Tacca pinnatifida* J. R. & G. Forster, Char. Gen. Pl. 35, t. 35. 1775; Haines, Botany 3 : 1164. *Arum gracile* Roxb. Hort. Beng. : 65. 1814, nom. illeg. *Katu-schena* Rheede, Hort. Malab. 11 : 41. t. 1692 (type of both *Podophyllum trilobatum* J. Burm. and of *Arum gracile* Roxb.).

Erect herbs; tubers depressed-globose or broadly ellipsoid. Leaves 1-3, radical-petioled, broadly obovate, ovate or oblong-ovate, palmately 3-lobed and pinnately divided into smaller lobes, upto 70 × 120 cm; petioles 17-150 cm long; sheath 2-25 × 0.6-3.5 cm. Inflorescences umbellate, 20-30-flowered, on a leafless scape 20-170 cm long, subtended by oblong or lanceolate, acuminate, bracts, often 4, herbaceous, spathaceous, forming an involucre to umbels, inner bracts filiform, 7-15 cm long, overtopping flowers and drooping; flowers broadly campanulate, greenish or pale yellow, 6-8 mm long on pedicels 1-2 cm long; perianth petaloid or sub-herbaceous, broadly urceolate or globosely campanulate; lobes 6, 2-seriate, fleshy, elliptic or ovate-lanceolate, 3 inner ones broadly ovate or oblong ovate; stamens 6, inserted on tube or base of perianth-lobes; ovaries 2-5 mm long; disc annular, ribbed with pellucid glandular hairs. Fruits globose, 1.5-2.5 cm across, berry (capsule) with 10-α seeds.

Fl. : July-Aug. *Frt.* : Oct.-Dec.

Common in shady places, thickets, in forest clearings, edges of the forests.

Khóndra : 12789; Lamni : 19252.

Africa, India.

In vegetative stage, it is very similar to species of *Amorphophallus*. In *Tacca*, the petiole is ribbed and hollow, while in *Amorphophallus* it is smooth and solid; the leaves of *Amorphophallus* always possess an intra-marginal vein, which is lacking in *Tacca*. Tubers are edible after boiling.

The species is known as the East Indian or Tahiti arrowroot plant. Leaves used in hat-making. Endosperm copious, rich in starch and protein. Rootstock bitter, full of starch, and when prepared, is with excellent culiniary properties. Useful in dysentery.

Origin unknown, perhaps a beach plant.

n = 15.

DIOSCOREACEAE

R. Brown. Prodr. : 294. 1810 ('*Dioscoreae*').

T. : *Dioscorea* Linn.

Herbs, usually dioecious, with twining, rarely spiny, shoots arising from a fleshy starchy rhizome or tuber derived from lower internodes and/or hypocotyl; raphides usually present, also steroidal saponins and often lactone-alkaloids. Vessel elements usually present throughout the vascular bundles in 2 dissimilar whorls or 1 whorl of alternating types and no secondary thickenings excluding in tuber.

Of the eight genera, *Dioscorea* L. includes c.95% species. Tubers arise in *D. pentaphylla* L. from internode above cotyledon as well as hypocotyl. Many species are cultivated for starch- their culture intimately connected with life and ceremonials of many people; others are collected and cultivated for manufacture of steroidal hormones for use as oral contraceptives. *D. alata* L. (white yam, water yam, Guyana arrowroot), is most widely grown with many cvs. with 3x to 8x (all ploidy levels), tubers weighing up to 50 kg. *D. bulbifera* L. (air-potato) produces axillary bulbils; some cvs. edible. *D. esculenta* (Lour.) Burkill (potato yam) has clones with 4x, 6x, 9x, 10x. Diosgenin, a precursor of progesterone, cortisones etc., is yielded in commercial quantities by a number of species. *D. floribunda* M. Martens & Galeotti (Mexico) produces it 10% by weight.

DIOSCOREA L., Sp. Pl. : 1032. 1753 & Gen. Pl. ed. 5. 456. 1754.

LT. : *D. sativa* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 1. : 535. 1913).

1a. Leaves 3-5-foliolate; flowers short-pedicelled

2a. Leaves 3-foliolate; male flowers in dense, cylindric spikes clustered along a more or less prickly, long, pubescent or villous rachis, female in solitary, distant spikes; stamens 6, all perfect, capsules 4-5 cm long — *D. hispida*

2b. Leaves 5-foliolate or upper simple; male flowers in small racemes on long, slender, axillary or terminal panicles, female in slender, elongate, 1-3-nate racemes; stamens 3, perfect, 3 staminodes; capsules upto 2.5 cm long — *D. pentaphylla*

1b Leaves simple; flowers sessile

3a. Stems twining to left; spikes slender, pendulous; sepals linear; capsules oblong, longer than broad; seeds winged only at base — *D. bulbifera*

3b. Stems twining to right; spikes stiff, spreading; sepals broadly oblong or orbicular; capsules broader than long; seeds broadly winged all round

4a. Plants, especially inflorescences, densely pubescent or tomentose; ovary tomentose — *D. puber*

4b. Plant glabrous; inflorescences slightly pubescent; ovary glabrous

5a. Leaf 7-9-veined, margin not cartilaginous, tip acute, base deeply to shallowly cordate, dark glaucous beneath; tubers at end of long fleshy fibres; male spikes 1-3-nate in axils or on leafless axillary shoots — *D. belophylla*

5b. Leaf 3-5-veined, coriaceous with a cartilaginous margin, tip acuminate or obtuse, base acute or rounded, not glaucous beneath; tubers direct from rootstock; male spikes fascicled on a long slender rhachis — *D. oppositifolia*

Dioscorea belophylla (Prain) J. O. Voigt ex Haines, For. Fl. Chota Nagpur : 530. 1910, et Botany 3 : 1169; Hara *et al.*, Enum. 1 : 67. 1978; *D. nummularia* Lam. var. *belophylla* Prain, Bengal Pl. 2 : 1065. 1067. 1903; *D. belophylla* J. O. Voigt, Hort. Suburb. Calcutta. 653. 1845, *nom. nud.*; Fl. Hassan : 806. 1976; *D. glabra sensu* J. D. Hook. in FBI 6 : 294. 1892. *pro part., non* Roxb. 1832. (*Korondi-alu, Tara-kanda, Malara*—Or.).

Slender twiners; stems twining to right. Leaves opposite, long-petioled, orbicular, ovate-oblong or ovate-lanceolate, 7-18 × 2-10 cm; petioles twisted at base. Male spikes 2-5 cm long; flowers dioecious, scattered, globose or oblong, 1-1.5 mm long; tepals 6, 2-seriate; stamens 6, all perfect; female spikes from nodes of leafy branches, lax, solitary or fascicled, about 15 cm long; tepals 6, 2-seriate; staminodes 6; ovaries 3-quetrous, 3-celled; styles 3, very short. Capsules obovoid, base obconic, depressed at apex, pendulous, 2.5-3.5 cm in diam.

Fl. : Sept.-Nov. *Frt.* : Nov.-Mar.

Common in open rocky valley forests.

Khondra : 12744, 12790.

India, Nepal, Pakistan.

Tubers edible, but not much relished as they become gluey on cooking; a form found in Meghalaya and Abor hills yields better quality tubers.

D. bulbifera L., Sp. Pl. : 1033. 1753; Haines, Botany 3 : 1172; Nicolson *et al.*, Reg. Vegetab. 119 : 290. 1988. *D. sativa* Thunb., Fl. Jap. : 15. 1784, non L. (1753); in Hook. f. FBI 6 : 295. 1892. *Kanu-katsjii* Rheede, Hort. Malab. 7 : 69, t. 36. 1688. *Kantu-kelengu* Rheede, l.c. : 71, t. 37. (*Potato yam; Air potato*—Eng.; *Ratalu*—Hindi; *Pita alu*—Beng., Or.).

Slender twiner; stems twining to left, bulbiferous; tubers globose to pyriform. Leaves alternate, broadly ovate-cordate to sub-orbicular, acuminate-cuspidate or caudate, base deeply cordate, 7-11-veined, 10-30 × 6-15 (-18) cm; petioles 8-10 cm long, twisted at base. Bulbils roundish, brown, with tubercle-like eyes. Male spikes almost capillary, panicled, axillary, solitary or fascicled, 5-8 cm long; flowers greenish white or purple, 1.5-2.5 cm long; tepals 6, 2-seriate, linear, outer upto 2.5 mm long, fleshy, inner narrower; pistillodes minute; stamens 6, all perfect; female spikes 10-20 cm long, fascicled; tepals as in males; staminodes 6; ovaries 3-quetrous, 3-celled; stigmas 3, recurved. Capsules 2-2.5 cm long and 1-1.5 cm broad, reflexed, membranous.

LT.: Heimann (Parad, Bat. pl. : 217. 1698) (vide Jayasuriya; taste Nicolson *et al.*, 1988).

Fl.: July-Sept. *Frt.*: Oct.-Nov.

Common in open forests, along forest roads.

Lamni : 19231; Bilaspur to Champa : 19366; Korba : 12856; Kota : 13089; Keonchi : 13256A.

Palaeotropics.

Tubers acrid, eaten in times of scarcity; dried and pounded-applied to ulcers; also used in piles and dysentery. In Japan, it is used for starch extraction after elimination of calcium oxalate, poisonous alkaloids and volatile acids.

D. hispidia Dennst., Schlüssel Hort. Ind. Malab. : 15, 20, 33. 1818; Burkill & Prain, Ann. Roy. Bot. Garden (Calcutta) 14(1) : 188, t. 77. 1936; Nicolson *et al.*, Reg. Vegetab. 119 : 292. 1988. *D. triphylla* L. Herb. Amboin. : 23. 1754, et auctt., non L. (1753). *D. lunata* Roth, Nov.

Pl. Sp. : 370. 1821. *D. hirsuta* Bl., Enum. Pl. Jav. : 21. 1827, *D. daemona* Roxb. [Hort. Beng. : 72. 1814, nom. nud.] Fl. Ind. 3 : 805. 1832; Wight, Icon. : t. 811. 1844 ("*amoena*") : Haines, Botany 3 : 1173. *Podava-kelengu* Rheede, Hort. Malab. 7 : 97, t. 51-52. 1688. (*Karukanda*—Hindi).

Twining herbs; stems twining to left, hirsute, aculeate with short recurved prickles; tubers lobed or subglobose. Leaves long petioled; 3-foliolate, petiolules 5-10 mm long, middle leaflet obovate-elliptic, laterals ovate-elliptic to oblong, all with a cuneate or rounded base, cuspidate-acuminate. Male spikes 2-5 nate, pendulous, paniculate; 6-10 mm long; panicles 15-20 cm long, pubescent; bracts shorter than flowers; tepals 6, 2-seriate, outer orbicular-ovate, membranous, shorter than inner, ovate, incurved, coriaceous; stamens 6, all perfect; female spikes usually 2-nate, simple, 10-20 cm long; tepals as in males; ovaries 3-quetrous, 3-celled, tomentose, oblong. Capsules reflexed, oblong, base and top truncately round; 40-50 × 20-25 mm, seeds winged at base.

LT. : Podava-kelengu Rheede, l.c. t. 51 (vide Jayasuriya (mss.) vide Nicolson *et al.*, 1988).

Fl. : June-Aug. *Frt.* : Sept.-Oct.

Common in damp forests.

Lamni : 19247.

Tropics of Asia from India to Taiwan, Philippines.

Tubers acrid and poisonous; used as food after proper washing in running water, only in times of scarcity; may be utilised for industrial starch and edible flour.

D. oppositifolia L., Sp. Pl. : 1033. 1753; in Hook. f. FBI 6 : 292. 1892; Haines, Botany 3 : 1168; Fl. Hassan : 808. 1976.

Herbaceous twiners; stems turning to right; rootstock producing a fascicle of tubers. Leaves all simple, usually opposite, lanceolate to elliptic-oblong ovate or orbicular, 3-5-veined, 6-10 × 2-5 cm; petioles 1-2.5 cm long. Male spike dense, slightly pubescent, 1-2 cm long, subverticillate, on an axillary rhachis 2.5-10 cm long, or on a long terminal pendulous rhacis about 30 cm long; flowers globose, sweet scented, 2.5-3 mm across, yellow-green; tepals 6, 2-seriate, oblong-obovate outer ones about 2.5 mm long, inner ones 2 mm long; stamens 6, all perfect; pistillode of 3, green glands; female spikes solitary or fascicled; rhachis often pubescent, 20 cm long, panicled; flowers

distant; tepals as in males, about 1 mm long; ovaries pubescent. Capsules retuse or almost 2-lobed at apex, base depressed, coriaceous, 3-6 cm across, stipitate, pendulous. Seeds orbicular with large wing alround.

Fl. : July-Sept. *Frt.* : Oct.-Nov.

Common in moist forests.

Achanakmar : 13230; Lamni : 19253.

India, Sri Lanka.

Tubers 15-20 cm long, are edible, most esteemed of the yams; are also ground and applied to ulcers.

D. pentaphylla L., Sp. Pl. : 1032. 1753; Haines, Botany 3 : 1173; Burkill in Fl. Males., Ser. I. 4 : 315. 1951; Nicolson *et al.*, Reg. Veget. 119 : 292. 1988. (LT : Rheede l.c. t. 35. 1688) *D. triphylla* L., Sp. Pl. : 1032. 1753, non L. (1754). *D. digitata* Mill, Gard. Dict. ed. 8. 1768. *D. spinosa* J. Burm., Fl. Malab. : 5. 1769. *D. pentaphylla* var. *communis* Prain & Burkill, J. Proc. Asiat. Soc. Beng. 10 : 23. 1914, et var. *rheedei* Prain & Burkill l.c. ("*rheedii*"). *Tsjageri-nuren* Rheede, Hort. Malab. 7 : 63, t. 33. 1688. (LT. : of *D. triphylla* L.). *Katu-nuren-kelengu* Rheede, l.c. : 65 ("63"), t. 34. 1688. [LT. : *Wight* 2823 (NY)-vide Jayasuriya (mss) cf. Nicolson *et al.*, 1988] *Nuren-kelengu* Rheede, l.c. : 67, t. 35. 1688. (*Koraba-alu, Korba*—Or.).

Herbaceous twiners; stems twining to left; tubers oblong to globose; stems prickly at base, often bulbiferous. Leaves glabrous or sparsely pubescent beneath, 10-14 × 5-6 cm; petioles 3-10 cm long; leaflets digitate, ovate-elliptic, oblique at base, petiolules 3-5 mm long. Male spikes dense, pubescent, cylindric-oblong, pendent, 1-2-nate, 2-3.5 cm long, in long axillary racemes or terminally panicled; tepals 6, 2-seriate; stamens 3, perfect, staminodes 3; pistillodes minute; female spikes pendent, lax, pubescent, solitary or 2-nate, rarely panicled, 6-12 cm long; tepals as in males; staminodes 6; ovaries pubescent. Capsules oblong, rounded at both ends or base cordate and tip apiculate, reflexed, glabrous or pubescent.

LT. : Rheede, l.c. t 35 (vide Jayasuriya mss., cf. Nicolson *et al.*, 1988).

Fl. : July-Aug. & Nov.-Dec. *Frt.* : Oct.-Jan. & Feb.-Apr.

Common in damp forests.

Lamni : 13247A; Khandra : 12735.

India, Burma, Thailand, Vietnam, Malayasia.

Known in Hindi as *Bhusa* or *Kanta alu* and in Bengali, as *Suar alu*, tubers become edible only after repeated boiling and washing; tubers considered tonic and also applied on swellings; leaves and flowers consumed as vegetable.

D. pubera Bl., Enum. Pl. Java 1 : 21. 1827; Burkill in Fl. Males. Ser. I. 4 : 333. 1951; Hara *et al.*, Enum. 1 : 68. 1978; *D. anguina* Roxb., Fl. Ind., ed. 2. 3 : 803. 1832: J. D. Hook. in FBI. 6 : 293. 1892; Haines, Botany 3 : 1167. (*Kasa alu*—Hindi).

Herbaceous twiners; stems from a straight, cylindrical tuber. Leaves opposite, long-petioled, broadly ovate or orbicular, cordate to ovate-cordate, acuminate, pubescent, 12-24 × 9-20 cm. Bulbils globose. 4-5 cm across, greenish or greyish-brown. Male spikes pubescent, whorled in axillary and terminal panicles, upto 18 cm long; spikes dense-flowered, 1-3-nate, 1-2.5 cm long, flowers 2-3 mm across, greenish-yellow; tepals 6, 2-seriate; stamens 6, all perfect; female spikes pubescent, solitary axillary or in short axillary panicles upto 15 cm long; tepals as in males, much thickened at base with age, bearing a staminode on callus; ovaries 3-quetrous, 3-celled. Capsules 1.5 cm long; margins of wings thickened, apex retuse, base almost truncate, slightly pubescent.

Fl. : Sept.-Nov. *Frt.* : Nov.-Jan.

Common in moist localities.

Achanakmar : 13256.

India, Burma, Sumatra, Java.

Tubers are edible and also used for medicinal purposes.

LILIACEAE

A. L. Jussieu, Gen. Pl. : 48. 1789 ('*Lilia*').

T. : *Lilium* Linn.

Amaryllidaceae Jaune Saint-Hillaire, Expos. Fam. 1 : 134. 1805 ('*Amaryllideae*') ; Hutchinson, Fam. Fl. Pl. ed. 3 : 789. 1973. T. : *Amaryllis* Linn.

Note : Mabberley (1987), following Cronquist (1981), does not recognise the *Amaryllidaceae* Jaume Saint-Hilaire (1805) as distinct from the *Liliaceae* Juss. (1789), whereas ICBN (1988, App. IIB) lists the former as nom. cons. *Alliaceae* J. G. Agardh (G. hypg. umbels), *Amaryllidaceae* (G. epig. cymose, esp. umbels, perianth tube) *Hypoxidaceae* R. Br. (G, epig. racemes), *Liliaceae* s.s. (G, hypg.

racemes), etc. are all included by Cronquist in *Liliaceae s.s.* Of the 15 families recognised in *Liliales* by Cronquist, *Aloeaceae* Batsch. and *Hanguanaceae* Airyshaw are not listed in ICBN (1988) as *nom. cons.* Hutchinson (1973) segregates *Amaryllidaceae* from *Liliaceae* as follows.

Scapigerous herbs with radical leaves and bulbous rootstock; inflorescences subtended by one or more spathaceous bracts; corona often present, perianth segments free or often united at base into a single tube; ovary completely inferior, syncarpus. *Amaryllidaceae*

Herbs with corms, rhizomes or bulbs, rarely climbing; corolla-like perianth in two similar series and often fusing together into one tube; ovary superior or rarely semi-inferior *Liliaceae*

We follow here Cronquist (1981).

Allium cepa L. (cultigen. onion, possibly derived from *A. oschaninii* B. Fedtsch. but known from Dead Sea Chalcolithic (c. 3500-3000 B.C.)—3 groups: **Cepa**—onion, single bulbs without bulbils in inflorescence—(six types grown at the time of Pliny)—much dehydrated or powdered, as well as marketed fresh; **Aggregatum** = Shallot ('*A. ascalonicum*'), multiplier or potato onion, produces lateral bulbs and none in inflorescence (often sterile), widely used pickled onion; **Proliferum** = Egyptian or tree onion, propagated by bulbils in inflorescence; all groups with some medicinal uses (extracts antibacterial) *A. sativum* L. (garlic, cultigen, possibly derived from *A. longicuspis* Regel (Central Asia), but known from Dead Sea Chalcolithic, c. 3500-3000 B.C. and 2 or 3 types cultivated at the time of Pliny)—strong flavour, also used in Chewing-gum and garlic salt for cooking, bactericidal and much used medicinally since time before Galen and in horticulture, where effective against foot-rot of runner beans, also in superstition worn round neck to ward off Trolls etc. These two species are widely cultivated for commercial purposes. *Zephyranthes carinata* Herbert (*Liliaceae-Amaryllidaceae*)—an ornamental bulbous herb with white, red, pink, yellow flowers, is cultivated in gardens in the district.

1a. Ovaries inferior

2a. Flowers arranged in a scapose umbel, subtended by more or less, membranous spathaceous bracts CRINUM

2b. Flowers solitary, on a short-scape CURCULIGO

1b. Ovaries superior

3a. Shrubby climbers

4a. Leaves replaced by linear or needle-like cladodes; flowers small, white or creamy ASPARAGUS

4b. Leaves well-developed, with cirrhose tips; flowers large, showy, yellow and red — GLORIOSA

3b. Erect herbs

5a. Rootstock short with many fleshy or tuberous roots; underground perennial stems very small — CHLOROPHYTUM

5b. Rootstock a bulb or corm; underground perennial stems well-developed

6a. Perennial stem a solid corm: flowers solitary or corymbose on leafy scapes — IPHIGENIA

6b. Perennial stem a tunicate bulb; flowers racemose on leafless scape — DRIMIA

ASPARAGUS L., Sp. Pl. : 313. 1753 & Gen. Pl. ed. 5 : 147. 1754.

LT. : *A. officinalis* L. (vide N.L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 1 : 313. 1913).

Usually rhizomes with photosynthetic inflorescences, sometimes with longer-lived woody thorny stems; cultivated ornamentals and young shoots edible. *A. officinalis* L. (Garden asparagus, Europe to N. Africa), is the asparagus of commerce; ground-seeds a good substitute for coffee and aerial parts are suggested for high quality paper-making. *A. setaceus* (Kunth) Jessop (*A. plumosus*, asparagus fern) much used by florists in botton-holes etc.

Asparagus racemosus Willd., Sp. Pl. 2 : 152. 1799; Haines, Botany 3 : 1137; Nicolson *et al.*, Reg. Veg. 119 : 295. 1988. *Schada-Veli—Kelangu* Rheede, Hort. Malab. 10 : 19-20, t. 10. 1690. (*Satawar, Shataori*—Hindi, Oriya).

Climbing shrubs; branches triquetrous striate, prickly with reflexed spines; rootstock tuberous. Cladodes 2-6-nate, finely acuminate falcate divaricate, more or less acicular and 3-quetrous, 1-2.5 cm long. Foliar cladodes arising in axils of scale-leaves. Racemes solitary or fascicled, simple or branched, 2.5-5 cm long; flowers white, sweet-scented, on filiform, articulate, 4 mm long pedicels, 3 mm across; bracts minute; perianth campanulate, 6-partite, segments spreading, 2-3 mm across; stamens 6, attached on base of segments; ovaries 3-gonous, 3-celled; style 1; stigmas 3. Berries globose, 4-6 mm in diam., red or reddish-violet, 1-3-seeded.

Fl. : Sept.-Dec. *Frt.* : Feb.-May.

Common in open forests and scrubs.

Khondra : 12733.

Africa, India, Malaysia, Australia.

Herb tonic, diuretic and galactogogue; fresh root-juice mixed with honey and given for dyspepsia. Roots form a constituent of medicinal oil used for nervous and rheumatic complaints. Roots mixed with the rhizomes of *Curculigo orchioides* and *Pueraria tuberosa*, are used as a drug for rejuvination (Panigrahi, 1963). In Bengal, the roots used for making sweetmeats; rich in vitamins.

CHLOROPHYTUM Ker-Gawl. in Bot. Mag. : t. 1071. 1807.

T.: *C. inornatum* Ker-Gawl.

Chlorophytum arundinaceum Baker in Jour. Linn. Soc. 15 : 323. 1876; Haines, Botany 3 : 1147; Hara *et al.*, Enum. 1 : 71. 1078. (*Safed musli*—Hindi).

Perennial herbs; tuberous roots on long fibres. Leaves radical, oblong-lanceolate, acuminate, narrowed into a petiole, 15-60 × 2-4 cm. Scape naked, 15-40 cm long or more. Racemes erect, dense-flowered, 7-18 cm long, elongate, simple or short-branched; flowers 2-several in axils of lanceolate, acuminate bracts; pedicels 3-6 mm long, jointed in middle; perianth macrescent, 6-partite; segments narrowly oblong, obtuse or lanceolate, acute, white 6-8 mm long; stamens 6, hypogynous or short-adnate to base of perianth-segments; ovaries sessile, 3-quetrous, 3-celled. Capsules 1-3 at each node, 6-8 mm in diam., retuse or truncate, orbicular, 3-4-seeded; seeds flat.

Fl. : Mar.-Aug. *Frt.* : Oct.-Dec.

Common in moist places in Sal forests.

Madai to Korba : 12918; Pasan to Pendra : 19133.

India, Nepal, Burma.

Tuberous roots possess medicinal properties; used as a tonic.

CRINUM L., Sp. Pl. : 291. 1753 & Gen. Pl. ed. 5 : 141. 1754. (*Amaryllidaceae*)

LT.: *C. americanum* L., vide N. L. Britton et P. Wilson, Scient. Surv. Porto Rico 5 : 160. 1923.

Crinum asiaticum L.—bulbous plants with spirally arranged leaves and conspicuous flowers maturing together and seeds with a layer of cork over endosperm aiding water dispersal, is often cultivated in gardens as ornamental and also found in marshy places as an escape. Alkaloids present.

Crinum defixum Ker-Gawler in Journ. Sci. & Arts (London) 3 : 105. 1817; Baker, Handb. Amaryllid. : 76. 1888; Haines, Botany 3 : 1157;

Nicolson *et al.*, Regnum Vegetab. 119 : 272. 1988. *Belluta-pola* Rheede, Hort. Malab. 11 : 75-76, t. 38. 1692.

Stout, stoloniferous, mucilage-containing herbs. Leaves radical, linear, ensiform, obtuse, concave or channelled above, base amplexicaul, 40-60 × 2-4 cm. Scapes from outer leaf axils, 30-60 cm long, compressed; umbels 6-12-flowered, subtended by 2 spathaceous, lanceolate, greenish, membranous finely scarious bracts 6-7.5 cm long; bracteoles linear, with clavate tips; flowers white; perianth-tubes, 6-8 cm long, salver-shaped, cleft into 6 linear-lanceolate, reflexed lobes, 7-10 cm long; stamens 6, attached on throat of perianth, filaments filiform, spreading, equalling perianth-lobes with anthers curved, 1-2 cm long; ovaries 3-celled. Fruits subglobose, 2.5 cm across, 1- or 2-seeded, breaking up irregularly.

Type: Rheede, l.c. : t. 38.

Fl.: July-Aug. *Frt.*: Oct.

Common in marshy and muddy places along streams, river banks.

Madai to Korbi : 19483.

India, Sri Lanka.

CURCULIGO Gaertn., Fruct. 1 : 63. t. 16. f. 11. 1788.

T.: *C. orchioides* Gaertn.

Ovary loculi imperfect, some propagules epiphyllous.

Note: Nicolson *et al.*, (1988) include the genus in the *Hypoxidaceae* R. Brown, *nom. cons.*, not treated by Cronquist (1981) as distinct from the *Liliaceae*.

Curculigo orchioides Gaertn., Fruct. 1 : 63, t. 16, f. 11. 1788; Haines, Botany 3 : 1182; Nicolson *et al.*, Reg. Veget. 119 : 294. 1988. *Nella-pana-Kelangu* Rheede, Hort. Malab. 12 : 111, t. 59. 1693. (*Tala-muli*—Oriya; *Kali musli*—Hindi).

Tuberous herbs; tubers elongated, tip crowned with remains of old leaves. Leaves radical, lanceolate, plicate, acuminate, pilose, sheathing at base, 8-15 × 1.5-2 cm. Scapes 2-5 cm long subterranean, clavate, flattened, sheathed with whitish lanceolate hairy bracts; flowers solitary on scapes, sessile or subsessile, yellow, opening in succession, 1.5-2 cm across, lowest bisexual or female, others male; perianth-tubes filiform, hairy, 1.5-2.5 cm long, 6-partite; segments spreading, borne on a rostrum, lanceolate-oblong, acute, ciliate at top, dimorphic, male 6-8 mm long, female or bisexual 1-1.5 cm long; stamens 6, adnate to base of perianth-

lobes, anthers longer than filaments; ovaries densely hairy; stigma 3-cleft. Capsules oblong, short-beaked, rather fleshy, indehiscent, 1-4-seeded.

Fl. : June-Aug. *Frt.* : Oct.-Nov.

Common in the forests in leaf-litters.

Marwahi : 19008.

India, Nepal, Sri Lanka, east to Japan, Malaysia.

Tuberous roots used for skin troubles; considered demulcent, diuretic, and tonic; in combination with aromatics and bitters, they are used in piles, diarrhoea, jaundice and asthma; used as a drug for rejuvination when mixed with root-powder of *Asparagus racemosus* and *Pueraria tuberosa* (cf. Panigrahi, 1963).

GLORIOSA L., Sp. Pl. : 305. 1753 & Gen. Pl. ed. 5 : 144. 1754.

T. : *G. superba* L.

Flame lily : scramblers, of forest-edge and scrubs, especially in abandoned cultivated fields, with tendrils of leaf-tips and pedicels adnate for two nodes above the point of emergence of their vascular bundles from the stem; the flowers have reflexed perianth, are nodding and with spreading anthers and styles projecting from flowers horizontally, yet close to one another, so that seed-set by selfing is possible in absence of pollinators; alkaloids including colchicine; brittle underground tubers poisonous and used for suicide; several selected forms with specific names in cultivation, the best possibly '*G. rothschildiana*'.

Gloriosa superba L., Sp. Pl. : 305. 1753 : Haines, Botany 3 : 1143; Nicolson *et al.*, Reg. Veg. 119 : 295. 1988. *Mendoni* Rheede, Hort. Malab. 7 : 107-108, t. 57. 1688.

Climbing or scrambling herbs; with fascicled tuberous roots. Leaves sessile or short-petioled, opposite or 3-nately whorled, oblong to ovate-lanceolate, base rounded or cordate, glabrous, 12-20 × 2-5 cm. Flowers solitary, axillary, 7-10 cm across forming terminal corymbs, inverted; pedicels 10-15 cm long, tip reflexed; perianth persistent, segments 6, subequal, narrow, spreading or reflexed, crisply waved, linear-lanceolate, lower half yellow, upper half red; stamens 6, spreading, equalling perianth-segments; anthers 1-1.5 cm long; ovaries 3-celled; styles 3-fid, 4 cm long, bent at base; stigma introrse. Capsules 5 cm long, oblong, coriaceous, septicidal, many-seeded.

Syntype : Rheede, l.c. : t. 57; Herb. Hermann [Sp. no. 127 (BM) vide Trimen (1887 : 138), as lectotype].

Fl. & Frt. : June-Sept.

Common in moist grassy places, low jungles, forest clearings, edges of the forests.

Pasarkhet : 12973; Madai to Korbi : 19479.

Throughout tropical Africa, Asia.

Tubers, leaves and flowers have reputed medicinal properties. Roots contain alkaloids, gloriosine and superbine.

IPHIGENIA Kunth, Enum. Pl. 4 : 212. 1843, *nom. cons.*

LT. : *I. indica* (L.) A. Gray (*Melanthium indicum* L.) vide Pfeiffer, Nom. 1 : 1755. 1874.

Iphigenia indica (L.) A. Gray in Kunth, Enum. Pl. 4 : 213. 1843; Haines, Botany 3 : 1146; Stearn in Hara *et al.*, Enum. 1 : 73. 1978; *Melanthium indicum* L., Mant. Pl. : 226. 1771. (*Chutia chandbol*—Santal).

Erect, perennial herbs; corms 1-1.5 cm across, sheaths brown; stems simple, terete, 8-25 cm long, flexuous, leafy. Leaves a few, sessile, linear-oblong, acuminate, sheathing, at base, 10-20 × 0.4-1 cm. Racemes terminal, flowers reddish or purplish, 4-5 mm across, solitary or 2; bracts linear, subulate, foliaceous; pedicels 2 cm long; perianth 6-partite; segments linear-subulate or oblanceolate, short-clawed, acuminate, reflexed, 5-7 mm long; stamens 6, dark purple, hypogynous; ovaries 3-celled; styles 3, short-connate below. Capsules oblong or obovoid, loculicidal, 2-2.5 cm long, many-seeded.

Fl. : July-Sept. *Frt.* : Oct.-Nov.

Common in moist places on the banks of streams, forest clearings.

Achanakmar : 19282; Pasarkhet : 12955.

India, Sri Lanka, Burma, Malaysia, Australia.

Corm is used in colic; flowers yield a red dye.

DRIMIA Jacq. (cf. Airy Shaw, Dict. Flow. Pl. & Ferns ed. 8 : 389. 1973; Mabberley, The Plant-Book : 194. 1987.

T. : *D. indica* (Roxb.) Jessop.

Urginea Steinh. in Ann. Sci. Nat. Ser. II, 1 : 321. t. 14. 1834.

T. : *U. undulata* (Desf.) Steinh (*Scilla undulata* Desf.).

Drimia indica (Roxb.) Jessop; cf. Mabberley, *l.c.* : 194. 1987. *Scilla indica* Roxb. [Hort. Beng. : 24. 1814, nom. nud.] Fl. Ind. ed. 2, 2 : 147. 1832. *Urginea indica* (Roxb.) Kunth. Enum. Pl. 4 : 333. 1843; Haines, Botany 3 : 1145; Hara *et al.*, Enum. Flow. Pl. Nepal 1 : 80. 1978. (Indian Squill, True Squill, Sea-Onion. *Vanapandan, Kolkanda*—Sansk.; *Jungli Piyaz*—Bengali, Oriya).

Scapigerous herbs; bulbs globose, ovoid, 3-4 cm in diam., tunicate, with adhering grey fleshy scales. Leaves radical, simple, linear, ensiform, flat, acute, 15-45 × 1-2.5 cm. Scapes 30-65 cm long, appearing before leaves, racemes 15-30 cm long, erect; flowers distant, long-pedicelled, drooping, greenish-white with brown streaks, pedicels elongating to 3-5 cm in fruits; bracts ovate-lanceolate, auricled, 2 mm long; perianth campanulate, segments 6, linear-oblong, white at margins, 7-10 mm long; stamens 6, inserted at base of perianth-segments, filaments white; ovaries oblong, 6-grooved, 3-celled; styles narrowly obconic; stigma 3-gonous. Capsules oblong, coriaceous, 3-quetrous, loculicidal many-seeded.

Types : Coromandelia, *W. Roxburgh s.n.*; Roxb. Icon. t. 1396 (CAL).

Fl : Mar.-May. *Frt.* : May-July.

Frequently seen in grassy places.

Korba : 8641; Katghora : 3705.

Tropical Africa, India.

Each flower lasts only one night, opening in the evening and closing early in the morning. The bulbs possess cardiac stimulant and diuretic properties. Bulbs are the source of drug known as INDIAN SQUILL, used as a cardiotonic, stimulant, expectorant and diuretic; in large doses, however, it is emetic and cathartic and may cause cardiac depression. Alcoholic extract of bulbs possess anticancer activity against human epidermoid carcinoma of the nasopharynx; also shows hypoglycaemic action. Bulbs employed as a deobstruent, used in dropsy, rheumatism and skin troubles. Externally used to remove corns and warts. Powder of bulbs acts as adhesive; 3% solution is used as paper-paste; also for sizing cotton-cloth used as a substitute for *D. maritima* (L.) Stern (Squill sea onion), used also as rat-poison (specific to rodents; other animals vomit).

SMILACACEAE Ventenat, Tabl. Regne. Veg. 2 : 146. 1799 ('*Smilaceae*').

T. : *Smilax* Linn.

Lianes or herbaceous climbers or branching shrubs with starchy rhizomes and with vessel elements throughout the vegetative body. Leaves spirally arranged, with a pair of tendrils; regarded as modified stipules, from base of petiole near sheath, lamina with 3-7 curved convergent veins, cross-connected. Flowers usually unisexual (*Smilax* dioecious); in umbels or panicles.

Dried rhizomes of some tropical South American species are the sarsaparilla of commerce, (medicinal, used as tonic).

SMILAX L., Sp. Pl. : 1028. 1753, & Gen. Pl. ed. 5 : 455. 1754.

LT. : *S. aspera* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 1 : 527. 1913).

Nicolson *et al.*, (1988) include *Smilax* L. in the *Liliaceae* Juss., although *Smilacaceae* Vent. is nom. cons. and Hutchinson (1973) quotes A.P. de Candolle (1878) to justify segregation from the *Liliaceae*, from which they differ mainly in habit, mostly dioecious flowers and by the confluent anther-loculi.

1a. Petiolar sheaths auricled, broadly winged; wings embracing branches, 1 cm broad on one side; umbels many — *S. perfoliata*

1b. Petiolar sheaths not auricled, narrowly winged, wings not embracing branches, less than 5 mm broad on one side; umbels 1-3 — *S. zeylanica*

Smilax perfoliata Lour., Fl. Cochinch. : 622. 1790; Koyama in Quart. Jour. Taiw. Mus. 13 : 38. 1960, et in Hara *et al.*, Enum. 1 : 79. 1978; *S. prolifera* Roxb., Fl. Ind. 3 : 795. 1832, *pro part.*; Haines, Botany 3 : 1136.

Stout climbers; branchlets 4-angular; prickles recurved. Leaves elliptic-lanceolate, acuminate-cuspidate, base rounded or sub-cordate, 3-7-costate from above base, 10-20 × 3.5-15 cm; petioles 2.5-5 cm long, conspicuously sheathed to half its length. Umbels upto 20 in axillary and terminal panicles, 7-15 cm long, 3-nate or whorled, many-flowered; peduncles 1.5-3 cm long; pedicels 1 cm long; flowers white, dioecious; bracteoles minute; perianth-segments 6, free, recurved, 2-seriate; outer 4-5 mm long, oblong-lanceolate, inner narrower; stamens 6, at base of perianth, free; pistillodes absent; staminodes 3; ovaries oblong, 3-gonous, 3-celled; stigmas 3, deciduous. Fruits a globose berry, red to black, about 8 mm in diam

Fl. : Feb.-Apr. *Frt.* : Oct.-Dec.

Common near streams, in ravines, edges of the forests.

Lamni : 15423.

Roots used as a substitute for sarsaparilla (*Hermidesmus indicus*) for venereal diseases; also employed into applications for rheumatism and employed for urinary complaints and dysentery.

India, Nepal, N. Burma, Indo China, S. China.

S. zeylanica L., Sp. Pl. 2 : 1029; Poiret in Lam., Encycl. 6 : 467, 1805; Haines, Botany 3 : 1196; Nicolson *et al.*, Reg. Veget. 119 : 296. 1988. *Smilax indica* N. Burm., Fl. Ind : 213. 1768.

T. : *Cari-villandi* Rheede, Hort. Malab. 7 : 59-60, t. 31. 1688.

Stout climbers; branches more or less 4-angled. Leaves variable, elliptic, ovate-elliptic, broadly oblong, or ovate-oblong, cuspidate, base rounded or subcordate, 3-5-costate from above base, 10-30 × 7-20 cm; petioles 1.5-2.5 cm long, sheath inconspicuous. Umbels on a common peduncle in axillary short cymes; peduncles bracteate, 1.5-2 cm long; pedicels 4-5 mm long; bracteoles minute; flowers small, greenish-yellow, dioecious; perianth-segments 6, free, oblong, obtuse, 5-6 mm long; stamens 6, at base of perianth; pistillodes absent; staminodes 3; ovaries 3-gonous, 3-celled; stigmas 3, recurved. Fruits a globose berry, red, about 1.5 cm in diam.

Fl. : Apr.-July. *Frt.* : Oct.-Jan.

Common in damp localities, ravines, scrub jungles.

Khondra : 12758; Marwahi to Pasan : 19074.

Roots eaten in veneral and skin diseases; decoction given for sores, swellings and abscesses; leaves consumed as a vegetable.

PONTEDERIACEAE

Kunth in Humboldt, Bonpland et Kunth, Nov. Gen. et Sp. 1 : ed. fol. 211; ed. qu : 265. 1816. ('*Pontedereae*').

T. : *Pontederia* Linn.

Hydrophytes, sometimes free-floating, occasionally annual, with sympodial branching, vegetatively glabrous. Leaves usually with sheath, (inflated with aerenchyma, sometimes) petiole and expanded lamina with parallel convergent curved veins, in basal rosettes. Roots with vessel elements. *Eichhornia* Kunth comprises 7 species of tropical America. *E. crassipes*

(C. Martius) Solms-Laub. (the water-hyacinth), a native of Brazil, trimorphic, heterostylous, is a free-floater with swollen petioles with aerenchyma, the lamina raised above water-level and acting as sails; 2 parents can give 30 offsrings in 23 days and 1200 in 4 months, a yield of 470 tons per hactare. The plant originally introduced as an ornamental, has spread to choke many tropical waterways and is naturalized; when grown on sewage, it can yield 800 kg. dry matter/ha/day, which is harvested for pigs and has been suggested as a methane source (Mabberley 1987). It is used to purify industrial effluents of hard metals, like Mg. and Cadmium and is used in India as a manure and for generating BIOGAS.

MONOCHORIA C. Presl, Rel. Haenk. 1 : 127. 1827.

T.: *M. hastifolia* C. Presl, (*'hastaefolia*) *nom. illeg.* (*Pontaderia hastata* L. = *M. hastata* (L.) Solms-Laubach).

M. hastata (L.) Solms.-Laubh. is expected to occur in the district.

All except roots relished as a vegetable.

Plants tonic and cooling; juice of leaves applied to boils; rhizomes pounded with charcoal, used for scurf.

Monochoria vaginalis (N. Burm.) C. Presl, Reliquiae Haenkeanae 1 : 128. 1827 : Mabberley, The Plant-Book : 378. 1987 [as (Burm. f.) Kunth]; Nicolson *et al.*, Regnum Veget. 119 : 314. 1988. *Pontederia vaginalis* N. Burm., Fl. Ind. : 80. 1768. *Pontederia plantaginea* Roxb., Fl. Ind. 2 : 123. 1832. *Carim-gola* Rheede, Hort. Malab. 11 : 91-92, t. 44. 1692.

Marshy herbs; rootstock short; stems erect or ascending. Leaves linear-lanceolate or ovate, ovate-cordate to ovate-oblong, base subcordate-truncate to rounded, acute or acuminate, glabrous, 5-veined, 4-12 × 2-10 cm; petioles broadly sheathing at base, 5-45 cm long. Inflorescences racemose or sub-spicate, subtended by a spathe-like leaf-sheath, a few-many-flowered; centripetal; flowers short-pedicelled, blue or lilac blue; perianth unequal, 6-partite, campanulate, 1 cm across, 2-seriate, outer lanceolate-oblong, obtuse, inner broader; stamens 6, inserted at the base of perianth-lobes, 1 filament longer with a lateral appendage and larger anther; ovary 3-celled, ellipsoid, 2-3 mm long; style 1; stigma 3-lobed. Capsules ellipsoid, 3-gonous, loculicidally 3-valved, 8-10 mm long; seeds ribbed.

Fl. : June-Aug. *Frt.* : Oct.-Nov.

Common in ditches, rice-fields, muddy soil of ponds.

Kota : 13068; Pasan to Pendra : 19137.

India, Nepal, East to China, Malaysia.

Very variable in habit, size and shape; populations growing in dry conditions tend to have linear-lanceolate leaves and a few-flowered inflorescences, while those growing in marshy areas have ovate-oblong leaves and growing in marshy areas, have ovate-oblong leaves and many-flowered inflorescences. Root is chewed to cure toothache; juice of leaves taken for cough and that of roots for stomach and liver complaints and asthma.

XYRIDACEAE

C. A. Agardh, Aphor. Bot. 158. 1823. ('*Xyrideae*').

T.: *Xyris* L.

Herbs usually in wet places, sometimes rhizomatous; vessel elements throughout vegetative body. Leaves with open sheath, narrow, flat to terete, usually distichous and basal. Flowers bisexual, 3-merous, pollinated by pollen-collecting bees (no nectar or scent), usually sessile in axils of tough imbricate bracts in cylindrical heads or dense spikes.

XYRIS L., Sp. Pl. : 42. 1753; Gen. Pl. ed. 5 : 25. 1754.

T.: *X. indica* L.

Xyris pauciflora Willd., Phytogr. 1 : 2. t. 1, f. 1. 1794; Haines, Botany 3 : 1121; van Royen in Fl. Males. Ser. I. 4 : 371. f. 1H, 3. 1953; Karthikeyan *et al.*, Flor. Ind. Enum. Monocot. : 289. 1989.

Erect, tufted, rigid, marshy herbs; rootstock short, bulbous. Leaves radical, 3-4, linear, acute, smooth or scaberulous, 7-20 × 0.3-0.4 cm. Scapes striate, smooth or scaberulous, upto 12 cm long; heads terminal, globose or ovoid, 6-10 mm in diam.; bracts orbicular-obovate, pale, thin, with often green tip; lateral bracteoles 3, hyaline; flowers about 6, sessile, in axils of imbricating bracts; sepals 3, about 3 mm long, hyaline, deciduous, anterior dorsal sepals obovate, embracing corolla and 2 lateral scarious, cymbiform; corolla about 7 mm in diam.; petals 3, yellow, marcescent, claws connate into a tube below; stamens 3, inserted at base of petals, staminodes 3, bifid; ovaries superior, 1-celled or imperfectly 3-celled; styles 3-fid. Capsules loculicidally 3-valved or top circumscriss.

Fl. & Frt.: Sept.-Jan.

Common in marshes.

Pali : 6724; Pasarkhet : 12968; Katghora : 3981.

India, Nepal, Sri Lanka, Burma, China, Malaysia, Australia.

Bulbs eaten; herb used for insomnia.

COMMELINACEAE

R. Br., Prodr. : 268. 1810 ('*Commelineae*').

T. : *Commelina* L.

Faden & Hunt (Taxon 40 : 19-31. 1991) propose a new classification of the *Commelinaceae* R. Br. comprising two subfamilies, subfam. *Cartonematoideae* (Pichon) Faden & Hunt (non-Indian) and subfam. *Commelinoideae*. The latter has two tribes : tribe *Tradescantieae* Meisner has seven subtribes including subtrib. *Cyanotinae* (Pichon) Faden & Hunt (*Cyanotis* excluding *Amischophacelus* R. Rao & Kamm., nom. superfl. for *Tonningia* Juss.) ; subtribe *Tradescantiinae* Rohw. (*Tradescantia* L.) ; tribe *Commelineae* (to include *Commelina, Murdannia, Aneilema* and *Floscopa*).

They diagnose the two tribes as :

1a Stemata with 2(4) subsidiary cells, if 6, then terminal pair equal to or larger than the second lateral pair ; pollen exine lacking spines ; flowers mainly actinomorphic ; filament hairs when present moniliform

Tribe : *Tradescantieae*

1b. Stemata with 6 subsidiary cells ; pollen exine spinulose, tectum perforate ; flowers actinomorphic or zygomorphic ; filament hairs when present, not moniliform

Tribe : *Commelineae*

Subtribe *Cyanotinae* have seeds with a terminal embryotega ; filaments and style with a subterminal swelling ; anthers usually dehiscing longitudinally by basal pores ; bracteoles conspicuous, foliaceous ; plants succulent : *Cyanotis* D. Don., and *Tonningia* A. Juss.

x = 9 ?, 10-14.

Tradescantia spathacea Sw. [*Rhoeo spathacea* (Sw.) W.T. Stearn], the *Boat-lily*, pachycaul, usually unbranched with leaves to 30 cm long, green and glossy above, but pinkish below and with white flowers ; and *Tradescantia zebrina* Bosse (*Zebrina pendula* Schnizl.) ; *T. pendula* with leaves having two silvery bands separated by green, glabrous adaxially, but purple abaxially, flowers red-purple, are commonly cultivated in the district.

1a. Stamens 3 fertile and 1-3 staminodes

2a. Inflorescences a cymose panicle ; bracts not spathaceous ; petals equal — MURDANNIA

2b. Inflorescences not paniculate, a few-flowered ; bracts spathaceous ; one petal larger than other two and clawed — COMMELINA

1b. Stamens 6, all perfect

3a. Cymes secund, arranged in a panicle; petals free; ovaries 2-celled with 1 ovule in each cell; capsules 2-celled — FLOSCOPA

3b. Cymes scorpioid; petals united in lower parts into a tube; ovaries 3-celled with 2 ovules in each cell; capsules 3-celled

4a. Inflorescences terminal, short-stalked, with conspicuous 2-seriate, imbricate bracteoles — CYANOTIS

4b. Inflorescences axillary, sessile, with small, inconspicuous bracteoles not imbricately arranged — TONNINGIA

COMMELINA L., Sp. Pl. : 40. 1753 & Gen. Pl. ed. 5 : 25. 1754.

LT.: *C. communis* L. (vide N. L. Britton et A. Brown Ill. Fl. N.U.S. ed. 2. 1 : 457. 1913).

1a. All the cells of ovaries 1-ovuled

2a. Spathe 7-15 mm long; capsules 2-celled; seed with large pits — *C. suffruticosa*

2b. Spathe 2-3.5 cm long; capsules 3-celled; seeds smooth — *C. maculata*

1b. Anterior pair of cells of ovaries 2-ovuled, posterior cell 1-ovuled

3a. Spathe funnel-shaped or cucullate with margins connate nearly to top — *C. forsskalaei*

3b. Spathe complicate, margins free or connate at very base only

4a. Capsules 1-2-celled — *C. attenuata*

4b. Capsules 3-celled

5a. Seeds tuberculate and distinctly reticulate, oblong-cylindric — *C. diffusa*

5b. Seeds smooth, truncate at one end

6a. Branches of cymes equal, usually 1-2-flowered; seeds ovoid or sub-globose, with a whitish membranous appendage at one end — *C. longifolia*

6b. Branches of cymes usually unequal, upper 2-4-flowered, lower usually 1-2-flowered; seeds cylindric, subacute or rounded at one end, not appendaged — *C. caroliniana*

Commelina attenuata Koenig ex Vahl, Enum. Pl. 2 : 168. 1806; Haines, Botany 3 : 1124.

Diffuse herbs; stems tufted; branches angled. Leaves sessile, linear or lanceolate, mostly conduplicate, acute or sub-obtuse, 3-7 × 0.7-2 cm; sheaths cylindric, 6-7 mm long, ciliate. Spathes oblong or ovate-lanceolate, 2-3.5 cm long, long-acuminate or caudate-acuminate, base auricled, deeply cordate, 2-3 cm long, ciliate. Cymes 2-nate or 2-fid; flowers small, blue, slightly exserted; sepals 3, membranous; petals 3, longer than sepals; stamens 3, anthers oblong; ovaries 3-celled. Capsules 6 mm long, oblong, retuse, with 1 subglobose seed or 2 superposed seeds.

Fl. : July-Aug. *Frt.* : Sept-Nov.

Commonly found in leaf-litters inside forests.

Madai : 19462.

2n = 48.

India, Sri Lanka.

C. diffusa N. L. Burm., Fl. Ind. : 18. t. 7, f. 2. 1768; Rolla Rao in Notes Roy. Bot. Gard. Edinburgh 25 : 179. 1964; Panigrahi & Kammathy in J. Indian bot. Soc. 43 : 299. 1964; Faden, Taxon 38 : 52. 1989, *C. nudiflora* auct., non L. (1753); Haines, Botany 3 : 1123. *C. communis* Dalz. & Gibson, Bombay Fl. : 252. 1861.

Weedy diffusely spreading herbs; stems creeping and rooting at nodes. Leaves sessile, usually glabrous, lanceolate or ovate-lanceolate, acute or acuminate, 2.5-7.5 × 0.8-1.5 cm; sheaths 1-2 cm long, ciliate. Spathes peduncled, distinctly falcate, conduplicate, ovate-lanceolate, acute, base rounded or cordate, glabrous or pubescent, striate, 2-4 cm long. Cymes 2-forked, branches 1-3-flowered, upper branch often 1-several flowered; flowers small, blue, exserted from spathe, about 1.5 cm in diam.; sepals 3, green, anterior 2 larger; petals 3, lateral petals smaller, obovate, long clawed, dorsal one orbicular, distinctly blue; stamens 3, anthers oblong; ovaries 3-celled. Capsules broadly oblong 4-6.3 mm long; ventral locule 5-seeded, one cell i-seeded; seeds 2.0-2.8 (-3.2) mm long, brown or black, deeply reticulate.

Fl. & Frt. : Aug.-Oct.

Common in damp grassy places, on the banks of streams.

Achanakmar : 13219.

2n = 28, 30, 42, 56, 58, 60.

Pantropic and warm regions of both the hemispheres.

C. forsskalaei Vahl, Enum. Pl. 2 : 172. 1806; J. D. Hook. in FBI. 6 : 371. 1892; Maheshwari & Baldev in Phytomorphology 8 : 277-298. 1958.

Diffuse herbs; stems creeping and rooting at nodes. Leaves sessile, narrowly oblong or linear-oblong, obtuse, or subacute, narrowed at base, margins usually undulate, 2.5-5 × 0.6-1 cm; sheaths 7-10 mm long, ciliate. Spathes ovate or orbicular, short-peduncled, acute, broader than long, often hispid. Cymes 2-forked; flowers dimorphic, aerial ones blue, chasmogamous, underground ones white cleistogamous; sepals 3, 2 inner often connate at base; petals 3, 2 long-clawed; stamens 3, anthers oblong; ovaries 3-celled. Capsules broadly oblong, underground cleistogamous flowers with deformed capsules.

Fl. : July-Aug. *Frt.* : Oct.-Nov.

Frequently seen in road-side ditches.

Keonchi : 15378; Khuria to Pandaria : 19349.

2n = 28, 30.

Africa, India.

C. carolinlana Walter, Fl. Carol. : 68. 1788; Faden. Taxon 38 : 50, figs. 2, 3. 1989. *C. hasskarlii* C. B. Clarke, Commel. & Cyrtandr. Bengal. : 13, t. 3. 1874; Haines, Botany 3 : 1125. (type : India, Rohilkund, Oct. 1845, *T. Thomson*, (K- det. C. B. Clarke fide Faden l.c. fig. 3).

Diffuse herbs; stems creeping and rooting at nodes. Leaves subsessile, narrowly lanceolate or oblong-lanceolate, sub-acute or obtuse, scabrid on margins, 2.5-7.5 × 1-1.5 cm; sheaths ovoid inflated, conspicuously 7-10-veined, pale, margins ciliate, 7-10 mm long. Spathes on 7-15 mm long, peduncled, not at all or slightly falcate, ovate, acute, mucronate, deeply cordate, complicate, margins free to base, 1-5.2 cm long. Upper cymes usually vestigial (rerely well-developed and 1-flowered). Flowers blue; sepals 3, unequal, ovate, obtuse, 3-4 mm long; petals 3, long-clawed;, stamens 3, anthers oblong. Capsules (5-) 6-8 mm long, only one developing to each spathe; ventral locule seeds 2.4-4.3 (-4.6) mm long, smooth to faintly alveolate.

LT. : United States, South Carolina, *Walter* (or *Fraser*?) s.n., Walter Herb. p. 35, upper right hand corner (BM) (vide Faden l.c. : fig. 2)

Fl. : July-Sept. *Frt.* : Sept.-Nov.

Common in moist places, near streams, cultivated fields, along forest-roads.

Khondra : 12714.

Nepal, Bangladesh, India; probably introduced to United States of America in South Carolina with rice seeds from India in 1696.

2n = c. 84, 90.

C. longifolia Lam., Encycl. Meth. Bot. 1 : 129. 1783; Rolla Rao in Taxon 10 : 254. 1961. *C. salicifolia* Roxb., Fl. Ind. 1 : 172. 1820; Haines, Botany 3 : 1124.

Diffuse herbs; stems with long branches and internodes. Leaves linear-lanceolate, 7.5-15 × 0.3-1 cm; sheaths ciliolate, 1-1.5 cm long. Spathes on 1-2 cm long peduncles, lanceolate or ovate-lanceolate, axillary, solitary, acute or acuminate, base rounded, 3-5 cm long. Cymes 2-branched, exserted from spathes; flowers deep blue, polygamous; sepals 3, ovate, obtuse, 2 lateral connate at base; petals 3, equal, ovate, with undulate margins, 2 lateral long-clawed. Capsules 6 mm long, oblong, short- and suddenly acute. Seeds appendiculate, black.

Fl. & Frt.: Oct.-Nov.

Occasionally found on forest floors.

Pasan : 13281.

2n = 75, 90.

India, Burma, Java.

C. maculata Edgew. in Trans. Linn. Soc. 20 : 89. 1846; Rolla Rao in *Blumea* 14 : 353. 1966. *Commelina paludosa* Bl., Enum. Pl. Jav. 1 : 2. 1827; Rolla Rao in Notes Roy. Bot. Gard. Edinb. 25 : 181. 1964; Hara *et al.*, Enum. 1 : 82. 1978; *C. obligua* Ham. ex D. Don, Prodr. Fl. Nepal. : 45. 1825, *non* Vahl 1806; Haines, Botany 3 : 1126. *C. paludosa* Bl. var. *viscida* (Clarke) Rolla Rao & Kammathy in Bull. Bot. Surv. India 3 : 165. 1961.; Panigrahi & Kammathy in J. Indian bot. Soc. 43 : 294-310. 1964.

Stout herbs; stems decumbent or creeping and rooting below. Leaves subsessile, lanceolate, elliptic-lanceolate, lanceolate-oblong, to oblong acute or caudate-acuminate, oblique at base, 5-20 × 2.5-5 cm; sheaths 1.8-2 cm long, mouth ciliate and oblique. Spathes subsessile, funnel-shaped, usually in terminal heads, acute, base cordate, acuminate; cymes simple or branched once, on 1-1.5 cm long peduncles; pedicels 5-15 mm long; flowers blue, about 1.5 cm across; sepals 3, dorsal one 0.3 cm long, lateral ones 5 mm long; petals 3, one larger than the other 2, orbicular and clawed; stamens 3; ovaries 3-celled. Capsules trigonous, obovoid, 3-valved. Seeds ellipsoid, compressed, gray-coloured.

Fl. : July-Sept. *Frt.* : Sept.-Nov.

Frequently seen on slopes, between rock boulders, along forest roads.

Khoota Ghat : 19505; Kabirchabutra : 13334.

2n = 60.

India, Sri Lanka, Burma, Thailand, Vietnam.

Roots laxative, useful in bilious affections.

Root is considered as an antidote for snake poison; useful is vertigo and fever.

C. suffruticosa Bl., Enum. Pl. Jav. 1 : 3. 1827; Haines, Botany 3 : 1126; Hara *et al.*, Enum. 1 : 82. 1978. Panigrahi & Kammathy in Proc. 49th Ind. Sci. Congr. Part 3 : 97-98. 1962.

Stout, scrambling herbs; with creeping rhizomes and fleshy roots; stems with thickened nodes. Leaves sessile, lanceolate, acuminate, base unequal, scaberulous above margins scabrid, 8-20 × 2-5 cm; sheaths auricled, 2.5-3 cm long, ciliate. Spathes short-peduncled, funnel-shaped, broadly ovate-cordate, acute or obtuse, villous, panicled or clustered, 6-15 mm long. Cymes simple, 6-10 flowered; flowers blue or bluish-white, about 1.5 cm across; sepals 3, dorsal one about 4 mm long, lateral ones 6 mm long; petals 3, one larger than the other 2; stamens 3; ovaries 2-celled. Capsules obovoid, cells 1-seeded. Seeds ellipsoid, straw-coloured, with pits.

Fl. : July-Sept. *Frt.* : Oct.-Nov.

Common in moist situations, in leaf-litters, on muddy slopes of streams.

Khondra : 12842, 12745; Pasan to Korbi : 19076; Lamni : 19251; Kabirchabutra : 19190; Madai : 12879.

2n = 60.

India, Nepal, Malaysia.

CYANOTIS D. Don, Prodr. Fl. Nepal. : 45. 1825, *nom. cons.*

T. : *C. barbata* D. Don.

1a. **Plants cottony; bracts slightly longer than cymes; seeds faintly rugose** — *C. fasciculata*

1b. **Plants glabrous or patently hairy; bracts subtending cymes more than twice length of cymes; seeds striate and pitted** — *C. cristata*

Cyanotis cristata (L.) D. Don. Prodr. Fl. Nepal. : 46. 1825 in adnot; Haines, Botany 3 : 1130; Panigrahi & Kammathy in Proc. 53rd. Indian

Sci. Cong. Part 3 : 278-279. 1966; Faden in Taxon 34 : 296. 1985; Nicolson *et al.*, Reg. Veget. 119 : 282. 1988. *Commelina cristata* L., Sp. Pl. : 42. 1753. *Tradescantia cristata* (L.) Jacq., Hort. Vind. 2 : 64, t. 137. 1772. *T. imbricata* Roxb., Fl. Ind. 2 : 120. 1832. *Cyanotis imbricata* (Roxb.) Kunth, Enum. 4 : 103. 1843. *Vetla-caitu* Rheede, Hort. Malab. 7 : 109, t. 58. 1688.

Decumbent ascending herbs. Leaves sessile, ovate-oblong or lanceolate-oblong, obtuse or acute, glabrous or hirsute, 3-10 × 0.8-2.5 cm; sheaths with ciliate margin and throat. Bracts foliaceous, ovate-cordate, 2-8 cm long. Bracteoles falcate, oblong to ovate, acute, striate, hairy at apex. Cymes terminal, recurved, 1-2 cm long, in axil of a lanceolate, 2.5-3.5 cm long spathe; flowers subsessile, blue or purple, exserted; sepals 3, linear-oblong or lanceolate, hairy, 5-6 mm long; petals 3, oblong, spathulate, 7-8 mm long; stamens 6, filaments bearded; ovaries 3-locular, hairy at apex. Capsules obtuse, 3-gonus, 5-6 mm long, truncate, enclosed in bracteoles, each cell 2-seeded.

Fl. & Frt. : July-Oct.

Common in moist places, forest clearings.

Khondra : 12837; Khootaghat : 19504.

2n = 24, 24+0+1B, 26, 30.

A good forage plant, contains about 8% albuminoides.

Tropical Africa, India, China, Malaysia.

C. fasciculata (Heyne ex Roth) J.A. Schult. in Roem. & Schult., Syst. Veg. 7 : 1152. 1830; Panigrahi & Kammathy, *op. cit.* : 278-279, 1966. *Tradescantia fasciculata* Heyne ex Roth, Nov. Pl. Sp. : 189. 1821.

Decumbent herbs. Leaves sessile, linear or oblong-lanceolate, acute, 2-5 × 0.4-0.8 cm; sheaths inflated, ciliate. Bracts ovate-cordate, foliaceous. Bracteoles foliaceous, imbricate, 2-seriate, secund. Cymes terminal; flowers purplish, sepals 3, villous, subequal 6-7 mm long; petals 3, connate below into a tube; stamens 6; filaments bearded with bicoloured, moniliform hairs; anthers oblong; ovaries 3-locular. Capsules trigonous, oblong, pilose upwards, enclosed in bracteoles, loculicidal.

Fl. & Frt. : July-Oct.

Common in moist situations, in swampy places.

Khondra : 12767.

2n = 22, 24.

India, Sri Lanka.

FLOSCOPA Lour., Fl. Cochinch. 1 : 189, 192. 1790.

T. : *F. scandens* Lour.

Floscopa scandens Lour., Fl. Cochinch. 1 : 193. 1790; Haines, Botany 3 : 1131; Hara *et al.*, Enum. 1 : 82. 1978. Karthikeyan *et al.*, Florae Ind. Enum. Monocot. : 27. 1989.

Erect or subscandent herbs. Leaves subsessile, lanceolate or elliptic-lanceolate, acuminate, narrowed at base, scabridly hairy on upper surface, 5-12 × 1.5-3 cm; sheaths hirsute, ciliate on margins and mouth, 1-1.5 cm long. Cymes secund, glandular pubescent, in axillary or terminal, thyrsoid panicles, short-peduncled, pyramidal, about 5 cm long; flowers lilac, subglobose, lower bracteate, upper ebracteate; sepals 3, oblong, villous, 2-3 mm long; petals 3, broadly obovate, 5-6 mm long; stamens 6, filaments purplish; ovaries 2-celled. Capsules subglobose to orbicular or ellipsoid, compressed, loculicidal, about 2 mm long, 2-seeded. Seeds transversely rugose on back.

Fl. & Frt. : Aug.-Oct.

Frequently seen in marshy places

Korba : 8696.

2n = 22, 24, 30, 54.

India, China, Malaysia.

Used in applications for fractured bones; juice of stems used in sore eyes.

MURDANNIA Royle, Illustr. Bot. Himal. t. 95. f. 3. 1839; 403, 1840, *nom. cons.*

T. : *M. scapiflora* (Roxb.) Royle (*Commelina scapiflora* Roxb.) [= **M. edulis** (Stokes) Faden].

1a. Herbs with fasciculated, fusiform or tuberous roots; panicles on a leafless scape — *M. edulis*

1b. Herbs with fibrous roots; panicles or cymes on leafy scape

2a. Leaves ovate-lanceolate, 1-3 cm long; cells of ovaries 5-many-ovuled; capsules 10-or more-seeded — *M. spirata*

2b. Leaves linear, 4-10 cm long; cells of ovaries 2-ovuled; capsules 6-seeded — *M. nudiflora*

Murdannia edulis (Stokes) Faden in Taxon 29 (1) : 77. 1980 : *Commelina tuberosa* Lour., Fl. Cochinch. 1 : 40. 1790, *nom. illeg.*, non L. (1753)

Commelina edulis Stokes, Bot. Materia Med. 1 : 184. 1812; *C. scapiflora* Roxb. (Hort. Beng. 5. 1814, *nom. nud.*) Fl. Ind. 1 : 178. 1820; *Aneilema scapiflorum* (Roxb.) Kostel., Allg. Med.-Pharm. Fl. 1 : 127. 1831 in adnot; Haines, Botany 3 : 1127; *Murdannia scapiflora* (Roxb.) Royle, Illust. Bot. Himal. t. 35, f. 3. 1839 : 403. 1840. Type : Roxburgh plate 1521 (K. CAL). *Murdannia loureirii* (Hance) Rolla Rao & Kammathy in Notes, Roy. Bot. Gard., Edinburgh 25 : 184. 1964.

Perennial, erect herbs with tuberous roots from a thickened rootstock; many, with distal more or less, fusiform tubers. Leaves sessile, in basal rosettes, narrowly ensiform, finely acuminate, rather fleshy, 10-25 × 1-2 cm. Scapes 20-45 cm long, with narrow panicles; bracts 2.5 cm long, tubular or amplexicaul; flowers purple-blue or sepals red and petals violet, about 2 cm across; pedicels 5-7 mm long; sepals 3, lanceolate-oblong, obtuse, 6-7 mm long, membranous; petals 3, obovate or suborbicular, obtuse, about 1.5 cm long; stamens 3, filaments bearded, anthers purple; staminodes 2 or 3; ovaries sessile, 3-celled; cells 4-5-ovuled; styles 4 mm long. Capsules ellipsoid, 3-gonous, 6 mm long.

Type : None preserved. *Neotype* : Fig. 3; Laos/Vietnam, Mekong-Hanoi, Sept. 1877, *D. Harmand* 1887 (P) (vide Faden, *l.c.*).

Fl. : June-July. *Frt.* : July-Sept.

Common in Sal Forests, at the edge of forests.

Lamni : 19232.

2n = 18 (as '*M. scapiflora*').

India, Nepal, Sri Lanka, Burma.

Tuberous roots possess medicinal properties.

M. nudiflora (L.) Brenan in Kew Bull. 1952 : 189. 1952; Panigrahi & Kammathy, Proc. Nat. Acad. Sci. India 33 : 495. 1963; Fadden in Taxon 34 : 295. 1985; Nicolson *et al.*, Reg. Veget. 119 : 283. 1988. *Commelina nudiflora* L., Sp. Pl. : 41. 1753, as to lectotype; *Aneilema nudiflorum* (L.) Sweet, Hort. Brit. : 430. 1827 ('*nudiflora*'); Wallich, Num. List no, 5224. 1831-'32; Haines, 3 : 1128. *Tradescantia malabarica* L., Sp. Pl. ed. 2 : 412. 1762. *Murdannia malabarica* (L.) Bruekner in Engl. & Prant., Pflanzenfam. ed. 2, 15A : 173. 1930. *Talipullu* Rheede, Hort. Malab. 9 : 123, t. 63. 1689. (holotype of *T. malabarica* L.).

Procumbent herbs. Leaves sessile, linear or linear-lanceolate to oblong, base rounded or sub-cordate, acute or subobtuse, glabrous or hairy, scabrid on the margins, 5-12 × 0.4-0.7 cm; sheaths patent hairy on margins, ciliate

on mouth, 3-10 mm long. Panicles sub-terminal, cymes a few-flowered; bracts ovate, obtuse, membranous, deciduous, 2 mm long; peduncles 1.5-5 cm long; flowers blue or purplish, on pedicels 3-4 mm long; sepals 3, ovate-oblong, obtuse, 3-4 mm long; petals 3, obovate, rounded, 4-5 mm long; stamens 3, filaments bearded; ovaries sessile, 3-celled, cells 2-ovuled. Capsules broadly oblong or sub-globose, mucronate, 3 mm long, 6-seeded.

LT. : *Osbeck* s.n. (received in 1752 vide Merrill, 1937).

Fl. & Frt. : July-Sept.

Common on the sandy bed of streams, moist shady places.

Pasarkhet : 12963; Pasan : 13286A; Khondra : 12824; Katghora : 6079; Pasarkhet to Siang : 19421; Lamni : 19238.

2n = 20.

Africa, India, Burma, China, S. Japan, Malaysia.

Bruised plant relieves burns, itches, sores etc.

M. spirata (L.) Brueckn. in Engl. et Prantl, Pflanzenfam. ed. 2. 15a : 173. 1930 ('*spiratum*'); Faden, Taxon 34 : 295. 1985. *Commelina spirata* L., Mant. Pl. : 176. 1771. *Aneilema spiratum* (L.) R. Br. Prodr. : 271. 1810; Sweet in Sweet's Hort. Brit. : 430. 1827; Kunth, Enum. Pl. 4 : 64. 1843 (as '*Aneilema spirata* M. Wight), Wight ex Wallich, Num. List no. 521. 1831-1832. Haines, Botany 3 : 1128.

Procumbent or ascending herbs; roots fibrous. Leaves sessile, flat, ovate-lanceolate to oblong, subobtuse or acute or acuminate, base amplexicaul, margins thickened, often scaberulous, 1-3 × 0.5-1 cm; sheaths ciliate on margins and mouth. Cymes scorpoid, panicled, branches short, divaricate, a few-flowered; bracts ovate, persistent, 1.5 mm long; flowers blue or violet, 6 mm across; pedicels slender 5 mm long, fruiting erect; sepals 3, ovate-oblong, obtuse, brownish, 2 mm long, membranous; petals 3, obovate, obovate-rounded, 3-4 mm long; stamens 3, filaments bearded; staminodes 3; ovaries sessile, 3-celled, cells 2-ovuled. Capsules oblong or subglobose, trigonous, hairy, 6 mm long.

Fl. & Frt. : Sept.-Jan.

Common in moist situations in road-side ditches.

Achanakmar : 13218A; Pasarkhet : 12948; Katghora : 6077; Korba : 8666, 8694, 8710; Korba to Madak; 12929; Keonchi : 1329A; Khondra : 12806.

2n = 18, 20, 40.

India, China, Malaysia.

TONNINGIA Necker ex A.H.L. Jussieu, Dict. Sci. Nat. 54. : 505. 1829.

T. : *T. axillaris* (L.) O. Ktze. (*Commelina axillaris* L.).

Amischophacelus Rolla Rao & Kammathy in Journ. Linn. Soc. Bot. 59 : 306. 1966, nom. superfl.

T. : *A. axillaris* (L.) Rolla Rao & Kammathy (*Commelina axillaris* L.).

Nicolson *et al.*, (Reg. Veg. 119 : 282. 1988), following Faden (Taxon 34 : 295. 1985) consider *Amischophacelus* Rolla Rao & Kammathy as a congeneric synonym of *Cyanotis* D. Don, whereas Mabberley (1987) considers that the former is a superfluous re-namig of *Tonningia* Juss., both based on *Commelina axillaris* L. Karthikeyan *et al.*, (1989), in the *Addenda* (P. 1) follow Mabberley (1987). In *Tonningia* Juss., the inflorescence is embedded in the hollow axils of the leaf-sheath, inconspicuous linear and transparent bract-scales, capsule with pointed tip or depressed in centre with 3 projections.

1a. Filaments bearded; capsules acute; seeds sub-cylindric, punctate — *T. axillaris*

1b. Filaments naked; capsules depressed in centre with 3 horns; seeds sub-quadrate, pitted — *T. cucullata*

Tonningia axillaris (L.) O.Ktze., Rev. Gen. Pl. 2 : 721. 1891; Mabberley, The Plant-Book : 584. 1987 [as "(L.) Juss,"] *Commelina axillaris* L., Sp. Pl. : 42. 1753. *Zygomanes axillaris* (L.) Salisb., Trans. Hort. Soc. 1 : 271. 1812. *Cyanotis axillaris* (L.) D. Don, Prodr. Fl. Nepal. : 46. 1825; Sweet in Hort. Brit. : 430. 1827; J. H. Schult., Syst. Veg. 7(2) : 1154. 1830; Haines, Botany 3 : 1130; Faden in Taxon 34 : 295. 1983; Nicolson *et al.*, Regnum Veg. 119 : 282. 1988 [as (L.) Sweet]. *Amischophacelus axillaris* (L.) Rolla Rao & Kammathy, Journ. Linn. Soc. Bot. 59 : 306. 1966. *Nir-pulli* Rheede, Hort. Malab. 10 : 25, t. 13. 1690.

Glabrous or sparsely hairy, creeping herbs with many erect and spreading branches; rooting at nodes. Leaves linear or linear-lanceolate, acute or acuminate, 5-15 × 0.3-1 cm; sheaths inflated, ciliate on throat and margin. Flowers clustered in axils, bright blue, 2 cm long; enclosed in inflated leaf-sheaths; calyx 7 mm long, split about half-way into 3 narrow greenish or hyaline segments, keeled in fruits; corolla-tubes about 1 cm long, petals sub-equal, ovate, long-clawed; clavate at tip; stamens 6, filaments hairy; style filiform, spiral, clavate above; ovaries 3-celled. Capsules 5 mm long, glabrous, acute, loculicidal, valves 2-fid.

Syntypes : Rheede, *l.c.* : t. 13, et Plukenet's illustration.

Fl. & Frt. : July-Jan.

Common in marshy and wet places, rice fields.

Bilaspur : 12984; Madai : 19477.

2n = 20, 24.

India, China, Malaysia, Australia.

T. cucullata (Roth) O. Ktze. Gen. Pl. : 722. 1891. *Tradescantia cucullata* Roth, Nov. Pl. Sp. : 189. 1821. *Cyanotis cucullata* (Roth) Kunth, Enum. Pl. 4 : 107. 1843. *Zygomanes cucullata* (Roth) Rolla Rao & Kammathy in Notes Roy. Bot. Gard., Edinb. 25 : 187. 1965. *Amischophacelus cucullata* (Roth) Rolla Rao et Kammathy, Journ. Linn. Soc. Bot. 59 : 306. 1966.

Glabrous or sparsely hairy, creeping, branches erect and spreading, rooting at nodes. Leaves linear-lanceolate, or oblong-lanceolate, acuminate, 3-4 × 0.4-1 cm; sheaths inflated, ciliate. Cymes enclosed in leaf-sheaths; flowers blue, white or violet, about 2 cm long; calyx 6-7 mm long, split about half way into 3 narrow, hyaline segments; keeled in fruits; corolla-tube about 1 cm long; petals ovate, long-clawed; stamens 6, filaments hairy, anthers oblong; ovaries glabrous, 3-celled; style filiform. Capsules 5-8 mm long, glabrous, sub-quadrate, smooth or obscurely pitted.

Fl. & Frt. : July-Jan.

Common in moist shady places.

Pali : 13024.

2n = 20.

India.

JUNCACEAE

Juss., Gen. Pl. : 43. 1789 ('*Junci*').

T. : *Juncus* L.

JUNCUS L., Sp. Pl. : 325. 1753 & Gen. Pl. ed. 5 : 152. 1754.

LT. : *J. acutus* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 1 : 465. 1913).

Rhizome sympodial, producing 1-leafy shoot a year; leaves grassy, needle-like or centric. Inflorescence often appearing lateral on a leaf-like, cylindrical stem, but actually bracts takes over terminal position. Some medicinal, roots used in skin infections or robust species used for matting and chair seats.

Juncus leschenaultii Gay in Laharpe, Monogr. Jonc. : 137. 1827; Hara *et al.*, Enum. 1 : 84. 1978; *J. indicus* Royle ex D. Don in Trans. Linn. Soc. Lond. 18 : 323. 1840, *pro part.*; *J. prismatocarpus* var. *leschenaultii* (Gay) Buchenau in Engl., Bot. Jahrb. 6 : 205. 1885; *J. prismatocarpus auct.*, non R. Br. 1810; Haines, Botany 3 : 1132.

Caespitose, erect or prostrate herbs. Leaves compressed or terete or sometimes tubular, distantly septate, alternate, linear, filiform, vertical, 7-20 × 0.15-0.2 cm; sheaths scarious, 2 cm long. Cymes terminal, irregularly compound, erect with spreading branches; flowers densely clustered in hemispherical heads; lower bracts leafy; floral-bracts hyaline, lanceolate, acuminate; flowers bisexual; greenish-brown; tepals 6, persistent, imbricate, outer 2 subulate or linear-lanceolate, glumaceous, 3-4 mm long, keeled or with thickened mid-vein, 3 inner ones not keeled, 4 mm long, linear-lanceolate; stamens 6, included; ovaries 3-celled; stigmas 3. Capsules prismatic or conical, exserted, trigonous, acute at apex, loculicidally 3-valved.

Fl. & Frt. : Feb.-May.

Common in swampy, marshy places, in cultivated fields, waste places.

Katghora : 8602, 8717; Pondu to Ratanpur : 16778.

India, east to China, Japan.

ARECACEAE

C. H. Schultzenstein, Nat. Syst. Pflanzenr. : 317. 1832.

Alt. name : PALMAE Juss., Gen. Pl. : 37. 1789.

T. : *Areca* Linn.

Caryota urens L. (toddy palm) (2n = 32), *Phoenix sylvestris* (L.) Roxb. [source of palmsugar (2n = 36) and toddy] and *Borassus flabellifer* L. (Palmyra palm) (2n = 36) are found in the outskirts of villages and are often naturalized, but were not collected. Amongst the species grown in gardens, *Roystonea regia* (Kunth) O.F. Cook (Royal palm) (2n = 36), *Licuala peltata* Roxb. (2n = 28) and *Livistona chinensis* (Jacq) R. Br. ex Mart. (2n = 36), are the ornamental species.

PHOENIX L., Sp. Pl. : 1188. 1753 & Gen. Pl. ed. 5 : 496. 1754.

T. : *P. dactylifera* L.

Phoenix humilis Royle (Illustr. Bot. Himal. 8. 14. 1833, *nom. nud.*) ex Beccari & J.D. Hook. in FBI. 6 : 426. 1892, Haines, Botany 3 : 924.

var. **humilis**

var. *typica* Beccari, Males. 3 : 347, 379, t. 44 and ii, f. 22-24 Beccari & J.D. Hook., FBI 6 : 427. 1892. dwarf date palm, hill date palm. *Bukhorjuro, kojiri* (Oriya).

Short, erect shrubs; stems densely covered with stumps of fallen leaves. Leaves pinnate, 100-120 cm long; leaflets elongate, pale green, in usually remote fascicles, not lying in one plane, lanceolate or ensiform, lowest often spiniscent, 25-50 × 0.6-2 cm; spines upto 7 cm long. Spadices several, interfoliar, 15-25 cm long, erect, ultimately drooping, branched; spathe coriaceous; flowers dioecious, yellowish; male flowers; sepals 3, connate in a cupular, 3-toothed calyx; petals 3, obliquely ovate, valvate; stamens 6, pistillodes minute or none; female flowers; sepals 3, connate in a globose, accrescent calyx; petals 3, rounded, imbricate; staminodes 6, free or connate in a 6-toothed cup; carpels 3, free. Fruiting peduncles 60-120 cm long, drooping; fruits oblong, terete, about 1.5 cm long, 1-seeded; orange-red when ripe.

Fl. : Mar.-Apr. *Frt.* : May-June.

Common on dryer grounds waste places.

2n = 36.

Katghora : 3727 : Korba : 8729.

India, Nepal, Burma, Indo China.

Fruits sweet and edible, pith from the upper portion of the stem eaten; leaves used for mats, brooms baskets and fancy handbags, also looped for fodder. Roots and pith of young stems used as aperient.

TYPHACEAE

A. L. Jussieu, Gen. Pl. : 25. 1789 ('*Typhae*').

Type : Typha L.

Marsh-herbs, perennial, with starchy rhizomes. Stems erect with terminal inflorescence, interior pithy; vessel elements throughout the vegetative body. Leaves with sheathing base and narrow parallel-veined spongy lamina,

distichous, mostly basal. Inflorescence of indeterminate number of flowers forming dense cylindrical spike, the upper part distinct and male, the lower ones female. Endosperm with protein and oil.

X = 15.

Typha elephantina Roxb. (*Reed mace, cat-tail, bulrush*) with rhizones rich in starch which serve as emergency food, flush of female flowers formerly used as kapok substitute, pollen (which provide unusual carbohydrates) eaten locally; leaves for mats, chair-seating and as temporary tents for labourers, for paper-making and dried inflorescence as ornamental, is expected to occur in the district.

ARACEAE

A.L. Jussieu, Gen. Pl. : 23. 1789 ('*Aroideae*').

T. : *Arum* Linn.

Engler (cf. Mabberley, 1987 : 39) recognises eight subfamilies within the family. The genera occurring in the Bilaspur district are classified as :

Pothoideae : *Pothos*. *Monsteroideae* : *Monstera*.

Lasioideae : *Amorphophalus*. *Colocasioideae* : *Alocasia*, *Colocasia*, *Caladium*. *Aroideae* : *Arisaema*, *Typhonium*. *Pistioideae* : *Pistia*.

Of these, *Alocasia macrorhiza* (L.) G. Don, *Monstera deliciosa* Liebm., *Caladium bicolor* (W. Ait.) Vent., are grown in gardens.

1a. Floating, aquatic herbs; leaves in a close spiral, forming an erect cup, sessile — PISTIA

1b. Terrestrial herbs; leaves long petioled, not in close spirals

2a. Leaves ovate-cordate, ovate-hastate or sagittate

3a. Leaves ovate-cordate, peltate, 20 cm long or more; spadix shorter than spathe, not exserted; stamens synandrous; ovules many, placentation parietal — COLOCASIA

3b. Leaves ovate-hastate or sagittate, not peltate, upto 15 cm long; spadix exserted; stamens free; ovules 1-2, placentation basal — TYPHONIUM

2b. Leaves pedatisect or pinnatisect.

4a. Leaves pinnatisect; flowers appear before leaves; flowers monoecious; male flowers sessile; ovules solitary; seeds exalbuminous — AMORPHOPHALLUS

4b. Leaves pedatisect; leaves and flowers appear together; flowers dioecious, rarely monoecious; together; flowers dioecious, rarely monoecious; non. ARISAEMA

AMORPHOPHALLUS Bl. ex Decne., Nouv. Ann. Mus. Hist. Nat. 3 : 366. 1834, *nom. cons.*

T.: *A. campanulatus* Bl. ex Decne.

[= *Amorphophallus paeoniifolius* (Dennst.) Nicolson var. *campanulatus* (Decne.) Sivadasan] (2n = 26, 28, 36).

Amorphophallus bulbifer (Roxb.) Bl., Rumph. 1 : 148. 1835; Haines, Botany 3 : 903; Hara *et al.*, Enum. 1 : 88. 1978; *Arum bulbiferum* Roxb. in Sims in Curtis, Bot. Mag. 46 : t. 2072. 1819; Fl. Ind. ed. 2, 3 : 510. 1832, *non* Salisb. 1796; *Pythonium bulbiferum* Schott in Schott & Endl., Melet. Bot. 18. 1832.

Erect herbs; tubers globose. Leaves solitary, 30-45 cm in diam., 3-partite, segments dichotomously dividing, leaflets obovate or lanceolate, 10-17 cm long; petioles 30-60 cm long, mottled dark and light green, a bulbil above petiole at forks of leaf. Peduncles 15-25 cm long, mottled with green or black spots. Spathes 12-15 cm long, erect, broadly tubular, limb ovate, cymbiform, obtuse, pale-pink or yellowish, rose-pink within, entirely withering. Spadix sessile, 7-8.5 cm long; appendage as long as inflorescence, pale-pink; male portion in middle, 2.5-3.5 cm long; stamens 2-4; female portion at base, scarlet, 1.5 cm long; ovaries globose or obovoid; style short or absent; stigma 2-lobed, pink; upper part (appendix) naked, pale-pink; neuters absent. Fruits of sub-globose or obovoid berries, in clusters.

Fl.: May-June. *Frt.*: July.

Common in leaf litter on forest floors.

Pasan to Pandra : 19128.

2n = 36, 39.

India, Nepal, Burma.

ARISAEMA C. Martius in Flora 14, 2 : 459. 1831.

T.: *non designatus.*

Arisaema tortuosum (Wall.) Schott in Schott & Endl., Meletem. Bot. 1 : 17. 1832; Haines, Botany 3 : 905; Hara *et al.*, Enum. 1 : 90. 1978; *Arum tortuosum* Wall., Pl. As. Rar. 2 : 10. t. 114. 1830. *Arisaema neglectum*

Schott in Bonplandia 7 : 26. 1859. *A. helleborifolium* Schott in Syn. Aroid. : 29. 1856.

var. **tortuosum**

Erect herbs, tubers depressed globose. Leaves usually 2, leaflets 9, 12-20 × 3.5-5 cm, ovate or linear-lanceolate, sub-caudately acuminate; petioles 30-65 cm long. Peduncles 60-90 cm long, embraced by leaf-sheaths; spathes 7-12.5 cm long, broadly cymbiform above open tube, incurved, acuminate, pale green or purplish. Spadix 15-20 cm long, fertile in lower portion 5-6.5 cm long, lowest portion pistillate, about 2 cm long and staminate portion about 3-4 cm long, more or less separated from pistillate, appendage slender, yellow, decurved and again upcurved and exserted; male flowers; stamens 2-5; female flowers : densely crowded, ovaries basal Fruiting heads about 6 cm long, ovoid with red, 1- or few-seeded berries.

Fl. : May-June. *Frt.* : Sept.-Nov.

Frequently seen on slopes in humus soil.

Kabirchabutra : 19170.

2n = 24, 26, 26 + 0 + 7B, 28, 52, 56.

India, Nepal, Burma, W. China.

Corm is used to kill worms which infest cattle.

COLOCASIA Schott in Schott & Endl., Meletem. Bot. 1 : 18. 1832, *nom. cons.*

T. : *C. antiquorum* Schott. (*Arum colocasia* L.) (*typ. cons.*).

Colocasia esculenta (L.) Schott in Schott & Endl., Melet. Bot. : 18. 1832; Suresh *et al.*, Taxon 32 : 131. 1983; Nicolson *et al.*, Reg. Veget. 119 : 275. 1988. *Arum esculentum* L., Sp. Pl. : 965. 1753. *Arum colocasia* L., Sp. Pl. : 965. 1753. *Caladium nymphaeifolium* Vent., Mag. Encycl. 4 : 471. 1801. *Colocasia antiquorum* Schott in Schott. & Endl., Melet. Bot. : 18. 1832; Haines, Botany 3 : 908. *Colocasia nymphaeifolia* (Vent.) Kunth, Enum. Pl. 3 : 37. 1841. *Weli-ila* Rheede, Hort. Malab. 11 : 43-44, t. 22. 1692. (*Cocoyam, Taro, Dasheen, Saru*).

Schott (1856) reduced *C. esculenta* (L.) Schott as a variety of *C. antiquorum* Schott. But the treatment of an older valid (*esculenta*) specific epithet at the rank of species of a later name (*C. antiquorum*), is incorrect (Art. 14.5).

Erect herbs; aerial stems absent or short. Rhizomes swollen, subterrenean. Leaves peltate, with a broad, triangular basal sinus, rather dark green above, paler beneath; petioles as long as blade, purplish below,

Peduncles 15-20 cm long. Spathe about 20 cm long, convolute, lower part green and accrescent, upper elongate, yellow, deciduous; tubes oblong, mouth constricted; spadix about 12 cm long, in 4 parts; male above and female below with usually interposed flat neuters in between and appendage cylindric, subulate, naked at apex; stamens 7-8, fasciculate by their filaments; ovaries ovoid, 1-celled, stigmas discoid. Fruits of small obconic or oblong berries.

Type: Jamaica, Illustration-t. 106, f. 1, published as *Arum minus nymphaeae foliis esculentum* by Sloane, Voy. Jam. Nat. Hist. 2. 1725.

Fl.: July-Oct. *Frt.*: Nov.-Dec.

Common in marshy places along the banks of nalahs, streams; also cultivated.

Pasan to Pendra : 19141.

2n = 14, 22-28. 28, 36, 38, 42.

India, Nepal, Sri Lanka.

Leaves, and rhizomes are used as vegetables. The juice from the corm and the petiole is medicinal as stimulant, rubifacient and as a styptic.

Many selected forms and cultivars incl. var. *antiquorum* (Schott) Hubb. & Rehder (eddoes) yield small edible tubers; cv. Fontanesia (*C. violacea*) ornamental with violet petioles and veins.

Note: Roxburgh (1832) distinguishes : four varieties : 1.—a dark one from wet places in which the base of stem never swells, but sends out many suckers, and the leaves are more or less purple; much eaten; 2—one that grows on dry ground with dark-purple or bluish clouds in the leaf; 3.—like no. 2, but whole plant green; var. *nymphaeifolia*—abundant in borders of lakes, ponds, with the subterranean stem often as long and thick as a man's arm; reddish petioles, and leaves; all parts eaten.

PISTIA L., Sp. Pl. : 963. 1753 & Gen. Pl. ed. 5 : 411. 1754.

T.: *P. stratiotes* L.

Pistia stratiotes L., Sp. Pl. : 963. 1753; Suresh *et al.*, Taxon 32 : 127. 1983; Nicolson in Dassan., Rev. Handb. Fl. Ceylon 6 : 100. 1988 ('1987'); Nicolson *et al.*, Reg. Veget. 119 : 276. 1988. *Koda-pail* Rheede, Hort. Malab. 11 : 63-64, t. 32. 1692. *Pistia stratiotes* var. *cuneata* Engl. in Fl. Bras. 3, 2 : 214. 1879. *P. stratiotes* var. *spathulata* Engl. l. c.

Floating, gregarious, stemless, stoloniferous herbs. Leaves sessile, obovate-cuneate, rounded or retuse, undulate, pubescent, flabelliform, in a rosette, forming an erect cup, 3-7 cm long. Peduncles short, partly sheathed. Spathe tubular below, open above, pale yellow, obliquely campanulate, contracted near middle, tomentose externally, about 1.2 cm long; spadix adnate to back of tube of spathe, free above; male inflorescence above, of a few sessile, connate stamens; a ring of minute, confluent neuters below; female inflorescence a solitary, ovoid-conic, 1-celled ovary at base; style conical; stigma discoid. Fruits membranous.

LT. : Rheede *l.c.* t. 32. (cf. Suresh *et al.*, 1983).

Fl. : May-July. *Frt.* : Sept.-Dec.

Common in ponds.

Ratanpur : 13036.

Pantropic.

The leaves are demulcent and the roots are used as laxative.

Pistia stratoites L. floating equatic plant(s) spreading like an umbrella—the only species of the genus, exhibits high range of variations which resulted in the recognition of many "species" and "varieties" which actually do not exist.

Bogner (in Fl. Madagascar : 67. 1973) selected Linn. Herb. 1072.1 (LINN) as the lectotype, but Nicolson *et al.*, (1988) set it aside and selected Rheede's t. 32 as the lectotype, because Linnaeus based his species on published illustrations, of which Rheede's t. 32 is the best candidate.

TYPHONIUM Schott in Wiener, Zeitschr. Kunst 1829(3) : 732. 1829.

LT. : *T. trilobatum* (L.) Schott (*Arum trilobatum* L.) (vide Nicolson, Taxon 16 : 519. 1967).

Typhonium trilobatum (L.) Schott in Wiener, Zeitschr. Kunst 1829(3) : 72. 1829; Haines, Botany 3 : 906; Hara *et al.*, Enum. 1 : 92. 1978; *Arum trilobatum* L., Sp. Pl. : 965. 1753.

Erect herbs; tubers white, subglobose, about 1 cm in diam. Leaves hastately 3-lobed, lobes ovate, acute, 6-12 × 10-15 cm; petioles 15-20 cm long. Peduncles about 10 cm long; spathe 8-15 cm long, tubes convolute, mouth constricted, limb ovate-oblong, lanceolate or linear, acuminate, straight or twisted, bad smelling, green outside, red-purple inside, deciduous; male and female inflorescences distant with neuters above female and sometimes

below males, appendage bright red, smooth, elongate, stipitate, base expanded, truncate, lobulate, intruded; male flowers; stamens 1-2; female flowers; ovary 1-celled; stigma sessile; neuters white, about 1 cm long, much curved, twisted, clustered at base. Berries ovoid, 1-2-seeded.

Fl. : July-Sept. *Frt.* : Oct.-Nov.

Occasionally seen in leaf litter; under bamboo shade.

Achanakmar : 19272.

2n = 18, 26.

India, Nepal, Thailand to Vietnam, Malaysia.

LEMNACEAE

S. F. Gray, Nat. Arr.. Brit. Pl. 2 : 729. 1821 ('*Lemnadeae*').

Type : *Lemna* L.

Small to minute free-floating thalloid plants, glabrous with 0-several unbranched roots and without any xylem (roots of *Spirodella* Schleiden have tracheids), sometimes accumulating manganese. Thallus more or less globular to membranous, flat and linear and sometimes with visible xylem-less veins; reproductive pouches 2, 1 marginal, the other marginal or on upper surface, with vegetative budding of new plants within; inflorescence rare, in 1 marginal pouch, when 2-3 male and 1 female flower with small membranous spathe; male with perianth 0, stamen 1; female with carpel pseudomonomerous, 1-locular with short terminal style, fruit a utricle with 1-4 seeds. X = 5, 8, 10, 11, 21.

Of the six genera with 30 species, *Spirodella* Schleiden is the largest and *Wolffia microscopica* (Griff. ex Voigt) Kurz in India, is the smallest (c. 1.5 mm). *Spirodella polyrhiza* (L.) Schleiden (2n = 30, 40), *Lemna perpusilla* Torrey (2n = 40, 42, 50, 80) and *Wolffia arrhiza* (L.) Wimmer, (2n = 40, 44-46, 50, 70, 80.), are commonly found floating in the ponds and ditches.

ALISMATACEAE

Vent., Tab. Regne Veg. 2 : 157. 1799 ('*Alismoideae*')

T. : *Alisma* L.

Perennial (annual in seasonal water) glabrous, aquatic and marsh plants with rhizomes, vessels only in roots; laticifers present.

Family considered allied to *Ranunculaceae*, but resemblances superficial.

1a. Flowers polygamous; stamens 6; receptacles flat; achenes turgid — LIMNOPHYTON

1b. Flowers mostly unisexual; stamens many; receptacles elevated, globose or oblong; achenes laterally compressed — SAGITTARIA

LIMNOPHYTON Miq., Fl. Ind. Bat. 3 : 242. 1856.

T.: *L. obtusifolium* (L.) Miq. (*Sagittaria obtusifolia* L.)

Mabberley (1987) treats the genus as monotypic, whereas Airy Shaw (1973), presumably following Susan Carter (1960), assigns 1-3 species (2 in East Africa) to *Limnophyton* Miq.

Limnophyton obtusifolium (L.) Miq., Fl. Ind. Bat. 3 : 244. 1855; Haines, Botany 3 : 885; den Hartog in Fl. Males. Ser, I, 5 : 324. 1957. Nicolson *et al.*, Reg. Veget. 119 : 271. 1988. *Sagittaria obtusifolia* L., Sp. Pl. : 993. 1753. *Culi-tamara* Rheede Hort. Malab. 11 : 93, t. 45. 1692.

Erect, scapigerous herbs; stemless. Leaves reniformly-sagittate to triangular, lanceolately lobed, rounded at apex, lobes long tapering, spreading, 15-20 × 10-15 cm; petioles 30-40 cm long. Scape 30-50 cm long, angled; bracts scarious; flowers numerous, white, 8-12 mm across, in whorls on branches of a large panicle; upper whorls mostly males, lower hermaphrodite; sepals 3, herbaceous, reflexed after flowering, persistent; petals 3, membranous, deciduous, obovate; stamens 6, filaments filiform, anthers erect; carpels many; ovules solitary. Fruits of achenes in a globose head; achenes turbinate, turgid.

Syntypes: Asia, Plukenet t. 220. f. 7 in Herb. Sloan vol. 97. fol. 181 (BM); Rheede, *l.c.* : t. 45.

Fl.: Jan.-Feb. *Frt.*: Mar.-July.

Common in marshy places; in Waterlogged areas.

2n = 22, 24.

Ratanpur : 13038.

Paleotropics.

SAGITTARIA L., Sp. Pl. : 993. 1753 & Gen. Pl. ed. 5 : 429. 1754.

LT.: *S. sagittifolia* L. (vide J.K. Small, N. Amer. Fl. 17 : 51. 1909) (= *S. trifolia* L.).

Sagittaria guayanensis Kunth subsp. **lappula** (D. Don) Bogin in Mem. New York. Bot. Gard. 9 : 192. t. 5 C. 1955; Hartog in Steenis, Fl. Males. Ser. I. 5 : 328. 1955; *S. lappula* D. Don, Prodr. Fl. Nepal. : 22. 1825; *S. guayanensis sensu* J. D. Hook. in FBI 6 : 561. 1893, *non* Kunth 1816; Haines, Botany 3 : 886; *S. cardifolia* Roxb. (Hort. Beng. 68. 1814, *nom. nud.*) Fl. Ind. 3 : 647. 1832.

Aquatic herbs; stems absent or very short. Leaves long-petioled, membranous, broadly ovate, deeply cordate, obtuse or rounded, with rounded auricles and obscure, radiating veins, 2.5-10 × 2.5-8.5 cm; leaf-sheaths broad, scarious margined. Scapes 10-25 cm long, often hairy, ribbed; raceme with 2-4 (-6), approximate, irregular whorls, each 2-3-flowered; upper male, lower female; bracts 3 in each whorl, connate at base, ovate, obtuse, scarious margined; flowers white, about 1.5 cm across; pedicels upto 1 cm long, thickened and recurved after anthesis; sepals 3, broadly ovate-triangular, obtuse, keeled, appressed in female; petals 3, obovate-orbicular, denticulate at apex, 1-1.5 cm long; filaments filiform, compressed; carpels many, laterally compressed, crowded on receptacles; stigma punctiform. Achenes flat, obovoid, elliptic, short-stalked, with a broad, obtuse spiny, shallowly crested wing, strongly echinate.

Type : Nepal, *Buchanan-Hamilton s.n.* (BM).

Fl. & Frt. : July-Oct.

Common in ponds.

Khuria : 19347; Pasan : 13273A; Korba : 8722; Bilaspur : 13004.

2n = 22.

India, Nepal, S. China.

Subsp. *guayanensis*, typified by Humboldt from Colombia in America, differs from ssp. *lappula* by its compressed, larger, deeply-crested-winged, faintly ribbed achenes, smaller in size.

LIMNOCHARITACEAE

Takht. ex Cronquist cf. Mabberley, The Plant-Book : 334. 1987; 634. 1987.

T. : *Limnocharis* Bonpl.

Note : *Limnocharitaceae* Cronquist are not listed in ICBN, 1988, App. II B as *fam. nom. cons.* Airy Shaw (1973) considers this family as intermediate between *Butomaceae* and *Hydrocharitaceae*, differing from the former in the leaves differentiated into petiole and lamina, in the presence of latex-tubes, in the green calycine

perianth whorl and delicate non-persistent corolline inner whorl, in the pollen grains with 4 or more pores and in the curved or folded embryo. From the *Hydrocharitaceae*, *Limnocharitaceae* differ in having principally superior ovary, with ovules scattered over the walls of carpels (Airy Shaw, 1973; Mabberley, 1987). *Limnocharis*, *Hydrocleys* and *Butomopsis* (*Tenagocharis*) are the three genera of the family, although *Butomopsis* Kunth was formerly included in the *Butomaceae* L. C. Rich.

BUTOMOPSIS Kunth, Enum. Pl. 3 : 164. May 1841.

T. : *B. latifolia* (D. Don) Kunth.

Tenagocharis Hochst. Flora : 369. June 1841.; J. D. Hook., FBI 6 : 562. 1893 (as '*Taeganocharis*').

Butomopsis latifolia (D. Don) Kunth, Enum. Pl. 3 : 165. 1841; Mabberley, The Plant-Book : 86. 1987. *Butomus latifolius* D. Don, Prod. Fl. Nepal. 22 : 1825; *B. lanceolatus* Roxb. (Hort. Beng. 89. 1814, *nom. nud.*) Fl. Ind. ed. 2. 2 : 315. 1832; *Butomopsis lanceolata* (Roxb.) Kunth, Enum. Pl. 3 : 165. 1841; Haines, Botany 3 : 886; *Tenagocharis latifolia* (D. Don) Buchen. in Abh. Nat. Ver. Bemen. 2 : 3. 1869; van Steenis in Fl. Males. Ser. I. 5 : 118. t. 1. 1953; Back. & Bakh. f., Fl. Java. 3 : 1. 1968.

Erect, laticiferous, scapigerous herbs; rhizomes small. Leaves erect, elliptic or elliptic-lanceolate, acute or obtuse, narrowed into a long petiole, 3-7-veined, 5-15 × 3-7 cm; petioles enclosed by sheaths below. Scapes longer than leaves; bracts scarious, ovate, acute; flowers in bracteate whorls or a terminal umbel of usually 3-5 flowers at apex of scape, white, about 2 cm across, bisexual; pedicels 2.5-10 cm long; sepals 3, herbaceous, persistent, ovate or orbicular; petals 3, membranous, fugacious, obovate; stamens 8-12, filaments filiform; carpels 6-9, whorled on a flat receptacle, sessile, short-connate below, 1-celled. Fruits of 6-7 erect, membranous follicles; follicles tapering into short beaks, connate below, wrapped by calyx, about 6 mm long.

Type : Nepal, *Buchanan-Hamilton s.n.* (BM).

Fl. & Frt. : Sept.-Feb.

Common in muddy soil of ponds, road-side ditches, rice fields.

Pasan to Semra : 15345; Pali 13023; Katghora : 3989; Korba : 8684.

2n = 14 (*Tenagocharis latifolia*).

Tropical Africa, India, Nepal, W. China, Thailand to Vietnam, Malaysia,

NAJADACEAE

A. L. Jussieu, Gen. Pl. : 18. 1789 ('*Naiades*').

T. *Najas* L.

Monogeneric.

NAJAS L., Sp. Pl. : 1015. 1753; Gen. Pl. ed. 5 : 445. 1754.

Type : *N. marina* L. (2n = 12).

Monoecious or dioecious fresh water/brackish water aquatics rooted, but with reduced vessel-less xylem in branched stems. Leaves opposite to approximately whorled, narrow, 1-veined, somewhat sheathing at base and often subtending 2 small axillary scales. Stomata o. Flowers water-pollinated, small, usually 1 per axil; males always with spathe-like set of scales and flask-shaped inner involucre; stamen 1, basal; female with superior solitary carpel. Fruit indehiscent; seed 1, exendospermous. X = 6, 7.

Najas graminea Delile Descr. Egypt. Hist. Nat. 2 : 282. t. 50. f. 3. 1813; Haines, Botany 3 : 893; de Wilde in Fl. Males. Ser. I. 6 : 169. 1962; *Najas seminuda* Griff. ex Voigt, Hort. Suberb. Cal. : 694. 1845.

Submerged herbs. Leaves ternate, in pseudowhorls, linear-subulate, obtuse, acute or acuminate, flaccid, margins spinulosely dentate, base sheathing, 1-2.5 × 0.05-0.1 cm; sheaths spinulosely denticulate, 4-8 mm long, with 2 auricles triangular, acute or obtuse, entire or rarely shallowly notched, 2-5 mm long. Flowers solitary or 2-4-together, minute, not enclosed in spathe, monoecious; pedicel 0.5-1 mm long; male flowers; perianth 2-seriate, outer tubular or inflated and inner hyaline; stamen 1, adnate to hyaline perianth, anther 4-celled; female flowers with solitary, sessile carpel; styles subulate, 2-fid; stigma 2 or 3. Fruit an achene, ellipsoid-oblong, 1.5-2 mm long.

Fl. & Frt. : Sept.-Feb.

Common in ponds.

Pasan : 15302; Kota to Bilaspur : 13049, 13042.

2n = 24, 48, 72, 96+4f.

Bad weeds in rice fields, but good green fertiliser and valuable fish-food (e.g. in water 5 m deep for *tilapia*), also as packing material for crabs and local-food (Hawaii).

APONOGETONACEAE

J. G. Agardh, Theoria Syst. Pl. : 44. 1858 ('*Aponogetaceae*').

T. : *Aponogeton* Linn. f., *nom. cons.*

Monogeneric.

APONOGETON Linn. f., Suppl. Pl. : 32, 214. 1782, nom. cons.

T. : *A monostachyos* Linn. f. ("*monostachyon*"), *nom. Superfl.* (*Saururus natans* L.; *A. natans* (L.) Engl. & Krauss (*typ. cons.*).

Aponogeton natans (L.) Engl. & Krause (*A. monostachyon* Linn. f. *nom. Superfl.*) (2n = 24, 76) and *A. echinatus* Roxb., are likely to occur in the district.

Aponogeton undulatus Roxb. (Hort. Beng. 26. 1814, *nom. nud.*), Fl. Ind. 2 : 211. 1832; van Bruggen in Blumea 18(2) : 465. f. 28. t. I-II. 1970; *A. crispus sensu* Hook. f. in FBI 6 : 564. 1893, *pro part., non* Thunb. 1781; Haines, Botany 3 : 888.

Stoloniferous, scapigerous, aquatic herbs. Submarged leaves linear-oblong to lanceolate, base and apex narrowly cuneate or rounded, 3-7-veined, 10-20 × 0.8-2.5 cm; petioles 10-15 cm long; floating leaves rare, upto 20 × 3.6 cm, base rounded or cordate, apex cuneate, tip blunt: petioles upto 70 cm long. Peduncles upto 55 cm long, thickened towards inflorescence; spikes solitary, upto 10 cm long, lax-flowered young enclosed in a conical, deciduous spathe-like sheath upto 1.7 cm long; flowers white or pinkish, bisexual; tepals 2, rarely 1 or 3, caducous, spathulate or obovate, 6-7 × 1-2 mm; stamens 6 in 2 whorls; carpels usually 3, superior about 2 mm long, beaked, 2-ovuled. Fruits of 3-4, smooth 1 2-seeded follicles, 4-5 mm long, with a short, terminal curved beak, coriaceous.

Fl. & Frt. : July-Oct.

Common in ponds.

Ompur Nursery, Pasarkhet : 19447; Kota : 13041.

India, Burma.

POTAMOGETONACEAE

Dumortier, Anal. Fam. Pl. : 59, 61. 1829. ('*Potamogetoneae*').

T. : *Potamogeton* L.

2 genera : *Groenlandia* Gay (monotypic) is sometimes reduced as congeneric with *Potamogeton* L.

POTAMOGETON L., Sp. Pl. : 126. 1753 & Gen. Pl. ed. 5 : 61. 1754.

LT. : *P. natans* L. [vide N. Taylor, N. Amer. Fl. 17(1) : 14. 1909].

Fresh water perennial glabrous herbs rooted in substrate (roots with vessel elements) with creeping sympodial rhizomes and erect leafy shoots; leaves spirally arranged with basal open sheath, ligule and parallel-veined lamina, linear or expanded atop a petiole in floating ones. Flowers bisexual, small, usually wind-pollinated, regular, 4-merous in rather fleshy bractless; spikes held a little above water. Fruit a head of drupelets, usually floating (pericarp aerenchymatous). X = (?) 7, 13-15.

Rhizome possible starch-source.

1a. Leaves all submerged, sessile; linear or linear-oblong, crisped and serrulate, 3-veined; stems slender; spikes lax, a few-flowered, upto 1.5 cm long — *P. crispus*

1b. Leaves all or upper ones floating, petioled, oblong-elliptic or elliptic-lanceolate, not crisped, many-veined; stems terete; spikes dense, many-flowered, 3.5-4 cm long — *P. nodosus*

Potamogeton crispus L., Sp. Pl. : 126. 1753; Haines, Botany 3 : 889; Hara *et al.*, Enum. 1 : 95. 1978.

var. crispus

Submerged herbs, stems compressed, dichotomously branched; root-stock creeping. Leaves alternate and narrowed at base or distichous and half-amplexicaul, acute or obtuse, serrulate, transluscent, 3-veined, 2.5-7.5 × 0.2-0.6 cm. Spikes 5-6 mm long, on a lateral peduncle arising from a membranous spathe or sheath, 5-7 mm long, 6-8-flowered; peduncles 2.5-3 cm long, curved, tapering upwards; flowers bisexual, greenish, ebracteate, about 2 mm across; perianth-segments 4, clawed, about 2 mm long; stamens 4, free, sessile; carpels 4, sessile, free, 1-celled, 1-ovuled; stigma sessile, persistent. Drupelets obliquely ovoid, long-beaked, compressed, warted, 4-5 mm long.

Type : 'Habitat in Europae fossis rivulis'.

Fl. & Frt. : Dec.-Apr.

Common in ponds.

Khuria : 15486.

2n = 26, 36, 42, 52, 72, 78.

Europe, Africa, India, Australia.

P. nodosus Poir. in Lam., Encycl. Meth. Bot. 4 : 535. 1816; Hara *et al.*, Enum. 1 : 95. 1978; *P. indicus* Roxb., Fl. Ind. 1 : 471. 1820, *non* Roth ex Roem. & Schult. 1818; Haines, Botany 3 : 888.

Submerged herbs; stems terete, branched; rootstock creeping. Leaves rounded, obtuse or acute at both ends, coriaceous, shining with strong mid-vein, 6-10 × 2.5-5 cm; submerged leaves longer, narrower, lanceolate, undulate, membranous; petioles 2.5-10 cm long. Spikes 0.8-3 cm long, many-flowered, on axillary or leaf-opposed peduncles; flowers greenish or whitish, about 2 mm across; perianth-segments 4, about 2 mm long, clawed, limb suborbicular, concave; stamens 4, free, sessile; carpels 4, free, sessile, 1-celled, 1-ovuled. Drupelets about 1.5 mm long, smooth, obliquely truncate, short-beaked.

Type : Canary Islands, *Broussonet s.n.*

Fl. : July-Jan. *Frt.* : Apr.-May (probably round the year).

Common in ponds.

Khuria : 15487, 19345.

2n = 42 (*P. indicus*) ; 2n = 52 (*P. nodosus*).

Warm temperate and tropical regions of Europe, Africa, Asia and America.

ERIOCAULACEAE

Desvaux, Ann. Sci. Nat. (Paris) 13 : 47. 1828 ('*Eriocauloneae*').

T. : *Eriocaulon* L.

Perennial (usually) small herbs without secondary thickening; growing in wet places; vessel-elements in all vegetative organs. Leaves in a dense basal spiral, parallel-veined, grass-like but without a well-differentiated basal sheath. Inflorescence a dense centripetally flowering, usually grey or white, head on a scape, the receptacle naked, hairy or with chaffy bracts subtending flowers. Flowers small, wind- or insect-pollinated without nectaries except for glands in petal-tips of *Eriocaulon*, unisexual, the sexes mixed or females marginal. Fruit a loculicidal capsule.

ERIOCAULON L., Sp. Pl. : 87. 1753 & Gen. Pl. ed. 5 : 38. 1754.

LT. : *E. decangulare* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 1 : 454. 1913.

E. luzulifolium Mart. and *E. sollyanum* Royle (*E. trilobum* Buch.-Ham. ex Hook. f.) are expected in the district.

1a. Floral-bracts glabrous or nearly so; petals absent or minute; anthers white — *E. cinereum*

1b. Floral-bracts bearded, villous or pubescent; petals well-developed; anthers black.

2a. Leaves green; one male petal much enlarged — *E. polycephalum*

2b. Leaves reddish or pinkish at base; male petals equal — *E. quinquangulare*

Eriocaulon cinereum R. Br., Prodr. 254. 1810; Hara *et al.*, Enum. 1 : 96. 1978; *E. sieboldianum* Sieb. & Zucc. ex Steud., Syn. Pl. 2 : 272. 1855 ('*sieboldtianum*'); Haines, Botany 3 : 1116.

Annual, scapigerous herbs. Leaves radical, subulate or setaceous, acute, 5-12 × 0.2-0.3 cm. Scapes 4-12 cm long; heads terminal, pale whitish, rarely purplish, 3-5 mm in diam.; involucral bracts obtuse, passing into oblong-lanceolate, subacute, floral-bracts, truncate, toothed or lacerate; flowers minute, unisexual, monoecious; receptacle columnar, glabrous or sparsely hairy; male flowers; calyx spathaceous, broadly spathulate, 3-toothed; petals minute, with an apical gland; stamens 6; female flowers; stipitate; sepals 1-2, hyaline or absent; petals absent; ovaries stipitate, 3-celled; stigmas 2-3. Capsules 3-lobed, membranous, loculicidal.

Fl. & Frt. : July-Nov.

Common in marshy places, rice-fields.

Bilaspur : 13002; Pasarkhet : 12959; Khondra : 12772.

2n = 32.

India, Sri Lanka, Nepal, Burma, China, Japan, Philippines.

E. polycephalum J. D. Hook. in FBI 6 : 573. 1893; Fl. Hassan : 653. 1976; E.

Annual, scapigerous herbs; rootstock stout. Leaves radical, linear-ensiform, acuminate, 5-12 × 0.4-0.7 cm. Scapes 10-25 cm long; heads terminal, grey-coloured, 6-8 mm in diam.; involucral bracts cuneately obovate, scarious, blackish shining, fringed with white hairs; floral bracts oblanceolate, caudate or cuspidate; flowers minute, unisexual, monoecious; male flowers : sepals 3, free, ciliate at apex; petals 3, hairy narrow with apical glands, one lobe longer than floral bracts; stamens 6; female flowers : sepals 3, oblong, hairy; petals 3, narrowly oblanceolate, ciliate

with apical glands; ovaries 3-celled; stigmas 3. Capsules 3-lobed, membranous, loculicidal.

Fl. & Frt. : Apr.-July.

Occasionally found in the muddy sandy alluvium on the banks of streams.

Katghora : 8699; Pasarkhet : 19422.

India.

E. quinquangulare L., Sp. Pl. : 87. 1753; Haines, Botany 3 : 1116; Hara *et al.*, Enum. 1 : 96. 1978. **Fig. 27**

Annual, scapigerous herbs. Leaves radical, linear ensiform or subulate, acute or acuminate, 4-10 × 0.4-0.8 cm. Scapes 5-8-ridged upwards, 7-15 cm long; heads terminal, globose or ovoid, grey or white, 4-6 mm in diam., villous; involucral-bracts scarious, linear-oblong to broadly cuneate, pale glabrous; floral bracts oblanceolate or spathulate, hyaline, acuminate or finely cuspidate glabrous; flowers minute, unisexual, monoecious; male flowers : sub-sessile, sepals 2 or 3, spathaceous, linear-oblanceolate, tips hairy; petals minute, hairy at apex, with minute apical gland; stamens 6; female flowers : sepals 3, narrowly linear clavate, hairy in upper half; petals 3, narrowly oblanceolate, sparsely hairy, with an apical gland; ovaries 3-celled, stipitate. Capsules 3-lobed, about 3 mm in diam.

Fl. & Frt. : Oct.-Feb.
Common in muddy places, in cultivated fields.

Lafa : 13028; Kprbi : 15328; Katghora : 3967; Pasarkhet : 16826; Korba : 16795.

India, Sri Lanka, Nepal, Burma.

CYPERACEAE

A. L. Jussieu, Gen. Pl. : 26. 1789 ('*Cyperoideae*').

Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 125-405. 1985.

T. : *Cyperus* L.

Note : While Kern (Fl. Males Ser. I : 7 : 452. 1974) and T. Koyama (in Dassan., Rev. Handb. Fl. Ceylon 5 : 125-126. 1985) recognise in *Cyperaceae* Juss. four subfamilies, *Mapanioideae*, *Cyperoideae*, *Scleroideae* and *Caricoideae*, Mabberley (The Plant-Book : 166. 1987), following Cronquist (1981), would divide the family into three subfamilies :

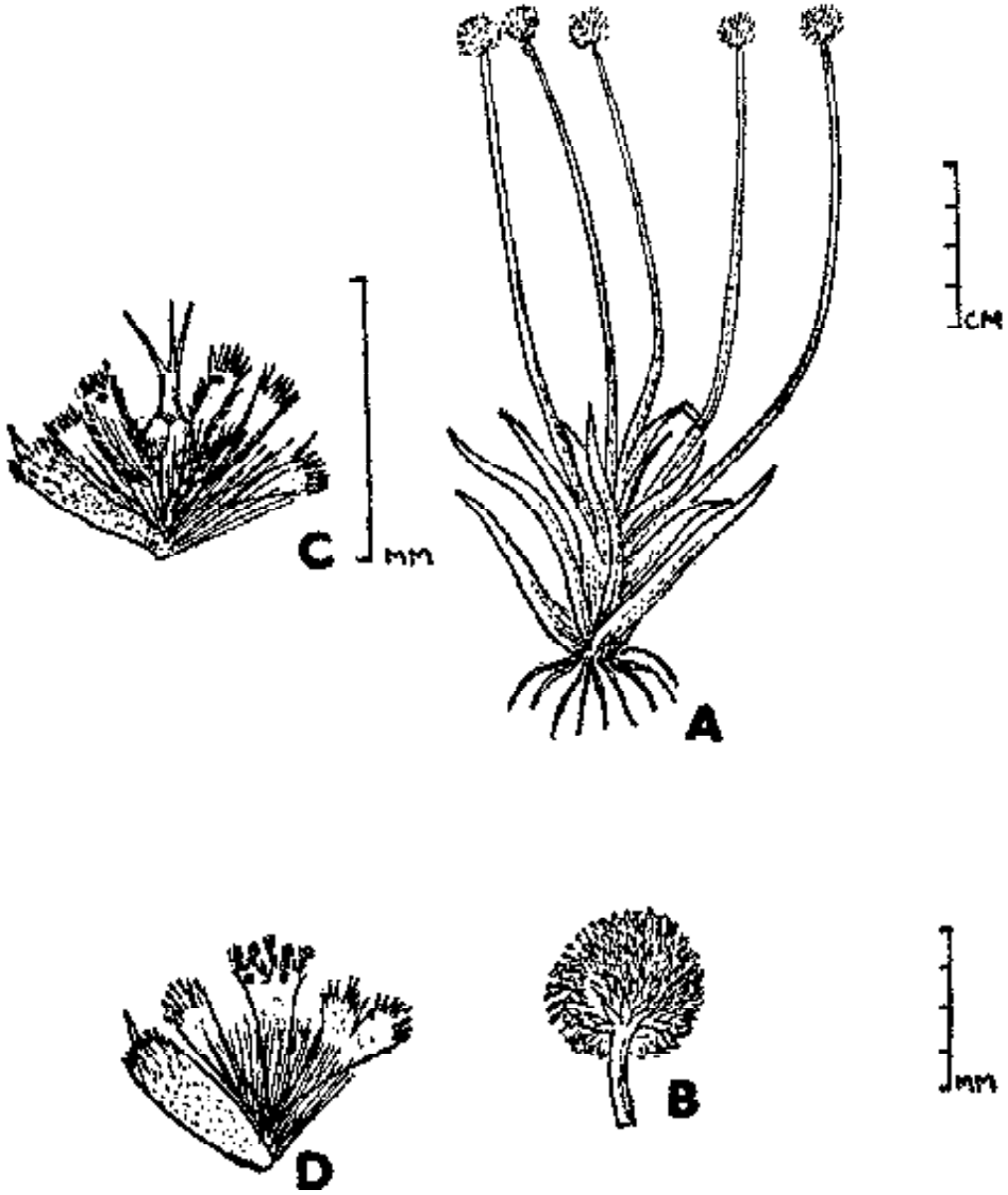

Fig. 27. *Eriocaulon quinquangulare* L.

A. Habit. B. Floral head. C. Flower dissected. D. Sepal, two petals and stamens with hairs arising from the base.

I. *Cyperoideae* : flowers bisexual in many-flowered spikelets, or solitary, unisexual; ± perennial; (*Cyperus, Eleocharis, Fimbristylis, Scirpus, Schoenoplectus, Rikliella, Fuirena, Lipocarpha, Bulbostylis, Mariscus, Pycreus, Kyllinga*).

II. *Rhynchosporoideae* : flowers bisexual or unisexual; more or less perennial, in few-flowered spike-like racemes in spikes or heads : *Scleria.*

III. *Caricoideae* : flowers unisexual, naked, usually in many-flowered spikes, females surrounded by a perigynium (utricle) : *Carex.*

T. Koyama (1985) groups the following 14 genera into 6 tribes :

Tribe **Scirpeae** : *Fuirena, Schoenoplectus.*

Tribe **Cypereae** : *Cyperus, Pycreus, Courtoisina, Mariscus, Kyllinga.*

Tribe **Lipocarpheae** : *Lipocarpha, Rikliella.*

Tribe **Fimbristylideae** : *Elaeocharis, Fimbristylis, Bulbostylis.*

Tribe **Sclerieae** : *Scleria.*

Tribe **Cariceae** : *Carex.*

1a. Flowers unisexual

2a. Nuts enclosed in a sac-like utricle, not bony, not borne on a hypogynous disc — CAREX

2b. Nuts not enclosed in a sac-like utricle, bony and borne on a hypogynous disc — SCLERIA

1b. Flowers bisexual

3a. Leaves absent or all reduced to sheaths

4a. Inflorescences terminal; bracts glume-like; style-bases constricted, not passing into nuts

5a. Styles usually glabrous with base persistent, hypogynous bristles present — ELEOCHARIS

5b. Styles usually fimbriate or villous, style with base deciduous, hypogynous bristles absent — FIMBRISTYLIS

4b Inflorescences pseudolateral: bracts scale-like: style-bases not constricted, passing gradually into nut

6a. Spikelets strongly squarrose by recurved mucro of glumes; mucro about as long as or longer than glumes — RIKLIBILLA

6b. Spikelets not squarrose, mucro absent or very small — SCHOENOPLECTUS

3b. Leaves present, well-developed, sometimes a few reduced to sheaths

7a. Leaves with base sheathing like a collar around stems; inflorescences paniculate — FUIRENA

7b. Leaves without a sheathing base; inflorescences not paniculate

8a. Hypogynal structures present, scaly, membranous — LIPOCARPHA

8b. Hypogynal structures absent

9a. Style-bases bulbiform, styles with style-bases deciduous, rarely persistent

10a. Style-bases not articulated with ovary, styles with style-bases deciduous leaving a minute button on nuts — BULBOSTYLIS

10b. Style-bases articulated with ovary, styles with style-bases deciduous without leaving a button-shaped structure on nuts, rarely persistent — FIMBRISTYLIS

9b. Style-bases not bulbiform, styles gradually passing into nut, styles with style-bases persistent on nut

11a. Rachilla articulated and deciduous

12a. Spikes sessile; styles 2-fid; nuts laterally flattened with one angle against rachilla — KYLLINGA

12b. Spikes stalked; styles 3-fid; nuts triquetrous with one side facing rachilla

13a. Keel of nut-bearing glumes winged, spikelets much flattened; nuts narrow, plants annual — COURTOISINA

13b. Keel of nut-bearing glumes not winged; spikelets cylindrical; nuts oblong trigonous; plants perennial — MARISCUS

11b. Rachilla not articulated, persistent

14a. Styles 3-fid; nuts trigonous or if flattened then one edge not against rachilla — CYPERUS

14b. Styles 2-fid; nut flattened with one edge against rachilla — PYCREUS

BULBOSTYLIS Kunth, Enum. Pl. 2 : 205. 1837, *nom. cons.*

T. : *B. capillaris* (L.) C. B. Clarke (*Scirpus capillaris* L.) (*typ. cons.*).

Note : Mabberley (1987) lists the genus as congeneric with *Fimbristylis* Vahl (1806), nom. cons.

B. densa (Wall. in Roxb.) Hand.-Mazz. [*Scripus densus* Wall. in Roxb. *B. capillaris* (L.) C. B. Clarke var. *trifida* (Nees) C. B. Clarke], is expected in the district.

Bulbostylis barbata (Rottb.) C. B. Clarke in J. D. Hook., FBI 6 : 651. 1893; Haines, Botany 3 : 967; Kern in Fl. Males. Ser. I, 7 : 539, 1974; Koyama in Dassan. *op. cit.* : 327. 1985. *Scirpus barbatus* Rottb., Descr. Pl. Rar. Programm. 27. 1772, et Descr. l.c. Pl. : 52. t. 17. f. 4, 1773. (*Masa*-Hindi).

subsp. **barbata**

Tufted annual herb without rhizome; stems striate, setaceous, erect or ascending, glabrous. Leaves capillary, glabrous, 5-10 cm long; sheath ciliate at mouth. Spikelets 3-20, in terminal, globose heads, heads 5-10 mm across; bracts 2-3, longest upto 1.5 cm long; spikelets sessile, chestnut-brown, 3-6 mm long, oblong-lanceolate; glumes membranous, 1.6-2.5 mm long, cymbiform, ovate, keel conspicuously 3-nerved ending in a small mucro at apex, 2 mm long, imbricate on all sides, 2-1 lowest empty; stamens usually 1, rarely 2; ovary 1-celled; stigmas 3. Achenes smooth, straw-coloured, obscurely reticulated, obpyramidal or obovoid, triquetrous, 0.5-0.7 mm long.

Type : Not cited; Rottboel l.c. t. 17, f. 4.

Fl. & Frt. : July-Dec.

Common near water margins, moist river banks, cultivated fields.

Karidongri : 19334 ; Khuria : 15468 ; Katghora : 6089 ; Pasan : 13287A. 2n = 10.

N. Africa to India, China and Japan, South to Indonesia and N. Australia.

Herb is boiled in water and the brew given in dysentery.

Note : Koyama (1985) recognises two subspecies, subsp. *pulchella* (Thw.) T. Koyama restricted to the sea beaches of Sri Lanka and South India.

CAREX L., Sp. Pl. : 972. 1753.

LT. : *C. pulicaris* L. (vide N. L. Britton & A. Brown, Ill. Fl. N.U.S., ed. 2. 1 : 352. 1913).

C. hirta L. has also been chosen as lectotype (vide N. L. Green, Prop. Brit. Bot. 187. 1929) ; this, however, is not a historically acceptable selection (Farr *et al.*, 1979). Again, Koyama (l.c. 1985) lists *Carex acuta* L. as "type species".

This is the largest genus in the family with c.1000 species.

Carex cruciata Wahlenb. in Kongl. Vetensk. Acad. Naya Handl. Stockh. 24 : 149. 1803 ; Haines, Botany 3 : 978 ; Karthikeyan *et al.*, Fl. Indiae Enum. Monocot. : 35. 1989. *C. condensata* Nees ex Wight, Contrib. Bot. Ind. : 123. 1834 ; C. B. Clarke in J. D. Hook., FBI 6 : 716 1894.

var. **cruciata**

Subcaespitose herbs ; rhizomes horizontal, covered with fibrous sheaths ; stems 3-gonous. Leaves all along and exceeding stems, 40-70 cm long, narrow, striate, caudate-acuminate ; sheaths trigonous, ultimately fibrous. Inflorescences of distant, peduncled, pyramidal, compound panicles, 20-35 cm long ; lower bracts foliaceous, as long as, or longer than panicles ; spikes with female part below, 3-9 mm long and a terminal cylindric male portion, 6-8 mm long, linear oblong, ferruginous ; glumes brown, ovate to lanceolate, concave, with strong mid-vein, 2.5-3 mm long ; stamens 3 ; utricles ellipsoid or ovate, acuminate or turbinate, strongly ribbed, ferruginous or brown ; style 1.5 mm long, 3-fid ; stigmas 3. Nuts 3-quetrous, ellipsoid, sub-stipitate, about 2.5 mm long.

Fl. & Frt. : Aug.-Jan.

Common on slopes, in shady places.

Pasarkhet : 19428; Korba to Madai : 12916; Kabirchabutra : 19177. Madagascar, India, Vietnam, east to China and S. Japan.

COURTOISINA Sojak in Cas. Nur. Muz. (Praha) 148(3 & 4) : 193. 1979/1980; Taxon 38 : 300. 1989, et Taxon 41 : 102. 1992.

T. : *C. cyperoides* (Roxb.) Sojak (*Kyllinga cyperoides* Roxb).

Courtoisia Nees in Linnaea 9 : 286. June 1834 (sub-nud.), et Edinb. New Phil. J. 17 : 261. Oct. 1834, non Marchand (1830), nec Reichenbach (1837).

T. : *C. cyperoides* (Roxb.) Nees

Indocourtoisia Bennet & Raizada, Indian For. 107(7) : 432. 1981.

T. : *I. cyperoides* (Roxb.) Bennet & Raizada.

Pseudomariscus Rauschert in Taxon 31 : 559. 1982.

T. : *P. cyperoides* (Roxb.) Rauschert.

Courtoisina cyperoides (Roxb.) Sojak, l.c. : 193. 1980.

Kyllinga cyperoides Roxb., Fl. Ind. 1 : 187. 1820, non *Scirpus cyperoides* L. (1753). *Courtoisia cyperoides* (Roxb.) Nees in Edinb. New Phil. J. 17 : 261. Oct. 1834, et in Wight, Contrib. Bot. Ind. : 92. 1834; C. B. Clarke, in J. D. Hook., FBI 6 : 625. 1893; Haines, Botany 3 : 954; Fl. Hassan : 661. 1976. *Mariscus cyperoides* (Roxb.) A. Dietr., Sp. Pl. 2 : 438. 1833; Hara *et al.*, Enum. Pl. Nep. : 116. 1978. *Cyperus pseudokyllingioides* Kuekenth in Engl. Planzenr. 101 : 501. 1936; Rao & Verma, *Cyperaceae* in N.E. India : 21. 1982. *Indocourtoisia cyperoides* (Roxb.) Bennet & Raizada, l.c.; Karthikeyan *et al.*, Fl. Ind. Enum. Monocot. 57. : 1989. *Pseudomariscus cyperoides* (Roxb.) Rauschert, Taxon 31 : 559. 1982.

Annual herbs; stems caespitose, triquetrous. Leaves 1-3, basal 2-5 mm broad, as long as the stems, sheaths membranous. Umbels compound, corymbiform, rays 3-10, upto 10 cm long, ultimately bearing globose spikes 7-10 mm in diam.; bracts 3-7, foliaceous; spikes short, globose, yellowish-brown, spikelets compressed, elliptic, elliptic-oblong, 3-4.5 mm long, a few-flowered, lowest glumes empty, bract-like; flowering glumes 2, cymbiform, 4-5 mm long, usually one bearing nut; stamens 3; styles continuous with nuts, 3-fid, stigmas 3. Nuts narrowly oblong or fusiform, 3-quetrous, apiculate, 2.5-3 mm long, deep-brown or blackish.

It differs from *Cyperus* L. s. str. by its deciduous spikelets which are shed in tact, as in *Mariscus* Vahl; it differs from the latter by its annual habit, by the spacing of secondary veins of the glumes close to the midrib

to leave the wide "winged" flanks of the glumes veinless, persistence of the two lower glumes and anatomically significantly by its hyaline parenchymatous vascular bundlesheath outside the fibrous sheath in the leaf and entirely lacking the inner chlorenchymatous ('kranz') bundlesheath so characteric of *Mariscus* Vahl, s. str., which is perennial in habit. (cf. Vorster, Taxon 35 : 745-746. 1986).

Fl. & Frt. : Oct.-Feb.

Common in moist cultivated fields, muddy banks of ponds.

Bilaspur : 12999.

2n = 10, 40.

Southern/Eastern/Northeastern tropical Africa, India, Bangladesh, Bhutan.

Used as a Vermifuge.

Note : P. Vorster (l.c.) proposal No. 853 to conserve *Courtoisia* Nees was rejected by the Spermatophyta Committee by 0-11 votes (Taxon 38:300. 1989) ; instead, *Courtoisina* Sojak (1980) was approved as the correct generic name (see Taxon 41 : 102. 1992).

CYPERUS L., Sp. Pl. 44. 1753 & Gen. Pl. ed. 5 : 26. 1754.

LT. : *C. esculentus* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S., ed. 2. 1. : 297. 1913)

Juncellus (Griseb.) C. B. Clarke in J. D. Hook., FBI 6 : 594. 1893 based on (*Cyperus* L. sect. *Juncellus* Griseb.).

Cyperus L. *sens. lat.* has been split up into *Cyperus* L. *sens. str.*, *Juncellus* C. B. Clarke, *Kyllinga* Rottb., *Mariscus* Vahl, *Pycreus* P. Beauv., *Indocourtoisia* Bennet & Raizada (= *Courtoisina* Sojak) etc., by various authors. Such splitting is debatable and needs further study on a world-wide basis to establish divisions more broadly based than the above, which depend much on embryo-type and physiological studies for their distinction. Pending further revisionary work, we have followed Hooper (1976), Koyama (1977, 1978, 1985) for generic delimitations in *Cyperus* L. Kern (1974), in his treatment of the family *Cyperaceae* has treated *Cyperus* L. as an all-inclusive genus, whereas Koyama (in Dassan, Rev. Handb. Fl. Ceylon 5 : 126-127. 1985) recognise *Cyperus* L., *Kyllinga* Rottb., *Pycreus* Beauv., *Mariscus* Vahl, as generically distinct.

C. halpan L., *C. nutans* Vahl and *C. alopecuroides* Rottb. [*Juncellus alopecuroides* (Rottb.) C. B. Clarke] are expected in the district.

1a. Stigmas 2; nut plano-convex — *C. michelianus* ssp. *pygmaeus*

1b. Stigmas 3; nut 3-gonous

2a. Nuts asymmetrically 3-angled; angles corky

3a. Inflorescences capitate; styles long, undivided, with minute stigmas — *C. cephalotes*

3b. Inflorescences not capitate, spikelets digitately arranged; styles short, 3-cleft stigmas as long as styles — *C. platystylis*

2b. Nuts symmetrically 3-angled, angles not corky

4a. Slender, caespitose, annual herbs

5a. Stamens usually 1, rarely 2; nuts pale brown or white

6a. Inflorescences capitate; glumes broadly obovate-orbicular, 0.5-0.6 mm long; nuts pale brown — *C. difformis*

6b. Inflorescences with distinct rays, not capitate; glumes ovate or ovate-lanceolate, 0.8-1 mm long; nuts white — *C. tenuispica*

5b. Stamens usually 3, occasionally 2; nuts black or dark brown

7a. Inflorescences with rays 1-3 or rays absent; spikelets sub-digitately arranged, 1-3 cm long; glumes chartaceous, ovate, acute at apex, tightly disposed, 2.5-4 mm long — *C. compressus*

7b. Inflorescences with many rays: spikelets spicately arranged, 5-10 mm long; glumes membranous, obovate-orbicular, rounded at apex, loosely disposed, 1-1.5 mm long

8a. Spikelets compressed, spreading at right-angles, 2.5 mm broad; glumes 7-veined; keel of glumes serrulate-scabrous, wing-like; nuts 1.5 mm long — *C. alulatus*

8b. Spikelets erect and spreading, 1.5-2 mm broad; glumes 3-5-veined; keel of glumes smooth, not winged; nuts 1-1.25 mm long — *C. irla*

4b. Perennial herbs with thick rootstocks or rhizomes

9a. Spikelets clustered, not spicate

10a. Stems considerably thickened below; bracts usually 2; spikelets 10-25 mm long, 14-40-flowered; glumes chartaceous, tightly imbricated, 4-5 mm long; nuts 1.5 mm long — *C. niveus*

10b Stems not or scarcely thickened below; bracts 3-5; spikelets 3-7 mm long, 8-10-flowered; glumes membranous, not or scarcely imbricated, 1-1.75 mm long; nuts 0.5-0.8 mm long — *C. pulchellus*

9b Spikelets spicate

11a. Rachis of spikes hispidulous or scabrous hairy — *C. pilosus*

11b Rachis of spikes glabrous

12a. Plants with usually 1 leaf, sometimes leaves 2 or absent — *C. pangorei*

12b. Plants with several leaves

13a. Stolons present — *C. rotundus*

13b. Stolons absent

14a. Spikes cylindrical; glumes not hyaline-margined; nuts ellipsoid — *C. exaltatus*

14b. Spikes ovoid or broadly ovoid; glumes with a broad hyaline margin in upper half; nuts obovoid or oblong-cylindrical

15a. Spikelets narrowly linear, subulate, loosely arranged, 0.7-1 mm wide, spreading at right angles; glumes remote — *C. distans*

15b. Spikelets oblong linear, compressed, densely crowded, clasping in a tassel, 2 mm wide; glumes almost overlapping, not remote — *C. nutans* ssp *eleusinoides*

Cyperus alulatus Kern in Reinwardtia 1 : 463. f.1. 1952; Koyama in Hara *et al.*, Enum. 1 : 107. 1978. *C. iria* var. *rectangularis* Kuekenth in Engl. Pflanzenr. 101 : 152. 1935. *Cyperus rectangularis* (Kuekenth) Bennet in Indian For. 95. : 692. 1969.

Erect herbs; stems caespitose, 3-quetrous. Leaves as long as or longer than stems, 4-6 mm broad. Inflorescences compound or decompound umbels; spikes upto 3 cm long; rachis scabrid on angles; bracts 7-8, longest upto 30 cm long; rays 4-8, unequal, upto 15 cm long; spikelets greenish-yellow, patent, 9-18-flowered; glumes ovate, imbricate, membranous, keel 7-veined, winged with a serrulate margin in upper part; stamens 2-3, anthers oblong; ovaries 1-celled; styles 0.6-0.7 mm long, 2-fid or partite; stigmas 3. Nuts obovoid, apiculate, reddish-brown, 1.5 mm long.

Fl. & Frt. : July-Oct.

Common in moist cultivated fields, roadside ditches, bank of canal.

Pasan : 19111.

2n = 16, 72, 128 (as '*Cyperus iria* L.').

Pakistan, India, Nepal.

This species resembles *C. iria* very much, differing therefrom in its floral glumes that are clearly winged on the keel and minutely serrulate-scabrous along the edge of the wing.

C. cephalotes Vahl, Enum. 2 : 311. 1806; C. B. Clarke in J. D. Hook., FBI 6 : 597. 1893; Haines, Botany 3 : 936; Kern in Fl. Males. Ser. I. 7 : 632. 1974; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 212. 1985. *Anosporum cephalotes* (Vahl) Kurz in J. Asiat. Soc. Beng. 65 : 159. 1876; Lye in Nord. J. Bot. 1 : 186. 1981; Karthikeyan *et al.*, Fl. Ind. Enum. Monocot : 32. 1989.

Erect, caespitose, glabrous herbs; rhizome often with slender stolons. Culms 2-5, rigid, triquetrous, scabrid, 10-30 × 0.2-0.4 cm. Heads 1-2 cm across, ovoid; bracts 3-5, 7-12 cm long, foliaceous; spikelets 6-10 × 2-3 mm, rigid, often curved; rachilla stout, persistent, angular; glumes closely imbricate, cymbiform, keeled, 3-veined, greenish or pale-brown, streaked with red or brown, 2-3 mm long; stamens 3, filaments broadly ligulate, anthers muticous; ovaries 1-celled; styles passing gradually into nut, 3-4 mm long, undivided. Nuts stipitate below, corky, ovoid, trigonous, dorsally compressed, about half as long as the glume, apiculate by persistent style-base.

Type locality : India, Nicobar Islands.

Fl. & Frt. : Feb.-May.

Common in the sandy mud of tanks, roadside ditches.

Ratanpur : 16762.

2n = 42.

India, Malesia, S. China, N. Australia, New Guinea.

Airy Shaw (1973) and Rudd (1991) equate *Anosporum* Nees with *Cyperus* L. and Mabberley (1987) does not list *Anosporum* Nees as a good genus.

C. compressus L., Sp. Pl. : 46. 1753; C. B. Clarke in J. D. Hook., FBI 6 : 605. 1893; Haines, Botany 3 : 938; Koyama in Dassan., *op. cit.* 5 : 194. 1985. *C. pectiniformis* J. A. Schultes, Mantissa 2 : 128. 1824. *C. compressus* var. *pectiniformis* (J. A. Schultes) C. B. Clarke in J. Linn. Soc. 21 : 97. 1884.

Slender caespitose, glabrous herbs; stems triquetrous. Leaves nearly as long as stem or longer, 3-4 mm broad, lower sheath reddish-brown. Spikes in a simple terminal head or heads umbelled on rays 2.5-7 cm long; bracts 3-5, longer than umbel, foliaceous; spikes broadly ovoid; spikelets 3-10, subdigitately arranged, much compressed, elongating after fall of lower glumes; glumes chartaceous, cymbiform, ovate, keeled, keel produced into a short cusp, margins white, scarious; rachilla not or very slightly winged; stamens 3, anthers linear-oblong; ovaries 1-celled; stigmas 3. Nuts obovoid obtuse, faces concave, trigonous, broadly stipitate, shining dark brown to blackish.

Fl. & Frt. : July-Dec.

Common in sandy mud of streams, lake margins, open grasslands, cultivated fields.

Pasan : 13288; Pasan to Pendra : 19145.

2n = 96, c. 98, 128.

Cosmopolitan.

Used as a fodder.

C. difformis L., Sp. Pl. : 67. 1753 et in Torner, Cent. Pl. 2 : 6. 1756; C. B. Clarke in J. D. Hook., FBI 6 : 599. 1893; Haines, Botany 3 : 935. Koyama in Dassan., *op. cit.* 5 : 206. 1985.

Erect, tufted, annual herbs stems acutely triquetrous at top. Leaves shorter or as long as stems, flaccid, abruptly acuminate, 2-4 mm broad.

Heads 6-10 mm in diam., several, in irregular umbels 1-5 cm across; bracts 2-3, 5-12 cm long, sharply keeled; rays upto 5 cm long; spikelets linear-oblong, stellately spreading, 2-6 mm long, turgid, 10-30-flowered; glumes ovate-truncate, concave, obtuse, membranous, straw-coloured, sides, more or less, red, centre greenish, when dry almost white, about 0.1 mm long; rachilla with pale centre and grey wings or not; stamens 2, rarely 1, anthers elliptic or elliptic-oblong; ovaries 1-celled; styles very short; stigmas 3. Nuts broadly ellipsoid, triquetrous, nearly as long as glumes, subsessile, shining stramineous or pale brown.

Type : From India.

Fl. & Frt. : July-Jan.

Common in damp places, cultivated fields.

Pasan to Pendra : 19142; Khuria to Pandaria : 19346; Kota : 13075; Pondu to Ratanpur : 16779.

2n = 24, 34, 36.

Cosmopolitan.

C. distans L. f., Suppl. Pl. : 103. 1782; C. B. Clarke in J. D. Hook., FBI 6 : 607. 1893; Haines, Botany 3 : 940; Koyama in Dassan. & Fosberg, Rev. Handb. Fl. Ceylon 5 : 189. 1985.

Robust, erect herbs; rhizomes woody, short-creeping, stolons 5 cm long, covered with brown, elliptic acute scales; stems triquetrous. Leaves shorter than or as long as stems, scabrous in upper part, 7-10 mm broad. Umbels 20-30 cm in diam., rays upto 30 cm long; sometimes reduced to a single head about 6 cm in diam.; bracts 4-6, longer than umbel, foliaceous; spikes broadly ovoid-pyramidal; spikelets narrow, linear, 1-2 cm long, young nodding; rachilla flexuous, winged; glumes oblong-elliptic, erect, appressed to rachilla, 3-5-veined; stamens 3; ovaries linear, 1-celled; styles shorter than nut; stigmas 3. Nuts dusky black, trigonous, oblong-cylindrical, broadly stipitate, 1-1.5 mm long.

Fl. & Frt. : July-Oct.

Common in sandy mud of nalas, streams, ponds, cultivated fields.

Ratanpur : 13025; Achanakmar : 13215A, 19537; Lamni : 19215; Khondra : 12793; Korba to Putka : 19455.

2n = 48, 54, 58.

Tropical and subtropical regions of both the hemispheres.

C. michelianus (L.) subsp. **pygmaeus** (Rottb.) Aschers & Graebn., Syn. Mitteleur. Fl. ed. 2, 2 : 273. 1904; Nicolson *et al.*, Reg. Veg. 119 : 284. 1988; *Cyperus pygmaeus* Rottb., Descr. et Icon 20 : t. 14, f, 5. 1773, non Retz. (1786); Kern in Fl. Males., Ser. I. 7 : 634. 1974; Koyama in Gard. Bull. Singapore 30 : 146. 1977. *Juncellus pygmaeus* (Rottb.) C. B. Clarke in J. D. Hook., FBI 6 : 596. 1893; Haines, Botany 3 : 949. *Peemottenga* Rheede, Hort. Malab. 12 : 99, t. 53. 1693.

Small, caespitose, annual herbs; stems triquetrous. Leaves linear, acuminate, scabrid on margins in upper part, flaccid upto 10 cm long, basal sheaths brown or reddish. Heads solitary, terminal, several contracted into a triangular-ovoid to sub-globose, lobed heads, 8-15 mm in diam., bracts 3-5, unequal, 5-10 cm long, foliaceous with dilated bases; spikelets many, about 6 mm long, ovate to lanceolate, strongly compressed, 8-20-flowered, greenish-white, turning pale brown; glumes distichous, narrowly boat-shaped, 3(-5)-veined, closely packed, keel spinulose, rounded, acute or with a thickened, slightly mucronate tip; stamens 1-2, anthers linear-oblong, muticous; ovaries 1-celled; style shorter than nut, branches 2, short-exserted; stigmas 2. Nuts oblong-ellipsoid, planoconvex, top pyramidal, brown.

Fl. & Frt. : Feb.-July.

Common on moist soil near ponds, tanks and swampy places, cultivated fields.

Khootaghat to Khaira : 19521; Pali : 8577.

2n = 78.

Paleotropics.

Note : *Cyperus pygmaeus* Retz. (1786) is reduced as a synonym of *Pycreus pumilus* (L.) Nees ex C. B. Clarke (*Cyperus pumilus* L. 1756).

C. nutans Vahl ssp. **eleusinoides** (Kunth) Koyama in Gard. Bull Singapore 30 : 136. 1977. *Cyperus eleusinoides* Kunth, Enum. Pl. 2 : 39. 1837; C. B. Clarke in J. D. Hook., FBI 6 : 608. 1893 *C. nutans* Vahl var. *eleusinoides* (Kunth) Haines, Botany 3 : 898. 1924; Kern in Fl. Males. Ser. I. 7 : 610. 1974; Fl. Hassan : 667. 1976.

Robust, erect herbs; rhizomes short, woody; stems trigonous, triquetrous below inflorescences. Leaves 5-10 mm broad, coriaceous, scabrous on margins in upper part. Umbels, 20-25 cm in diam., rays upto 25 cm long; bracts 4-6, longer than umbels, foliaceous; spikes corymbose, dense,

2-3 cm long; spikelets pale-brown, oblong-linear, 8-10 mm long; rachilla flexuous, narrowly winged; glumes slightly imbricate, oblong, mucronulate, 2 mm long, 7-veined; stamens 3, anthers oblong, muticous; ovaries linear, 1-celled; styles shorter than nuts, stigmas 3 Nuts brown, triquetrous, slightly curved, 1.5 mm long, oblong-ovoid.

Type: Nepal, *Wallich* 3346B.

Fl. & Frt.: July-Oct.

Common in sandy black mud of ponds, lakes-margins, near streams.

Kabirchabutra : 15234; Madai : 19469; Lamni : 19223.

2n = 72, 104.

Tropical and subtropical Africa and Asia.

Note: Ssp. *eleusinoides* differs from ssp. *nutans* in having more densely disposed longer spikelets.

C. exaltatus Retz., Obs. Bot. 5 : 11. 1788; Haines, Botany 3 : 945; Nicolson *et al.*, Reg. Veget. 119 : 284. 1988. *Cyperus venustus* R. Br., Prodr. : 217. 1810. *Para-pullu* Rheede, Hort. Malab. 12 : 77, t. 42. 1693.

var. **exaltatus**

Robust, erect herbs; rhizomes short, woody; stems obtusely 3-gonous. Leaves 6-8 mm broad, flat or plicate with mid-vein prominent beneath, coriaceous, scabrous on margins, scaberulous on upper surface; lower sheath somewhat spongy. Umbels compound, upto 20 cm long; bracts 4-6, erecto-patent, upto 35 cm long, foliaceous; spikes 2.5-4 cm long, digitately arranged; spikelets linear, 8-20-flowered, usually spreading at right angles from rachis, 2-6 mm long, often brightly coloured; rachilla narrowly winged, wings persistent; glumes broadly ovate, acute or minutely aristate, brown with green keel; stamens 3, anthers oblong, apiculate; ovaries 1-celled; stigmas 3. Nuts pale, 3-gonous, ellipsoid.

Type: India : Tamil Nadu, Tranquebar.

Fl. & Frt.: July-Oct.

Common in black mud of ponds, ditches.

Pasarkhet : 19395.

2n = 90, 96.

India to Vietnam, East China, Japan, S. Australia.

Suitable for paper-making.

C. iria L., Sp. Pl. : 45. 1753 ; C. B. Clarke in J. D. Hook., FBI 6 : 606. 1893 ; Haines, Botany 3 : 938 ; Kern in Fl. Males. Ser. I. 7 : 616. 1974 ; Koyama in Dassan., *op. cit.* 5 : 194. 1985. *Cyperus parviflorus* Nees in Wight, Contrib. Bot. India : 87. 1834, p.p. excl. syn, non Vahl (1806). *C. iria* var. *paniciformis* (Franch. et Sav.) C. B Clarke, *l.c.* : 607.

Erect, tufted herbs ; stems 3-quetrous. Leaves as long as or longer than stems, 5 mm broad, rather flaccid, scabrous on margins in upper part. Spikelets in simple or compound spikes or sub-racemes, on branches of decompound umbels 20 cm long ; primary rays sometimes at apex corymbose, sometimes again umbelled ; bracts 3-5, longer than umbel, foliaceous ; spikes oblong-ovoid, sessile ; spikelets yellow or pale brown, lanceolate, compressed ; rachilla wingless ; glumes orbicular-obovate, truncate, spreading, scarcely imbricate in fruits, sharply keeled, 3-5-veined ; stamens 2-3, anthers oblong, muticous ; ovaries 1-celled ; styles much shorter than nut ; stigmas 3. Nuts obovoid, triquetrous, broadly stipitate, shining dark brown to black.

Type : China, *Osbeck*.

Fl. & Frt. : July-Oct.

Common in moist cultivated fields, road-side ditches, bank of canals.

Khuria : 19305.

2n = 16, 72, 128.

Cosmopolitan.

Note : Koyama (1985) cites the type : "India, *Osbeck*".

C. niveus Retz., Obs. 5 : 12. 1788 ; C. B. Clarke in J. D. Hook., FBI 6 : 601. 1893 ; Haines, Botany 3 : 939 ; Karthikeyan *et al.*, *op. cit.* 46. 1989.

Small, erect, caespitose herbs ; rhizomes creeping woody ; stems trigonous base swollen. Leaves narrow with filiform tips, shorter than stems 2-3 mm broad. Inflorescences capitate, 1-4 cm broad, supported by linear or filiform bracts 2-4.5 cm long ; spikelets white or pale, 4-9 together, much compressed, ovate-lanceolate to oblong, 10-30-flowered ; glumes chartaceous, muticous, closely imbricate, acutely keeled, many-veined, 4-5 mm long, mid-vein scarcely produced into a mucro ; stamens 3, anthers linear, muticous ; ovaries 1-celled ; styles 3.5 mm long, linear ; stigmas 3. Nuts obovoid-ellipsoid, or oblong-obovoid, subsessile, triquetrous, about 1.5 mm long, apiculate, deep brown.

Fl. & Frt. : Feb.-July.

Common in grassy places, road-sides, at the edges of the forest.

Marwahi to Pasan : 19063, 19068.

2n = 72.

Central Asia, India, N. Burma, Vietnam, S.W. China.

C. pangorei Rottb., Descr. Ic. Rar. Nov. Pl. : 31. t. 73. f. 3. 1773 : Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 176, fig. 9. 1985. *C. tagetum* Roxb. (Hort. Beng. : 6. 1814, nom. nud.) Fl. Ind. 1 : 211. 1820, et ed. 2 : 208. 1832; Haines, Botany 3 : 943.

Type : From Calcutta.

var. **pangorei**

Erect herbs; rhizomes long-creeping woods aromatic, stoloniferous, covered with brown scales; stems obtusely 3-angled. Leaves often reduced to sheaths, sometimes upper one with blade upto 10 cm long. Umbels upto 30 cm across; rays 6-10, 2.5-15 cm long, secondary rays often with a tubular cladoprophyll at base; bracts 3-5, foliaceous, upto 30 cm long; spikes peduncled, umbelled or corymbose on branched umbels; spikelets linear, brown or reddish, 1.5-2.5 mm long, remote in fruits, obliquely spreading, margins broad scarious; wings of rachilla caducous, ovate, acute; glumes spreading, laxly imbricating, elliptic-oblong, 3 mm long, muticous, keeled, keel 3-5-veined, green; stamens 3; ovaries 1-celled; styles shorter than nuts, 3-fid; stigmas 3, long-exserted. Nuts oblong obovoid, half as long as glume.

Type : India : Tamil Nadu, Tranquebar.

Fl. & Frt. : Aug.-Jan.

Common in marshy places near ponds, river banks.

Achanakmar : 15434.

Nepal, India, Sri Lanka, Burma.

The species provides materials for making mats.

C. pilosus Vahl, Enum. Pl. 2 : 354. 1806; Haines, Botany 3 : 944; Koyama in Dassan., in Rev. Handb. Fl. Ceylon 5 : 193. 1985. Nicolson *et al.*, Reg. Veg. 119 : 285. 1988. *Ira* [II], *Balari* Rheede, Hort. Malab. 12 : 105, t. 56. 1693.

Erect herbs; stolons with distant nodes and scales; stems acutely triquetrous at top. Leaves shorter than or as long as stems, prominently 3-veined, scabrous on margins in upper part, lower sheath brownish, 4-6 mm broad. Umbels upto 35 cm in diam., secondary umbels closely corymbed; rays upto 15 cm long; bracts 3-5, overtopping umbels, foliaceous; spikes ovoid, 2-3 cm long, rachis angular, hispidulous or pubescent; spikelets compressed, linear, 10-20-flowered; when ripe, spreading at right angles, 3-seriate, 3-8 mm long; glumes ovate, 3-7-veined, mid-vein green, sides stramineous to reddish brown and whitish-hyaline margins in the upper part, muticous, ultimately loosely imbricated, 2-3 mm long; stamens 3; anthers oblong, muticous; ovaries 1-celled; stigmas 3. Nuts apiculate, black, triquetrous, obovoid or ellipsoid, broadly stipitate.

Type: *'India orientali'*; ex Madras.

Fl. & Frt.: Sept.-Oct.

Frequently seen in moist places, cultivated fields, near streams.

Pasarkhet : 12954.

2n = 16, 36.

Tropical Africa through India to China, Japan and Malaysia.

Used as a fodder.

C. platystylis R. Br., Prodr. Fl. Nov. Holl. : 214. 1810; C. B. Clarke in J. D. Hook., FBI 6 : 598. 1893; Haines, Botany 3 : 945; Koyama in Dassan., *op. cit.* 5 : 198, fig. 12. 1985.

Small herbs; rhizomes short, covered with scales; roots thick, fusiform; stems triquetrous. Leaves often as long as or longer than stems, septate, nodulose, scabrous on margins and mid-vein, 6-10 mm broad, lower sheaths keeled. Inflorescences 3-15 cm in diam., compound or decompound, densely spicilose hemispherical umbels; spikes numerous; bracts 5-8, foliaceous; 4-30 cm long; spikelets bright brown, umbellately or digitately clustered, ovate to linear-lanceolate, 20-40 flowered, 4-15 mm long; rachilla wingless, persistent; glumes membranous, close-packed, broadly ovate or ovate-oblong, back with 3 green veins; stamens 3, anthers linear; ovaries 1-celled; style flat, ciliate, branches 3; stigmas 3. Achenes ellipsoid, with spongy thickened angles, trigonous, apiculate, greyish brown or black, 1.75-2 mm long.

Type: From Australia.

Fl. & Frt.: May-Feb.

Occasionally found in the moist mud of ponds, lakes, roadside-ditches, wet rice fields.

Pali : 8581.

India, Sri Lanka, Malaysia, N. Australia.

C. pulchellus R. Br., Prodr. 213. 1810; Kern in Reinwardtia 3 : 44. 1954; et in Fl. Males. Ser. I. 7 : 632. 1974. *C. leucocephalus sensu* C. B. Clarke in J. D. Hook., FBI 6 : 602. 1893. *pro part. non.* Retz. 1788; Haines, Botany 3 : 939. *Sorostachys pulchellus* (R. Br.) Lye in Nord. J. Bot. 1 : 189. 1981; Karthikeyan *et al., op. cit.* : 73. 1989.

Small, erect, perennial, caespitose herbs; rhizomes short, woody; stems slender, trigonous below, triquetrous above, base surrounded by stramineous to brownish cataphylls. Leaves 1 or 2, filiform, shorter than stems. Heads white, solitary, terminal, subglobose, 8-15 mm in diam.; bracts usually 3, overtopping inflorescences; spikelets 8-50, compressed, ovate, 6-20-flowered, 3-5 mm long; glumes oblong-obtuse, membranous, obscurely 3-1-veined, keeled, margins hyaline; stamen 1; ovaries 1-celled; styles shorter than nuts, branches 3, linear; stigmas 3, about as long as styles. Nuts oblong or oblong-ellipsoid, trigonous, apiculate, black with white reticulations.

Fl. & Frt. : May-July.

Frequently seen on damp forest-floors with scanty vegetation.

Lamni : 19214.

Paleotropics.

Note : Airy Shaw (1973) equates *Sorostachys* Steud. with *Cyperus* L. and Mabberley (1987) does not list the genus at all.

C. rotundus L., Sp. Pl. : 45. 1753; C. B. Clarke in J. D. Hook., FBI 6 : 614. 1893; Haines, Botany 3 : 946; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 181, fig. 10 a-c. 1985. (Nut Grass; *Mutha*-Oriya).

Erect herbs; rhizomes with long, slender stolons ending a subglobose, blackish tuber 8-15 mm across; stems nodosely thickened at base, triquetrous at top. Leaves shorter or as long as the stem, 3-5 mm broad, tip filiform, lower sheaths reddish-brown. Umbel-rays 5-15 cm long; bracts 3, longest upto 20 cm long; spikes ovoid, with glabrous rachis; spikelets 5-20 cm long, pale brown, lanceolate-linear; rachilla flexuous, broadly winged, persistent; glumes ovate, imbricate, obtuse or subacute with a slight mucro, keeled, 3-7-veined on back, 3 mm long; stamens 3;

anthers apiculate; ovaries 1-celled; styles shorter than nuts, 3-fid; stigmas 3. Nuts obovoid-ellipsoid, trigonous, 1.5 mm long, brownish to black.

Type : From India.

Fl. & Frt. : July-Dec.

Common in nurseries, along forest roads, moist places, near streams.

Pasarkhet : 19445; Marwahi : 19028; Hasdo river bank : 8619.

2n = 16, 26, 84, 96, 108, 152.

Cosmopolitan.

Young tubers are edible and are used in traditional medicine in India, China, Japan, Sri Lanka and Germany. Tubers contain such effective components as cyperine, cyperone, cyperol and l-Pinene and are used for spasms or as an emenagogue. Dried tuberous roots, known is Soucher, are aromatic, used in perfumes and agarbatties; credited with diuretic, diaphoretic and astringent properties; used in stomach and bowel complaints; yields an essential oil.

C. tenuiaptica Steud., Syn. Pl. Glumac. 2 : 11. 1855; Koyama in Dassan., *op. cit.* : 205. 1985. *C. flavidus-sensu* C. B. Clarke in J. D. Hook., FBI 6 : 600. 1893, non Retz. 1789; Haines, Botany 3 : 936.

Erect annual herbs; stems slender, triquetrous. Leaves basal, shorter or longer than stems, flaccid, 2-4 mm broad, lower sheaths bladeless or short-laminate, scarious. Umbels 5-15 cm in diam.; rays 6-10, unequal, upto 15 cm long, bracts 2, unequal, upto 25 cm long; spikelets digitately arranged in clusters of 3-9, stellately spreading, greenish yellow, linear, 2-6 mm long, glumes ovate-oblong, obtuse, 1-1.5 mm long, close-packed, keel green, 3-veined; stamens 1(-2), anthers linear-oblong; ovaries 1-celled styles about as long as nuts, branches 3, linear, stigmas 3. Nuts ovoid-globose, planoconvex, obtuse at top, densely tuberculate, white, 0.3-0.4 mm long.

Type : India : Mangalore, *Hohenacker* 1607.

Fl. & Frt. : May-Sept.

Frequently seen in cultivated fields, moist situations, near ponds.

Pasarkhet to Siang : 19416.

2n = 16.

Tropical and sub-tropical Africa and Asia, tropical Australia.

ELEOCHARIS R. Br., Prodr. Fl. Nov. Holl. : 224. 1810.

T. : *E. capitata* R. Br.

1a. Glumes distichous, atleast at base of spikelets; styles 3-fid, stigmas 3; nuts 3-quetrous, white — *E. retroflexa* subsp. *chaeteria*

1b. Glumes spiral; styles 2-fid; stigmas 2; nuts bicoonvex, black or brownish-yellow

2a. Spikelets 2-6 mm long; bristles glistening white; style-base very small, button-like, depressed or disciform; nuts 0.7-0.8 mm long, black — *E. atropurpurea*

2b. Spikelets 10-20 mm long; bristles brown; style-base very large, oblong-conical; nuts 1.5-2 mm long, yellow or brownish yellow — *E. palustris*

Eleocharis atropurpurea (Retz.) K. B. Presl, Rel. Haenk. 1 : 196. 1828 exclud specim.; C. B. Clarke in J. D. Hook., FBI 6 : 627. 1893; Haines, Botany 3 : 956; Kern in Fl. Males.Ser. I. 7 : 536. 1974. *Scirpus atropurpureus* Retz., Obs. Bot. 5 : 14. 1788.

Slender, annual, caespitose herbs; many barren, leaf-like stems at base, shorter than normal stems with inflorescences. Leaves absent; sheaths membranous; appressed, purplish or brownish. Spikelet terminal, oblong-ovoid or sub-cylindric, wider than stems, many-flowered; bristles 5-6, shorter than or as long as nuts, retrorsely scabrous; glumes black or chestnut brown, 1-1.5 mm long, broadly elliptic or oblong, obtuse or rounded at tip, folded, membranous, 3-veined, keel green. imbricate; stamens 1-2, anthers linear-oblong, not crested; ovaries 1-celled; styles stigmatic. Nuts smooth, black obovoid.

Fl. & Frt. : Apr.-Dec.

Common in muddy situations near streams, in dried up ditches, cultivated fields.

Korbi : 19097; Pali to Ratanpur : 19499; Bilaspur : 13006.

2n = 10, 20, 21.

Pantropics; also in Europe and U.S.A.

E. palustris (L.) R. Br., Prodr. : 224. 1810; Roem. & Schult., Syst. Veg. 2 : 151. 1817; C. B. Clarke in J. D. Hook., FBI 6 : 628. 1893; Haines, Botany 3 : 955; Koyama in Hara *et al.*, Enum. 1 : 109. 1978; *Scirpus palustris* L., Sp. Pl. : 70. 1753.

var. **palustris**

Perennial, tufted herbs; rhizomes black, creeping; stems terete. Leaves

absent; sheaths membranous, often red below. Spikelet solitary, terminal, ellipsoid or cylindric, wider than stems, dense-flowered, yellow or brownish; bristles 5-6, as long as or slightly longer than nuts, retrosely scabrous; glumes membranous, ovate-lanceolate, muticous, keel green, margins hyaline or coloured, obtuse, 4-5 mm long, lower 2-3 empty; stamens 3, sometimes 2, anthers apiculate; ovaries 1-celled. Nuts obovoid rounded and with very broad style-base, nearly half as long as nuts.

Fl. & Frt.: Dec.-July.

Common in the muddy situations.

Pasarkhet : 19390.

2n = 10, 14, 16, 17, 18, 36, 37, 38, 39, 40, 42, 44, 46-49, 50 & 51.

Cosmopolitan, chiefly in temperate regions of Northern hemisphere.

E. retroflexa (Poir.) Urban subsp. **chaetaria** (Roem. et Schult.) Koyama in Bull. Nat. Sci. Mus. Tokyo, N. S. 17 : 68, fig. 2. 1974, et in Dassan. Rev. Handb. Fl. Ceylon 5 : 265. 1985. *Cyperus setaceus* Retz., Obs. Bot. 5 : 10. 1789, non *Eleocharis setacea* R. Br. (1810); *E. chaetaria* Roem., et Schult., Syst. Veg. 2 : 154. 1817; C. B. Clarke in J. D. Hook., FBI 6 : 629. 1893; Haines, Botany 3 : 966.

Annual, caespitose herbs; stems angled. Leaves absent; sheaths lax, white or reddish, scarcely torn. Spikelets solitary, terminal, wider than stems, ovoid or ellipsoid, a few-flowered; bristles 6, unequal, longest usually longer than nuts, retrorsely scabrous, pale or whitish; glumes membranous, ovate, obtuse, keeled, *c.* 2 mm long, with broad, purplish sides and scarious margins, greenish mid-vein, spreading in fruits; stamens 3-2, anthers linear-oblong, not crested; ovaries 1-celled; style-base depressed-conic, 1.5 mm long. Nuts truncate, acute angles sometimes excurrtnt at its shoulder.

Type : India : Calcutta, *Koenig s.n.*

Fl. & Frt.: Sept.-Apr.

Common in muddy situations, cultivated fields.

Katghora : 8669.

2n = 10.

Nepal, India to Vietnam, Malaysia, Sri Lanka.

Note: subsp. *chaetaria* differs from subsp. *retroflexa* in having nuts broadly ovate 0.6-0.7 mm wide and with prominently ribbed angles; style-base as wide as nut, blunt, deeply 3-lobed.

In subsp. *retroflexa* nuts are obovate, 0.4-0.5 mm wide with angles much narrower and style-base not as blunt, larger and deeply lobed as in subsp. *chaetaria*. Though Kern (Fl. Males. Ser. I. 7 : 534. 1974) has united *E. retroflexa* (Poir.) Urban with *E. Chaetaria* Roem. & Schult., Hooper (1976) and Koyama (1978, 1985) consider the two taxa as subspecies. Subsp. *retroflexa* is considered as confined to tropical America.

Note : Karthikeyan *et al.* (1989) do not list any subspecies in *E. retroflexa* (Poir.) Urb. nor refer to *C. setaceus* Retz.

FIMBRISTYLIS Vahl, Enum. Pl. 2 : 285. 1806, *nom. cons.*

T. : *F. dichotoma* (L.) Vahl ('*dichotomum*') (*Scirpus dichotomus* L.) (*typ. cons.*).

F. argentea (Rottb.) Vahl, *F. ferruginea* (L.) Vahl, *F. quinquangularis* (Vahl) Kunth and *E. squarrosa* Vahl are expected to occur in the district.

1a. Styles 3-fid, usually glabrous; stigmas 3; nuts trigonous or triquetrous

2a. All glumes spiral

3a. Spikelets sessile, in clusters, clusters umbellate — *F. falcata*

3b. Spikelets peduncled, in compound umbel

4a. Rhizomes absent, stems 4-5-angled above; leaves eligulate i.e. sheath gradually passing into blades; spikelets subglobose, 2-4 mm long; glumes 0.8-1 mm long; stamens 2 — *F. miliacea*

4b. Rhizomes present; stems flattened above; leaves ligulate i.e. blade and sheath separated by a fringe of short hairs; spikelets lanceolate, 5-8 mm long; glumes 2-2.5 mm long; stamens 3 — *F. complanata*

2b. All glumes not spiral, lower distichous or sub-distichous

5a. Stems with several spikelets in compound umbel; spikelets yellow-brown, 2-3 mm wide — *F. fusca*

5b. Stems with 1, rarely 2 or 3, spikelets; spikelets greenish-yellow, 4-7 mm wide — *F. ovata*

1b. Styles 2-fid, nearly always hairy above or below; stigmas 2; nuts biconvex

6a. Stems with only one or a few spikelets

7a. Flowering stems not 4-angled, leafy; spikelets 1-3 to a corymb — *F. schoenoides*

7b. Flowering stems 4-angled, leafless; spikelets solitary, terminal

8a. Glumes ovate, subacute, 3.5-4.5 mm long, keeled; styles slightly villous at top; nuts obovate, oblong-obovate, transversely fluted — *F. acuminata*

8b. Glumes oblong or obovate-oblong, rounded, 2.5-3 mm long, not keeled; styles villous nearly to base; nuts cylindrical, linear-oblong not fluted — *F. tetragona*

6b Stems with many spikelets, umbelled

9a. Fertile-glumes aristate with awns as long as blade; nuts linear-cylindric — *F. dipsacea*

9b. Fertile-glumes muticous or keel only slightly excurrent; nuts obovoid

10a. Nuts smooth, obscurely reticulate, not striate

11a. Pubescent or puberulous herbs; leaves eligulate i.e. sheath gradually passing into leaves; styles not hyaline-margined, scarcely ciliate at top; nuts with very minute gynophore or gynophore absent — *F. aestivalis*

11b. Glabrous herbs; leaves ligulate i.e. sheaths and blades separated by a fringe of short hairs; styles hyaline-margined, ciliate in upper part; nuts with large, prominent, obconic gynophore — *F. tomentosa*

10b. Nuts longitudinally and prominently striate, tuberculate

12a. Spikelets 1.5-2 mm wide, angled by prominent keels of glumes; glumes usually puberulous, membranous, without lateral veins, yellow or yellow-brown, 1-1.5 mm long; styles 0.6-1 mm long; nuts 0.6-0.7 mm long, not tuberculate — *F. bis-umbellata*

12b. Spikelets 3-5 mm wide, terete, not angled by keels of glumes; glumes glabrous, chartaceous, usually with 2-4 lateral veins, deeply brown, 2.5-3 mm long; styles 2-4 mm long; nuts 1-1.5 mm long, tuberculate *F. dichotoma*

Fimbristylis acuminata Vahl, Enum. 2 : 285. 1806; Haines, Botany 3 : 962; Koyama in Dassan., *op. cit.* : 319; Karthikeyan *et al.*, *op. cit.* : 50 1989.

Erect, glabrous, perennial herbs; rhizomes short; stems tufted, slender, obscurely quadrangular. Leaves reduced to obliquely truncate, bladeless sheaths. Spikelets solitary, terminal, ebracteate, lanceolate or ovoid-lanceolate, terete, 6-12 mm long: rachilla narrowly winged; glumes spiral, chartaceous, ovate, scarcely mucronate, pale or chestnut, keel green, 3-5-veined, 3.5-4 mm long, lowest 2-3 empty; stamens 2-3, anthers oblong-linear; ovaries 1-celled; styles nearly as long as nut, flattened, slightly villous at top; stigmas 2. Nuts biconvex, obovate or oblong-obovate, transversely wavy-wrinkled, white or straw-coloured, 1.5-2 mm long.

Type: Malacca, *Koenig.*

Fl. & Frt.: Oct.-Feb.

Common in moist situations forming clumps, in cultivated fields.

Katghora : 8601, 8691; Pasarkhet : 16819; Pali : 8579.

2n = 10.

India, Sri Lanka, Malaysia, extending to Philippines.

F. aestivalis (Retz.) Vahl, Enum. Pl. 2 : 288. 1806; C. B. Clarke in J. D. Hook., FBI 6 : 637. 1893, *pro part.*; Haines, Botany 3 : 963; Koyama in Dassan., *op. cit.* : 313. 1985. *Scirpus aestivalvis* Retz., Obs. Bot. 4 : 12. 1786. *Fimbristylis bis-umbellata sensu* C.E.C. Fischer in Gamble, Fl. Pres. Madras : 1898, 1936 (3 : 1151. 1967 reprint edn.), non Bub. (1850).

ssp. **aestivalvis**

Small, erect, annual, caespitose herbs; stems angular, filiform. Leaves linear, acute, hairy, often shorter than stems; sheaths stramineous or ferrugineous; ligules absent. Umbels compound and decompound, 1-7 cm long; bracts 4-6, filiform, foliaceous; spikelets many, solitary, oblong, subcylindric, angular, acute 3-8 mm long; rachilla narrowly winged; glumes

spiral, membranous, ovate, mucronulate, with sharp, green keel, ferrugineous, 1-1.5 mm long; stamen 1, anther oblong; ovaries 1-celled; styles nearly as long as nuts, flat, dilated at base; stigmas 2. Nuts biconvex, elliptic or obovate, short-stipitate, smooth, obscurely reticulate, straw-coloured, 0.5-0.8 mm long.

Type : Ceylon, *Koenig*.

Fl. & Frt. : Feb.-July.

Common in moist sandy places along streams, banks of ponds, cultivated fields.

Khootaghat to Khaira : 19522; Khuria : 19341; Katghora : 6030, 8665, 8675.

2n = 10.

India, Sri Lanka, Malaysia, Australia.

Note : ssp. *major* (Trimen) Koyama (l.c. : 313. 1985) has corymbs more frequently simple, with 2-7 rays, each terminated by 1 or 2 spikelets, spikelets 5-7 mm long, may occur in the district.

This species is quite similar to *F. squarrosa* Vahl, but can be distinguished by its floral glumes which are short-sub-mucronate or cuspidate at apex, whereas in *F. squarrosa* Vahl, the glumes are long aristate, the awns being recurved and hooked and hence the spikelets become squarrose. However, this character sometimes varies and occasionally there are non-squarrose glumes in *F. squarrosa* Vahl, then the spikelets look quite similar to *F. aestivalis*. The difference therefore rests only on the characters of styles. The styles of *F. aestivalis* are very minutely hairy at base or glabrous in contrast to those of *F. squarrosa* with pendent, long silky hairs at the base.

F. bis-umbelleta (Forssk.) Bubani, Dodecanth. : 30. 1850; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 312. 1985. *Scirpus bis-umbellatus* Forssk., Fl. Aegypt.-Arab. 15. 1775. *Fimbristylis dichotoma auct., non* (L.) Vahl (1805); C. B. Clarke in J. D. Hook., FBI 6 : 635. 1893; Haines, Botany 3 : 965.

Erect, annual, caespitose herbs; pubescent or puberulous. Leaves basal, usually shorter than stems, falcate-linear, acute, glabrous or hairy, 1-2 mm broad; sheaths membranous, stramineous or ferrugineous; ligule a dense fringe of hairs. Umbels compound or decompound, 5-10 cm across; bracts 2-3, unequal, foliaceous, glabrous or hairy; spikelets many, solitary, oblong or ovoid, angular, acute, 5-8 mm long, elongating after fall of lower

glumes; rachilla narrowly winged; glumes spiral, membranous, ovate, acute or mucronate, sharply keeled; margins hyaline, pale brown, 1-1.5 mm long, lowest empty; stamen 1, anthers oblong; ovaries 1-celled, styles flattened, base dilated, ciliate in upper part, stigmas 2. Nuts 5-9-striately ridged on each face, biconvex, broadly obovate, short-stipitate, straw-coloured.

Type : Described from Egypt.

Fl. & Frt. : July-Feb.

Common in moist places, cultivated fields, near streams.

Pasan to Semra; 15347; Korbi : 19104; Parasi : 19032; Lamni : 15398; Pasan to Pendra : 19144; Semra : 15365.

2n = 10.

India, Malaysia, Australia, Mediterranean region, Africa.

Note : It differs from *F. dichotoma* (L.) Vahl. in having more densely tufted, strictly annual habit and slightly smaller spikelets, which are yellow-brownish and dull vs. dark brown, more or less shining spikelets in *F. dichotoma*.

F. complanata (Retz.) Link, Hort. Bot. Berol. 1 : 292. 1827; Haines, Botany 3 : 959; Koyama in Dassan., Rev. Handb Fl. Ceylon 5 : 284. 1985. *Scirpus complanatus* Retz., Obs. Bot. 5. 14 : 1788.

Perennial rhizomatous herbs, upto 6 cm long, 1-1.25 mm thick, clothed with brown scales and their fibrous remnants; stems tufted, angular below. Leaves basal, shorter or as long as stems, 3-5 mm broad; ligule a dense fringe of short hairs; sheaths compressed, keeled on back, lower one bladeless. Umbels compound/decompound, 6-12 cm across; bracts 2-4, broad, very obtuse, shorter than umbels, foliaceous; spikelets lanceolate to oblong, angled, acute, chestnut brown, 5-8 mm long; glumes spiral, membranous, ovate or oblong-ovate, keel 3-veined, excurrent as a fine point; stamens 3, anthers linear; ovaries 1-celled; styles triquetrous, longer than nuts, with a short conical base; stigmas 3. Nuts obovoid, obtuse, trigonous, faintly striate and tubercled, 2 mm long, white or pale.

Type : Described from 'India orientalis'.

Fl. & Frt. : May-Sept.

Occasionally found in moist places, near ponds, margins of rice fields, canals, also in and around cultivated fields.

Pasarkhet : 19393.

2n = 10, 16, 20.

Pantropical.

F. dichotoma (L.) Vahl, Enum Pl. 2 : 287. 1806; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 306-311. 1985. *Scirpus dichotomus* L., Sp. Pl. 50. 1753; *S. diphyllus* Retz., Obs. Bot. 5 : 15. 1788; T. : India orientalis (Tranquebar), *Koenig. Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2 : 289. 1806; C. B. Clarke in J. D. Hook., FBI 6 : 639. 1893, *pro part. excl.* var. *pluristriata*; Haines, Botany 3 : 964.

Erect, annual or perennial herbs; stems tufted, striated, 3-5-angled or compressed. Leaves basal, shorter than or as long as stems, falcate linear, obtuse or acute, glabrous or hairy, 2-3 mm broad; ligule a dense fringe of hairs. Corymbs simple or sub-compound, 5-15 cm across; bracts 4-5, foliaceous, 5-12 cm long; spikelets solitary, brown or chestnut brown, ovoid-oblong or ovoid-lanceolate, terete, acute, 5-10 mm long; rachilla narrowly winged; glumes spiral, chartaceous, ovate-rounded, obtuse, mucronulate, keel green, margin chestnut brown, closely imbricate, 2.5-3 mm long, lowest 1-3 empty; stamens 1-3, anthers oblong-linear; ovaries 1-celled, styles flattened, slightly dilated at base; stigmas 2. Nuts short-stipitate, 5-8 striate on each face with transversely oblong cells, biconvex, obovate, straw-coloured or whitish.

Type : Ceylon; *Herb. Hermann* 2, fol. 63 (BM).

Fl. & Frt. : July-Feb.

Common in waste places, forest clearings, along forest roads, on the bank of ponds, cultivated fields.

Neur : 16722; Madai to Korba : 12931.

Tropics and subtropics.

Note : Koyama (1985) recognises three subspecies in *F. dichotoma*, ssp. *dichotoma* comprising two varieties and he provides keys and discusses the taxonomy and distribution area of these taxa.

F. dipsacea (Rottb.) C. B. Clarke in J. D. Hook., FBI 6 : 635. 1893; Haines, Botany 3 : 963; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 321. 1985. *Scirpus dipsaceus* Rottb., Descr. et. Icon. Pl. : 56. t. 12. f. 1. 1773.

Small, erect, annual herbs; stems caespitose, filiform. Leaves capillary, often as long as stems; sheaths obliquely truncate, brownish; ligule absent. Umbels simple or compound, 2-4 cm across; bracts 2-3, filiform, often

overtopping umbels, 2.5 cm long; spikelets 1-many, subglobose or oblong, terete, obtuse, squarrose, pale green, 3-5 mm long; glumes spiral, membranous, squarrose, narrowly elliptic, pale, hyaline, 1-2 mm long, with green keel excurrent into an awn as long as blade; stamen 1 or 2, anther oblong; ovaries 1-celled; styles glabrous, slender, stigmas 2. Nuts glabrous, smooth, pale brown, subterete, oblong-linear, cylindric.

Type : From 'India orientalis', *Koenig*.

Fl. & Frt. : May-July.

Occasionally found in moist sandy bed of streams, cultivated fields, bank of ponds.

Pasarkhet to Siang : 19402; Pasan to Korba : 19084.

2n = 10.

Paleotropics

F. falcata (Vahl) Kunth, Enum. 2 : 239. 1837; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 289. 1985. *Scirpus falcatus* Vahl, Enum. Pl. 2 : 275. 1806; *Trichelostylis junciformis* Nees in Wt., Contr. Bot. Ind. : 106. 1834. *Fimbristylis junciformis* (Nees) Kunth, Enum. Pl. 2 : 239. 1837; C. B. Clarke in J. D. Hook., FBI 6 : 647. 1893; Haines, Botany 3 : 960 (*Bindi muthi*-Santal).

Type : Nepal, ad ripus Irawaddi, *Wallich* 3520A except P(K).

var. **falcata**

Erect, perennial herbs; rhizomes woody, short-creeping, covered with brown leaf-sheaths; stems rigid, angular, sulcate. Leaves basal, shorter than stems, 1.5-3 mm broad, obtuse, hispidulous; ligule absent; sheaths ferrugineous. Umbels compound/decompound, 2.5-7 cm across, each umbel with 15-25 clusters of spikelets; bracts 2-4, shorter than rays, foliaceous; spikelets 2-5 in a cluster, brown or chestnut, ovoid-oblong, 3-6 mm long; rachilla broadly winged; glumes spiral, ovate, acute, with 3-veined keel, margins scarious, 2-3 mm long; stamens 3, anthers linear, bristly at top; ovaries 1-celled; styles triquetrous, longer than nuts, base pyramidal, style with style-base deciduous; stigmas 3, about as long as style. Nuts trigonous, obovoid, smooth or verrucose, pale straw-coloured, about 0.5 mm long.

Type : 'India orientalis', *Koenig*.

Fl. & Frt. : May-Sept.

Common in waste places, along forest-roads, forest clearings in grassy places.

Marwahi : 19012; Korbi : 19095; Pasan to Pendra : 19125.

2n = 44; 22 (*F. junciformis* Kunth).

Nepal, India, Sri Lanka, Malaysia.

Roots given in dysentery.

F. fusca (Nees) C. B. Clarke in J. D. Hook., FBI 6 : 649. 1893; Haines, Botany 3 : 960; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 276. 1985. *Abildgaardis fusca* Nees in Wt., Contr. Bot. Ind. 95. 1834.

Erect, perennial herbs; rhizomes short, woody, covered with decayed leaf-sheaths; stems slender, angular. Leaves basal, shorter than stems, linear, obtuse, nearly glabrous, 2-3 mm broad; ligule absent. Umbels compound, loose, 2-10 cm across; bracts 3-5, dilated at base, hairy, 8-15 mm long; spikelets solitary, brown, lanceolate, compressed, acute, 5-8 mm long; rachilla broadly winged; glumes lower distichous, subchartaceous, obliquely erect, lanceolate, keeled, 1-veined, fulvous, with broad, whitish hyaline margins, 3-5 mm long, lowest 2-3 glumes empty, nut-bearing glumes 2-6, upper male or sterile glumes 2-6; stamens 2-3, anthers linear; ovaries 1-celled, styles slender, triquetrous, 4-5 mm long, base pyramidal, style with style-base deciduous; stigmas 3, shorter than style. Nuts trigonous, obovoid, obtuse, minutely verrucose, whitish to brownish.

Type : Nepal, *Wallich.*

Fl. & Frt. : July.

Occasionally found in open grasslands, at the edges of the forests.

Achanakmar : 19278.

Nepal, India, China, Malaysia.

F. miliacea (L.) Vahl, Enum. Pl. 2 : 287. 1806; emend. S. T. Blake in J. Arnold Arbor. 35 : 216. 1954; Haines, Botany 3 : 958; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 296. 1985. *Scirpus miliaceus* L., Syst. Nat. ed. 10. 2 : 868. 1759. *Fimbristylis littoralis* Gaud., in Freycinet, Voy. Bot. : 413. 1826; Koyama in Hara, Fl. East. Himal. : 391. 1966; Kern in Fl. Males. Ser. I. 7 : 551. 1974.

Erect, annual herbs; stems caespitose, slender, striate. Leaves distichous, as long as or longer than stems, laterally flattened, equitant, grooved on inner margin, 1.5-2 mm broad; sheaths laterally compressed,

sharply keeled, upto 10 cm long. Umbels decompound, loose, 10-20 cm in diam.; branches often strongly 3-quetrous and scabrid, with 3-5, upto 3 cm long rays; bracts 2-4, filiform linear, shorter than rays; spikelets solitary, brown, globose or ellipsoid, terete, obtuse, 2-4 mm long; glumes spiral membranous, ovate or oblong, obtuse, sub-acute, scarcely keeled, 3-veined in centre, margins brown, hyaline; stamens 1-2, anthers oblong-linear; ovaries 1-celled; styles triquetrous, thickened at base, glabrous, style with style-base deciduous; stigmas 3, about as long as style. Nuts trigonous, obovoid, minutely transversely striate, minutely verrucose, pale straw-coloured, 0.5 mm long.

LT.: Described from India, Linn. Herb. No. 71.41 (LINN.) [vide Kern (1954), et Koyama (1985)].

Fl. & Frt.: July-Dec.

Common in moist cultivated fields, ditches, muddy bank of ponds.

Korba to Kudmura : 16803; Pasarkhet : 19397.

2n = 10.

Used for making mats.

Pantropical.

Note: Linn. Herb. No. 71.40 labelled "*miliaceus*" in Linnaeus's own hand, is indeed *F. quinquenguluris* Kunth. Therefore, to maintain the current usage, Kern (1954) selected the other syntype 71.41 as the lectotype and he is supported by Koyama (1985).

F. ovata (N. Burm.) Kern in Blumea 15 : 126. 196. 1967; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 273. 1985. *Carex ovata* N. Burm., Fl. Ind. : 194. 1768. *Cyperus monostachyos* L., Mant. Pl. 2 : 180. 1771. Type : Ind. or., *Fimbristylis monostachyos* (L.) Hassk., Pl. Jav. Rar. : 61. 1848 ('*monostachya*'); Haines, Botany 3 : 961.

Erect perennial herbs; rhizomes short; stems caespitose, slender, angular striate, somewhat thickened at base. Leaves basal, filiform, half as long as stems; ligule absent. Spikelets solitary, terminal, rarely 2 or 3, ovate or ovate-lanceolate, compressed, acute, shining stramineous or yellowish, 8-15 mm long; rachilla broadly winged; bracts 2-3, glumaceous; lower glumes distichous, subcoriaceous, broadly ovate, acute, back rounded, 3-veined, keel green, sides yellow or straw-coloured, middle 5-6 male, upper tabescent; all 4-5 mm long; stamens 2-3, anthers linear; ovaries

1-celled; styles triquetrous, style-base pyramidal, style with style-base deciduous; stigmas 3, much shorter than style. Nuts obovoid or globose, obtusely trigonous, base attenuate, minutely verrucose, straw-coloured, 2-3 mm long.

Type: Described from Java.

Fl. & Frt.: July-Sept.

Frequently seen in moist places, cultivated fields, along canals, and on moist grassy patches.

Pali to Ratanpur : 19494.

2n = 10, 20.

Pantropical.

F. schoenoides (Retz.) Vahl, Enum. Pl. 2 : 286. 1806; Haines Botany 3 : 962; Koyama in Dassan., Rev. Handb. Fl. Ceylon. 5 : 315. 1985; *Scirpus schoenoides* Retz., Obs. Bot. 5 : 14. 1788.

Erect, annual or perennial herbs; stems slender, caespitose, compressed, sulcate, striate, often thickened below. Leaves basal, linear, filiform, shorter or as long as stems; lower sheaths stramineous or ferrugineous; ligule a dense fringe of hairs. Inflorescences consisting of a single, terminal spikelet or 1-2 lateral, peduncled spikelets; spikelets globose-ovoid, terete, pale or brown, dense flowered, 5-10 mm long, supported at base sometimes by 1 or 2 rigid, glumaceous bracts; rachilla narrowly winged; glumes spiral, subchartaceous, appressed, ovate-rounded, obtuse or suborbicular concave, scarcely keeled, short-mucronate, many-striate, 3.5 mm long; stamens 2-3, anthers oblong-linear; ovaries 1-celled; styles flattened, dilated at base, ciliate in upper half; stigmas 2, shorter than styles. Nuts obovoid, short-stipitate, smooth, pale straw- or whitish-coloured.

Type: 'India orientalis', *Koenig*.

Fl. & Frt.: July-Oct.

Frequently seen in muddy situations, near streams, on the margins of rice-fields.

Pasarkhet : 19396.

2n = 10.

Nepal, India, Thailand to Vietnam, Malaysia, N. Australia.

F. tetragona R. Br. Prodr. Fl. Nov. Holl. : 226. 1810 ; Haines, Botany 3 : 961 ; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 323. 1985.

Erect, annual or perennial herbs ; rhizomes short ; stems caespitose, quadrangular. Leaves of flowering stems reduced to 2-3, obliquely truncate, sheaths 3-6 cm long, in sterile stems leaves basal, filiform. Spikelets solitary, terminal, ebracteate, globose, ovoid or oblong-ovoid, terete, dull brown, dense-flowered, 6-10 mm long ; glumes spiral, membranous, oblong-ovate, obtuse, truncate, scarcely mucronate, closely imbricate with rounded backs, margins hyaline, 3-5 mm long, lowest 2 or 3 empty ; stamens 2 or 3, anthers linear ; ovaries 1-celled ; styles flattened, brown, short-stipitate, base nearly as wide as nuts, deciduous with glumes ; stigmas 2. Nuts planto-convex or subterete, linear-oblong, cylindrical, stipitate, reticulate, straw-coloured, 1.5-2 mm long.

Type : Described from Australia.

Fl. & Frt. : July-Dec.

Common in moist cultivated fields, bank of ponds, in marshy places in open deciduous forests.

Pasarkhet : 19391 ; Katghora :

2n = 10, 20.

India to tropical Australia.

F. tomentosa Vahl, Enum. Pl. 2 : 290. 1806 ; Kern in Fl. Males. Ser. I. 7 : 576. 1974 ; *F. podocarpa* Nees & Meyen ex Nees in Wight, Contr. Bot. Ind. 98. 1834, *pro part.* includo *typ.* ; C. B. Clarke in J. D. Hook., FBI 6 : 638. 1893 ; Haines, Botany 3 : 964 ; Fl. Hassan : 680. 1976 ; *F. dichotoma* (L.) Vahl, subsp. *podocarpa* (Nees & Meyen ex Nees) : Koyama in Micronesica 1 : 87. 1964, et in Hara *et al.*, Enum. 1 : 111. 1978.

Erect, annual herbs ; stems caespitose, angular, compressed below inflorescence. Leaves basal, as long as or shorter than stems, abruptly acuminate, ciliate, or hispid on margins, 1.5-2 mm broad ; sheaths, often hairy ; ligule a fringe of hairs. Umbels simple or compound, loose ; bracts 4 5, hairy at base, scabrid on edges above, foliaceous, one often longer than umbel ; spikelets brown, ovoid, terete, acute, 5-10 mm long ; rachilla narrowly winged ; glumes spiral, chartaceous, appressed, concave-ovate or cymbiform, keeled, scarious margined, 2-3 mm long ; stamens 2, anthers oblong-linear ; ovaries 1-celled ; styles flattened, ciliate in upper part ; stigmas 2.

Nuts pale yellow or white, biconvex, elliptic to orbicular, stipitate, 1.5-2 mm long.

Type : 'India orientalis'.

Fl. & Frt. : July-Nov.

Occasionally found in moist places, cultivated fields, grassy places, forest clearings.

Bilaspur to Seput : 13008.

2n = 20, 30 (*F. podocarpa*).

Tropical Africa, India and Malaysia.

Note : Koyama (1985) reduces *F. tomentosa* Vahl (1806) as conspecific with *F. dichotoma* (L.) Vahl, without comment, recognises three subspecies including ssp. *podocarpa* (Nees & Meyen) Koyama (1964).

FUIRENA Rottb., Descr. et Icon. Nov. Pl. : 70. 1773.

T. : *F. umbellata* Rottb.

F. umbellata Rottb. (2n = 48, 52) and *F. wallichiana* Kunth (2n =38) may also occur in the district.

Fuirena ciliaris (L.) Roxb. (Hort. Beng. : 81. 1814, nom. nud.), Fl. Ind. 1 : 184. 1820; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 150., fig. 5. 1985; *Scirpus ciliaris* L., Mant. Pl. 2 : 182. 1771; *Fuirena glomerata* Lam., Ill. 1 : 150. 1791; Haines, Botany 3 : 972; *F. rottboellii* Nees in Wight, Contrib. Bot. Ind. : 94. 1834. Types : India and China (cf. Koyama *l.c.*).

Annual, caespitose, hairy herbs; stems leafy, triquetrous. Leaves linear, acute or tapering, pubescent, 5-12 × 0.3-0.6 cm; sheaths pubescent, spikelets 2-4, in clusters, axillary and terminal, dirty or brownish-green, 6-8 mm long; glumes spirally imbricated, orbicular, obovate, 1.5 mm long, hairy with a green hairy dorsal awn as long as blade; hypogynous bristles 6, 2-seriate, outer 3 linear, smooth or scabrous at top, inner 3 obovate or subquadrate, clawed, 3-veined, glabrous or minutely hairy; stamens 2-3, anthers oblong; ovaries 1-celled; styles 3-fid, deciduous above base, leaving an apiculus on nuts. Nuts elliptic-ovoid or obovoid, 3-quetrous, smooth, pale or brown, 1 mm long.

Fl. & Frt. : Oct.-Apr.

Common in cultivated fields, moist bank of ponds, lake margins.

Katghora : 8671, 3990; Korba to Kudmara : 16794.

2n = 38.

Paleotropics.

KYLLINGA Rottb., Descr. et Icon. Nov. Pl. : 12. 1773, *nom. cons.*

LT. : *K. nemoralis* (J. R. & G. Forst.) Dandy ex Hutchinson & Dalziel (*Thryocephalon nemorale* J. R. & G. Forst.) [=*K monocephala sensu* Rottboell, non Rottboell, 1773, *nom. illeg.* (*typ. cons.*)].

Note : Koyama (1985) cites "*K. brevifolia* Rottboell" as the type species and Mabberley (1987) lists *Kyllinga* Rottb., as a congeneric synonym of *Cyperus* L.

2n = 116, 120.

1a. Glumes winged on keels — *K. nemoralis*

1b. Glumes not winged

2a. Rhizomes short, stems tufted, densely caespitose, not stoloniferous; older leaf-sheaths fibrous; spikes usually 3, in a globose head — *K. bulbosa*

2b. Rhizomes horizontally-creeping or stoloniferous; stems distantly or closely arranged in one row along rhizome; leaf-sheaths not fibrous; spike usually 1 — *K. brevifolia*

Kyllinga brevifolia Rottb., Descr. et Icon. Pl. : 13. t. 4. f. 3. 1773; C. B. Clarke in J. D. Hook., FBI 6 : 588. 1893; Haines, Botany 3 : 950; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 248. 1985. *Cyperus brevifolius* (Rottb.) Hassk., Cat. Pl. Hort. Bogor : 24. 1844; Kern in Fl. Males. Ser. I. 7 : 656. 1974.

Perennial herbs; rhizomes creeping, clothed with non-fibrous, brown scale-leaves; stems rigidulous, triquetrous. Leaves subbasal, shorter than or as long as stems, linear, acuminate, scabrid in upper part, 1-3 mm broad. Inflorescences capitate, terminal; spikes ovoid or globose, 5-10 mm across, subtended by 3-4 foliaceous bracts, bracts 2-5 cm long; spikelets strongly compressed, lanceolate or ovate-lanceolate, 2-3 mm long, usually with one flower; glumes 4-5, lowest empty; first glume elliptic-lanceolate, second ovate, third and fourth (floral) boat shaped, concave, sub-mucronate, keel green, sides scarious, 3-4-striate, 2 mm long; stamens usually 2, anthers

linear; ovaries 1-celled; styles 1.5 mm long; stigmas 2. Nuts obovoid-ellipsoid, compressed, obtuse, yellow or pale brown, 0.25-0.3 cm long.

Type: India or. (probably Ceylon), *Koenig. s.n.* (vide Koyama, *l.c.*).

Fl. & Frt.: May-Feb.

Common in moist places, near streams, canal-banks, waste places, forest clearings.

Khondra : 12709; Kota : 13082; Bilaspur : 6561; Pandu to Ratanpur : 16786.

2n = 116, 120, 126.

Tropical and warm temperate regions of the world.

Readily eaten by cattle; roots and rhizomes aromatic, leaves in diarrhoea.

K. bulbosa P. Beauv., Fl. d'Oware & Benin. 1 : 11, t. 8, f. 1. 1804; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 245. 1985. *Kyllinga tenuifolia* Steud., Syn. Pl. Glum. 2 : 69. 1855; Fl. Hassan. : 638. 1976. Karthikeyan *et al., op. cit.* : 61. 1989. [*K. triceps* Rottb., Descr. et Icon. Pl. : 14, t. 4, f. 6. 1773, *nom. superfl.*; C. B. Clarke in J. D. Hook., FBI 6 : 587. 1893; Haines, Botany 3 : 950; Koyama in Hara *et al.*, Enum. 1 : 115. 1978]. *Cyperus triceps* Endl., Cat. Hort. Acad. Vindob. 1 : 94. 1842; Kern in Fl. Males. Ser. 1. 7 : 659. 1974 [as (Rottb.) Endl.].

Erect perennial herbs; rhizomes short; stems thickened at base, covered with fibrous leaf-sheaths. Leaves basal, shorter than or as long as stems, linear, flat or slightly conduplicate, 2-4 mm broad. Inflorescences capitate, consisting of 1-3, dense spikes, ovoid-oblong, pale, 4-8 mm across; bracts 3-4, upto 7 cm long; spikelets compressed, obliquely lanceolate or oblong, 1.5-2 mm long; glumes 4, hyaline, ovate-oblong; lowest 2 empty, third (floral) ovate or lanceolate, keel green, slightly excurrent, 3-4-veined, 1-1.5 mm long, fourth glume membranous, empty; stamens 2, anthers oblong-linear; ovaries 1-celled; styles 1 mm long; stigmas 2. Nuts oblong-ellipsoid, obtuse, compressed, yellowish-brown, 0.15-0.2 cm long.

Fl. & Frt.: July-Apr.

Common in moist grassy places, roadsides.

Pasarkhet to Siang : 19414; Pasan : 13290A; Pasan to Pendra : 19124; Pasarkhet : 12949.

2n = 96, c. 124.

Paleotropics and subtropics.

Note : Hara *et al.* (1978) consider *Kyllinga triceps* Rottb., as the correct name but state "excluding the plate of Rheede and the relevant synonym". Rottboel *l.c.* included the validly described species viz. *Scirpus tuberisus N. Burm.* 1768; in its synonymy (=*Scirpus glomeratus* L.), thus *K. triceps* Rottb., is to rejected as *nom. illeg.* (Art. 63.1, ICBN, 1988). While S. Hooper. (1976) considers *Kyllinga tenuifolia* Steud. (1840) as the correct name, Koyama (1985) accepts *K. bulbosa* Beauv. (1804) as correct; he, however, does not refer to *K. tenuifolia* Steud. as a synonym of *K. bulbosa* Beauv. Karthikeyan *et al.* (1989) violate the rule of priority without any comment. If *Kyllinga* Rottb. (1773) is merged in *Cyperus* L., the correct name for *Kyllinga bulbosa* P. Beauv., would be *Cyperus triceps* Endl. (1842), non *Cyperus bulbosus* Vahl.

Cyperus bulbosus Vahl (1806), non *Kyllinga bulbosa* P. Beauv. (1804), yields edible bulbs.

K. nemoralis (J. R. & G. Forst.) Dandy ex Hutchinson, & Dalzell, Fl. West Trop. Afr. 2 : 486 (in Key) & 487. 1936; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 249. 1985. [*K. monocephala sensu* Rottb., non Rottb., Descr. et Icon. Pl. : 13. t. 4. 1773, *nom. superfl.*; C. B. Clarke in J. D. Hook., FBI 6 : 588. 1893; Haines, Botany 3 : 930]. *Thryocephalon nemorale* J. R. & G. Forst., Char. Gen. Pl. : 130. 1776. *Cyperus kylingia* Endl., Cat. Hort. Acad. Vindob. 1 : 94. 1842; Kern in Fl. Males. Ser. I. 7 : 639. 1974. Type : Same as for *K. monocephala* Rottb., nom. superfl. (*Nirbishi-Badamutha*).

Erect herbs; rhizomes creeping, stoloniferous, covered with brown scale-leaves; stems rigidulous, triquetrous. Leaves basal, as long as or longer than stems, scabrid on margins in upper part, acuminate, 3-5 mm broad. Heads terminal, usually solitary, white globose-ovoid, 5-10 mm long, occasionally 1-3 smaller heads below the terminal one, subtended by 3-4, foliaceous bracts; spikelets obliquely ellipsoid-ovoid, strongly compressed, 3 mm long, usually with one flower; glumes 4, ovate, acuminate with reddish glands, lowest glume hyaline, keeled, 3-5-veined, 1-1.5 mm long, third glume (floral) 3 mm long, enclosing a bisexual flower; fourth glume enclosing a male or bisexual flower, sometimes barren; stamens 3, anthers linear; ovaries 1-celled; styles about 1.5 mm long; stigmas 2. Nuts oblong-obovoid, compressed, yellowish-brown, about 1.5 mm long.

Fl. & Frt. : July-Mar.

Common in grassy moist places.

Achanakmar : 19288; Pasarkhet : 19324; Marwahi : 19007; Pasan to Pendra : 19138; Katghora : 6095.

2n = c. 102, c. 120, 124.

Tropical and subtropical regions of the world.

Decoction of aromatic rhizomes used as a dieuretic, refrigerant, demulcent, tonic; also given in fevers and diabetes to relieve thirst. Rhizomes yield an essential oil used for the same purpose as the decoction.

Note : Farr *et al.* (1979) consider for *Kyllinga monocephala* Rottb., *nom. superfl.* [=*Kylinga colorata* (L.) Druce (*Schoenus coloratus* L.)] as the correct name, but against item No. 462, Appendix III A (ICBN, 1988) *K. monocephala* Rottb., *nom. superfl.*, is shown as a taxonomic (=) synonym of *K. nemoralis*.

LIPOCARPHA R. Br. in Tuckey., Narr. Exp. Congo : 459. 1818, *nom. cons.*

T. : *L. argentea* R. Br. *nom. illeg.* [*Hypaelyptum argenteum* Vahl, *nom. illeg.*, *Scirpus senegalensis* Lam., *L. senegalensis* (Lam.) T. Durand & H. Durand].

Lipocarpha chinensis (Osbeck) Kern in Blumea, Suppl. 4 : 167. 1958; Koyama in Dassan, Rev. Handb. Fl. Ceylon 5 : 251. 1985. *Scirpus chinensis* Osbeck, Dagb. Ostind. Resa : 220. 1757; [*Hypaelyptum argenteum* Vahl, Enum. Pl. 2 : 283. 1806, *nom. illeg.*]. *Lipocarpha argentea* R. Br. in Tuckey, Narr. Exp. Congo : 477. 1818, *nom. illeg.*; C. B. Clarke in J. D. Hook., FBI 6 : 667. 1893; Haines, Botany 3 : 973.

Erect annual herbs; stems tufted, obtusely trigonous. Leaves basal, shorter than stems, linear-filiform, 2.5 mm broad; sheaths striate. Spikelets 3-6 (-10), in terminal head, 1-2 cm across, pale or greyish, subtended by 2-3 bracts, longest upto 7 cm long; glumes membranous, spathulate to oblong-obovate, tip short, erect or incurved, triangular, imbricated on all sides, deciduous, hypogynous, scales 2, narrowly lanceolate or oblong, longer than nut, hyaline, 5-7 veined; stamens 1 or 2, anthers linear; ovaries 1-celled; styles 3-fid, glabrous. Nuts oblong-obovate or ellipsoid-obovoid, obtuse, obscurely trigonous, 1-1.5 mm long, closely invested by scales.

Type : From India (Malabar).

Fl. & Frt. : Oct.-Feb.

Frequently seen in muddy soil along the ponds, ditches, cultivated fields, forest clearings.

Pasarkhet : 16816, 12946.

2n = 26, 32.

Tropical and subtropical Africa, Asia, Malaysia, N. Australia.

Note : Against item No. 452 (Appendix IIIA. ICBN, 1988), the type species of *Lipocarpha* R. Br. *nom. cons.*, is shown as *L. senegalensis* Lam.) T. & H. Durand (=*Scirpus senegalensis* Lam.), because *L. argentea* R. Br., based on *Hypaelyptum argenteum* Vahl, is *nom. illeg.* Since *Scirpus chinensis* Osbeck. (1757) antedates *S. senegalensis* Lam. (1791), Hooper (1976) in Hara *et al.* (1978 and Koyama (1985) accept *L. chinensis* (Osbeck) Kern as the correct name.

MARISCUS Vahl, Enum. Pl. 2: 372. 1806, *nom. cons.*

T. : *M. capillaris* (Sw.) Vahl (*Schoenus capillaris* Sw.) (*typ. cons.*).

Note : Mabberley (1987) lists *Mariscus* Vahl, as a congeneric synonym of *Cyperus* L. But Koyama who recognises them as distinct genera, diagnoses the two as :

Rachilla not articulated, persistent, hence glumes falling apart from rachilla ..... *Cyperus* L.

Rachilla articulated, hence spikelets falling in entirety ..... *Mariscus* Vahl

1a. Umbels contracted into a single ovoid, dense head ..... *M. dubius*

1b. Umbels not contracted into heads

2a. Leaves septate-nodulose; lower sheaths spongy, strongly septate-nodulose; inflorescences compound or decompound; bracts numerous ..... *M. compactus*

2b. Leaves not septate-nodulose; lower sheaths not spongy, nor septate-nodulose; inflorescences simple, rarely subcompound; bracts 2-10

3a. Glumes aristate with recurved awns; rachilla wingless; stamens 3 ..... *M. squarrosus*

3b Glumes muticous, not aristate; rachilla broadly winged; stamen 1 ..... *M. concinnus*

Mariscus compactus (Retz.) Boldingh, Zakfl. Landb. Java : 77. 1916; Druce in Rep. Bot. Exch. Club Brit. Isles 1916; 634. 1917; Haines, Botany 3 : 953; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 228. 1985. *Cyperus compactus* Retz., Obs. Bot. 5 : 10. 1788; Kern in Fl. Males. Ser. I. 7 : 634. 1974; *C. dilutus* Vahl, Enum. Pl. 2 : 357. 1806; *Mariscus microcephalus* Presl, Rel. Haenk. 1 : 182. 1828; C. B. Clarke in J. D. Hook., FBI 6 : 624. 1893; *M. dilutus* (Vahl) Nees in Wight, Contr. Bot. Ind. : 90. 1834.

Erect herbs; rhizomes short, covered with leaf-sheaths; stems obscurely trigonous with large spongy, septate nodulose leaf-sheaths at base. Leaves nearly as long as stems, linear, acuminate, scabrous on margins and mid-vein in upper part, 4-8 mm broad; sheaths reddish-brown. Inflorescences compound or decompound, umbels upto 20 cm across; spikes stellately globose, brown; bracts usually several, spongy, reflexed, lower ones overtopping inflorescences; spikelets linear-subulate, stellately spreading, squarrose, falling off as a whole, 4.5-15 mm long; rachilla flexuous, with oblong, hyaline, persistent wings; glumes membranous, imbricate, oblong, obtuse, 4-6 mm long, keel rounded, 3-veined in centre, green, reddish-brown on sides, 3-4 lowest empty; stamens 3, anthers oblong-linear, male or tabescent; style passing gradually into ovaries, 3-fid halfway. Nuts narrowly obovoid or oblong, trigonous, slightly beaked, brown, 2-3 mm long.

Type : China, *Osbeck*.

Fl. & Frt. : July-Nov.

Common in cultivated fields, moist places.

Khondra : 12746.

2n = 86.

Nepal, India, Sri Lanka, Thailand to Vietnam, Malaysia.

Used for making coarse mats.

M. concinnus Schrader ex Nees in Mart., Fl. Bras. 2 (1) : 47. 1843; Nicolson *et al.*, Regnum Veget. 119 : 287. 1988. *Scirpus cyperoides* L., Mant. Pl. 2 : 181. 1771; *Mariscus cyperoides* (L.) Urban, Symb. Ant. 2 : 164. 1900, non A. Dietr. 1833. *Kyllinga umbellata* Rottb., Descr. Ic. Rar. Pl. : 15. 1773 *nom. illeg.*; *Kyllinga sumatrensis* Retz., Obs. Bot. 4 : 13. 1786, *nom. illeg.*; *Mariscus sieberianus* Nees [Linnaea 8 : 286. 1835, nom. nud.] ex C. B. Clarke in J. D. Hook., FBI 6 : 622. 1893; Haines, Botany 3 : 952; *Cyperus cyperoides* (L.) O Kuntze, Rev. Gen. Pl.

3(2) : 333. 1898; Kern in Fl. Males. Ser. I. 7 : 642. 1974. *Kol-pullu* Rheede, Hort. Malab. 12 : 119, t. 63. 1693.

Erect, perennial herbs; rhizomes short-creeping, covered with old leaf-sheaths; stems tufted, rigid, trigonous. Leaves subbasal, often nearly as long as stems, 3-5 mm broad, scabrid in upper part; lower sheaths reddish-brown. Umbels simple, 4-10 cm across, rays 3-8, upto 10 cm long; bracts 5-10, patent, lower overtopping inflorescences; spikes pedunculate, cylindric, 2-4.5 cm long; spikelets closely spirally arranged, erecto-patent in flower, linear subulate, 2-4 mm long, in fruits spreading, 4-5 mm long, deciduous, with glumes; rachilla broadly winged, wings hyaline, tightly clasping nuts; glumes membranous, broadly ovate, acute, lowest 2 empty; stamens 3, anthers oblong-linear; styles 3-fid; stigmas 3, longer than styles. Nuts linear-oblong or ellipsoid-oblong, 3-gonous, curved, brown.

Fl. & Frt. : July-Sept.

Common in grassy places, road sides, edges of the forest.

Lamni to Achanakmar : 19267; Marwahi to Pasan : 19070; Pasan to Pendra : 19130.

Paleotropics.

Note : Karthikeyan *et al.* (1989) treat *Mariscus sumatrensis* (Retz.) Raynal (1975), *nom. illeg.*, for *Scirpus cyperoides* L. (1771) (cf. Nicolson *et al.*, 1988), as the correct name and Karthikeyan (*l.c.*) makes a number of combinations at varietal rank with *M. sumatrensis* Raynal. Since *M. concinnus* Schrader ex Nees (1843) is the correct name for this species complex, the following new combinations are proposed :

(a) *M. concinnus* Nees var. *evolutior* (C. B. Clarke) Panigr. comb. nov. *M. sieberianus* C. B. Clarke var. *evolutior* C. B. Clarke in J. D. Hook., FBI 6 : 622. 1893.

(b) *M. concinnus* Nees var. *khasiana* (C. B. Clarke) Panigr. comb. nov. *M. sieberianus* C. B. Clarke var. *khasiana* C. B. Clarke in J. D. Hook., *l.c.* : 623. 1893.

(c) *M. concinnus* Nees var. *subcompositus* (C. B. Clarke) Panigr. comb. nov. *M. sieberianus* C. B. Clarke var. *subcompositus* C. B. Clarke in J. D. Hook., *l.c.* : 622. 1893.

M. dubius (Rottb.) Kükenth. ex C.E.C. Fischer in Gamble, Fl. Pres. Madras : 1644. 1931; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 237. 1985. *Cyperus dubius* Rottb., Descr. & Icon. Pl. : 21. t. 4. f. 5. 1773; Kern in Fl. Males. Ser. I. 7 : 643. 1974; *Mariscus dregeanus* Kunth, Enum. Pl. 2 : 120. 1837; C B. Clarke in J. D. Hook., FBI 6 : 620. 1893; Haines, Botany 3 : 951.

Erect perennial herbs; rhizomes short; stems tufted, triquetrous; base covered with striate, scarious, brownish sheaths. Leaves often as long as stems, sometimes longer, flaccid, 2-3 mm broad. Heads 7.5-10 mm across, consisting of 1-6 confluent dense spikes; bracts 3-5, upto 15 cm long; spikelets many, ovoid to linear, or oblong-lanceolate, acute, 5-8 mm long; nodes of rachilla short with elliptic wings; glumes subcoriaceous, pale brown, 3-5 mm long, lowest 2 empty, fruiting glumes ovate to lanceolate, blunt, triangular, many striate; stamens 3, anthers oblong-linear; styles continuous with nuts, 3-fid; stigmas 3. Nuts linear-oblong or obovoid, trigonous, black, 2.5-3 mm long.

Fl. & Frt. : July-Oct.

Occasionally found in leaf-litters on forest floors.

Lamni : 19250; Pasan to Korbi : 19086.

2n = 112.

Tropical Africa, India, Sri Lanka, Indo-Malaysia.

M. squarrosus (L.) C. B. Clarke in J. D. Hook., FBI 6 : 623. 1893, *quoad basionym*; Haines, Botany 3 : 952; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 229. 1985; *Cyperus squarrosus* L. in Torner, Cent. Pl. 2 : 6. 1756; Kern in Fl. Males. Ser. I. 7 : 631. 1974; *C. aristatus* Rottb., Descr. Pl. Rar. Programm. 22. 1772, et Descr. et Icon. Pl. : 25. t. 6. f. 3. 1773; Babu, Herb. Fl. Dehra Dun : 554. 1977.

Erect annual herbs; stems caespitose, triquetrous. Leaves basal, linear-filiform, shorter than or as long as stems, 1-2 mm broad; lower sheaths membranous, purplish. Umbels usually one sessile head and 2 or 3 rays ending in head-like spikes, or reduced to 1 head; spikes loose or dense, 6 mm long, broadly oblong-ovoid to quadrate; bracts 3-4, foliaceous, one overtopping umbel; spikelets divaricate, 8-20-flowered, 5-8 mm long; glumes membranous, oblong-ovate or elliptic-ovate, 1-2.5 mm long, keeled, strongly 3-5-veined, tapering into a strong, recurved awn, lower 2 glumes empty; stamen 1, anther elliptic to elliptic-oblong; style continuous with nut, 3-fid; stigmas 3. Nuts linear-oblong or obovoid, pale brown, 3-quetrous, 0.8-1 mm long.

Fl. & Frt. : Oct.-Feb.

Frequently seen in moist places, near streams, cultivated fields.

Kota to Lormi : 15457B.

2n = 108, c. 94 (as *Cyperus aristatus* Rottb.).

Pantropical.

PYCREUS P. Beauv., Fl. d' Oware & Benin. 2 : 48. t. 86. 1807.

T. : *P. polystachyos* (Rottb.) P. Beauv. (*Cyperus polystachyos* Rottb.).

Note : Mabberley (1987) lists *Pycreus* P. Beauv. as an alternate name for *Cyperus* L., but Koyama (1985) treats them as two distinct genera of the tribe Cypereae and diagnoses them as :

Achenes triangular or dorsiventrally flattened with one side facing rachilla *Cyperus* L.

Achenes bilaterally flattened with one angle facing rachilla *Pycreus* P. Beauv.

1a. Culms 20-90 cm long ; glumes acute to obtuse, stamens 2 : anthers 0.5 mm long *P. flavidus*

1b. Culms 2-8 cm long ; glumes truncate or shallowly emarginate at apex, mucronate, stamen usually 1, sometimes 2 ; anthers 0.3 mm long *P. pumilus*

Pycreus flavidus (Retz.) Koyama in Journ. Jap. Bot. 51(10) : 313. 1976, et in Dassan., Rev. Handb. Fl. Ceylon 5 : 222. 1985 ; *Cyperus flavidus* Retz., Obs. Bot. 5 : 13. 1788, non *sensu* C. B. Clarke in J. D. Hook., FBI 6 : 600. 1893 ; Kern in Fl. Males. Ser. I. 7 : 648. 1974. *C. globosus* Allion., Fl. Pedem. Auct. : 49. 1789, *non* Forssk. 1775 ; Babu. Herb. Fl. Dehra Dun : 557. 1977. *C. capillaris* Koenig ex Roxb., Fl. Ind. 1 : 198. 1820. *C. strictus* Roxb., Fl. Ind. 1 : 203. 1820, non Lam. 1791. *Pycreus globosus* (Allion.) Reichenb., Fl. Germ. Excurs. 2 : 140. 1830 ; Haines, Botany 3 : 948 ; Fl. Hassan : 692. 1976, *pro part. excl.* var. *P. capillaris* (Koenig ex Roxb.) Nees [Linnaea 9 : 283. 1834 comb. invalid.] ex C. B. Clarke in J. D. Hook., FBI 6 : 591. 1893, *pro part. excl.* var. *nilgiricus* (Hochst. ex Steud.) C. B. Clarke.

Erect, annual herbs ; stems trigonous, caespitose. Leaves subbasal, rigid, linear, filiform, as long as or shorter than stems, 1-2 mm broad ; sheaths with a truncate mouth. Umbel compound, spikes dense, short-

linear, sometimes several rays and a central, sessile, subglobose spike; rays short, upto 5 cm long; bracts 2-3, upto 15 cm long; spikelets pale brown, linear or lanceolate, compressed, many-flowered, 6-10 mm long; glumes chartaceous, ovate or ovate-oblong, closely imbricate, keeled; stamens 2, anthers small, muticous; ovaries 1-celled; styles 2 mm long, 2-fid; stigmas 2, as long as or longer than styles. Nuts biconvex, ellipsoid, compressed, apiculate, chestnut brown to black, 1 mm long.

Type: India, Tranquebar, *Koenig*.

Fl. & Frt.: July-Nov.

Common in marshy places, water-sides, cultivated fields.

Pasarkhet : 19392; Korba to Kudmura : 16808; Korbi : 19101; Kabirchabutra : 13229.

2n = 16, 20 (as *Cyperus flavidus* Retz.).

S. Europe, Africa, W. & C. Asia, India, China, Japan, Malaysia.

P. pumillus (L.) Nees (Linnaea 9 : 283. 1835, comb. invalid) ex C. B. Clarke in J. D. Hook., FBI 6 : 591. 1893, *pro part. quoad basion., excl. syn. et descr.*; Haines, Botany 3 : 948; Koyama in Hara *et al.*, Enum. 1 : 117. 1978 ['as (L.) Domin']. *Cyperus pumilus* L. in Torner, Cent. Pl. 2 : 6. 1756, et Sp. Pl. ed. 2. 1 : 69. 1762. Kern in Fl. Males. Ser. I. 7 : 650. f. 66. 1974. *C. nitens* Retz., Obs. Bot. 6 : 13. 1791. *Pycreus nitens* (Retz.) Nees in Nova Acta. Acad. Caes. Leop.-Carol. German. Nat. Curr. 19. Suppl. 1 : 53. 1843; C. B. Clarke in J. D. Hook., FBI 6 : 591. 1893.

ssp. **pumilus**

Small, erect, annual herbs; stems caespitose, obscurely 3-gonous. Leaves basal, shorter than or as long as stems, 1-2 mm broad, acute-acuminate, scabrid in upper part. Umbels simple or compound or reduced to single head; bracts 3-5, overtopping rays, foliaceous; spikes ovoid or subglobose, dense, 1-2 cm across; spikelets clustered or short-spicate, strongly compressed, linear or linear-lanceolate, divergent, pale brown or straw-coloured, 5-10 mm long; rachilla slender, persistent; glumes membranous, ovate, sharply keeled, 3-5-veined not exposing the achenes; stamen 1, occasionally 2, anthers oblong; ovaries 1-celled; style slender, 1 mm long; 2-fid; stigmas 2, about as long as style. Nuts obovoid, laterally compressed, retuse apiculate at apex, brown, 0.4-0.7 mm long.

Fl. & Frt.: Oct.-July.

Common in moist grassy places, in ditches, muddy situations.

Khondra : 12818; Madai : 19466; Katghora : 6075.

2n = 90 (as *Cyperus pumilus* L.).

Nepal, India, Thailand to Vietnam, Malaysia.

RIKLIELLA J. Raynal in Adansonia 13(2) : 154. 1973.

T. : *R. rehmannii* (Ridl.) J. Raynal [*Scirpus rehmannii* Ridl.].

Recent trends in splitting the heterogenous genus *Scirpus sens. lat.* into *Bulboschoenus*, *Hemicarpha*, *Isolepis*, *Rikliella*, *Schoenoplectus* and *Scirpus sensu stricto* is for the present, accepted. Justification at present depends largely on differences in embryo-structure (vide Vaken in Bull. Jard. Bot. Burse. 35 : 285-354. 1965.).

Note : Genus *Scirpus* L. of the tribe Scirpeae does not occur in Sri Lanka (cf. Koyama, 1985), nor has it been collected from Bilaspur district, unless we treat *Schoenoplectus* (Reichb.) Palla as congeneric with *Scirpus* L. Karthikeyan *et al.* (1989) list both the genera as distinct and enumerate only 11 species of *Scirpus* L. s. str. from India. While they treat *Hemicarpha* Nees, *Isolepis* R. Br. also as distinct genera, they merge *Bulboschoenus maritimus sensu* Koyama in *Scirpus affinis* Roth and Mabberly (1987) does not list the genus at all. Rikliella J. Raynal of the tribe

Lipocarpheae differs from *Lipocarpha* R. Br. as :

Glumes 2, dorsiventral — *Lipocarpha*

Glumes none, hence a spikelet represented only by an achlamydeous flower subtended directly by a bracteole of spike — *Rikliella*

Rikliella squarrosa (L.) Raynal, Adansonia, Ser. 2. 13 : 154. 1973; Nicolson *et al.*, Reg. Veget. 119 : 288. 1988. *Scirpus squarrosus* L., Mant. Pl. 2 : 181. 1771; Haines, Botany 3 : 969; Kern in Fl. Males. Ser. I. 7 : 516. 1974. *Motta-pullu* Rheede, Hort. Malab. 12 : 72, t. 38. 1693.

Erect, glabrous, annual herbs; stems caespitose, setaceous, slender, striate. Leaves filiform, basal; sheaths glabrous, membranous, inflated, many-veined. Spikelets 1-4 in pseudo-lateral, ovoid-globose clusters; bracts 1-3, filiform, 1.5-5 cm long, lowest erect, continuous with stem, others patent reflexed; spikelets brown, densely soft-hairy, ovoid to sub-cylidrical, terete, obtuse, 3-6 mm long; glumes narrowly obovate, thinly membranous, squarrose, 3-5-veined, narrowed abruptly into a recurved mucro, 1-1.5 mm long, caducous; bristles absent; stamens 1-2, anthers oblong; ovaries 1-celled; style hardly any; stigmas 3, recurved. Nuts obovoid, oblong-obovate, trigonous, brown, turning black, 0.3-0.4 mm long.

Fl. & Frt. : July-Jan.

Common in moist grassy places, near streams, roadsides.

Pasan : 13285A; Pasarkhet to Siang : 19417

2n = 40.

India, Sri Lanka to China.

SCHOENOPLECTUS (H.G.L. Reichbach) Palla in Verh. K. K. Zool.-Bot. Ges Wien 38, Sitzungsber. : 49. 1888, *nom. cons. Scirpus* L. subg. *Schoenoplectus* Reichb. Ic. Fl. Germ. 8 : 40. 1846.

T. : *S. lacustris* (L.) Palla (*Scirpus lacustris* L.).

1a. Stems and bracts transversely septate; inflorescences inserted near base of stems; bracts longer than stems — *S. articulatus*

1b. Stems and bracts not septate; inflorescences inserted in upper half of stems; bracts shorter than stems

2a. Hypogynous bristles absent; nuts transversely undulate-rugose — *S. laterifloras*

2b. Hypogynous bristles present; nuts smooth or pitted

3a. Stems terete; styles usually 2-fid; nuts biconvex — *S. juncoides*

3b. Stems triquetrous; styles usually 3-fid; nuts plano-convex or trigonous — *S. mucronatus*

Schoenoplectus articulatus (L.) Palla in Engl., Bot. Jahrb. Syst. 10 : 209. 299. 1889; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 163, fig. 7. 1985. *Scirpus articulatus* L., Sp. Pl. : 47. 1753, non *Cyperus articulatus* L. (1753); Haines, Botany 3 : 969; Kern in Fl. Males. Ser. I. 7 : 513. 1974; Nicolson *et al.*, Reg. Veg. 119 : 289. 1988. *Tsjeli* Rheede, Hort. Malab. 12 : 135, t. 71. 1693.

Erect, annual herbs; stems caespitose, terete, fistular, spongy, septate when dry, a few without any inflorescences. Leaves reduced to 1-2 sheaths, loose, membranous, scarious, soon torn, mouth oblique. Spikelets in a single, dense, pseudo-lateral head, 1-3 cm across near base of stems, 8-15 mm long, ovoid to oblong-ovoid, acutish, brownish; bracts looking like continuation of stems, terete, somewhat longer than stems; glumes ovate, membranous, 3-5 mm long; bristles absent; stamens usually 3, anthers oblong; ovaries 1-celled; styles 2 mm long, 3-fid, slender; stigmas 3, shorter than styles. Nuts obovoid, acutely triquetrous, faintly transversely wavy, tip pyramidal, brownish-black, 1-1.5 mm long.

Type : India orientalis.

Fl. & Frt. : Oct.-Feb.

Common in muddy places; near streams, ponds, roadside-ditches, cultivated fields.

Bilaspur : 13001; Keonchi : 15375; Lamni : 13260A.

2n = 30, 32 (as *Scirpus articulatus*).

Paleotropics; Mediterranian Region.

Note : Nicolson *et al.* (Reg. Veget. 119 : 289. 1988) follow Kern (1974) and consider *Scirpus articulatus* L. as belonging to *Scirpus* L. rather than to *Schoenoplectus* (Reichb.) Palla, *nom. cons.* Koyama (1985) cites the page "229" for *S. articulatus* (L.) Palla.

S. juncoides (Roxb.) Palla in Engl., Bot. Jahrb. Syst. 10 : 299. 1888; Koyama in Dassan., Rev. Handb. Fl. Ceylon 5 : 160. 1985. *Scirpus juncoides* Roxb., Fl. Ind. 1 : 219. 1820; Kern in Fl. Males. Ser. I. 7 : 512. 1974. *erectus sensu* C. B. Clarke in J. D. Hook., FBI 6 : 656. 1893, *pro part., excl. typo et synon.*, non Poir. 1805.

Erect, annual herbs; stems caespitose. Leaves reduced to sheaths; sheaths basal, membranous, mouth oblique, sometimes produced in a short erect blade. Spikelets 2-7, in a single pseudo-lateral head near apex of stems, terete, brown, oblong-ovoid, 6-15 mm long; bract 1, 5-10 cm long, looking like a continuation of stem; glumes broadly ovate-rounded, concave, acute, incurved, keel excurrent into a short mucro; bristles 5-6, retrorsely scabrid, as long as nuts; stamens 2 or 3, anthers linear; ovaries 1-celled; styles 2-3 mm long, glabrous; stigmas 2. Nuts broadly obovoid, dorsiventrally compressed, apiculate, smooth or faintly transversely undulate, straw-brown, turning to nearly black, 2-2.5 mm long.

Type : From India.

Fl. & Frt. : July-Jan.

Common in marshy places, cultivated fields, roadside-ditches.

Lamni : 19236; Nonbira : 16810; Pasan : 15288; Katghora : 8686.

2n = 76.

India, Thailand to Vietnam, China, Japan, Malaysia, Australia.

Comes up as a weed and eaten by Cattle; ploughed as green manure.

S. lateriflorus (J. F. Gmelin) Lye, Bot. Not. 124 : 290. 1971; Karthikeyan *et al., op. cit.* : 69. 1989. *Scirpus lateriflorus* J. F. Gmelin, Syst. Veg. ed. 13, 1 : 127. 1791; Kern in Fl. Males. Ser. I. 7 : 514.

1974. *S. supinus auct. non* L. 1753 C. B. Clarke in J. D. Hook., FBI 6 : 655. 1893; Haines, Botany 3 : 969. *Schoenoplectus supinus* (L.) Palla subsp. *lateriflorus* (J. F. Gmelin) Koyama in Hara *et al.*, Enum. 1 : 119. 1978. *Scirpus supinus* L. var. *lateriflorus* (J. F. Gmelin) Koyama in Jour. Fac. Sci Univ. Tokyo, Bot. 7 : 302. 1958, et in Hara, Fl. E. Himalaya : 393. 1966.

Erect, annual herbs; stems caespitose, terete. Leaves reduced to 2-3 sheaths slightly widened upwards, sometimes with small leaf-blade upto 2 cm long; sheaths membranous, mouth oblique. Axil of basal sheath sometimes with a solitary female flower terminal inflorescences in pseudo-lateral clusters with 2-8 spikelets; spikelets 15-20 flowered, 3-8 mm long, ovoid-oblong, pale brown; bracts 1-2 lowest erect upto 10 cm long, stem-like; second patent, shorter; glumes ovate, membranous, keel acute, greenish, without lateral veins, mucro usually black or dark-coloured; bristles absent; stamens 3, anthers oblong, connectives produced, papillose-bristly; ovaries 1-celled; styles 2-2.5 mm long, slender, 3-fid; stigmas 3, about as long as styles. Nuts obovoid, triquetrous or trigonous compressed, obtuse, apiculate, transversely undulate-rugose, one face usually broader than other two, black.

Type : From Ceylon.

Fl. & Frt. : July-Nov.

Common in moist cultivated fields, near streams, roadside ditches.

Khondra : 12819, 16754; Katghora : 3982, 8663; Bilaspur : 13000; Kota : 13061; Korba : 16799; Pasan : 15291.

2n = 30.

India, Sri Lanka, Thailand to Vietnum, Malaysia, N. Australia.

We have followed Hooper (Fl. Hassan) in giving this taxon a specific rank. Koyama *l.c.*, comments that subsp. *supinus*, of which the Paris region is the type locality, is known from Europe and Western Asia and is thus geographically separated from the Asiatic subsp. *lateriflorus*, of which Sri Lanka is the type locality. But the morphological differences between them are a very minor one. *S. supinus* L. can be distinguished by its less slender habit, the nodeless stems, the absence of basal flowers, always solitary involucral bract, capitate inflorescences, glumes many-veined and smooth appendages of the connectives.

S. mucronatus (L.) Palla in Sitzb. Verh. Zool.-Bot. Ges. Wien 38, Sitzerb : 49. 1888; Koyama in Hara *et al.*, Enum. 1 : 118. 1978.

Scirpus mucronatus L., Sp. Pl. : 50. 1753; C. B. Clarke in J. D Hook., FBI 6 : 657. 1893 p.p.; Haines, Botany 3 : 970; Kern in Fl. Males. Ser. I. 7 : 510. 1974.

Erect, perennial herbs; rhizomes short; stems caespitose, triquetrous. Leaves reduced to sheaths; sheaths triangular, lanceolate, membranous, mouth oblique. Spikelets 1-12, ovoid to oblong in a single, pseudo-lateral, dense head 4 cm across near apex of stems, pale, 8-15 mm long; bract 1, erect, 2-6 cm long, looking like continuation of stems; glumes ovate, many-veined, subacute, keeled, mucronate, 3.5-4 mm long; bristles 5-6, retrorsely scabrous, unequal; stamens usually 3, anthers linear; ovaries 1-celled; styles 2 mm long, sparsely fimbriate; stigmas 3. Nuts obovoid or obcompressed, apiculate, faintly rugulose or smooth, shining black, 2 mm long.

Type : From Europe.

Fl. & Frt. : July-Nov.

Common in muddy places, near streams, ditches, margin of ponds.

Pasarkhet : 19398.

2n = 42.

Mediterranean region and Paleotropics.

Used for making mats.

SCLERIA P. Borgius in Kongl. Vet. Acad. Handl. Stockh. 26 : 142, tt. 4. 5. 1765.

T. : *S. flagellum-nigrorum* Berg.

S. parvula Steud., *S. lithosperma* (L.) Sw., *S. tessellata* Willd. (= *S. milkawana* Makino) (2n = 28) and *S. terrestris* (L.) Fassett may also occur in the district.

Scleria levis Retz., Obs. Bot. 4 : 13. 1786, non *sensu* C. B. Clarke 1894; Kern in Fl. Males. Ser. I. 7 : 732. 1974; Koyama in Hara *et al.*, Enum. 1 : 119. 1978 ('*laevis*'). *S. hebecarpa* Nees in Wight, Contr. Bot. Ind. : 117. 1834; C. B. Clarke in J. D. Hook., FBI 6 : 689. 1894; Haines, Botany 3 : 976. Type. : Ceylon, *Macrae*.

Perennial herbs; rhizomes woody, covered with scales; stems tufted, scabrid on angles, glabrous to softly villous, leafy throughout. Leaves linear,

acutish, glabrous to densely pubescent, scabrid on margins in upper part, 3-8 mm broad; sheaths triquetrous, angles retrorsely scabrid. Inflorescences in panicles, 5-12 cm long; primary bracts foliaceous, overtopping inflorescences; secondary ones setaceous; spikelets unisexual, in clusters of 2-4; male spikelets; oblong-lanceolate, 3-4 mm long; glumes ovate-lanceolate, acute; stamens 3, anthers linear; female spikelets; ovate, 4-6 mm long; glumes ovate, acute or mucronate; disc deeply 3-lobed; lobes lanceolate or ovate, appressed to nuts, acute, brown, 1-1.5 mm long; styles 3-fid. Nuts globose or ovoid-globose, obscurely trigonous, apiculate, smooth or faintly transversely rugulose, shining white or straw-coloured, 2-2.5 mm long.

Type : 'India orientalis'.

Fl. & Frt. : July-Nov.

Common on slopes, edges of the forests, along forest-roads.

Korba to Putka Pahar : 19452; Lamni : 19249; Madai to Korba : 12930.

Nepal, India, Sri Lanka, China, Japan, Malaysia, N. Australia.

Fruits eaten as betel quids; useful in coughs; rhizome is used in stomach disorders.

GRAMINEAE

A. L. Jussieu, Gen. Pl. : 28. 1789.

POACEAE

Barnhart, Bull. Torrey Bot. Club 22 : 7. 1895 (nom. alt.).

T. : *Poa* L.

Bambusaceae Nakai, Ord. Fam. etc. : App. : 223. 1943.

T. : *Bambusa* L.

Note : Hutchinson (1973) cites "*Bambusaceae* Burmett (1835)", and "*Poaceae* Barmhart, (1925". Airy Shaw (1973) cites *Poaceae* Nash (p. 504) and *Poaceae* Barnhart (p. 922).

651 genera and 10,000 species (Clayton & Renvoize, 1986); 737 genera, 7950 spp. (Mabberley, 1987), in the world flora. 63 genera and 115 taxa in Bilaspur district.

Clayton & Renvoize (*Genera Graminum, Grasses of the World*: 1-389. 1986) proposed a revised classification of the 651 genera they recognise and grouped them into six subfamilies and 40 tribes and several subtribes. Since their classification is based on morphology, reproductive behaviour, anatomy, metabolism, leaf architecture, phytochemistry, embryology and palynology, we adopt here their classification for grouping the 63 genera of the *Poaceae* from Bilaspur district, as follows :

1. Subfamily *Bambusoideae* Asch. & Graeb.

    1. Tribe *Bambuseae* Nees : *Bambusa, Dendrocalamus.*

    2. Tribe *Oryzeae* Dumort. : *Leersia, Oryza.*

2. Subfamily *Arundinoideae* Tateoka.

    3. Tribe *Arundineae* Dumort. : *Phragmites, Elytrophorus.*

    4. Tribe *Thysanolaeneae* C. E. Hubbard : *Thysanolaena.*

    5. Tribe *Aristideae* C. E. Hubb. : *Aristida.*

3. Subfamily *Chloridoideae* Rouy.

    6. Tribe *Eragrostideae* Stapf : *Acrachne, Dactyloctenium, Desmostachya, Eleusine, Eragrostiella, Eragrostis, Leptochloa, Sporobolus.*

    7. Tribe *Cynodonteae* Dumort. (Chlorideae Reichb.) : *Chloris, Cynodon, Melanocenchrius, Perotis.*

4. Subfamily *Panicoideae* A. Br.

    8. Tribe *Arundinelleae* Stapf : *Arundinella.*

    9. Tribe *Isachneae* Benth. : *Coelachne, Isachne.*

    10. Tribe *Paniceae* R. Br. : *Alloteropsis, Brachiaria, Digitaria, Echinochloa, Oplismenus, Panicum, Paspalidium, Paspalum, Pennisetum, Sacciolepis, Setaria.*

    11. Tribe *Andropogoneae* Dumort. : *Apluda, Arthraxon, Bothriochloa, Chionachne, Chrysopogon, Coix, Capillipedium, Cymbopogon, Dichanthium, Diectomis, Dimeria, Eulalia, Hackenochloa, Hemarthria, Heteropogon, Imperata, Ischaemum, Iseilema, Ophiuros, Pogonatherum, Pseudosorghum, Saccharum, Schizachyrium, Sehima, Sorghum, Spodiopogon, Themeda, Vetiveria.*

None of the genera belonging to the two other subfamilies *Pooideae* and *Centothecoideae* Soderstrom have been collected from the area during our studies. Of course, the *Pooideae* are virtually limited to the temperate zones of both the hemispheres, bridging the tropics on the tops of high mountains. *Centothecoideae* genera are not unlike the herbaceous bamboos, and with the exception of *Centotheca* Desv., the other genera are mainly African-New World in distribution.

Tribe *Oryzeae* Dumort., kept under the subfam. *Pooideae* by Bor (1960), has now been transferred to the subfam. *Bambusoideae* on the basis of anatomical studies.

Mabberley (1987), who refers to Clayton (? pers. comm.), divides the *Poaceae* into seven subfamilies, 50 tribes and recognises 737 genera comprising 7950 species. The seventh subfam. *Stipoideae* (Dumort.) Panigr., comb. nov. (tribe *Stipeae* Dumort., Obs. Gram. Belg. : 83. 1824) comprise only the type genus *Stipa* L., included by Clayton & Renvoize (1986) in the subfam. *Pooideae*. The type genus is characterised by "tussocky or reed-like, spikelets 1-flowered, lemmas usually with a terminal hygroscopic awn."

Mabberley (*l.c.*) removes the tribe *Aristideae* to the subfam. *Chloridoideae*, re-names tribe *Cynodonteae* as *Chlorideae*; segregates *Sporobolus* and *Muehlenbergia* to constitute a separate tribe, *Sporoboleae*; *Thysanoelaenae* is abandoned by him as a tribe and merged in (?) *Arundineae*.

Clayton & Renvoize (*l.c.*) do not provide a diagnostic key to the subfamilies of the *Poaceae* Barnhart, but start off with a diagnostic composite key to all the tribes. They, however, state that:

(i) Only *Bambusoideae* have fusoid cells and also primitive spikelet characters.

(ii) Microhairs are usually slender; swollen hairs (*Chloridoideae*) and lack of hairs (*Pooideae*) are good markers for the two subfamilies.

(iii) Large chromosomes with basic number x = 7 are unique; and suggest advancement of the *Pooideae* line.

(iv) The strictly 2-flowered spikelets, of which the lower floret is sterile, is a good marker for the *Panicoideae*.

The phylogenetic diagram they construct, is based primarily on anatomical sequence : fusoid-non-krantz-krantz and only secondarily, on differences in the embryo structure.

Hutchinson (1973) adopts C. E. Hubbard's (1948) classification of the *Gramineae* Juss. and recognises only two subfamilies :

Pooideae and *Panicoideae* and 27 tribes, of which 24 tribes including the tribe *Bambuseae* are assigned to the former and only three tribes, to the latter.

Key to the 11 tribes

1a. Bamboos with woody culms — 1. *Bambuseae*

1b. Herbs (came-like, reed-like or suffrutescent in a few genera)

2a. Spikelets 1-many-flowered

3a. Spikelets with 1 fertile floret, with or without additional male or barren florets

4a. Palea 1-keeled, glumes absent or minute — 2. *Oryzeae*

4b. Palea 2-keeled, rarely 0-1-keeled, and then, glumes well-developed

5a. Spikelets disarticulating above glumes

6a. Lemma awned, involute or convolute and concealing the palea; spikelets strictly 1-flowered

7a. Palea as long as lemma — 3. *Arundineae*

7b. Palea less than half-length of lemma — 4. *Aristideae*

6b. Lemma awnless, rarely 1-awned and then either accompanied by sterile florets or palea not concealed — 5. *Eragrostideae*

5b. Spikelets falling entire — 6. *Arundinelleae*

3b. Spikelets with 2 or more fertile florets

8a. Lemma margins clasping palea keels, both scales, more or less, indurated (lemma at most puberulous, never awned) — 7. *Isachneae*

8b. Lemma margins not clasping palea keels

9a. Inflorescences of several racemes (leaf-blades without cross nerves; lowest floret fertile) — 5. *Eragrostideae*

9b. Inflorescences, a panicle or a single raceme

10a. Spikelets disarticulating between florets

11a. Leaf-blades herbaceous, or if pungent, the plant tufted — 3. *Arundineae*

11b. Leaf-blades stiff, distichous, pungent; plant rhizomatous or stoloniferous — 5. *Eragrostideae*

10b. Spikelets not disarticulating between florets

12a. Glumes falling with spikelets — 5. *Eragrostideae*

12b. Glumes persistent on racemes — 8. *Cynodonteae*

2b. Spikelets 2-flowered, the lower floret male or barren, the upper fertile

13a. Spikelets breaking up at maturity above the persistent glumes

14a. Glumes deciduous; fertile floret dorsally compressed — 7. *Isachneae*

14b. Glumes persistent; fertile floret terete — 6. *Arundinelleae*

13b. Spikelets falling entire at maturity

15a. Upper (rarely lower) lemma or palea cartilaginous to bony, thicker than lower glume

16a. Spikelets falling singly with pedicel attached, very small, borne in a large panicle — 9. *Thysanolaeneae*

16b. Spikelets rarely falling with pedicel attached, and then, not as above (leaf-sheath clasping stem) — 10. *Paniceae*

15b. Both lemmas hyaline to membranous, thinner than lower glume

17a. Spikelets never paired, nor in fragile racemes, nor geniculately awned — 10. *Paniceae*

17b. Spikelets paired, one sessile, the other pedicelled, usually dissimilar, the pedicelled sometimes much reduced, rarely single and then in fragile racemes or the upper lemma geniculately awned; lower glume as long as spikelet or almost so — 11. *Andropogoneae*

Keys to the genera of various tribes.

1. Tribe **Bambuseae** Nees subtribe **Bambusinae** Presl

1a. Florets separated by a rachilla internode, or if 1-flowered, then rachilla extension present; paleas alike, not bifid — *Bambusa*

1b. Florets arising at almost the same level and deciduous together; if 1-flowered, then rachilla extension absent; palea of sole or uppermost floret rounded on the back — *Dendrocalamus*

2. Tribe **Oryzeae** Dumort.

1a. Spikelets with 2 sterile lemmas below the fertile floret; bisexual (leaf-margin smooth or scabrid; fertile lemma coriaceous throughout) — *Oryza*

1b. Spikelets strictly 1-flowered (bisexual and floret strongly laterally compressed) — *Leersia*

3. Tribe **Arundineae** Dumort.

1a. Plants tufted with basal leaves (inflorescences strongly condensed; panicles of globular clusters) — *Elytrophorus*

1b. Plants reed-like with cauline leaves (inflorescences bisexual, lowest florets male or empty) — *Phragmites*

4. Tribe **Thysanolaeneae** C. E. Hubbard (monogeneric)

Characters of the tribe; spikelets with dimorphic florets disarticulating below the pedicel. It is evidently related to *Phragmites*.

5. Tribe **Aristideae** C. E. Hubbard

Of the three genera of the tribe, only *Aristida* L., with awns glabrous, upper glume 1-nerved, the lower nearly always also 1-nerved, with about 250 species occurs in tropics and subtropics of the other two genera, one is confined to South Africa-Madagascar region, and the other extending to Rajasthan desert as the eastern limit.

6. Tribe **Eragrostideae** Stapf

1a. Spikelets 2- or more-flowered (rarely 1-flowered, but then the inflorescences a raceme—*Leptochloa*)

2a. Tips of lemma emarginate to 2-3-lobed or flanks hairy between lateral nerves and margin

3a. Inflorescences a panicle or head — *Eragrostis*

3b. Inflorescences composed of distinct racemes

4a. Rachilla persistent, or upper part of spikelet shed as a whole — *Acrachne*

4b. Rachilla disarticulating between florets

5a. Raceme rachis terminating in a bristle — *Eragrostis*

5b. Raceme rachis terminating in a spikelet — *Leptochloa*

2b. Tips of lemma entire, the nerves and flanks glabrous

6a. Inflorescences a panicle — *Eragrostis*

6b. Inflorescences of 1- or more racemes

7a. Raceme single (spikelets breaking up at maturity; spikelets several flowered) — *Eragrostiella*

7b. Racemes 2- or more

8a. Inflorescences, digitate, or, more or less, whorled

9a. Racemes terminating in a fertile spikelet — *Eleusine*

9b. Racemes terminating in an abortive spikelet or bare point

10a. Paleas, or some of them, remaining on rachilla — *Acrachne*

10b. Paleas falling with lemmas — *Dactyloctenium*

8b. Inflorescences of racemes disposed singly along a central axis

11a. Spikelets breaking up at maturity — *Eragrostis*

11b. Spikelets falling entire — *Desmostachya*

1b. Spikelets strictly 1-flowered; inflorescences a panicle (fruit a utricle with free pericarp; leaf-blades linear) — *Sporobolus*

7. Tribe Cynodonteae Dumort.

1a. Racemes persistent; spikelets breaking up at maturity

2a. Spikelets 2-several flowered (upper glume acute to bidenticulate, awnless or rarely with a very short awn; lemma nearly always long awned, usually pallid) — *Chloris*

2b. Spikelets 1-flowered; lemma awnless; glumes acute — *Cynodon*

1b. Racemes deciduous or spikelets falling entire

3a. Spikelets 2-several-flowered, or at least with a rachilla extension; glumes awn-like, hirsute — *Melanocenchris*

3b. Spikelets 1-flowered, without rachilla extension; glumes membranous, 1-nerved, flexuously awned — *Isachne*

8. Tribe **Arundinelleae** Stapf

Of the 12 genera included in this tribe, only *Arundinella* Raddi occurs in Bilaspur district. It is characterised by : spikelets 2-flowered, usually breaking up; lower floret male or barren; upper lemma scaberulous. It is diagnosed from the other related Indian genus *Jansenella* Bor, (upper lemma hairy) and from the other two Indian genera *Garnotia* Brongn. (spikelets 1-flowered) and from *Chandrasekharania* Nair (both florets bisexual).

9. Tribe **Isachneae** Benth.

1a. Upper lemma indurated, glumes 3/4 to as long as spikelets — *Isachne*

1b. Upper lemma membranous, glumes persistent; 1/3-2/3 length of spikelets — *Coelachne*

10. Tribe **Paniceae** R. Br.

1a. Spikelets, singly or in clusters, subtended by one or more bristles in a rosette without evident axis, involucral bracts free throughout, more or less filiform — *Pennisetum*

1b. Spikelets not subtended by bristles, or if so, these persistent on branches

2a. Upper lemma coriaceous to bony at maturity with inrolled or flat margins

3a. Spikelets not subtended by bristles, nor raceme, rachis prolonged into a subulate point

4a. Inflorescences a panicle

5a. Upper lemma with decurrent wings or scars at the base — *Panicum*

5b. Upper lemma without basal wings or scars

6a. Spikelets supported on a globular head — *Eriochloa*

6b. Spikelets without a head

7a. Spikelets rarely gibbous, and then, dorsally compressed in an open panicle — *Panicum*

7b. Spikelets gibbous; panicle usually spiciform — *Sacciolepis*

4b. Inflorescences of, more or less, unilateral racemes

8a. Glumes of lemmas awned

9a. Spikelets laterally compressed in 2 rows; awns often sticky — *Oplismenus*

9b. Spikelets dorsally compressed

10a. Upper lemma awned, crisply chartaceous — *Alloteropsis*

10b. Upper lemma awnless, coriaceous — *Echinochloa*

8b. Glumes and lemmas awnless or at most mucronate

11a. Lower glume present except in *Brachiaria breviglumis*

12a. Spikelets paired or in racemelets

13a. Tip of upper palea reflexed and slightly protruberant — *Echinochloa*

13b. Tip of upper palea not reflexed; upper lemma not crested

14a. Spikelets broadly elliptic, plump, more or less obtuse — *Brachiaria*

14b. Spikelets narrowly elliptic, more or less acute — *Panicum*

12b. Spikelets single — *Brachiaria*

11b. Lower glume absent, rarely minute (some exceptions in *Paspalum*) (upper glume present, rarely absent, but, then, upper lemma crustaceous) — *Paspalum*

3b. Spikelets, at least those terminating a branch, subtended by one or more bristles, or the raceme rachis prolonged into an often obscure point

15a. Inflorescences usually a panicle, all or most of the spikelets subtended by bristles — *Setaria*

15b. Inflorescences of racemes, only the terminal spikelet (or sometimes also the lowest when paired or clustered) subtended by an inconspicuous bristle or point — *Paspalidium*

2b. Upper lemma cartilaginous to chartaceous, or rarely hyaline; the margins flat and usually hyaline — *Digitaria*

11. Tribe **Andropogoneae** Dumort.

1a. Spikelets not paired, unaccompanied by a vestige

2a. Raceme rachis tough — *Dimeria*

2b. Raceme rachis fragile (spikelets awned, awns arising from low down on back of lemma) — *Arthraxon*

1b. Spikelets paired, but sometimes one of them vestigial

3a. Spikelets, or at least one of each pair, bisexual

4a. Rachis internodes and pedicels slender

5a. Pedicelled spikelets similar to the sessile, both fertile

6a. Inflorescences a panicle, with elongated central axis

7a. Lower glume chartaceous, convex, the nerves raised — *Spodiopogon*

7b. Lower glume membranous to coriaceous, the nerves flat

8a. Raceme rachis fragile; one spikelet of the pair sessile; panicles ample, with long loose racemes, (these mostly white hairy) — *Saccharum*

8b. Raceme rachis tough; both spikelets pedicelled; panicle contracted or spiciform (glumes membranous) — *Imperata*

6b. Inflorescences of single or subdigitate racemes

9a. Inflorescences axillary — *Pogonatherum*

9b. Inflorescences terminal — *Eulalia*

5b. Pedicelled spikelets differing from the sessile in shape and sex

10a. Inflorescences a panicle with elongated central axis; raceme internodes never with a translucent median line

11a. Lower glume of sessile spikelet dorsally compressed

12a. Glumes of sessile spikelet coriaceous; panicles usually loose of short racemes — *Sorghum*

12b. Glumes of sessile spikelet firmly cartilaginous; panicle dense, of moderately long racemes — *Pseudosorghum*

11b. Lower glume of sessile spikelet laterally compressed

13a. Racemes composed of several to many spikelet pairs; awns slender or inconspicuous — *Vetiveria*

13b. Racemes reduced to a triad; awns usually prominent — *Chrysopogon*

10b. Inflorescences of single or subdigitate racemes, sometimes with an elongated central axis, but then, raceme internodes with a translucent median line

14a. Sessile spikelets fused to cruciform homogamous pairs and awned — *Iseilema*

14b. Sessile spikelets separately deciduous and without awns

15a. Pedicels and internodes without a translucent median line

16a. Inflorescences a panicle; racemes 1-5 (-8) spikelets — *Capillipedium*

16b. Inflorescences of single or subdigitate racemes; racemes more than 8 sessile spikelets — *Bothriochloa*

15b. Pedicels and internodes without a translucent median line

17a. Lower floret of sessile spikelets male, with a palea

18a. Ligule membranous

19a. Sessile spikelets dorsally compressed; racemes usually 2 or more — *Ischaemum*

19b. Sessile spikelets laterally compressed; racemes single, spathate — *Apluda*

18b. Ligule a line of hairs — *Sehima*

17b. Lower floret of sessile spikelet barren and reduced to a lemma

20a. Upper lemma of sessile spikelet awned from low down on back — *Arthraxon*

20b. Upper lemma awned from tip, or sinus bilobed at tip, rarely awnless

21a. Lower glume of sessile spikelet 2-keeled; callus, more or less, inserted in hollowed internode tip

22a. Racemes digitate or paired, lower glume or sessile spikelet concave or grooved between the keels

23a. Racemes not deflexed, borne upon unequal terete raceme-bases; leaves not aromatic — *Diectomis*

23b. Racemes usually deflexed at maturity and borne upon subequal flattened raceme-bases, panicle compound, dense and much-branched — *Cymbopogon*

22b. Raceme single; lower glume of sessile spikelet more or less convex, the keel lateral to frontal, with intercarinal nerves — *Schizachyrium*

21b. Lower glume of sessile spikelet convexly rounded without keels and the callus applied obliquely to the internode with its tip free

24a. Raceme with two large homogamous pairs at the base forming an involucre — *Themeda*

24b. Raceme with or without homogamous pairs, if present, not forming an involucre

25a. Sessile spikelets dorsally compressed, the callus obtuse (spikelets wingless) — *Dichanthium*

25b. Sessile spikelets subterete, the callus pungent — *Heteropogon*

4b. Rachis internodes and pedicels stout, thickening upwards; upper lemma awnless

26a. Pedicelled spikelets present

27a. Rachis of raceme tough — *Hemarthria*

27b. Rachis of raceme fragile (lower glume of sessile spikelet not or slightly winged at tip) — *Mnesithea*

26b. Pedicelled spikelet absent — *Ophiuros*

3b. Spikelets unisexual, with male and female spikelets in separate inflorescences, or in different parts of the same inflorescence

28a. Sheaths subtending raceme herbaceous — *Chionachne*

28b. Sheaths subtending racemes indurated and forming an ovoid utricle around the female spikelet — *Coix*

ACRACHNE Wight & Arn. ex Chiov. in Ann. Ist. Bot. Roma 8 : 361. 1907; Clayton & Renvoize, Gen.Gram. : 222. 1986 (as 'Chiov.').

T.: *A. verticillata* (Roxb.) Chiov. (*Eleusine verticillata* Roxb.).

Note: Clayton & Renvoize (*l.c.*) reduce *Arthrochloa* Lorch (1960), non R. Br. (1823), nec. Schultes (1927) [= *Normanboria* Butzin (1978); T. : *N. henrardiana* (Bor) Butzin], as also *Camusia* Lorch (1961) [T. : *C perrieri* (A. Camus) Lorch], as congeneric with *Acrachne* Chiov. But Airy Shaw (1973) equates *Camusia* Lorch as a synonym of *Dactyloctenium* Willd.

Although Mabberley (1987) treats *Normanboria* Butzin as a monotypic genus based on *Daniel & S. R. Babu* 20089 from Madras, S. M. Phillips

(Kew Bull. 37 : 158. 1982) transfers *Normanboria henrardiana* (Bor) Lorch to Acrache as *A. henrardiana* (Bor) S. M. Phillips (cf. Clayton & Renvoize, 1986; Karthikeyan *et al.*, 1989).

Acrachne racemosa (Heyne ex Roem. & Schult.) Ohwi in Bull. Tokyo Sci. Mus. No. 18.1.1947; Cope in Fl. Pakistan No. 143 : 104. 1982; *Eleusine racemosa* Heyne ex Roem. & Schult., Syst. Veg. 2 : 582. 1817; *E. verticillata* Roxb., Fl. Ind. 1 : 346. 1820; C. B. Clarke in J. D. Hook., FBI 7 : 295. 1896.

Erect annual herbs; stems 30-60 cm long. Leaf-sheaths 4-6 cm long, compressed, leaf-blade flat, acuminate, flaccid, glabrous, 5-20 × 0.3-0.8 cm. Ligule a ciliate membrane. Inflorescences of ascending, secund spikes, arranged sub-digitately, 2-8 cm long; spikelets many-flowered, shining, 4-8 mm long, closely overlapping, oblong with a serrate outline, laterally compressed, subsessile on slender, flattened rachis terminating in an abortive spikelet; glumes unequal, lower glumes broadly ovate, finely acuminate or aristulate, 2-3 mm long; upper glumes 2.5-3 mm long, awned from tip; lemmas narrowly ovate, 2-2.5 mm long, 3-veined, keel excurrent into short awn, lateral veins ending in small teeth, disarticulating from below upwards; paleas persistent; lodicules 2; stamens 3. Grains ovoid, rugose, 1 mm long, sulcate on the hilar side.

Type : India, *Heyne* (B).

Fl. & Frt. : July-Oct.

Frequently seen in moist grassy places

Lamni : 19218; Khuria; 19313.

2n = 18, 36 (as *Eleusine verticillata*).

Tropical Africa, Sri Lanka, India and Australasia.

A good fodder grass.

ALLOTEROPSIS C. Presl, Rel. Haenk, 1 : 343. 1830.

T. : *A. distachya* Presl [= *A. semialata* (L.) Hitch.].

Note : Mabberley (1987) cites "*Alloteropjsis* J. Presl", but K. B. Presl is the author of' Rel. Haenk. (1830) (vide Stafleu. Tax. Lit. : 365. 1967). It is a remarkable genus with species possessing non-kranz, PS and MS anatomy.

Alloteropsis cimicina (L.) Stapf in Prain, Fl Trop. Afr. 9 : 487. 1919; Haines, Botany 3 : 1055; Cope in Fl. Pakistan No. 143 : 214. 1982;

Milium cimicinum L., Mant. Alt. Pl. : 184. 1771. *Axonopus cimicinus* (L.) P. Beauv., Ess. Agrost. : 12. 1812; C. B. Clarke in J. D. Hook., FBI 7 : 64. 1896.

Tufted, annual, aromatic, hairy herbs. Leaf-sheaths 2.5-8 cm long. Leaf-blades ovate-lanceolate, acute, base cordate, tuberculate-ciliate on margins, 3-8 × 0.7-1.8 cm. Ligule a rim of stiff hairs. Inflorescences of 4-6, pseudospicate racemes, verticillately arranged; racemes 10-15 cm long; spikelets paired below, single upwards, elliptic-ovate, 3.5 mm long; lower glumes hyaline, 3-veined, 2 mm long; upper glumes subulate-acuminate, 2.4 mm long; lower lemma 3-veined; palea absent; lodicules 2; stamens 3; upper lemma 5-veined, hyaline, boat shaped, 2.3 mm long, awn 2.5 mm long; paleae flat, 2-veined, margins infolded; stamens 3; styles 2; stigmas 2, plumose. Grains 1 mm long, suborbicular.

Type: India, *Koenig*.

Fl. & Frt.: July-Oct.

Common in forest clearings, open places, edges of the forests.

Pasarkhet : 19384.

2n = 30, 36 [2n = 36 as *Axonopus cimicina* (L.) P. Beauv.].

Paleotropics.

It is grazed by cattle.

APLUDA L., Sp. Pl. : 82. 1753 & Gen. Pl. ed. 5. 35. 1754.

T.: *A. mutica* L.

Calamina P. Beauv., Ess. Agrost, : 128. 1812, *nom. illeg.* for *Apluda* L.

Apluda mutica L., Sp. Pl. 82. 1753; Bor, Grasses : 93. 1960; Cope in Fl. Pakistan No. 143 : 318. 1982; *A. varia* Hack. in DC., Monogr. Phan. 6 : 196. 1889, *nom. superfl.*, based on *A. mutica* L.; C. B. Clarke in J. D. Hook., FBI 7 : 150. 1896; Haines, Botany 3 : 1104. *A. varia* ssp. *aristata* Hack. (*Ponai*-Hindi, *Goroma*-Beng.).

Perennial herbs with rambling geniculate branches. Leaf-sheaths 3.5-6.0 cm long; leaf-blades often falsely petiolate linear-lanceolate, acuminate, 20-30 × 1-2 cm; ligule a membrane, 2 mm long. Terminal panicles of many racemes, upto 30 cm long, each raceme embraced by a boat-shaped spatheole and composed of 3 spikelets, 1 sessile and 2 pedicelled, a triangular box around the sessile spikelet, lowermost spikelet reduced to a single glume, 5.4 mm long, 3-veined; sessile spikelets : 2-6 mm long; 2-flowered, lower floret male, upper floret bisexual; lower

glumes ovate, 4.5 mm long, 11-13-veined; upper glumes folded asymmetrically, narrowed to a 2-tipped point, 4.5 mm long; lower lemma folded, hyaline, 4 mm long: palea hyaline, 2-veined, linear, acute, 4 mm long; stamens 3; upper lemma hyaline, notched at tip with an awn 4-12 mm long or tip entire to emarginate and awnless; palea reduced to a scale; pedicelled spikelets : similar to sessile, 2-flowered, one male or bisexual, other barren; upper lemma entire, male. Grains 1 mm long, oblong.

Type : Described from India.

Fl. & Frt. : Sept.-Feb.

Common in shady places, on slopes, in thickets and forest margins.

Pendra : 15277.

2n = 20, 20 + 2B, 40, 60, 70,140 (ssp. *aristata*) ; 2n = 20 (ssp. *mutica*).

Tropical Asia.

Note : Babu (1976) recognises two subspecies, ssp. *mutica* and ssp. *aristata* (L.) Babu. the latter with many cytological races.

A fairly good fodder grass; usually assumes a climbing habit. It may be used as raw materials for rayon industry; stalks used for making hats.

ARISTIDA L., Sp Pl. : 82. 1753, & Gen. Pl. ed. 5 : 35. 1754.

T. : *A. adscensionis* L.

Note : Clayton & Renvoize (1986) recognise five sections, sect. *Aristida*, with some 200 species, has "awns persistent, with or without a column, rarely the lateral branches suppressed; lemma convolute or involute. ."

1a. Glumes short-awned (2 mm) or not, upper emarginate, mucronate at tip; lemma involute — *A. adscensionis*

1b. Glumes long-awned (1.5-2mm long) ; lemma convolute — *A. setacea*

Aristida adscensionis L., Sp. Pl. : 82. 1753; Haines, Botany 3 : 1022; Cope in Fl. Pakistan No. 143 : 41. 1982. *A. depressa* auct.; *sensu* Behera *et al.*, JBNHS, Suppl. 74 : 654. 1979, non Retz. (1786). *Aristida pumila* Dcne in Ann. Sci. Nat. 2, 4 : 85. 1835.

Annual or perennial, tufted herbs. Leaf-sheaths with rounded auricles, glabrous; leaf-blade filiform, convolute, glabrous, 7-30 × 0.1-0.3 cm. Panicles 7-30 cm long, interrupted, sub-secund, branches solitary or 2-nate;

spikelets 7-10 mm long, 1-flowered, purplish; lower glumes oblong-lanceolate, acute, membranous; 5-6 mm long, scaberulous on keel; upper glumes 2-toothed, mucronate, 6-7 mm long, keel smooth; florets bisexual, lemma 7 mm long, linear, indurated, 1-3-veined, with a bearded callus, produced into a 3-branched persistent awn 1-2.5 cm long, keel scabrid; palea 8 mm long, obtuse; lodicules similar to palea, 2-3-veined; stamens 3; styles 2; stigmas 2, plumose. Caryopsis terete, or grooved, tightly enclosed by lemma.

Type: Ascension Is., *Osbeck* (LINN).

Fl. & Frt.: July-Jan.

Common in sandy alluvium on slopes, edges of dry forest, forest clearings.

Khootaghat : 19518; Katghora : 3994, 3708; Bilaspur : 8643.

2n = 22.

Throughout the tropics; probably native to N. Africa (Murti, 1975).

A good fodder grass, when tender.

A. setacea Retz., Obs. Bot. 4 : 22. 1786; Haines, Botany 3 : 1023; Bor, Grasses : 412. 1960; Karthikeyan *et al.*, Flor. Ind. Enum.-Monocot. : 184. 1989.

Perennial, tufted herbs. Leaf-sheaths ribbed, 8-10 cm long; leaf-blade filiform, inrolled, scabrid on back of mid-vein, 10-30 × 0.1-0.3 cm; ligule a rim of stiff hairs. Panicles terminal, 30 cm long; spikelets 1-flowered, linear-lanceolate; glumes scarious, 1-veined, tip bifid, midvein excurrent as a slender, scabrid awn; lemma 1 cm long, convolute around palea, 3-veined, indurated, with a bearded callus, produced into a 3-branched awn, central awn 3.5 cm long, lateral ones 3 cm long; palea linear, acute, 1.5 mm long; lodicule small, hyaline; stamens 3; styles 2; stigmas 2, plumose. Grains tightly enclosed by lemma.

Fl. & Frt.: July-Feb.

Common in open places, forest clearings, waste lands, on sandy gravelly or kunker soil.

Korba : 12935; Pasan : 13277; Pasan to Korbi : 15326, 19091; Pasarkhet : 16820.

2n = 22, 44.

India, Sri Lanka, Burma, Mascarene Islands.

Culms used for making brooms, brushes, screens and frames for paper manufacture.

Note : *A. contorta* P. Muell. (Australia) has "fruits around legs can immobilise sleep"; *A. pungens* Desf. (Africa) yeilds grains used as famine-food (Mabberley, 1987).

ARTHRAXON P. Beauv., Ess. Agrost. : 111, t. 11, f. 6, 1812.

T. : *A. ciliaris* P. Beauv. [= *A. hispidus* (Thunb.) Makino].

Note : A homogenous genus with x = 9 and several unusual features.

1a. Spikelets laterally compressed; lower glumes of sessile spikelets rounded on back, not keeled; stamens 2 — *A. lancifolius*

1b. Spikelets not compressed; lower glumes of sessile spikelets 2-keeled, almost flat on back, stamens 3 — *A. lanceolatus*

Arthraxon lanciolatus (Roxb.) Hochst. in Flora 39 : 188. 1856; Haines, Botany 3 : 1072; Welzen, Blumea 27 : 266. 1981. *Andropogon lanceolatus* Roxb., Fl. Ind. 1 : 262. 1820. *Arthraxon prionodes* (Steud.) Dandy in Andrews, Fl. Pl. Sudan 3 : 399. 1956; Cope in Fl. Pakistan No. 143 : 310. 1982. *Andropogon prionodes* Steud., Syn. Pl. 1 : 383. 1854.

Perennial herbs; culms decumbent. Leaf-sheaths 2-2.5 cm long, leaf-blades lanceolate to ovate, caudate-acuminate, margins tuberculate-ciliate, base cordate amplexicaul. Ligule membranous, with a fringe of hairs. Racemes 2-8, upto 6 cm long; rachis sparsely hairy; spikelets paired, one sessile, other pedicelled; sessile spikelets : lanceolate, 5-6 mm long; lower glumes lanceolate, rounded on back, awns 8-10 mm long; upper glumes 3-veined with hyaline margins, 6.5-7 mm long; lower lemma hyaline, 4 mm long, epaleate; upper lemma 1-veined, 4.5 mm long, awned, epaleate; pedicelled spikelets : 4.5 mm long; lower glumes 7-veined, with short bristles in upper half, floret 1, male, awnless; lemma 2-lobed. Grains narrowly linear.

Syntypes : Ethiopia, *Schimper* 1117 (K) and *Quartin Dillon* (P).

Fl. & Frt. : Oct.-Feb.

Common in moist shady places.

Khondra : 12788, 12808.

2n = 20, 26, 30, 36.

N. Africa, Arabia, India, Nepal, China, Thailand.

Used for fodder and for hay.

A. lancifolius (Trin.) Hochst. in Flora 39 : 188. 1856; Welzen, Blumea 27 : 288. 1981; Cope in Fl. Pakistan No. 143 : 308. 1982; *Andropogon lancifolius* Trin. in Mem. Acad. Imp. Sci. St-Petersb. Ser. 6, 2 : 271. 1832; *Arthraxon microphyllus* auct., *sensu* C. B. Clarke in J. D. Hook., FBI 7 : 147. 1896, non (Trin.) Hochst. 1856; Haines, Botany 3 : 1073. *A. microphyllus* var. *hindustanicus* Jain et. Despande in J. Indian Bot. Soc. 51 : 176. 1972.

Annual, slender herbs; rooting from the lower nodes. Leaf-sheaths 2-2.5 cm long, hairy; leaf-blades oblong to oblong-lanceolate, acuminate, glabrous or ciliate, base, cordate-amplexicaul, 1.5-3.5 × 0.3-1 cm; ligules ciliare. Spikes 3-8, in ligitate, spiciform racemes, each 2-3 cm long; spikelets paired, one sessile, the other pedicelled; rachis villous; sessile spikelets; linear, compressed, 2-3 mm long; lower glumes 2-2.5 mm long, membranous, scabrid on veins, 2-toothed; upper glumes finely awned, or acuminate; lower lemma hyaline, empty or absent; upper lemma 1-1.5 mm long, awned from base, awns 8-10 mm long; palea bisexual; anthers 0.3-0.6 mm long; pedicelled spikelets; reduced to 1.5 mm long, empty glumes. Grains linear.

Type : Nepal (LE).

Fl. & Frt. : Sept.-Dec.

Gregarious in moist places, in ravines.

Khondra : 12752, 12816; Madai : 12889.

n = 9, 2n = 18, 36.

Tropical Africa, India, Sri Lanka, Burma, Malaysia.

Used as a cattle fodder.

Note : *Arthraxon microphyllus* (Trin.) Hochst., is confined to Himalayas in Nepal, Sikkim and Assam (Jain in *Ind. For.* 97 : 220-222. 1971).

ARUNDINELLA Raddi, Agrost. Bras. : 36, t. 1. 1823.

T. : *A. brasiliensis* Raddi.

1a. Culms solid; spikelets without bristles, 1.5-2 mm long *A. pumila*

1b. Culms hollow; spikelets subtended by 2 bristles at the tip of pedicels : 4.5-7.5 mm long

2a. Plants not woolly at base; spikelets 6.5-7.5 mm long *A. setosa* var. *setosa*

2b. Plants woolly at base; spikelets 4.5-5.5 mm long *A. setosa* var. *lanifera*

Arundinella pumilla (Hochst. ex A. Rich.) Steudel, Syn. Pl. Glum. 1 : 114. 1854; Bor, Grasses : 423. 1960; Hara *et al.*, Enum. 1 : 122. 1978; *Acratherum pumilum* Hochst. ex A. Rich., Tent. Fl. Abyss. 2 : 414. t. 100. 1851; *Arundinella tenella* Nees ex Steud., Syn. Pl. 1 : 115. 1854; C. B. Clarke in J. D. Hook., FBI 7 : 71. 1896.

Erect, annual herbs; sparsely hairy. Leaf-sheaths sub-compressed, usually hairy; leaf-blades lanceolate to ovate, acuminate, membranous, glabrous, 20-25 × 1-1.5 cm. Ligule hairy, 1 mm long Panicles 20-30 cm long, fan-shaped, rachis and branches capillary, spreading; spikelets minute, short-pedicelled, 2-flowered : male, female or bisexual; lower glumes chartaceous, ovate, acute, 3-veined, 1-1.5 mm long; upper glumes lanceolate, or ovate-lanceoltte, acuminate, often hairy on back, 3-veined, 1.5-1.8 mm long; lower lemma 3-veined, 1 mm long; inferior palea awned, awn with 2 setae on either side, upper lemma obtuse, bifiid, awned from sinus, 0.7-0.8 mm long, bisexual, awn 3.5-4 mm long; palea hyaline, 0.5-0.7 mm long, bisexual; lodicules 2; stamens 3; stigmas 2, plumose, long-exserted. Grains free within lemma.

Fl. & Frt. : Sept.-Nov.

Common in moist shady places.

Kota : 13080; Madai to Korba : 12913.

2n = 20.

Tropical Africa, India, Nepal, Sri Lanka, Burma, S. E. Asia.

Used as forage.

A. setosa Trin., Gram. Panic. : 63. 1826, Hara *et al.*, Enum. 1 : 122. 1978; *A. capillaris* C. B. Clarke in J. D. Hook., FBI 7 : 74. 1896.

var. **setosa**

Perennial, caespitose herbs; rootstock stoloniferous. Leaf-sheaths terete; leaf-blades narrow, setaceous, convolute, acuminate, hairy along margins, 15-25 × 0.5-1 cm. Panicles spreading, 15-25 cm long, greenish-grey or purple, with long, sub-erect, sub-solitary, or 2-4-nately whorled branches, 7-12 cm long; spikelets sub-secund, 2-flowered, pedicelled; pedicels with

bristles or setae; lower glumes chartaceous, cymbiform, 3-veined, aristate, glabrous or setose, 6.5-7.5 mm long; upper glumes lanceolate, 3-veined, 6.5 mm long; lower lemma obtuse or sub-acute, 3-7-veined, membranous; palea male, female or bisexual; upper lemma lanceolate, bifid, bisexual, 1.5-3 mm long, awned; awns with 2 setae, 1 cm long; palea hyaline, 2-keeled, bisexual; lodicules 2; stamens 3; stigmas 2, plumose, long exserted. Grains free within lemma.

Fl. & Frt. : Sept.-Dec.

Common in rocky places, dry slopes.

Pasan : 13276; Pasan to Semera : 15361; Pasan to Korbi : 19090; Lamni : 19260.

2n = 16, 20, 32, c. 48, 54, 80.

India, S. E. Asia, China, Malaysia.

Used for making brooms, fodder in times of scarcity.

A. setosa Trin. var. **lanifera** C. E. C. Fischer in Gamble, Fl. Pres. Mad. : 1801. 1934; Bor, Grasses : 425. 1960; Murti in Bull. Bot. Surv. India 24(1-4) : 232. 1983.

Perennial, caespitose herbs; rootstocks thick, stoloniferous; stem-base thick, woolly. Leaf-sheaths terete; leaf-blades narrow, setaceous, convolute, acuminate, hairy along margins and upper surface, 10-15 × 0.5-1 cm. Panicles spreading, of long, slender branches upto 12 cm long, grey or purplish; spikelets 2-flowered, pedicelled, 4.5-5.5 mm long, usually supported by stiff setae upto 0.5 mm long at tip of pedicel; lower glumes chartaceous, ovate, 3-veined, aristate, 4-5 mm long; upper glume lanceolate, acuminate, 3-veined, 5 mm long; lower lemma obtuse or sub-acute, 7-veined, palea male, female or bisexual; upper lemma lanceolate, bifid, awned from sinus, awns with 2 setae; palea hyaline, 2-keeled, bisexual; lodicules 2; stamens 3; stigmas 2, plumose, long-exserted. Grains free within lemma.

Fl. & Frt. : Sept.-Dec.

Occasionally seen in rocky places, on dry slopes.

Madai : 19471.

Note : According to Bor (*l.c.*), this variety is endemic to Tamil Nadu, but the present collection extends its limit to further north in Madhya Pradesh (Murti, *l.c.*).

BAMBUSA Schreber, Gen. Pl. ed. 8 : 1. : 236. 1789, *nom. cons.*

T. : *Bambusa arundinacea* Retz. [= *Bambusa bambos* (L.) Vilmorin].

Note : *B. vulgaris* Schrad. in Wendel is commonly planted in the district. Hexanthic after 34 years; yields timber, edible shoots, concretions of silica in stems (*tabashir*), medicinal.

Bambusa bambos (L.) Vilmorin, Blumengartneri 1 : 1189. 1896; Nicolson *et al.*, Regnum Veget. 119 : 306. 1988. *Arundo bambos* L., Sp. Pl. : 81. 1753. *Bambos arundinacea* Retz., Obs Bot. 5 : 24. 1789. *Bambusa spinosa sensu* Roxb., Fl. Ind. 2 : 198. 1832, excl. ref. Rumphian, non Roxb. 1814. *Bambusa arundinacea* (Retz.) Willd., Sp. Pl. 2(1) : 245. 1799; C. B. Clarke in J. D. Hook., FBI 7 : 395. 1896; Haines, Botany 3 : 995; Cope in Fl. Pakistan No. 143 : 14. 1982. *Ily* Rheede, Hort. Malab. 1 : 25-26, t. 16. 16781. (*Kantabans*-Oriya; *Male* or *Spiny bamboo*-Eng.).

Large, thorny, caespitose bamboos; rootstocks sympodially branching; culms upto 20 m high; internodes hollow; culm-sheaths 20-40 cm long, broad triangular. Ligule narrow with white hairs, upto 2 mm long, leaf-sheaths hairy. Leaves linear or linear-lanceolate, glabrous or pubescent beneath, 12-20 × 1.5-2 cm. Inflorescences usually a large, leafless, compound panicles, bearing spikelets in heads on spicate branchlets; spikelets about 2 cm long, with 3-6 florets, sessile; florets subtended by 1 or more glume-like bracts in addition to glumes; rachilla-internodes 3 mm long; floral-glumes 3-7, ovate-lanceolate, lower bisexual, upper male with 2-3 uppermost imperfect; lemmas ovate-lanceolate, mucronate, glabrous, 7-8 mm long; palea with 2 strongly fringed keels; lodicules 3, ciliate; stamens 6, filaments free; style 1; stigmas 3, plumose. Grains oblong or linear-oblong, furrowed on one side.

LT. : Rheede, *l.c.* : t. 16 (vide McClure, Blumea, Suppl. 3 : 95. 1946).

Fl. & Frt. : Feb.

Common along road-sides, outskirts of villages.

Pasan to Korbi : 15325.

2n = 70, 72.

Native of India (Cope, *l.c.*).

Used in building constructions and other similar purposes and also for paper-pulp. Young shoots pickled and made into curries.

Note : According to Gadgil and Prasad (Biotropica 16 : 161-172, 1984), *Bambusa bambos* flowers about every 46 years (in 1870, 1916, 1960, 1977). The grains are cooked and eaten by local people.

Bambusa spinosa Roxb., Hort. Beng. : 1814, validated by reference to Rumphius "H. A. 4, t. 3", is the correct name for *B. blumeana* J. H. Schult. of Malaya.

BOTHRIOCHLOA Kuntze, Rev. Gen. Pl. 2 : 762. 1891; de Wet & Harlan, Amer. J. Bot. 53 : 94-98. 1966; Clayton & Renvoize, Gen. Gram. : 344. 1986.

T. : *B. anamitica* Kuntze [=*B. bladhii* (Retz.) S. T. Blake].

Note : Mabberley (1987) treats *Bothriochloa* Kuntze as an alternate name for *Dichanthium* Willem et.

The boundaries between *Bothriochloa* Kuntze, *Capillipedium* Stapf and *Dichanthium* Willem are somewhat blurred. While Ohwi (Bull. Tokyo Sci. Mus. No. 18. 1947) merged *Bothriochloa* and *Capillipedium*, Gardner [Flora of Eastern Australia 1 (Pt. 1) : 297-344. 1952] and Roberty (Boissiera 9 : 1-455. 1960) merged *Bothriochloa* in *Dichnthium*. de Wet & Harlan (Amer. Jour. Bot. 53 : 94-98. 1966; Taxon 19 : 339-340. 1970 and Evolution 24 : 270-277. 1970) suggested the merger of all the three genera, accepting the oldest name *Dichanthium* Willem (1796) and recognising three sections under it. Clayton [Kew Bull. 32(1) : 1-4. 1977] and Jain & Deshpande (Bull. Bot. Surv. Ind. 20 : 133-135. 1978) supported this merger and transferred some of the species of *Bothriochloa* and *Capillipedium* to *Dichanthium*. According to Cope (1982), "The trouble is largely the result of rapacious hybridisation by a single species; apart from *B. bladhii* and its immediate neighbours, the genera are acceptably distinct both morphologically and genetically". (cf. Clayton & Renvoize, *l.c.*).

Cultivated for fodder.

1a. Inflorescences sub-digitate or with a central axis shorter than the lowest racemes; racemes 2-8, over-topping axis; lower racemes longer than rachis — *B. pertusa*

1b. Inflorescences with long central axis; racemes many, not over-topping axis; lower racemes shorter than rachis — *B. glabra*

Bothriochloa glabra (Roxb.) A. Camus, Ann. Soc. Linn. Lyon 1930, n.s. 76 : 164. 1931. *B. bladhii sensu* Choudhury & Patnaik, J. Econ. Tax. Bot. 4 (2) : 561. 1983; non (Retz.) Blake (1969). *Andropogon intermedius* auct., non R. Br. (1810). *Andropogon glaber* Roxb., Fl. Ind. 1 : 271. 1820. *Amphilophis glabra* (Roxb.) Stapf in Prain, Fl. Trop. Afr. 9 : 172. 1917; Haines, Botany 3 : 1075. *Andropogon montanus* Roxb. (Hort. Beng. : 82. 1814, *nom. nud.*) Fl. Ind. 1 : 271. 1820. Type : India, "a native

of the mountainous countries", Roxb. *s.n.* Roxb. Icon. No. 892 (CAL. K.). *Bothriochloa intermedia sensu* Bal, Rec. Bot. Surv. India 6(10) : 118. 1942; Bor, Grasses : 108. 1960, non (R. Br.) A. Camus; *Dichanthium glabrum* (Roxb.) Jain & Deshpande in Bull. Bot. Surv. India 20 : 134. 1978.

var. **glabra**

Tufted, perennial herbs. Leaf-sheaths terete or compressed; leaf-blade linear, setaceously acuminate, ciliate, 10-40 × 0.2-1 cm. Ligule a ciliate, scarious rim; racemes 2-5 cm long, in pyramidal, thrysiform or sub-corymbose panicles on a central axis 4-20 cm long; spikelets pale green or purplish, paired, sessile and pedicelled, 2-flowered; sessile spikelets : narrowly elliptic, 3-3.5 mm long; callus bearded; lower glumes chartaceous, obtuse or truncate, 4-6-veined, pitted or not, appressed hairy; upper glumes membranous, oblong or lanceolate, ciliate, 3-veined; lower lemma hyaline, oblong, acute, epaleate; upper lemma reduced to a slender awn, epaleate; awn 1-1.5 cm long, reduced to empty glumes; lodicules 2; stamens 3; styles 2; stigmas 2; pedicelled spikelets : lower glumes chartaceous, elliptic-lanceolate, laterally 2-keeled, infolding at margins; upper glumes membranous, 3-veined; lemmas hyaline, awnless, paleate or not, male. Grains oblong, obtuse.

Type : India, Bengal in elevated spots. Roxb. *s.n.* (Roxb. Icon. No. 1194, CAL, K.).

Fl. & Frt. : Oct.-Jan.

Common in open grassy places, edges of forest, along roads.

Kota : 13085; Pali : 12862 A.

2n = 34-44, 40, 50, 60, 80.

Paleotropics.

Young grass—a good fodder; provides good paper-pulp.

Note : *B. glabra* (Roxb.) A. Camus is a tetraploid fertile hybrid between *Capillipedium parviflorum* (4n) and *B. intermedia* (4n) and introgressive hybridisation takes place in nature between the parental species. Original *B. intermedia* (R. Br.) A. Camus may be an autoploid from *B. longifolia* (Hack.) Bor (2n) and crosses freely producing 3n, 5n hybrids and original *B. intermedia* occurs as widely scattered colonies and is a good species (cf. de Wet & Harlan, 1970). Karthikeyan *et al.* (1989) however, treat, *B. bladhii* (Retz.) S. T. Blake as the correct name for these groups of species involving *Andropogon bladhi* Retz., *A. intermedius* R. Br., *A. puncatus* Roxb., *A. glaber* Roxb., A. *caucasicus* Trin., *A. odoratus* Donna.

B. pertusa (L.) A. Camus in Ann. Soc. Linn. Lyon, n.s. 76 : 164. 1931; Bor, Grasses : 109. 1960; Cope in Fl. Pakistan No. 143 : 286. 1982; *Holcus pertusus* L., Mant. Pl. 301. 1771; *Andropogon pertusus* (L.) Willd., Sp. Pl. 4 : 922. 1806; C. B. Clarke in J. D. Hook., FBI 7 : 173. 1896; *Amphilophis pertusa* (L.) Nash ex Stapf in Agric. News, Bridgetown 15 : 179. 1916, et in Prain, Fl. Trop. Afr. 9 : 175. 1917; Haines, Botany 3 : 1077; *Dichanthium pertusum* (L.) Clayton in Kew Bull. 32(1) : 4. 1977. (*Besana*-Or.; *Sour-grass, Pitted blue-grass*-Eng.).

Stoloniferous, perennial herbs; nodes bearded. Leaf-sheaths terete or compressed; leaf-blades linear, acute or acuminate, base ciliate. Ligule membranous; racemes short-peduncled, purple-tinged, 4-5 cm long, silky, joints and pedicels silky hairy; spikelets paired, sessile and pedicelled, 2-flowered; sessile spikelets : oblong-lanceolate, 3-3.5 mm long; callus bearded; lower glumes cartilaginous, truncate, deeply pitted, 3-5-veined, hairy below the middle; upper glumes cymbiform, acute or acuminate, keeled; lower lemma hyaline, lanceolate, obtuse, 2-2.5 mm long, epaleate; upper lemma reduced to 1-1.5 cm long awn; lodicules 2; stamens 3; styles 2; stigmas 2; pedicelled spikelets : 3.5 mm long; lower glumes chartaceous, 7-13-veined, pitted or not, keeled; upper glumes 5-veined; lower lemma linear oblong; upper lemma short or absent. Grains oblong, obtuse.

Type : Described from India.

Fl. & Frt. : Oct.-Jan.

Common in open places, along roads.

Korba : 12935A.

Tropical Africa, Arabia, India, S. E. Asia.

It is a highly esteemed fodder grass and can also be made into hay. It will stand upto constant grazing and trampling and is able to withstand moderate period of drought. In many specimens the culms creep about on the surface of soil and root at the nodes.

BRACHIARIA Griseb. in Ledeb., Fl. Ross. 4 : 469. 1853 : Clayton & Renvoize, Gen. Gram. : 283. 1986. *Panicum* L. subdiv. *Brachiaria* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 3 : 194. 1834, nom. invalid. (Art. 3.1, Art. 5.1, & Art. 33.4, ICBN, 1988).

T. : *Panicum caucasicum* Trin.

Pseudobrachiaria Launert in Mitt. Bot. Seaats. Munch. 8 : 158. 1970.

T. : *P. deflexa* (Schumach.) Launert.

Note : Clayton & Renvoize (*l.c.*) and Prrummitt (1992) cite the authority of the generic name as "*Brachiaria* (Trin.) Griseb.", but Trinius' placement of the epithet *Brachiaria* as a *subdiv.* makes it invalid (Art. 33.4).

B. ramosa (L.) Stapf is expected to occur in the district.

1a. Spikelets 1.25-2 mm long — *B. reptans*

1b. Spikelets 2.5-4.5 mm long

2a. Spikelets very loosely scattered, broadly elliptic-oblong or broadly obovate-elliptic; rachis of racemes triquetrous or crescentric — *B. deflexa*

2b. Spikelets crowded and secund on rachis, narrowly elliptic; rachis or racemes flat — *B. distachya*

Brachiaria deflexa (Schum.) C. E. Hubb. ex Robyns in Bull. Jard. Brux. 9 : 181. 1932; Clayton & Renvoize (*l.c.*) : 283. 1986; *Panicum deflexum* Schum., Beskr. Guin. Pl. 63. 1827; *Pseudobrachiaria deflexa* (Schum.) Launert in Mitt. Bot. Staatssamml. Munchen. 8 : 158. 1970; Bor, Grasses : Add. & Corr. II. 1973 (Repr. ed.); Shukla & Jain in Bull. Bot. Surv. Ind. 20 : 66. 1978; Karthikeyan *et al.*, *op. cit.* : 252. 1989.

Tufted, annual herbs. Leaf-sheaths usually hairy; leaf-blades finely and short-hairy, upto 15 cm long, margins scabrid. Inflorescences panicle-like, upto 12 cm long; racemes, 7-15 × 2-9 cm long, of 3-5 spikelets; branches spreading and deflexed; spikelets mostly in pairs, loosely and irregularly 2-seriate, widely-spaced, broadly elliptic or oblong, dorso-ventrally compressed, 2.5-3.5 mm long, glabrous to pubescent, acute, 2-flowered; lower glumes membranous, 5-7-veined, 1.5 mm long; upper glumes membranous, 7-veined, 2 mm long; lower lemma similar to upper glume, 5-veined, 2 mm long; palea minute; lower florets sterile, rarely male; upper lemma rugose, oblong or elliptic, subacute to acute, 1.5 mm long; upper florets bisexual, transversely rigid; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains flattened, oval, 1.5 mm long.

Type : Ghana, *Thonning* (C).

Fl. & Frt. : July-Aug.

Rare on sandy alluvium in open damp, grassy places.

Lamni : 19220.

2n = 18, 20.

Pakistan, Senegal to Yemen and Southwards to South Africa, India.

Note: *B. deflexa* is closely related to *B. ramosa* but differs from the typical *Brachiaria* in two essential characters : firstly, the variable position of the lower glume in relation to the rachis and secondly, the inflorescence which is panicle-like, the secondary racemelets sessile or pedicelled. In *Brachiaria* all the spikelets are plumber and arranged usually in pairs, in dense racemes or spike-like branches along a common axis. The lower glumes of each spikelet faces the rachis (i.e. adaxial). The position of lower glumes in this species is virtually indefinable. The spikelets terminate pedicels of unequal length: some of the pedicels being longer than spikelets, thus rendering the entire inflorescence quite different from that of other two species of *Brachiaria* with characteristic racemes; those with inflorescences looking like species of *Panicum*.

It can be used for fodder. The grains are eaten at the time of scarcity.

B. distachya (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 565. 1919; Haines, Botany 3 : 1050; Bor, Grasses : 281. 1960; Cope in Fl. Pakistan No. 143 : 203. 1982; *Panicum distachyon* L., Mant. Pl. 183. 1771; C. B. Clarke in J. D. Hook., FBI 7 : 37. 1896.

Decumbent, annual herbs. Leaf-sheaths keeled, fringed along margins, 1.5-3 cm long; leaf-blades 5-8 cm long, linear, acute, cordate, 3-6 mm broad; ligule membranous, fringed. Inflorescences of 2-4, simple, distant racemes on a central flattened, axis 2.5-5 cm long; racemes 1-3 cm long; rachis hairy, winged; spikelets solitary, on either side of the median ridge, narrowly ellipsoid, 2.5-4 mm long; lower glumes membranous, 7-9-veined, 1.5-1.8 mm long; upper glumes membranous, boat-shaped, 5-7-veined, 2.5 mm long; lower lemma similar to upper glume, 5-veined, 2.5 mm long; palea hyaline, 2-veined, 2 mm long; lower floret sterile; upper lemma coriaceous, minutely rugulose punctate, 3-veined, 2 mm long; florets bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oval or elliptic, flattened, 1.5 mm long.

Type: 'India orientali', *Koenig* (Linn. Herb. No. 80.41-LINN; microf.-CAL.).

Fl. & Frt.: Aug.-Dec.

Common in moist places, cultivated fields.

Korba : 8629.

2n = 36, 72.

India, Sri Lanka, Burma, Thailand.

A good fodder grass.

B. reptans (L.) C. A. Gard. & C. E. Hubb. in Hook., Icon. Pl. Sub. t. 3363. 1938; Bor, Grasses : 285. 1960; Cope in Fl. Pakistan No. 143 : 205. 1982. *Panicum reptans* L., Syst. Nat. ed. 10. 870. 1759; *P. prostratum* Lam., Illustr. 1 : 171. 1791; C. B. Clarke in J. D. Hook., FBI 7 : 33. 1896; *Urochloa reptans* (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 601. 1920; Haines, Botany 3 : 1049.

Annual, decumbent herbs; rooting at nodes. Leaf-sheaths 1.5-2.5 cm long, terete; leaf-blade 2-5 cm long, linear, acuminate, broadly cordate; ligule a shallow membrane. Inflorescences of 4-8 simple, distant racemes on a central axis, 1.5-5 cm long; racemes 1-4 cm long; spikelets in pairs, alternately along one face of trigonous rachis, ovate-elliptic, 2 mm long; pedicels hairy; lower glumes hyaline, 0.2 mm long; upper glumes 7-9-veined, membranous, boat-shaped, 2 mm long; lower lemma 5-veined, 1.5-1.8 mm long; palea hyaline, 1.5-2 mm long; lower floret sterile or male; upper lemma coriaceous, rugose, boat-shaped, mucronulate, 1.5-1.8 mm long; upper florets bisexual; lodicules 2; stamens 3, styles 2; stigmas 2, plumose. Grains elliptic-oval, flattened, 1.2 mm long.

Type : Jamaica, *Browne* (LINN; microf.-CAL.).

Fl. & Frt. : July-Dec.

Common in moist places, grazed areas, cultivated fields.

Bilaspur : 12992.

2n = 14, 18.

Throughout the tropics.

A good fodder grass; grains are also used as food in times of famine.

CAPILLIPEDIUM Stapf in Prain, Fl. Trop. Afr. 9 : 169. 1917.

LT. : *C. parviflorum* (R. Br.) Stapf.

Filipedium Raiz. & Jain in J. Bombay Nat. Hist. Soc. 49 : 682. 1951.

T. : *F. planipedicellatum* (Bor) Raiz. & Jain.

Note : Mabberley (1987) lists *Capillipedium* Stapf as an alternate name for *Dichanthium* Willemet.

Filipedium Raiz. & Jain (1951), monotypic, differs from *Capillipedium* Stapf in having internodes and pedicels hyaline and translucent greatly expanded between margins and upper lemma awnless; otherwise, congeneric. Karthikeyan *et al.* (1989) reduce it as congeneric with *Capillipedium* Stapf.

C. huegelii (Hack.) Stapf [= *Dichanthium huegelii* (Hack.) Jain & Deshpande] is expected to occur in the district.

Capillipedium assimile (Steud.) A. Camus in Rev. Bot. Appl. 1 : 308. 1921, et Lecomte, Fl. Gen. Indo-China 7 : 314. 1922; Haines, Botany 3 : 1074; Cope in Fl. Pakistan No. 143 : 291. 1982; *Andropogon assimilis* Steud. (in Zoll., Syst. Verz. : 58. 1854, *nom. nud.*), Syn. Pl. 1 : 397. 1854; C. B. Clarke in J. D. Hook., FBI 7 : 179. 1896, *pro part. Dichanthium assimile* (Steud.) Deshpande & Jain, Fasc. Fl. India 15 : 6. 1984.

Perennial, suffruticose herbs; culms polished, nodes bearded. Leaf-sheaths bearded at mouth; leaf-blades 5-20 cm long, lanceolate, setaceously acuminate, glabrous or sparsely hairy. Inflorescences paniculate, panicles 5-10 cm long, of several racemes, decompound, pyramidal, branches capillary; but often reduced to triads, nodes ciliate; joints and pedicels villous; racemes 5-15 mm long; sessile spikelets; oblong, 2-2.5 mm long; lower glumes 3-veined, concave or flat on back, ciliate on keel; upper glumes 3-veined, lanceolate; lower lemma 1 mm long, epaleate; upper lemma reduced to 8-10 mm long scabrid awn; pedicelled spikelets : unawned, 3-4 mm long, male or barren; lower glumes 7-veined; lower florets male; upper glumes 3-5-veined; lower lemma without veins; lower florets male; upper lemma absent; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oblong, 1.5 mm long.

Type : Java, *Zollinger* 859 (L.).

Fl. & Frt. : Oct.-Feb.

Common along roads, edges of the forest.

Madai : 12895, 12917; Achanakmar : 13217; Kabirchabutra : 15215.

n = 10; 2n = 20, 40.

India, Burma, Thailand to China and Japan, Malaysia.

Although at the diploid level, *C. assimile* (n = 10) and *C. parviflorum* (R. Br.) Stapf (n = 10 + 1B) are genetically completely isolated (de Wet & Harlon in Taxon 19 : 339-340. 1970), they introgress at the tetraploid level. *Bothriochloa bladhii* lies intermediate between the two.

The plants can be used for fodder in young condition; later the culms become very woody.

CHIONACHNE R. Br. in J. J. Bennett & R. Br. Pl. Jav. Rar. : 15, 18. 1838.

T. : *Chionachne barbata* (Roxb.) Benth. (*Coix barbata* Roxb.).

Chionachne koenigii (Spreng.) Thw., Enum. Pl. Zeyl. : 357. 1864; Cope in Fl. Pakistan No. 143 : 351. 1982. *Coix arundinacea* Koen. ex Willd., Sp. Pl. 4 : 203. 1805, non Lam. 1791. *Coix koenigii* Spreng., Syst. Veg. 1 : 239. 1825. *C. barbata* Roxb., Fl. Ind. 3 : 569. 1832. *Chionachne barbata* (Roxb.) R. Br. in Benn. *et al.*, Pl. Jav. Rar. : 18. 1838. *Polytoca barbata* (Roxb.) Stapf ex C. B. Clarke in J. D. Hook., FBI 7 : 102. 1896; Haines, Botany 3 : 1110. (*Gurgur*-Beng.).

Perennial herbs; monoecious. Leaf-sheaths and blades with deciduous, tubercle-based hairs; leaf-blades linear, acuminate, lower ones 60-80 cm long, gradually smaller, scabrid above and on margins; ligule membranous. Inflorescences much branched, leafy panicles with clusters of branches subtended by foliaceous bracts; flowering branches from each upper leaf-axils; spikes 1-2.5 cm long, with 1 basal female spikelet and several male spikelets above; male spikelet : 2-flowered, 8-10 mm long; lower glumes herbaceous, lanceolate-oblong, obtuse, 9-veined; upper glumes chartaceous, lanceolate, 7-9-veined; lemmas membranous, lanceolate, 3-5-veined, paleate; stamens 3; female spikelets : sessile, 6-7 mm long, 2-flowered; glumes 4-6 mm long, oblong, coriaceous; lemmas hyaline, truncate, 3-veined; lower ones empty, paleate or not, upper ones fertile, paleate. Grains enclosed by thickened lower glumes.

Type locality : Described from India.

Fl & Frt. : Aug.-Dec.

Common in grassy places, edges of Sal forest.

Katghora : 6033; Achanakmar : 13210.

2n = 20, 40.

India, Sri Lanka, Burma, Java.

The sheaths and leaves are covered with irritating hairs. Cattle are not fond of this grass because of its harsh texture, but they eat it when it is young. Stony fruits used as rosary beads.

CHLORIS Swartz, Prodr. Veg. Ind. Occ : 1. 25. 1788.

LT. : *C. cruciata* (L.) Swartz (*Agrostis cruciata* L.) [vide Hitchcock, U. S. Dept. Agric. Bull. (1915-23) 772. 187. 1920].

1a. Spikes 10-25 cm long, widely spreading; upper glumes 5-7.5 mm long; fruiting lemmas glabrous; empty lemmas a fine awn upto 1.25 cm long — *C. dolichostachya*

1b. Spikes upto 6.5 cm long, crowded, not spreading; upper glumes 3-3.5 mm long; fruiting lemmas with apical margin ciliate; empty lemmas oblanceolate, truncate, with an arista about 4 mm long — *C. virgata*

Chloris dolichostachya Lagasca, Gen. et Sp. Pl. : 5. 1816; Cope in Fl. Pakistan No. 143 : 120. 1982; *C. incompleta* Roth, Nov. Sp. Pl. : 60. 1821; C. B. Clarke in J. D. Hook., FBI 7 : 290. 1896; Haines, Botany 3 : 1013 non Link (1821).

Perennial, tufted herbs. Leaf-sheaths 5.5-6.5 cm long, hairy; leaf-blades 12-30 cm long, linear, scabrid; ligule a rim of hairs. Inflorescences of 4-10, digitate, flexuous, often drooping; spikes 10-20 cm long; spikelets dorsally compressed, 4.5-5 mm long, 2-awned, of one sterile and one bisexual flower; lower glumes 1.5-1.8 mm long, linear-lanceolate, 1-veined, transparent; upper glumes 4-5 mm long; lower lemma oblong-lanceolate, dorsally compressed, 4.5-6.5 mm long, scabrid on back and margins, with an awn upto 10 mm long; callus ciliate; palea 2-veined, linear-lanceolate, margins infolded; upper lemma embraced by lower lemma, bearded at base, with an awn 2.5-4.5 mm long; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains 2.5 mm long, brown, flattened, enclosed in persistent lemma and palea.

Type: Philippines, "Hab. in Phillip. Insulis, *D. ludovicus*, Nee legit." (? MA or FI).

Fl. & Frt.: Oct.-Feb.

Common in damp places, edges of the forest.

Khondra : 12784, 12828; Achanakmar : 13100.

2n = 20, 40.

Afghanistan, India, Sri Lanka, Burma, S. E. Asia, China.

Note: There is some doubt about the inclusion of this species in *Chloris* Sw. vis-a-vis *Enteropogon* Nees in Lindley (1836). Cope (1982) accepts the solitary spike as the distinguishing character of *Enteropogon*, placing digitate spikes into *Chloris*. Clayton & Renvoize (1986) say:

Grain trigonous to sub-terete; lemma compressed—*Chloris*

Grain and lemma compressed dorsally— *Enteropogon*

This species may be used as fodder.

C. virgata Swartz, Fl. Ind. Occ. 1 : 203. 1797; C. B. Clarke in J. D. Hook., FBI 7 : 291. 1896; Haines, Botany 3 : 1014; Bor, Grasses : 468. 1960; Cope in Fl. Pakistan No. 143 : 121. 1982.

Annual, tufted herbs; erect or geniculately ascending and rooting at nodes. Leaf-sheaths 5-6 cm long, mouth bearded; leaf-blades 5-25 cm long, linear, acute; ligule a narrow, membranous ridge. Spikes 6-15, digitate, 2.5-6.5 cm long; rachis 5-angled; spikelets 2.5 mm long, 2-awned; lower glumes subulate, 1-veined, 2-3 mm long; upper glumes oblong, 3-4 mm long, 2-fid, vein produced between lobes into a scabridulous awn; lower lemma oblong-ovate, 2-fid, awned in sinus; awns 5-15 mm long; callus rounded, ciliate, upper lemma oblong, 2-2.5 mm long, with an awn 5-12 mm long; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains 2 mm long, fusiform.

Type: Antigua, *Swartz* (S).

Fl. & Frt.: Sept.-Dec.

Common in waste places, along roads, forest clearings.

Kota to Bilaspur : 13048.

2n = 14, 20, 26, 30.

Throughout tropics; probably native to tropical America (Murti, 1975). Its occurrence from sea-level to 3500 m is interesting.

A nutritious fodder, decoction is used for baths in rheumatism.

CHRYPSOPOGON Trin., Fund Agrost. : 187. 1822. *nom. cons.*

T.: *C. gryllus* (L.) Trin. (*Andropogon gryllus* L.) (*typ. cons.*).

Pollinia Spreng., Pl. Pugill. 2 : 10. 1815. *nom. rejic.*

T.: *P. gryllus* (L.) Spreng.

C. polyphyllus (Hack.) Blatt. & McCann may occur in the district.

1a. Creeping, stoloniferous herbs; pedicels of spikelets half as long as spikelet or longer, callus of sessile spikelet as long as spikelet, acicular — *C. aciculatus*

1b. Erect, non-stoloniferous herbs; pedicels of spikelets much less than half-length of spikelets; callus of sessile spikelets much shorter than spikelet, not acicular — *C. fulvus*

Chrysopogon aciculatus (Retz.) Trin., Fund. Agrost. : 188. 1822; Haines, Botany 3 : 1083; Mitra & Jain, in Manilal, Bot. Hist. Hort. Malab. : 151. 1980; Nicolson *et al.*, Reg. Veget. 119 : 307. 1988. *Andropogon aciculatus* Retz., Obs. Bot. 5 : 22. 1788; C. B. Clarke in

J. D. Hook., FBI 7 : 188. 1896. *Kudira-pullu* Rheede, Hort. Malab. 12 : 79, t. 43. 1693. (*Surwala*-Hindi; *Chorkanta*-Beng.).

Perennial herbs. Sheaths compressed, overlapping, margins ciliolate. Leaf-blades oblong, acute or rounded, 2-6 cm long; ligule a fimbriate rim. Panicles terminal, 5-10 cm long; spikelets 3-nate, 1 sessile and 2 pedicelled; sessile spikelets : laterally compressed, 2-flowered; lower glumes 2-veined, 2-fid, awned or not; upper glumes boat-shaped, 3-3.5 mm long, 3-veined, aristate, scabrid setose, margins hyaline and hairy; lower lemma hyaline, 2.5-2.8 mm long, male or barren; upper lemma 1-veined, with a scaberulous golden awn, 3 mm long, bisexual; palea hyaline, 1.5 mm long; callus pungent; pedicelled spikelets; 5 mm long, dorsally compressed; lower glumes 3-veined, unawned; upper glumes 3-veined, margins fringed, aristate; lemmas as in sessile spikelets, upper florets male; stamens 3. Grains linear.

Fl. & Frt. : July-Nov.

Common along river banks, waste places.

Pali to Ratanpur : 19497.

Tropical Asia, India, Sri Lanka, Burma, Malaysia, Australia.

Culms used in brush industry and woven into Cigarette-cases. It is often used for lawns.

Note : Mabberley (1987 : 128) names this species mistakenly as "*C. acicularis* (Retz.) Trin."

C. fulvus (Spreng.) Chiov., Fl. Somala 1 : 327. 1929; Bor, Grasses : 116. 1960; Hara *et al.*, Enum. 1 : 126. 1978; *Pollinia fulva* Spreng., Pugill. 2 : 10. 1815; *Chrysopogon montanus* Trin. ex Spreng., Neue Entdeck 2 : 93. 1821; Haines, Botany 3 : 1084; *Andropogon monticola* Roem. & Schult., Syst. Veg. 2. Mant. : 665. 1827; C. B. Clarke in J. D. Hook., FBI 7 : 192. 1896. *Chrysopogon monticola* (R. & S.) Haines, *l.c.* (*Goria*-Hindi).

Tufted, perennial herbs; culm-base thickened with white hairs. Leaf-sheaths compressed, keeled; leafblades linear, acute, scabrid, hairy towards base, upto 3.5 cm long. Ligule a shallow hairy rim. Panicles terminal, 7-12 cm long, branches arranged in successive whorls; spikelets 3-nate, 1 sessile, 2 pedicelled; central spikelet bisexual, lateral males; sessile spikelets : laterally compressed; lower glumes lanceolate, 2-veined, 4-4.5 mm long, awned or not; upper glumes 5 mm long, lanceolate, keeled, 3-veined, awned, pectinate-ciliate with golden hairs; awns 7.5 mm long; lower lemma hyaline; upper lemma hyaline, linear, 3.5 mm long, 2-fid, with a keeled awn 2.4 cm long; pedicelled spikelets : 5.5 mm long, dorsally

compressed; pedicels ringed with golden brown hairs; lower glumes 7-veined, lanceolate, 5.5 mm long, awned or not; upper glumes lanceolate, 3-veined, aristate, awned or not; lemmas 3.5-4 mm long, lanceolate, hyaline; stamens 3. Grains linear, compressed.

Fl. & Frt.: Sept.-Dec.

Common on slopes, road-side ditches.

Pali : 12862; Katghora to Morga : 12871; Katghora : 3991.

Tropical E. Africa and Asia.

It is a good fodder grass and can be made into hay, it is cut before flowering; a sand-binder.

COELACHNE R. Br., Prodr. Fl. Nov. Holl. : 187. 1810.

T.: *C. pulchella* R. Br.

Coelachne simpliciuscula (Wight & Arn. ex Steud.) Munro ex Benth. in Jour. Linn. Soc. Bot. 19 : 93. 1881; Hara *et al.*, Enum. 1 : 127. 1978; *Panicum simpliciusculum* Wight & Arn. ex Steud., Syn. Pl. Glum. 1 : 96. 1854; *Coelachne pulchella sensu* C. B. Clarke in J. D. Hook., FBI 7 : 270. 1896, *pro part.*, non R. Br. 1810; Haines, Botany 3 : 999.

var. **spicata** (J. D. Hook.) Panigr., comb. nov. *C. pulchella* R. Br. var. *spicata* C. B. Clarke in J. D. Hook., FBI 7 : 271. 1896; Haines, *l.c.*

Annual decumbent herbs; culms tufted. Leaf-sheaths 1-1.5 cm long; leaf-blades linear to lanceolate, flat or rolled, 1.5-2.5 cm long; ligule a rim of hairs Inflorescences open or contracted, spiciform panicle 5-10 cm long; spikelets 2 mm long, 2-flowered, upper ones imperfect lower ones bisexual; glumes ovate, 3-veined, with 2 hyaline wings, persistent; rachilla articulated above glumes, elongate between lemmas; lower lemma 1.5 mm long, ovate, cymbiform, hairy on margins below; palea 1.5 mm long, 2-veined, membranous, ovate, margins infolded, bisexual; upper lemma similar; palea ciliate on keel near middle; female or bisexual; callus glabrous; lodicules 2; stamens 3; styles 2; stigmas 2, plumose; second floret stipitate on a rachilla internode, 0.6 mm long above lower floret; stamens absent; ovary with a short style. Grains fusiform, brown, free within lemmas.

Syntypes: Nepal, *Wallich* Num. list No. 8908; Chotanagpur, *C. B. Clarke* s.n. : S. India, *Wight* Herb. No. 3376.

Fl. & Frt. : Nov.-Apr.

Common in marshy places.

Pali : 8662; Pasan to Semra : 15354.

2n = 18, 20, 36.

Indo-malaysia.

Note : *Coelachne pulchella* R. Br. var. *pulchella* extends from Burma to Australia.

Coix L., Sp. Pl. : 972. 1753 & Gen. Pl. ed. 5. : 419. 1754.

C. aquatica Roxb., is expected to occur in the district.

Coix lacryma-jobi L., Sp. Pl. : 972. 1753; Haines, Botany 3 : 1111; Bor, Grasses : 264. 1960; Nicolson *et al.*, Reg. Veget. 119 : 308. 1988. *Cetri-conda* Rheede, Hort. Malab. 12 : 133, t. 70. 1693 ('*Job's Tears*', Adlay; *Gurgur*-Beng.).

Tall, robust, annual or perennial, marshy herbs; monoecious; stems tufted, succulent. Leaf-sheaths smooth, glabrous; leaf-blades 40-60 cm long, flat, lanceolate, base broad, often cordate, margins wavy, scabrid, upper surface hairy; ligules membranous, 2 mm long. Inflorescences of many spikes, terminal and axillary, each subtended by an ovoid, hard, polished, bony, ivory-like cupule (hardened bract) 5-15 mm long; spikes 4-6 cm long, peduncled; female portion basal, enclosed in a cupule and consisting of 1 sessile spikelet and 2 barren pedicels; male portion terminal and protrudes out from the cupule; male spikelets : 2-3-nate, 1 pedicelled and 1-2 sessile, 7-8 × 2-3 mm, lanceolate, 2-flowered, lower floret male, upper one barren; lower glumes herbaceous, many-veined, narrowly winged or not, keeled along inflexed margin; upper glume lanceolate, herbaceous; lemmas hyaline, membranous, paleate; lodicules 2; stamens 3; female spikelets : 2-flowered; glumes orbicular, inflated below, contracted into a narrow cusp or beak, lower chartaceous, upper membranous, keeled; lower florets represented by membranous lemma; upper florets with membranous lemma and palea; lodicules absent; staminodes present; styles 2; stigmas 2, exserted from cupule. Grains orbicular or ovoid, bluish-grey or brown.

Type : Indies (LINN).

Fl. & Frt. : Aug.-Oct.

Common in marshes, near ponds and in ditches.

Khondra : 12751; Kota : 13088.

2n = 10, 20, 20+f, 21, 22, 27, 30, 31, 39, 40, 41.

Throughout the tropics.

Note : Clayton & Renvoize (1986 : 373 and ICBN 1978, Art. 73.9, ex. 14) spell the specific epithet as "*lacryma-jobi*", but Nicolson *et al.* (1988) spell "*lachryma-jobi*".

The sheath of the bract of the inflorescence, a hollow pear-shaped organ containing the 1-flowered female spikelet, the two males projecting from it; this "false-fruit" with this shell edible (adlay), esp. in India and Burma. Aquatic forms grow upto 30 m long.

Utricles which vary from globose to fusiform and from white to blue-grey, or brown, are used as ornamental beads and sometimes ground up for four (Vallayes in Bull. Agri. Congo Belge. 39 : 247-304. 1948; Jain & Banerjee in Econ. Bot. 28 : 38-42. 1974).

Grains a good substitute for rice, considered more wholesome by virtue of their higher fat and protein contents; also used for affections of air passage and urinary tract; leaves used as fodder.

CYMBOPOGON K.P.J. Sprengel, Pl. Min. Gogn. Pugill. 2 : 14, 1815; Soenarko in Reinwardtia 9 : 225-375. 1977.

LT. : *C. schoenanthus* (L.) K.P.J. Sprengel (*Andropogon schoenanthus* L.) (vide N. L. Britton et P. Wilson, Bot. Porto Rico 1 : 27. 1923).

Cymbopogon is closely allied to *Andropogon* and sometimes is difficult to separate (Clayton in Kew Bull. 19 : 454. 1965). A useful diagnostic character is the aromatic flavour when the leaf of *Cymbopogon* is chewed; *Andropogon* is tasteless, and its elaborate compound panicle with deflexed raceme-bases, is another diagnostic character.

Key to diagnose the three allied species in India, in which pedicelled spikelets are acute to acuminate :

1a. Sessile spikelets flat or concave on back

2a. Lower glume of sessile spikelet flat, more or less winged — *C. nardus* (Ser. *Citrati*)

2b. Lower glume of sessile spikelet concave, wingless — *C. schoenanthus* (Ser. *Cymbopogon*)

1b. Sessile spikelet with a V-shaped median groove in the lower half of the back — *C. martinii* (Ser. *Rusae*)

Cymbopogon martinii (Roxb.) J. Wats. in Atkins., Gaz. N. W. Prov. Ind. 10 : 392. 1882; Haines. Botany 3 : 1093; Bor, Grasses : 129. 1960; Cope in Fl. Pakistan No. 143 : 332. 1982; *Andropogon martinii* Roxb., Fl. Ind. 1 : 280. 1820; *A. schoenanthus* L. var. *martinii* (Roxb.) C. B. Clarke in J. D. Hook., FBI 7 : 204. 1896. *C. motia* B. K. Gupta, Proc. Indian Acad. Sci. B 71 : 92 1970; *C. martinii* var. *sofia* B. K. Gupta *l.c.* : 97. 1970. (*Palma-rosa, Rosha; Rusha*).

Tufted, perennial herbs. Leaf-sheaths glabrous; leaf-blades lanceolate or linear-lanceolate, 25-40 cm long; ligules 2-3 mm long. Panicles of spiciform racemes, linear-oblong, 30 cm long, reddish at maturity, spatheoles elliptic-lanceolate, 2-4 cm long, green, turning reddish; racemes 15-20 cm long; internodes and pedicels ciliate along margins; lowermost pair of spikelets in each raceme homogamous and resembling pedicelled ones; sessile spikelets : dorsally compressed, bisexual, 4-6 mm long, ovate or ovate-oblong; lower glumes oblong, flat on back in upper half and with a V-shaped median groove in lower, keels winged; callus obtuse; upper glumes 4 mm long, lanceolate, margins ciliate, keel winged; lemma 3.5 mm long, ciliate, upper deeply 2-fid, with an awn 12-18 mm long; palea absent; lower florets reduced to a hyaline lemma; upper floret bisexual; lodicules 2; stamens 3; styles 2; pedicelled spikelets: male or barren, 4 mm long, lanceolate, lower glumes muticous, 7-9-veined, keel ciliate; upper glumes lanceolate, 3-veined, keel ciliate; stamens 3. Grains oblong, sub-terete to plano-convex.

Type : India, *Martin* (K).

Fl. & Frt. : Oct.-Feb.

Frequently seen at the edges of the forest, on slopes; also planted.

Katghora : 12872; Katra : 16733; Keonchi : 15387.

2n = 20, 20-0-2B, 20-2B, 40.

South East Asia, India.

Note : Var. '*sofia*' yields Ginger grass oil, whereas var. *motia* yields Palma-rosa oil or East Indian Geranium oil; used for soaps and cosmetics; also for lumbago and stiff joints. Gupta (*l.c.*) established the latter as a diploid and the former, a tetraploid. Burkill (*Proc.* J. Asiat. Soc. Beng. 5, n.s. 3 : 87-93. 1909) and Bor (*l.c.*) discussed at length the morphological differences between them.

Cymbopogon citratus (DC.) Stapf (Lemon grass), *C. flexuous* (Nees ex Steud.) J. Wats. (Malabar oil), *C. martinii* (Roxb.) J. Wats. (Rosha), *C. nardus* (L.) Rendle (Citronella, mana

grass) and *C. winteranus* Jowitt are cultivated in India for the essential oils which are distilled from their leaves and used as inexpensive perfume. *C. citratus* is also used medicinally and appreciated as a culinary herb throughout the tropics (Clayton & Renvoize, 1986).

CYNODON L. C. Rich. in Pers., Syn. Pl. 1 : 85. 1805, *nom. cons.*

T. : *C. dactylon* (L.) Pers. (*Panicum dactylon* L.).

2n = 18, 36; morphologically similar and genetically introgressing species; it also hybridises with *Chloris* Sw.

Pasture & lawn grass

1a. Plants not rhizomatous; leaf auricles and orifices glabrous or pilose; ligule membranous; spikes many; hairs on lemma often clavate — *C. arcuatus*

1b. Plants rhizomatous; leaf auricles and orifices usually bearded; ligule a ring of hairs; spikes 2-6; hairs on lemma not clavate — *C. dactylon*

Cynodon arcuatus J. S. Presl ex C. B. Presl, Ref. Haenk. 1 : 290. 1830; de Wet & Harlon in Taxon 19 : 565. 1970; Cope in Fl. Pakistan No. 143 : 118. 1982; *C. intermedius* Rang. & Tad. in Jour. Bomb. Nat. Hist. Soc. 26 : 304. 1918; *C. dactylon* (L.) Pers. var. *intermedius* (Rang. & Tad.) C.E.C. Fischer in Gamble, Fl. Madras 10 : 1835. 1934.

Creeping, perennial, stoloniferous herbs; rooting at nodes; flowering branches erect or geniculately ascending. Leaf-sheaths compressed, sparsely bearded at mouth. Leaf-blades linear, margins scaberulous, 1.5-15 cm long. Ligules membranous, ciliolate on upper edge, 5 mm long. Spikes 5-10 cm long, drooping, digitate; spikelets 1.5-2 mm long, greenish or purplish, 1-flowered, laterally compressed, imbricate in 2 rows, awnless; rachis tumid and pubescent at its base; lower glumes lanceolate, 1-veined, shorter than upper glume; lemma obliquely ovate-oblong, chartaceous, 3-veined, longer than glume, margins and keel hairy; palea chartaceous, 2-keeled; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oblong, usually trigonous, reddish-brown.

Type : Described from Luzon, Philippines.

Fl. & Frt. : Almost throughout the year.

Along forest roads in grassy places; rare.

Katghora : 3993.

2n = 20, 32, 36.

India, Burma, S. E. Asia, N. Australia.

It is a tetraploid species (de Wet & Harlon, *l.c.*).

C. dactylon (L.) Pers., Syn. Pl. 1 : 88. 1805; Haines, Botany 3 : 1012; Nicolson *et al.*, Reg. Veget. 119 : 308. 1988. *Panicum dactylon* L., Sp. Pl. : 58. 1753. *Agrostis linearis* Retz. Obs. Bot. 4 : 19. 1783. *Beli-caraga* Rheede, Hort. Malab. 12 : 87, t. 47. 1693. (*Bermuda, Kweek grass* or *Star-gras*-Eng.; *Duba ghass*-Oriya; *Durva*-Sans.).

Stoloniferous herbs. Leaf-sheaths smooth; leaves on prostrate stems, subulate, 1-3.5 cm long, on ascending branches longer upto 7 cm, linear or linear-lanceolate, rigid, folded, convolute or flat; ligules 0.3 mm long. Spikes 1.5-5 cm long; spikelets 2-2.5 mm long, greenish, 1-flowered, laterally compressed, imbricate in 2 rows, awnless; rachis flattened; rachilla produced; lower glumes lanceolate, 1-1.5 mm long, keeled, conduplicate; upper glumes 2-2.5 mm long, lanceolate, keeled; lemma broadly cymbiform, silky pubescent on keel, 2.5-3 mm long; palea much narrower, 2-veined, keel scaberulous; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oblong, turgid, brown, 1.5 mm long.

Type: Portugal (LINN).

Fl. & Frt.: Almost throughout the year.

Common grass throughout the area.

Khuria : 15459; Pasarkhet : 19441; Achanakmar : 13203A; Kabirchabutra : 13374; Korba : 8620.

2n = 18, 18+1—3B, 18+0—3B, 27, 30, 36, 40.

Naturalized in tropical and warm temperate regions throughout the world.

It makes excellent hay and is considered as a very good fodder grass. It is considered as good lawn-grass but suffer from trampling and overgrazing; a good soil binder. Decoction diuretic, used for anasarca; rhizome used in genito-urinary troubles of much significance in religious/auspicious ceremonies.

DACTYLOCTENIUM Willd., Enum. Pl. Hort. Berol. : 1029. 1809.

LT.: *D. aegyptium* (L.) Willd. ('*aegyptiacum*') (*Cynosurus aegyptius* L.) [vide Hitchock, U. S. Dept. Agric. Bull. (1915-23). 772 : 175. 1920].

A close-knit, but taxonomically difficult genus undergoing speciation and introgression in East Africa.

Dactyloctenium aegyptium (L.) Willd., Enum. Hort. Berol. 1029. 1809; P. Beauv., Ess. Agrost. : t. 15. 1812; Cope in Fl. Pakistan No. 143 : 106. 1982; *Cynosurus aegyptius* L., Sp. Pl. : 72. 1753; *Eleusine aegyptia* (L.) Desf., Fl. Atlant. 1 : 85. 1798; C. B. Clarke in J. D. Hook., FBI 7 : 295. 1896 ('*aegyptiaca*'); Haines, Botany 3 : 1016. *Cynosurus cavara* Ham. ex Dillwyn, Rev. Hort. Malab. : 61. 1839. *Kavara-pullu* Rheede, Hort. Malab. 12 : 131, t. 69. 1693. (*Aegyptian-Sudan-Sahara-grass*).

Annual herbs; culms erect or geniculate at base. Leaf-sheaths hairy or ciliate above; leaf-blades linear, acute, ciliate on veins and margins, 3-20 cm long. Inflorescences of 3-6 spikes, 2-6.5 cm long, linear to narrowly oblong, olive-grey, peduncles hairy at base; spikelets spreading at right angles from rachis, 3-4-flowered, broadly ovate, 3-4 mm long; lower glumes 2 mm long, ovate-lanceolate, keel scabrid; upper glumes elliptic-obovate, keel smooth, excurrent into a divergent scabrid awn; lemmas 2.5-3 mm long, ovate, 3-veined, mucronate or short-awned; keel scabrid, gibbous; palea notched, 2-keeled; lodicules 2; stamens 3. Grains obovoid-globose, 1-1.5 mm long, transversely rugose, flattened on one side.

Syntypes: Egypt (description in Bauhin, Pinax 7. 1623; Theatr. 110. 1658) and India (illustration in Pluk. Alm. 175. t. 300/8. 1696.).

Fl. & Frt.: July-Nov.

Common in sandy grassy places, edges of the forest.

Pasan : 13269A; Karidongri : 19324.

2n = 18, 20, 22, 24, 34, 36, 38, 40, 44, 45, 46, 48.

Widely naturalized, including North America.

An exceedingly variable pantropical weed, it is a very good fodder grass and seeds edible; sand-binder.

Note: *Cynosurus cavara* Dillw., is based on Rheede, *l.c.* t. : 69.

DENDROCALAMUS Nees in Linnaea 9 : 476. 1835.

T.: *D. strictus* (Roxb.) Nees (*Bambusa stricta* Roxb.).

Klemachloa Parker in Indian For. 58 : 7. 1932.

T.: *K. detinens* Parker.

Tree sympodial; branch complement several, of which one is dominant, *Dendrocalamus giganteus* Munro is probably the largest of all grasses, attaining 30-35 m high, growing 46 cm a day and is a huge clump-forming woody bamboo, as all other species are.

Dendrocalamus strictus (Roxb.) Nees in Linnaea 9 : 476. 1834; C. B. Clarke in J. D. Hook., FBI 7 : 404. 1896; Haines, Botany 3 : 992; Cope in Fl. Pakistan No. 143 : 12. 1982: *Bambos stricta* Roxb., Pl. Corom. 1 : 58. t. 80. 1795. ('*Bansa*', *Calcutta bamboo*, *Male bamboo*-Eng. *Salia bansa*—Oriya).

Trees, sympodial, culms solid, 2.5-7.5 cm in diam.; culm-sheaths 7.5-30 cm long, rounded at apex, slightly auricled, ciliate on margins, stiff golden-brown hairs on back; imperfect blades triangular, subulate, hairy; ligule 0.2-0.3 cm long. Leaf-blades linear-lanceolate, acuminate and twisted at tip, rounded abruptly at base, rough and often hairy above, softly hairy beneath, scabrid on margins, 2.5-25 × 0.5-3 cm; petioles short. Inflorescences a branched panicle of dense, spinescent, spicate, globular heads 3-5 cm apart; spikelets spiny, hairy, 7-12 mm long, with 2-3 fertile florets and some sterile florets intermixed; glumes 2, or more, ovate, spinescent, many-veined; lemmas ovate, tip spiny and surrounded by ciliate tufts of hairs, 8 mm long; palea ovate, enarginate, lower 2-keeled, ciliate on keels; upper not keeled, 6-8-veined; lodicules absent; stamens 6; ovaries turbinate, stipitate; style 1; stigma 1. Grains broadly ovoid, shining, brown, beaked, 7-8 mm long, hairy above.

Type: India, *Roxburgh* (K).

Fl. & Frt.: Nov.-Feb.

Common throughout the area, at places forming pure and dominant forest.

Achanakmar : 15442.

2n = 70, 72.

Pakistan, India, Nepal, Burma, Singapore, Java.

It is the most important timber bamboos, especially for paper pulp, charcoal, activated carbon and rayon industry; split bamboo culms used for much of domestic articles. Usually deciduous undershrub; male bamboo is the most widespread bamboo in South East Asia. The foliage affords abundant fodder for elephants. It flowers gregariously over large areas at intervals of 25-35 years (McClure, The Bamboos : 169. 1966). It may also be found flowering sporadically a few clumps at a time almost every year. These clumps die after flowering.

DESMOSTACHYA (J. D Hook.) Stapf in Thiselt.-Dyer, Fl. Cap. 7 : 316. 1898, non *Desmostachys* Miers (1852), *Eragrostis* sect. *Desmostachya* C. B. Clarke in J. D. Hook., FBI 7 : 324. 1896.

T. : *Eragrostis cynosuroides* (Retz.) P. Beauv. [= *D. bipinnata* (L.) Stapf ; *Briza bipinnata* L.].

Stapfiola Kuntze in Post, Lexicon : 532. 1903. *nom. nov.* pro. *Desmostachya*.

Note : *Desmostachya* (J. D. Hook.) Stapf is unlikely to be confused with *Desmostachys* Miers (Art. 64.4, ICBN, 1988). Yet, Mabberley (1987 : 177) does not list the former but lists *Stapfiola* Kuntze (1903) as a good generic name, originally proposed as a *nom. nov.*

Desmostachya bipinnata (L.) Stapf in Thiselt.-Dyer, Fl. Cap. 7 : 632. 1900; Cope in Fl. Pakistan No. 143 : 109. 1982. *Briza bipinnata* L., Syst. Nat. ed. 10. 2 : 875. 1759. *Poa cynosuroides* Retz., Obs. Bot. 4 : 20. 1786. *Eragrostis cynosuroides* (Retz.) P. Beauv., Ess. Agrost. : 162. 1812; C. B. Clarke in J. D. Hook., FBI 7 : 324. 1896. *Desmostachya cynosuroides* (Retz.) Haines, Botany 3 : 1007. 1924. *Stapfiola cynosuroides* (Retz.) Kuntze in Post Lexicon : 523. 1903 (*Kusa*-Oriya).

Coarse, perennial herbs; culms ascending from creeping rootstock; stolons covered with shining sheaths. Leaf-sheaths thick, mouth often hairy; often densely flabellate towards base of culms. Leaf-blades linear or linear-lanceolate, 15-40 cm long. Inflorescences a narrow, erect, linear panicle 20-30 cm long; spikes clustered or spaced, 1-4 cm long; rachis puberulous; spikelets compressed, secund, 2-seriate, deflexed, pale-brown, ovate to linear-oblong, 2-10 mm long, upto 15-flowered, falling entire; lower glumes 0.5-1 mm long; upper glumes 1-2 mm long, ovate, 1-veined, coriaceous; lemmas coriaceous, keeled ovate, acute, 1.5-2 mm long; palea shorter than its lemma, sub-coriaceous, 2-keeled, keel minutely scabrid; lodicules 2; stamens 3; styles 2. Grains obliquely ovoid, laterally compressed, obscurely trigonous, 5-6 mm long.

Type : Egypt, *Hasselquist*.

Fl. & Frt. : June-Nov.

Frequently seen in open grasslands, on slopes.

Madai : 19472.

2n = 20.

North and Tropical Africa, India, Thailand to Vietnam.

The plants are found in sandy and water-logged soils—a good sand binder; used for ropes, mats, *Asanas* and for thatching; culms diuretic; used in dysentery and menorrhagia. It is used in several religious ceremonies.

DICHANTHIUM Willemet in Usteri, Neue Ann. der Bot. 18 : 11. 1796; de Wet & Harlan in Bot. Soc. Arg. Bot. 12 : 206-227. 1968.

T.: *D. nodosum* Willemet, *nom. illeg.* [*Andropogon annulatum* Forssk.; *Dichanthium annulatum* (Forssk.) Stapf].

Note: *Dichanthium* approaches *Bothriochloa*, from which it is rather arbitrarily separated by the solid pedicels.

1a. Leaf-sheaths terete; ligule 2-4 mm long, obtuse, decurrent into sheath; peduncles of racemes glabrous; keel of lower glumes ciliate, but not winged — *D. annulatum*

1b. Leaf-sheaths compressed; ligule shorter than 1 mm, truncate, not decurrent into sheath; peduncles of racemes hairy; keel of lower glumes with ciliate wings — *D. aristatum*

Dichanthium annulatum (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178. 1917; Haines, Botany 3 : 1087. *Andropogon annulatus* Forssk., Fl. Aegypt.-Arab. 173. 1775; C. B. Clarke in J. D. Hook., FBI 7 : 196. 1896. (*Loari*-Beng.).

Perennial, tufted herbs; nodes bearded. Leaf-sheaths striate; leaf-blades linear, papillose, scabrid, 5-30 cm long; ligule membranous. Spiciform racemes 2-4, rarely 8-15, sub-digitate and panicled, 3-7 cm long; joints of rachis and pedicels hairy; spikelets dorsally compressed, 2-nate, sessile and pedicelled, both similar in shape and size, lowest pair male or neuter; sessile spikelets : bisexual, 3-5 mm long, oblong, awned, keeled; lower glumes cartilaginous, hairy below middle, bulbous-based hairs on margins above, obtuse to sub-acute, concave on back, many-veined, 3-5 mm long; upper glumes 3-5 mm long, boat-shaped, 3-veined, keeled; lower floret barren; upper lemma 2.5-3.5 mm long, linear-oblong, awned, awns 8-25 mm long; upper floret bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose; pedicelled spikelets : male or neuter, unawned; lower glumes obtuse or acute, glabrous, 7-11-veined; upper glumes 3-veined, ciliate; lemma obtuse, 2.5-3 mm long. Grains obovate-oblong.

Type: Egypt, *Forsskal* (C).

Fl. & Frt.: July-Feb.

Common throughout the area.

Pondu to Ratanpur : 16785; Achanakmar : 13201A; Madai : 12905; Khondra : 12779; Korbi : 12853; Bilaspur : 12864; Katghora : 8630; Kabirchabutra : 13381; Champa : 19368; Karidongri : 19318; Pasan to Semera : 15362.

2n = 20, 40, 60.

Tropical and North Africa, India, Burma, Indonesia.

It is an excellent fodder grass, both when young and in flower.

D. aristatum (Poir.) C. E. Hubb. in Kew Bull. 1939 : 654. 1939; Bor. Grasses : 134 1960. *Andropogon aristatus* Poir. in Lam., Encycl. Meth. Bot. 1 : 585. 1810. *A. mollicomus* Kunth, Rev. Gram. 1 : 365. t. 96 : 1830. *A. caricosus* L. var. *mollicomus* (Kunth) in DC., Monogr. Phan. 6 : 569. 1889; C. B. Clarke in J. D. Hook., FBI 7 : 196. 1896.

Perennial, tufted herbs; culms geniculately ascending; nodes slightly pubescent. Leaf-sheaths keeled; leaf-blades linear, glabrous or ciliate, scabrid, 15-20 cm long; ligule membranous. Spiciform racemes solitary or 2-4; sub-digitate and panicled, silky, 2.5-10 cm long; joints of rachis and pedicels hairy; spikelets distichous; sessile spikelets : bisexual, 4-5 mm long, ovate-elliptic; lower glumes herbaceous-papyraceous, denticulate, 8-12-veined; upper glumes 4-5 mm long, membranous-papyraceous, 3-keeled; lower floret barren, reduced to a hyaline lamma 3-4 mm long; upper lemma 3.5-4.5 mm long, awned; awns 1-3 cm long; upper floret bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose; pedicelled spikelets : male, 4-5 mm long, hairy; lower glumes 15-19-veined; upper glumes ellliptic; lower lemma 2.5-3.5 mm long, linear. Grains obovate-oblong.

Fl. & Frt. : July-Feb.

Common on slopes, along forest roads.

Bilaspur : 12998; Kabirchabutra : 15210.

2n = 20, 40, 60, 80 [*D. annulatum* (2n = 40) × *aristatum* (2n = 20) = 2n = 31, 40, 42].

India.

Haines also collected this species from Bilaspur and kept under *Dichanthium caricosum* (a *comb. nov.* by him in 1924, presumably not knowing about the same combination by A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 549. 1921).

This is an excellent fodder grass.

DIECTOMIS Kunth in Mém. Mus. Hist. Nat. Paris 2 : 69. 1815, *nom. cons.*, non P. Beauv. (1812), *nom. rej*

T. : *D. fastigiata* (Sw.) P. Beauv. (*Andropogon fastigiatus* Sw.) (*typ. cons.*).

Diectomis fastigiata (Sw.) P. Beauv., Essai Agrost. : 132, 160. 1812; Kunth in H.B.K Nov. Gen. & Sp. 1 : 193, t. 64. 1816. Haines, Botany 3 : 1089. Bor, Grasses : 135. 1960. *Andropogon fastigiatus* Swartz, Prod. Veg. Ind. Occ 26. 1788. C. B. Clarke in J. D. Hook., FBI 7 : 167 1896. Clayton in Hutch. & Dalz., Fl. West Trop. Afr. ed. 2.3(2) : 485. 1972.

Perennial, much fastigiately branched herbs; culms erect or decumbent. Leaf-sheaths scabrous; leaf-blades linear, scabrid, 7-15 cm long; ligules elongate, acute. Peduncles in axil of a spathiform sheath 4-6 cm long; spikes 2.5-4.5 cm long, solitary; limbs compressed, bearded on margins, tips with 2 teeth; spikelets in pairs, dissimilar; sessile spikelets : laterally compressed, 4-5 mm long; lower glumes linear, margins infolded, dorsally villous above, 2-keeled; upper glumes cymbiform, 2-fid, membranous, dorsally keeled and ciliate above, 4 mm long, with slender awn; lower lemma linear-oblong, hyaline, margins ciliate; upper lemma hyaline, cymbiform, 2-toothed, awned from sinus; palea minute, hyaline; stamens 3; pedicelled spikelets; 7-8 mm long, concealing sessile ones, neuter; lower glumes ovate-lanceolate, 6.5 mm long, 13-veined, awned; upper glumes awned; lemma hyaline, oblong. Grains lanceolate-oblong.

Fl. & Frt. : Sept.-Dec.

Occasionally found on hard laterite soil, on slopes.

Pasarkhet : 12938.

2n = 20.

Palaeotropics.

Used as a fodder in young state.

Note : Clayton & Renvoize (*Genera Graminum* : 349, 1986), as also Mabberley (1987), reduce *Diectomis* Kunth, *nom. cons.*, as congeneric with *Andropogon* L., without any specific comment.

Diectomis P. Beauv., Essai Agrost. : 132, 160 (1812), *nom. rej.*, based on *D. fasciculata* P. Beauv., as the type species, is reduced as a synonym of *Anadelphia* Hack. (1885) restricted to Senegal and Zambia in Africa.

DIGITARIA Haller, Hist. Stirp. Helv. 2 : 244. 1768, *nom. cons.*, non Fabricius (1759) ; Valdecamp in Blumea 21 : 1-180. 1973.

T. : *D. sanguinalis* (L.) Scopoli (Fl. Carn. ed 2, 1 : 52. 1771) (*Panicum sanguinale* L.) (*typ. cons.*).

Note : *Digitaria* Haller (Crab or Finger-grasses) is extremely variable in inflorescences, relative length of spikelet scales and spikelet indumentum. The latter may display different combinations, of appressed pubescence, glossy bristles and marginal cilia within the same species, or even in two members of a spikelet pair.

1a. Hairs on spikelets verucose — *D. longiflora*

1b. Hairs on spikelets smooth

2a. Hairs on spikelets clavate

3a. Tips of pedicels somewhat thickened and without a rim of hairs ; racemes alternate ; upper glumes present — *D. abludens*

3b. Tips of pedicels cupuliform, with hairs on rim and below ; racemes sub-digitate ; upper glumes absent — *D. stricta*

2b. Hairs on spikelets not clavate

4a. Lower glumes absent or a minute rim or scale ; upper glumes a triangular scale, not well developed — *D. setigera*

4b. Lower glumes present, well-developed ; upper glumes well developed

5a. Spikelets of each pair heteromorphous i.e sessile spikelets glabrous, pedicelled spikelets covered with long hairs — *D. bicornis*

5b. Spikelets of each pair homomorphous i.e. both type of spikelets with same type of hairs — *D. ciliaris*

Digitaria abludens (Roem. & Schult.) Veldkamp in Blumea 21(1) : 53. 1973 ; Karthikeyan *et al.*, Flor. Indic. Enum.-Monocot. : 207. 1989. *Panicum abludens* Roem. & Schult., Syst. Veg. 2 : 457. 1817. *Paspalum granulare* Trin. ex Spreng., Neue Entdeck 2 : 47. 1821. *P. pedicellare* Trin. ex C. B. Clarke in J. D. Hook., FBI 7 : 19. 1896. *Digitaria pedicellaris* (Trin. ex J. D. Hook.) Prain, Bengal Pl. 1181. 1903 ; Haines, Botany 3 : 1055. *D. granularis* (Trin. ex Spreng.) Henr., Monogr. Digit.. : 302. f. 891. 1950 ; Bor, Grasses : 301. 1960.

Annual, tufted herbs; rooting at nodes. Leaf-sheaths glabrous; leaf-blades linear, 5-15 × 0.2-0.4 cm, scabrid; ligule truncate, erose. Racemes 2-8, 2.5-11.5 cm long, arranged along a short common axis 1-4 cm long; rachis triquetrous; pedicels terete, usually with a distinct band; spikelets binate or ternate, homomorphous, elliptic to obovate-oblong, 1.5-1.8 mm long; lower glumes absent; upper glumes 1-1.5 mm long, acute to obtuse, 3-veined; sterile lemma 7-veined, apex rounded; fertile lemma protruding, acuminate yellowish-brown, in fruits turning concolorously chestnut-coloured; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains plano-convex, apiculate, brownish-black.

Type: India, *Heyne* (BM, B).

Fl. & Frt.: Sept.-Nov.

Common along roads, edges of forests.

Khuria : 19342; Pasarkhet to Kartala : 19434.

2n = 36.

Tropical Asia to Thailand, Indonesia, New Guinea.

D. bicornis (Lam.) Roem. & Schult. ex Loud., Hort. Brit. 24. No. 1578. 1830; Veldkamp in Blumea 21(1) : 30. 1973. *Paspalum bicorne* Lam., Encycl. Meth. Bot. 1 : 176. 1791. *P. heteranthum* C. B. Clarke in J. D. Hook., FBI 7 : 16. 1896. *pro part.*

Annual, tufted herbs; rooting at nodes. Leaf-sheaths pilose to glabrous, compressed, keeled. Leaf-blades linear, flat, scabrous, 2.5-12 × 0.2-0.7 cm. Ligules truncate, erose, 1-3 mm long. Racemes 2, rarely 3-5, stiff, 3.5-14 cm long, digitate or in upto 3 whorls, base swollen; rachis with thick mid-rib, narrowly winged; pedicels stout; spikelets binate, sessile and pedicelled, both similar, 2-flowered, lanceolate, 2-3.5 mm long; lower glumes 0.2-0.5 mm long, acute or bifid; upper glumes 1-2.5 mm long, 3-veined, pubescent; lower lemma as long as spikelets, horny, 7-veined, epaleate; upper lemma slightly shorter, acute, yellowish in fruits, paleate; lower floret bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains plano-convex, oblong.

Fl. & Frt.: Oct.-Nov.

Common in waste places.

Kota : 13094; Bilaspur : 12977.

2n = 36, 54, 72.

Palaeotropics.

Spikelets show a great variability. The sterile lemma of the sessile spikelet is usually glabrous and equidistantly 7-veined. When it is slightly pubescent and inequidistantly-veined, then pedicelled spikelets always pectinate. When sterile lemma of the sessile spikelets pubescent and pectinate, then spikelets bisexual.

Cattle graze this species in young condition.

D. ciliaris (Retz.) Koeler, Descr. Gram. : 27. 1802; Veldkamp in Blumea 21(1) : 32. 1973. *Panicum ciliare* Retz., Obs. Bot. 4 : 16. 1786. *Digitaria biformis* Willd., Enum. Pl. : 92. 1809; Bor, Grasses : 299. 1960. *Panicum adscendens* Kunth, in HBK., Nov. Gen. & Sp. 1 : 97. 1816. *Paspalum sanguinale* (L.) Lam. var. *ciliare* (Retz.) C. B. Clarke in J. D. Hook., FBI 7 : 15. 1896. *P. sanguinale* (L.) Lam. var. *rottleri* J. D. Hook., *l.c. Digitaria sanguinalis* auct., non (L.) Scop. 1792; Haines, Botany 3 : 1053, *pro part. D. adscendens* (Kunth) Henr., in Blumea 1 : 92. 1934; Bor, Grasses : 298. 1960.

Annual herbs; culms decumbent at base and geniculately ascending. Leaf-sheaths 4-5 cm long; leaf-blades broadly linear, glabrous, sometimes softly hairy, 20-25 × 0.3-1 cm; ligules membranous, 2-3 mm long. Inflorescences of 4-7 racemes upto 12 cm long, digitate to sub-digitate; spikelets overlapping each other on a winged rachis; elliptic-lanceolate, acute, 2-nate, one pedicelled and other sessile, 2.5-3.5 mm long; rachis with triquetrous mid-rib; pedicels triquetrous, scabrid; lower glumes 3-5 mm long, triangular; upper glumes 3-veined, silky hairy on back and margins, 2 mm long; lower lemma ovate-acute, 5-7-veined, silky hairy on back, 3-3.5 mm long; upper lemma hyaline, 3-veined, narrowly ovate-acute, 2-3 mm long; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains 3 mm long.

Type : China, *Wennerberg* (LD).

Fl. & Frt. : Sept.-Nov.

Common in waste places, along roads.

Lamni : 19216; Pali : 8626; Pasan : 13290.

2n = 18, 36, 54, 60, 70, 72.

Pantropical, probably native to Tropical America (Murti, 1975).

It is a polymorphic species, showing at least four parallel series (Cope, *l.c.*). It is a good fodder grass.

D. longiflora (Retz.) Pers., Syn. Pl. 1 : 85. 1805; Haines, Botany 3 : 1054; Veldkamp in Blumea 21 (1) : 66. 1973; Cope in Fl. Pakistan

No. 143 : 219. 1982. *Paspalum longiflorum* Retz., Obs. Bot. 4 : 15. 1786; C. B. Clarke in J. D. Hook., FBI 7 : 17. 1896, *pro part.*

Tufted, annual or perennial herbs; base stoloniferous; prostrate and rooting at nodes or erect. Leaf-sheaths usually glabrous, 1.5 cm long; leaf-blades ovate-lanceolate to linear, usually glabrous, 2-6 cm long; ligules 0.8-1.5 mm long, truncate, erose. Racemes usually 2, rarely 3, 3-7 cm long, digitate; rachis winged, ribbon-like; pedicels terete, smooth, tip discoid; spikelets binate or ternate, oblong or ovate-elliptic, homomorphous, 1.2-1.7 mm long; lower glumes absent or a minute rim; upper glumes as long as spikelets, 3-5-veined, hairy between veins; lower lemma 1.4-1.6 mm long; hyaline, 5-7-veined; palea absent; upper lemma hyaline, 3-veined, 1.4 mm long, turning brown to purplish; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grain ellipsoid, pale brown, 3 mm long.

Type: India, *Koenig* (K).

Fl. & Frt.: July-Dec

Common along forest roads, waste sandy places, open sunny places.

Achanakmar : 19286.

2n = 18, 34, 36, 72.

Palaeotropics.

Cattle graze this grass. This may be used as a lawn-grass because it produces many runners when closely mown. It can also be grown to cover disturbed areas since it is a rapidly growing species. It is a good fodder grass.

D. setigera Roth ex Roem. & Schult., Syst. Veg. 2 : 474. 1817; Veldkamp in Blumea 21(1) : 37. 1973; Cope in Fl. Pakistan No. 143 : 226. 1982. *Panicum microbachne* C. B. Presl, Rel. Haenk. 1 : 298. 1830. *Paspalum sanguinale* (L.) Lam. var. *pruriens* (Trin.) C. B. Clarke in J. D. Hook., FBI 7 : 15. 1896. *P. sanguinale* (L.) Lam. var. *extensum* J. D. Hook, *l.c. Digitaria sanguinalis* auct., non (L.) Scop. 1792; Haines, Botany 3 : 1053, *pro part D. microbachne* (C. B. Presl) Henr. in Meded. Rijks. Herb. 61 : 13. 1930; Bor, Grasses : 302. 1960.

Slender annual herbs; culms geniculately ascending, rooting at nodes. Lower leaf-sheaths with tubercle-based hairs, upper usually glabrous. Leaf-blades broadly linear, patent to ascending, glabrous to appressed pilose, 4-28 × 0.4-1.2 cm. Ligule 1.5-3 mm long, truncate, erose. Racemes 3-10, 6-15 cm long; digitate or short-spiked on a common axis

1-6 cm long, rachis narrowly winged, mid-rib triquetrous; pedicels triquetrous with truncate tips; spikelets homomorphous, binate, oblong to lanceolate, overlapping, 2-3.5 mm long; lower glumes absent; upper glumes 1-2 mm long, oblong or triangular, glabrous or pubescent; lower lemma 2-2.5 mm long, 7-veined, appressedly pubescent; fertile floret slightly shorter than spikelets, yellowish to brownish in fruits; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains linear, 3 mm long, yellowish-brown.

Type: India, *Heyne* (B).

Fl. & Frt.: Sept.-Nov.

Common in waste places.

Ratanpur : 19523; Keonchi : 13298A.

2n = 36, 54, 72.

India, Burma, Thailand to Vietnam.

It is a good fodder grass, liked by all grazing animals.

D. stricta Roth ex Roem. & Schult., Syst. Veg. 2 : 474. 1817, non *Panicum strictum* R. Br. 1810; Bor. Grasses : 305. 1960; Cope in Fl. Pakistan No. 143 : 222. 1982. *Paspalum royleanum* Nees ex C. B. Clarke in J. D. Hook., FBI 7 : 18. 1896. *Digitaria royleana* (Nees ex J. D. Hook.) Prain, Bengal Pl. : 1182. 1903; Haines, Botany 3 : 1055. *D. denudata* Link, Hort. Berol. 1 : 222. 1827.

Tufted, annual herbs; erect or decumbent, sometimes tinged with purple. Leaf-sheaths upto 1.5 cm long, glabrous or sometimes hirsute with tubercle-based hairs; leaf-blades linear, erect, 7-15 cm long. Racemes 2-10, erect or suberect, sub-digitate or arranged along an axis 2-4 cm long, 5-10 cm long; rachis flexuous, scabrid, filiform, narrowly winged, with triquetrous mid-rib; pedicels narrowly winged, scabrid with stiff hairs at apex; spikelets oblong-ellipsoid, geminate, short-pedicelled, 1.5-2 mm long; glumes absent or only upper poorly developed and covered with clavate hairs or glabrous; lower lamma oblong, subacute, as long as spikelets, 3-5-veined, glabrous or short-hairy with clavate hairs, pale yellow; lower floret barren; upper lemma hyaline, 3-veined, about 1.5 mm long, pale; upper floret bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, purple. Grains oblong, black, shining.

Type: India, *Heyne* (B).

Fl. & Frt.: Sept.-Nov.

Common along river banks, sandy slopes.

Khondra : 12805, 12807; Kota : 13095.

2n = 18, 36.

Tropical Asia, India, Sri Lanka, Burma.

DIMERIA R. Br., Prod. Fl. Nov. Holl. : 204. 1810.

T. : *D. acinaciformis* R. Br.

Note : Spikelets 1-flowered.

1a. **Spikelets 3.5-4 mm long; glumes ciliate, upper glumes winged** — *D. connivens*

1b. **Spikelets 1.5-2.5 mm long; glumes glabrous, upper glumes not winged** — *D. ornithopoda*

Dimeria connivens Hack. in DC., Monogr. Phan. 6 : 689. 1889; C. B. Clarke in J. D. Hook., FBI 7 : 104. 1896; Haines, Botany 3 : 1062; Bor, Grasses : 140. 1960.

Tufted, annual herbs; culms slender, ascending, nodes minutely bearded. Leaf-sheaths 2-3 cm long; leaf-blades linear, hairy with long, tubercle-based hairs, upto 9 cm long; ligule membranous. Inflorescences of 2-3 spiciform racemes, sub-digitately arranged; rachis terete or angled, not articulate; spikes upto 3 cm long; spikelets solitary, sub-sessile, articulated on short pedicels, awned, with minute hairs at base, laterally compressed, 1-flowered; callus minutely villous; lower glumes ciliate, slightly shorter than spikelets, strongly keeled; upper glumes as long as spikelets, oblong-lanceolate, dorsally ciliate, prominently keeled; lower lemma hyaline, empty, epaleate; upper lemma hyaline, 2-fid, keeled, awned from sinus, bisexual; palea hyaline; lodicules 2 or absent; stamens 2 or 3; styles 2. Grains linear, laterally compressed, 3 mm long.

Type : India, Ranchi; *C. B. Clarke* (? K) (vide Haines, *l.c.*).

Fl. & Frt. : Oct.-Dec.

Common in waste places, pasture lands, grassy slopes.

Lafa : 13031; Bilaspur : 4000.

India (endemic).

D. ornithopoda Trin., Fund Agrost. : 167. t. 14. 1820; C. B. Clarke in J. D. Hook., FBI 7 : 104. 1896; Haines, Botany 3 : 1062; Bor, Grasses : 142. 1960; Hara *et al.*, Enum. 1 : 130. 1978.

var. **ornithopoda**

Tufted, annual herbs; culms several from root, slender. Leaf-sheaths 2-3 cm long, hairy; leaf-blades linear, often reddish, upto 11 cm long, hairy or ciliate; ligule a membrane. Inflorescences of usually 2, rarely 3 spiciform racemes, sub-digitately arranged; rachis flexuous, terete or angled, winged, not articulate; spikes sessile, upto 6 cm long; spikelets about twice as long as joints of rachis, sessile or sub-sessile, awned, with minute hairs at base, laterally compressed, 1-flowered; callus villous, truncate; lower glumes 1-veined, reddish, 2 mm long; upper glumes coriaceous with hyaline margins, 2.4 mm long, with a few hairs on keel near apex; lower lemma minute, hyaline, empty, epaleate; upper lemma hyaline, bisexual, 2-fid awned from sinus, 6-7 mm long; palea hyaline; lodicules minute or absent; stamens 2; styles 2. Grains linear, 1.5 mm long.

Fl. & Frt.: Sept.-Nov.

Common on hard rocky slopes.

Khondra : 12775; Kota : 13072; Katghora : 3985.

2n = 32.

India, Nepal, Tropical Asia, Australia.

An inferior fodder grass.

ECHINOCHLOA P. Beauv., Ess. Agrost. : 53. 1812, *nom. cons.*

LT.: *E. crusgalli* (L.) P. Beauv. (*Panicum crusgalli* L.) (vide Nash in N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2, 1 : 133. 1913).

It is taxonomically a difficult genus, because it consists of a number of intergrading polymorphic complexes and there is much introgression between species. It is also very difficult to separate from *Brachiaria*, but the two genera have different leaf-anatomy. The reflexe tip of the upper palea, though requiring careful dissection, seems to be another reliable distinguishing character.

E. crusgalli (L.) P. Beauv. (Barnyard grass, Cockspur) is expected in the district. *E. frumentacea* Link (Barnyard grass, Millet, Jungle rice, Sawa, Japanese or Sanwa-millet) is a minor grain crop and is a cereal, cropping in 6 weeks after sowing. In USA, it is grown for fodder and is known as a 'Billion dollar grass'.

1a. Annual decumbent herbs; ligule absent; spikes distant; spikelets 2.5-3 mm long; upper glumes acute; lower glumes and upper lemma obtuse, acute or cuspidate — *E. colona*

1b. Perennial erect herbs; ligule a fringe of stiff hairs; spikes crowded; spikelets 5-7 mm long; upper glumes mucronate or awned; lower glumes and upper lemma aristate *E. stagnina*

Echinochloa colona (L.) Link, Hort. Berol. 2 : 209. 1833; Haines, Botany 3 : 1043; Bor, Grasses : 308. 1960; Cope in Fl. Pakistan No. 143 : 196. 1982. *Panicum colonum* L., Syst. Nat. ed. 10. 2 : 870. 1759; C. B. Clarke in J. D. Hook., FBI 7 : 32. 1896. (*Jungle rice, Shama millet*).

Tufted herbs. Leaf-sheaths 3-4 cm long, glabrous, often reddish. Leaf-blades linear, flaccid, margins often undulate, cordate, glabrous or scaberulous, 5-30 × 0.2-0.8 cm. Inflorescences linear, spiciform panicles 5-15 cm long, of 8-10 short racemes on a central axis; rachis flattened, hispidulous; spikelets paired, forming 4 rows, ovate-elliptic, 1.5-3 mm long, pubescent, 2-flowered; lower glumes 3-veined, 1 mm long herbaceous, shorter than spikelets, acute or acuminate; upper glumes boat-shaped, 5-veined, hispidulous on back, acute, muticous or rarely short-awned, about 2 mm long; lower lemma like upper glumes, acute or cuspidate, rarely short-awned; palea hyaline, 2-veined, 1.5 mm long, male or empty; upper lemma indurated and shining, acute, 1.8-2.5 mm long; palea indurated with 2 flaps on lower half clasping grains; lodicules 2; stamens 3; styles 2. Grains elliptic, dorsally flattened.

Type: Jamaica, *Browne* (LINN).

Fl. & Frt.: July-Nov.

Common in cultivated fields, especially in rice-crop, waste lands, muddy places.

Pasan : 13269, 19110; Karidongri : 19320; Parasi : 19050; Lamni : 19222.

2n = 24, 36, 48, 52, 54, 56, 72, 96, 108.

Throughout the Tropics and sub-tropics.

In wet places the plant is very robust and leafy. It is an excellent fodder grass. The grains are eaten by tribals at the time of scarcity.

E. stagnina (Retz.) P. Beauv., Ess. Agrost. : 53, 161, 171. 1812; Bor, Grasses : 311. 1960. Cope in Fl. Pakistan No. 143 : 198. 1982. *Panicum stagninum* Retz., Obs. Bot. 5 : 17. 1789. *P. crusgalli sensu* C. B. Clarke in J. D. Hook., FBI 7 : 30. 1896, *pro part.*, non L. 1753; Haines, Botany 3 : 1044. (*Dul*-Beng.)

Marshy herbs; culms floating, spongy, from creeping rhizomes. Leaf-sheaths upto 15 cm long; leaf-blades upto 30 cm long, rough, margins ciliate, with purple cross-bands at regular intervals. Inflorescences a nodding, secund panicles, generally purplish, lanceolate, upto 25 cm long; racemes simple, 2-6.5 cm long, coarsely apiculate; spikelets ovate to rounded, 3.5-5 mm long, pubescent to hispid, 2-flowered, awned; lower glumes ovate, 3-5-veined, ciliate on veins, herbaceous, shorter than spikelets, acute or acuminate; upper glumes similar to lower glume, as long as spikelets, oblong, 5-veined, acute or acuminate, rarely short-awned; lower lemma 7-veined, veins hispid, 2.5-4 mm long, awn 5-8 mm long; palea oblong, hyaline, 2-veined, 1 mm long, male or empty; upper lemma coriaceous, indurating at maturity, elliptic-ovate, acute, 2-3 mm long; palea indurated, acute, basally auricled, clasping grains; upper floret bisexual; lodicules 2; stamens 3; styles 2. Grains shining, oval, dorsally flattened, 2.5 mm long.

Type: India, *Koenig.*

Fl. & Frt.: Aug.-Nov.

Common in roadside ditches, muddy places.

Achanakmar : 13212; Pasan to Semra : 15348.

2n = 18, 36, 54, 63, 108, 126.

Tropical Africa, Asia.

It is very similar in its aerial parts to *E. crus-galli* (L.) P. Beauv., but is generally more robust and marked by its perennial, creeping rhizomes in aquatic habitat and having a ligule of a row of stiff hairs. In *E. crus-galli*, ligule is absent. The species has a potentiality for use as a rich fodder grass, both as green and as hay. Stems used for thatching, pith for caulking-boats. Juice of the stems is fermented into vinegar or beer. Decoction of pith used as a diuretic.

ELEUSINE Gaertner, Fruct. Sem. Pl. 1 : 7. 1788.

LT.: *E. coracana* (L.) Gaertn. (*Cynosurus coracanus* L.) (vide Nash in N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2, 1 : 228. 1913).

Note: *E. coracana* (Finger-millet or Ragi) (2n = 36) is widely grown in Africa, India and China in upland area, as an important grain crop, originated in the 3rd millenium B. C. and is fermented for alcoholic drinks.

Eleusine indica (L.) Gaertn., Fruct. Sem. Pl. 1 : 8. 1788; C. B. Clarke in J. D. Hook., FBI 7 : 293. 1896. Haines, Botany 3 : 1015; Bor.

Grasses : 493. 1960; Cope in Fl. Pakistan No. 143 : 103. 1982. *Cynosurus indicus* L., Sp. Pl. 72. 1753. (*Crow-foot grass, Crab grass, Yard grass, Nadia*-Oriya).

Tufted, annual herbs Leaf-sheaths 8-8.5 cm long, loose, keeled. Leaf-blades linear, flat, sometimes folded, tip blunt, 10-35 × 0.3-0.6 cm. Ligule a membrane, truncate, 0.6-1 mm long. Inflorescences of digitate, 2-7 secund spikes, 3-15 cm long; rachis terminating in a spikelet; spikelets elliptic, laterally compressed, biseriate, closely overlapping, 3-9-flowered, disarticulating between florets, 4-7 mm long, upper 1 or 2 male; lower glumes 1.5-2.5 mm long, lanceolate, keeled 1-veined, persistent; upper glumes 2-3.5 mm long, ovate, acute, keeled, 2-5-veined; lemmas 3-5 mm long ovate-lanceolate to elliptic-oblong, acute, keeled, 3-veined, herbaceous or membranous, folded; palea 2-3 mm long, 2-veined, winged on keels, scabrid along wing-margins; lodicules 2; stamens 2; styles 2; stigmas plumose. Grains 1-1.5 mm long, elliptic, rugose, blackish.

Type : ? Illustration in Burman, Thes. Zeyl. 106. t. 47/1. 1737.

Fl. & Frt. : Aug.-Oct.

Common in waste places, forest clearings.

Pasan : 13268; Pali : 8652.

2n = 18, 36.

Tropical and sub-tropical regions of the world.

It is used for hats; grains eaten in times of scarcity.

It is a good fodder grass and a useful soil-binder. It is highly esteemed as a pasture grass in Australia and America. It has given rise to *E. coracana* (L.) Gaertn. (2n = 36) and *E. indica* ssp. *africana* (2n = 36), the latter two hybridise easily. *E. coracana* is an important grass crop in Africa and India and is fermented for alcoholic drinks; its grains used in cakes and puddings. Grains useful as a tonic and astringent, recommended especially for diabetics as a wholesome food.

ELYTROPHORUS P. Beauv., Ess. Agrost. : 67. 1812.

T. : *E. articulatus* P. Beauv. [= *E. spicatus* (Willd.) A. Camus].

Elytrophorus spicatus (Willd.) A. Camus in Lecomte. Fl. Gen. de l'Indo China 7 : 547. 1823; Bor, Grasses : 493. 1960. Hara *et al.*, Enum. 1 : 132. 1978; *Dactylis spicata* Willd., in Ges. Naturf. Freunde Berlin, Neue Schrift 3 : 416. 1801; *Elytrophorus articulatus* P. Beauv., Ess. Agrost. : 64. t. 14. f. 2. 1812. C. B. Clarke in J. D. Hook., FBI 7 : 306. 1896; Haines, Botany 3 : 1008.

Tufted, annual herbs. Leaf-blades linear, acuminate, glabrous or minutely hairy, flat, 1.5 cm to as long as the plant. Ligule membranous, upto 1 mm long. Spikelets minute, awned, in globose, sessile clusters, forming cylindric, often lobed, interrupted spikes; spikelets laterally compressed, upto 6-flowered, often subtended by many empty glumes; rachilla jointed at base and between lemmas; glumes lanceolate, membranous, mucronate, keeled, 1-veined, persistent, 0.6-1.5 mm long; lemmas lanceolate or ovate, membranous, 3-nerved, 1-1.8 mm long, with a short awn 0.5-1.8 mm long; palea complicate, 2-keeled, hyaline, truncately 3-lobed above, keel broadly winged; lodicules 2; stamens 1-3, minute; stigmas long hairy. Grains obliquely oblong, beaked.

Fl. & Frt.: Oct.-Dec.

Common in moist places along roads, forest clearings, in ditches.

Keonchi : 13294; Katghora : 3984; Pasan : 15300.

2n = 24, 26.

Palaeotropics.

ERAGROSTIELLA Bor in Indian For. 66 : 269. 1940.

T.: *E. leioptera* (Stapf) Bor (*Eragrostis leioptera* Stapf).

1a. Leaves almost filiform, puberulous above; keels of palea broadly winged — *E. bifaria*

1b. Leaves linear, glabrous above; keels of palea not broadly winged — *E. brachyphylla*

Eragrostiella bifaria (Vahl) Bor in Indian Forester 66 : 270. 1940, et Grasses : 494; Lazarides in Contrib. Herb. Austral. 22 : 1-7. 1976. *Poa bifaria* Vahl, Symb. Bot. 2 : 19. 1791; *Eragrostis coromandeliana* (Koen. ex Rottl.) Trin. in Mem. Acad. Sci. Petersb. ser. 6. 1 : 415. 1830. C. B. Clarke in J. D. Hook., FBI 7 : 326. 1896; Haines, Botany 3 : 1006. *E. bifaria* (Vahl) Wight ex Steud. (Nom. Bot. ed. 2, 1 : 562. 1840, nomen). Syn. Pl. 1 : 264. 1854; C. B. Clarke in J. D. Hook, FBI 7 : 325. 1896.

Perennial, tufted wiry herbs; culms with fibrous leaf-sheaths at base Leaf-blades involute, complicate, 4-16 cm long. Ligule a ring of hairs, 1 mm long. Inflorescences a simple terminal, secund spikes, 8-20 cm long; spikelets olive-grey or greenish, on one side of rachis 9-50-flowered, elliptic, laterally compressed or terete, short-pedicelled, sometimes spikelets linear-oblong, 6-9 mm long; rachis sub-compressed; rachilla articulate between lemmas; lower glumes lanceolate to narrowly ovate, with a

scabrid keel, 1-veined. 1.5-3 mm long, sub-acute to acuminate, deciduous; upper glumes oblong to narrowly ovate, rounded, 1-3-veined, 1.8-4 mm long, sub-acute, deciduous; lemmas ovate, acute, laterally compressed or not, 3-veined 1.9-2 mm long; palea 2-keeled; lodicules 2; stamens 3; styles 2. Grains 0.5-0.6 mm long, broadly ovate, obtusely trigonous.

Fl. & Frt.: Sept.-Dec.

Common in dry places, rocky slopes.

Pasarkhet to Madanpur : 19430; Madai : 19473.

2n = 18, 40.

India, Sri Lanka, Burma.

A good fodder grass; roots used for flavouring Burmese cheroots.

E. brachyphylla (Stapf) Bor in Indian For. 66 : 270. 1940, et Grasses : 494. 1960. *Eragrostis brachyphylla* Stapf, C. B. Clarke in J. D. Hook., FBI 7 : 327. 1896; Haines, Botany 3 : 1007.

Perennial, tufted herbs; culms with fibrous leaf-sheaths at base. Leaf-blades flat or conduplicate, plicate, coriaceous, acute or obtuse, 10-20 cm long. Ligule a ring of hairs, 5 mm long. Inflorescences a simple, terminal secund spikes, upto 15 cm long, often interrupted; spikelets linear or linear-oblong, laterally compressed, 2-seriate, about 20-flowered, olive-green or grey; rachis terete; rachilla articulate between lemmas; lower glumes lanceolate or ovate-lanceolate, acute, keeled, 1-veined, 1.5-3 mm long, deciduous; upper glumes oblong, obtuse, dorsally rounded, 3-veined, 1.5-3.5 mm long, deciduous; lemmas broadly ovate, obtuse, keeled, 3-veined, 1.5-2.5 mm long; palea obovate, concave towards rachilla, keels scabrid, persistent; lodicules 2; stamens 3. Grains 5-8 mm long; ellipsoid, obscurely triquetrous, reticulate.

Fl. & Frt.: July-Sept.

Common in drier situations, along forest roads, on grassy slopes.

Katghora : 6028; Pasan : 13283.

2n = 36.

India.

ERAGROSTIS N. M. Wolf, Gen. Pl. Vocab. Char. Def. : 23. 1776.

LT.: *E. minor* Host. (Icon. Deser. Gram. Austr. 4 : 15. 1809) (*Poa eragrostis* L.) (vide P. Beauv., Ess. Agrost. : 74. 1812; Roos, Acta Bot. Neerl. 15 : 157. 1966).

Diandrochloa de Winter, Bothalia 7 : 387. 1960.

T. : *D. namaquensis* (Nees) de Winter.

Roshevitzia Tzevelev in Bot. Zh. : 53. 311, 1968.

T. : *R. diarrhena* (Schult.) Tzevelev.

E. ciliata (Roxb.) Nees and *E. nigra* Nees ex Steud., are expected to occur in the district.

1a. Spikelets breaking up from above downwards; rachis fragile

2a. Lemma ciliate on margins; panicles spiciform, usually lobed — *E. coarctata*

2b. Lemma not ciliate on margins; panicles not spiciform, open or contracted

3a. Leaf-sheaths ciliate at mouth; panicles ciliate at nodes; keels of palea ciliate; stamens 3 — *E. tenella*

3b. Leaf-sheaths not ciliate; panicles not ciliate at nodes; keels of palea scabrid, not ciliate; stamens 2 — *E. japonica*

1b. Spikelets breaking up from below upwards; rachis tough

4a. Annual herbs

5a. Lemma upto 1.5 mm long

6a. Plants eglandular; spikelets close, pointing forward — *E. gangetica*

6b. Plants glandular hairy; spikelets scattered, spreading or pendulous — *E. pilosa*

5b. Lemmas over 1.5 mm long

7a. Spikelets 1.5 mm wide, linear or linear-oblong, not compressed; lemmas broadly ovate, side veins obscure, rarely prominent; palea persistent; rachilla zig-zag — *E. tremula*

7b. Spikelets 2.5-4 mm wide, ovate or ovate-oblong, compressed; lemmas narrowly ovate or elliptic, side veins prominent straight; palea deciduous, rachilla straight — *E. unioloides*

4b. Perennial herbs

8a. Panicles upto 20 cm long, 8-9 cm wide; spikelets 2-3 mm wide; lemmas 1.5 mm wide, paleas deciduous — *E. atrovirens*

8b. Panicles upto 12 cm long, upto 3 cm wide; spikelets 1 mm wide; lemmas 1 mm wide, paleas persistent *E. nutans*

Eragrostis atrovirens (Desf.) Trin. ex Steud., Nom. Bot. ed. 2. 1 : 562. 1840; Bor, Grasses : 503. 1960. Hara *et al.*, Enum. 1 : 132. 1978; *Poa atrovirens* Desf., Fl. Atlant. 1 : 73. t. 14. 1798.

Tufted, perennial herbs; culm-base with shining, straw-coloured cataphylles. Leaf-sheaths 6-8 cm long; leaf-blades inrolled when dry 10-20 cm long; ligule a rim, with hairs on auricles. Inflorescences a branching ovate or oblong, terminal panicles, more or less, effuse, 4-30 cm long; spikelets grey-green, laterally compressed, 5-10 mm long, 6-many-flowered, narrowly oblong, opposite rows of florets not overlapping; rachilla persistent; lower glumes 1-1.5 mm long, membranous, lanceolate, 1-veined; upper glumes 1.8 mm long, boat-shaped, membranous, lanceolate, 1-veined; lemmas 1.5-2 mm long, boat-shaped, 3-veined, scabrid on back; palea hyaline, 2-keeled, 1.8 mm long, margins inflated, falling soon after lemma, keel scaberulous; lodicules 2; stamens 3; ovaries with 2 feathery stigmas. Grains ellipsoid, 0.5-1 mm long.

Type: Algeria, *Desfontaines* (FI).

Fl. & Frt.: July-Feb.

Common in shady places in black alluvium.

Lamni : 1326A, 19239; Pasan to Pendra : 19126; Katghora : 8631; Korbi : 19094.

$2n = 20, 40, 60$.

Africa, Nepal, India, Thailand, Malaysia.

E. coarctata Stapf C. B. Clarke in J. D. Hook., FBI 7 : 313. 1896; Haines, Botany 3 : 1001. Bor, Grasses : 507. 1960; Hara *et al.*, Enum. 1 : 132. 1978.

Perennial, tufted herbs; culms erect or geniculately ascending. Leaf-sheaths bearded below mouth; leaf-blades spreading horizontally, involute upwards, flat below, 5-25 cm long, glaucous; ligule a ring of short hairs. Inflorescences a much contracted, spiciform panicles, often lobed or lax-flowered, 5-12 cm long; rachis bearded at nodes; rachilla of spikelets more or less, jointed; spikelets 2-3 mm long, 5-10-flowered; glumes 1.25-1.5 mm long, deciduous, 1-3-veined; lemmas obtuse, 1.5-2 mm long, 3-veined, membranous, overlapping; palea hyaline, 2-keeled, as long as

lemma, ciliate on keels; lodicules 2; stamens 3, styles 2; stigmas 2; plumose. Grains ovoid-ellipsoid, 0.5 mm long, polished, brown.

Fl. & Frt. : July-Feb.

Common along forest roads, forest clearings, pastures.

Korbi : 15337, 15339; Marwahi : 19019; Korba to Kudmura : 16807; Katghora : 8632.

Nepal, India, Burma.

Grazed or eaten by the Cattle.

E. gangetica (Roxb.) Steud., Syn. Pl. 1 : 266. 1854; Haines, Botany 3 : 1004; Bor. Grasses : 508. 1960. *Poa gangetica* Roxb., Fl. Ind. 1 : 341. 1820. *Eragrostis stenophylla* Hochst. ex Miq., Verh. Konink.-Nederl. Inst. 3. 4 : 39. 1851, *pro part.*; Stapf, in J. D. Hook., FBI 7 : 318. 1896, *pro part.*

Tufted, annual herbs; culms erect or ascending. Leaf-sheaths 2.5-7.5 cm long, mouth bearded. Leaf-blades flat or inrolled, linear, 5-20 cm long; ligule a minutely ciliolate rim. Inflorescence a narrow terminal, branching panicle, 5-15 cm long; rachis and pedicels often scabrid; spikelets 4.5-8 mm long, linear, 10-30-flowered, grey; rachilla tough, zig-zag; lower glumes membranous, 1.5-1.7 mm long, ovate-oblong, 1-veined; upper glumes membranous, 1.6-1.8 mm long, ovate, 1-veined; lemmas membranous, ovate, 2-2.5 mm long, 3-veined; palea 2-veined, hyaline, keeled, scabrid on keels, deciduous; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oblong, brown, les 0.8 mm long.

Fl. & Frt. : Oct.-Feb.

Common on wet ground.

Pasarkhet : 12939; Kota : 13050, 13057, 13083; Pasan : 13289A.

2n = 20, 80.

India.

Used as a fodder, green or as hay; also used for brooms.

Note : It is similar to *E. atrovirens* Steud., but is an annual. The flore's diverge at 45 degrees from the rachilla and 3-4 times as long as the internode.

E. japonica (Thunb.) Trin. in Mem. Acad. Sci. Petersb. Ser. 6. 1 : 405. 1830; Cope in Fl. Pakistan No. 143 : 88. 1982. *Poa japonica* Thunb.,

Fl. Jap. : 51. 1784. *P. diandra* Roxb., Fl. Ind. 1 : 337. 1820; non R. Br. (1810). *P. interrupta* Koen. ex Roxb., Fl. Ind. 1 : 336. 1820, non Lam. 1791. *P. diarrhena* Schult., Mant. 2 : 616. 1824, based on *P. diandra* Roxb.; *Eragrostis diarrhena* (Schult.) Steud., Syn. Pl. 1 : 266. 1854; Bor, Grasses : 507. 1960. *E. diplachnoides* Steud., *l.c.* 268; Bor, Grasses : 508. 1960. *E. interrupta sensu* Stapf. C. B. Clarke in J. D. Hook., FBI 7 : 316. 1896, p.p., non (R. Br.) P. Beauv., incl. var. *tenuissima* (Schrad.) Stapf, var. *koenigii* (Kunth) Stapf; Haines, Botany 3 : 1002. *Roshevitzia diarrhena* (Schult.) Tzvelev in Bot. Zh. 53 : 311. 1968. *Diandrochloa namaquensis* (Nees) de Winter in Bothalia 7 : 387. 1960. *D. diplachnoides* (Steudel) Henry, Bull. Bot. Surv. India 9 : 290. 1967.

Annual or perennial herbs, base compressed, shining straw-coloured. Leaf-sheaths 5-15 cm long; leaf-blades flat, upto 30 cm long, linear. Ligule a ciliolate membrane, 0.3-0.6 mm long, truncate, fimbriate. Inflorescences a strict panicle, linear, loose, 4-30 cm long, usually stiff, branches ascending or spreading or contracted in remote pseudo-whorls; spikelets short-pedicelled and appressed to secondary branchlets or longer pedicelled and spreading, ovate-oblong, 2.5-7 mm long, 6-flowered; lower glumes 3-7 mm long, ovate-lanceolate, acute or obtuse, 1-veined; upper glumes 0.9 mm long, lanceolate, lemma 1 mm long, ovate, obtuse, 3-veined; palea 0.8 mm long, 2-veined, scabrid on back; stamens 2; styles 2. Grains ovoid, translucent, 0.5-0.6 mm long.

Type: Japan, Herb. *Thunberg* (UPS).

Fl. & Frt.: Oct.-Nov.

Occasionally found forming clumps in moist sandy soil.

Achanakmar : 13204; Katghora : 6035; Khami to Pandaria : 16704.

2n = 20, 40, 60 (as *Eragrostis japonica*).

Grazed or eaten by the Cattle.

Tropical Africa, Asia, India, Malaysia, Australia.

A comprehensive biosystematic study is needed to justify the inclusion of some of the synonyms under this highly polymorphic species (Cope, 1982). Virendra Kumar & Subramanyam (1987) list the chromosome numbers, treating *japonica*, *diarrhena* and *diplachnoides* as three distinct species.

E. nutans (Retz.) Nees ex Steud., Nom. Bot. ed. 2. 1 : 563. 1840; Hara *et al.*, Enum. 1 : 133. 1978. *Poa nutans* Retz., Obs. Bot. 4 : 19.

1786. *Eragrostis stenophylla* auct. non Hochst. ex Miq. 1851; C. B. Clarke in J. D. Hook., FBI 7 : 318. 1896, *pro part.*; Haines, Botany 3 : 1004. *E. elegantula* Nees ex Steud., Syn. Pl. 1 : 266. 1854, non Nees 1841; C. B. Clarke in J. D. Hook., FBI 7 : 318. 1896.

Annual or perennial, tufted herbs; culms geniculately ascending. Leaf-sheaths smooth, mouth bearded. Leaves a few, short, smooth, flat or convolute, 7-12 cm long; ligule of sparse slender hairs. Inflorescence a terminal panicle, 6-10 cm long, oblong or ovate, greyish-green, branches distant, spreading, ramifying from above the base; rachis and pedicels somewhat scabrid; spikelets linear or linear-oblong, 8-many-flowered; 4-6 mm long, greyish-green or bluish; rachilla tough, zig-zag; lower glumes membranous, 0.8-1 mm long, ovate-oblong, acute or sub-acute, 1-veined; upper glumes sub-similar, 1-1.5 mm long; lower lemmas membranous, ovate, 1.8-2 mm long, 3-veined; upper lemma similar; paleae ovate, acute, 1-1.5 mm long, 2-veined, hyaline, keeled, keel scabrid; lodicules 2; stamens 3; styles 2; stigmas 2; plumose. Grains oblong, 0.3 mm long.

Type : India, *Koenig* in Herb. Retz. (LD).

Fl. & Frt. : Apr.-May.

Occasionally found in wet places.

Katghora : 3728.

2n = 60.

India, Nepal, Sri Lanka, China, Malaysia.

Grazed or eaten by the Cattle.

E. pilosa (L.) P. Beauv., Ess. Agrost. : 162, 175. 1812; C. B. Clarke in J. D. Hook., FBI 7 : 323. 1896; Haines, Botany 3 : 1006. Bor. Grasses : 512. 1960; Cope in Fl. Pakistan No. 143 : 91. 1982. *Poa pilosa* L., Sp. Pl. : 68. 1753.

Annual, slender, loosely tufted herbs; culms erect or ascending. Leaf-sheaths 2.5-5 cm long, mouth bearded. Leaf-blades flaccid, convolute, 5-18 cm long; ligule a rim with hairs on auricle. Inflorescence a terminal, oblong to pyramidal panicle, 5-20 cm long, branches in distant pseudo-whorls, usually with long cilia at their axils; spikelets purple or grey, 4-6 mm long, linear, 5-10-flowered; rachilla persistent; lower glume 0.25-0.5 mm long, hyaline, ovate, without veins; upper glumes 0.8-1 mm long, hyaline; lemmas ovate, acute, 1-1.5 mm long, 3-veined, scabrid on back; palea 1 mm long, 2-veined, keel scaberulous, margins infolded; lodicules 2;

stamens 3. Grains brown, 0.8-1 mm long, ellipsoid, somewhat laterally compressed.

Type : Italy, *Triumfettus.*

Fl. & Frt. : July-Jan.

Common in moist sandy places.

Korba to Pasarkhet : 19382; Khondra : 12787, 12802; Pali : 8668.

Tropical and warm temperate regions of the Old World.

It is a good fodder grass.

E. tenella (L.) P. Beauv. ex Roem. et Schult, Syst. Veg. 2 : 576. 1817; Haines, Botany 3 : 1001. Bor, Grasses : 513. 1960; Cope in Fl. Pakistan No. 143 : 88. 1982. *Poa tenella* L., Sp. Pl. : 69. 1753. *Poa amabilis* L. Sp. Pl. : 68. 1753. *Eragrostis amabilis* (L.) Wight & Arn. in Hook. et Arn., Bot. Beechy Voy. : 251. 1833; Nicolson *et al.*, Regnum Veget. 119 : 309. 1988. *Poa plumosa* Retz., Obs. Bot. 4 : 20. 1786. *Eragrostis plumosa* (Retz.) Link, Hort. Berol. 1 : 192. 1827. *Tsjama-pullu* Rheede, Hort. Malab. 12 : 75, t. 41. 1693.

Slender, tufted, annual herbs. Leaf-sheaths 2-4 cm long, hairy at mouth; leaf-blades narrow, flat, 5-12 cm long; ligule a rim of hairs. Inflorescences a terminal, much branched panicle 5-18 cm long, elliptic or pyramidal, open, often flexuous, branches capillary; spikelets 1.5-2.5 mm long, oblong-ovate, laterally compressed, 4-8-flowered; rachilla fragile, articulated between florets; lower glumes 0.5 mm long, ovate or lanceolate, acute, 1-veined; upper glumes 0.8 mm long, ovate, acute, 1-veined; lemma ovate, obtuse 0.7-1 mm long, smooth or scaberulous, 3-veined; palea 0.8-1 mm long, margins inflated; keels ciliate; lodicules 2; stamens 3. Grains ovoid, pale brown, 0.4 mm long.

Type : India, Linn. 87.39 (LINN) (*Poa tenella*).

Fl. & Frt. : July-Dec.

Common in overgrazed areas.

Lafa : 13030; Katghora : 7114; Hasdo river bank : 8623.

2n = 20, 60.

Throughout the tropics.

It is a good fodder grass; the grains are said to be nutritious.

Note: Prior to Stapf (in J. D. Hook. FBI 7 : 315. 1897) and Munro (in J. Linn. Soc. Bot. 6 : 43. 1862), Roem. & Schult. (1817) combined *Poa tenella* L. and *P. amabilis* L., accepting *P. tenella* L., as the correct name of the combined taxon (Art. 57.2).

E. tremula (Lam.) Hochst. ex Steud., Syn. Pl. 1 : 269. 1854; Stapf, in J. D. Hook., FBI 7 : 320. 1896. Haines, Botany 3 : 1005; Bor, Grasses : 514. 1960; Cope in Fl. Pakistan No. 143 : 98. 1982. *Poa tremula* Lam., Encycl. Meth. Bot. 1 : 185. 1791.

Slender, loosely tufted, annual herbs; culms erect or ascending. Leaf-sheaths bearded at mouth; leaf-blades 10-20 cm long, flat or convolute. Ligule a rim of short stiff hairs. Inflorescences upto 50 cm long, ovate, effuse, lax, nodding panicles, branches capillary; rachis glabrous, axils bearded; pedicels capillary, shorter or longer than spikelets; spikelets pale green or purplish, linear, many-flowered, 5-20 mm long; glumes subequal, 1-1.5 mm long, ovate, acute, keeled, 1-veined; lemmas ovate, sub-obtuse, 3-veined, closely imbricate, 1.5-1.7 mm long, breaking up from base; rachilla persistent; palea ovate-oblong, 1.4-1.8 mm long, keel scabrid, persistent; lodicules 2; stamens 3. Grains globose, 0.5 mm across, pale.

Type: Sudan, *Kotschy* 6 (K).

Fl. & Frt.: Aug.-Jan.

Common near cultivated fields.

Pali : 8741; Pasan : 13286A; Katghora : 6088.

2n = 20, 30, 40.

Tropical Africa, Nepal, India, Burma.

A fodder grass of sandy soils; grains eaten in times of scarcity.

E. unioloides (Retz.) Nees ex Steud., Syn. Pl. 1 : 264. 1854; Bor, Grasses : 515. 1960; Cope in Fl. Pakistan No. 143 : 90. 1982. *Poa unioloides* Retz., Obs. Bot. 5 : 19. 1789. *Eragrostis amabilis* Stapf, in J. D. Hook., FBI 7 : 317. 1896, non (L.) Wt. & Arn. ex Nees 1838; Haines, Botany 3 : 1003.

Slender, tufted, annual herbs; erect or ascending. Leaf-sheaths glabrous or hairy at mouth. Leaf-blades 7-14 cm long, flat or inrolled, acute at apex, glabrous or sparsely hairy, cordate; ligule a narrow rim. Inflorescences panicles, narrowly oblong to broadly ovate 2.5-15 cm long, contracted or with spreading browny-pinkish; spikelets ovate to ovate-oblong, acute, compressed, many-flowered, 4-10 mm long; rachilla persistent; glumes sub-equal, 1-2 mm long, ovate, acute, keeled, 1-veined; lemma broadly ovate-

orbicular, 3-veined, mucronulate, closely set, 1.8-2 mm long, distichously spreading, deciduous; palea falling with lemma, elliptic, keels scabrid; lodicules 2; stamens 3. Grains obovoid or ellipsoid, laterally compressed, brown, 0.8 mm long.

Type: India, *Koenig* (LD).

Fl. & Frt.: Oct.-Apr.

Common in muddy situations.

Hasdo river bank : 8625; Pali : 8605; Pondu to Ratanpur : 16788; Katghora : 3969; Lamni : 19221, 13292, 19234.

2n = 18, 20, c. 30, 40.

Africa, India, Nepal, S. E. Asia.

Fodder for horses; used as green manure.

ERIOCHLOA Kunth in Humb. & Bonpl., Nov. Gen. & Sp. Qu. 1 : 94; ed. fol. 78. 1816.

LT.: *E. distachya* Kunth (vide Hitchcock, U.S. Dept. Agric. Bull. 772 : 220. 1920).

Eriochloa procera (Retz.) C. E. Hubb. in Kew Bull. 1930; 256. 1930; Cope in Fl. Pakistan No. 143 : 200. 1982. *Agrostis procera* Retz., Obs. Bot. 4 : 19. 1786. *Eriochloa ramosa* (Retz.) Kuntze, Rev. Gen. Pl. 2 : 775. 1891; Haines, Botany 3 : 1052. *E. polystachya sensu* C. B. Clarke in J. D. Hook., FBI 7 : 20. 1896, non Kunth 1816.

Slender annual herbs; culms erect or geniculately ascending. Leaf-shaeths 6-10 cm long; leaf-blades 8-25 cm long, linear, flat; ligule a rim of short hairs. Inflorescences a compound, 10.30 cm long panicles of spiciform, secund, racemes 2-10 cm long: rachis puberulous, triquetrous; spikelets 3-4 mm long, paired, lanceolate or ovoid, acute to acuminate, 2-fid, short-pedicelled, dorsally compressed, thickened at base; lower glumes absent; upper glumes membranous, ovate, acute to acuminate, 5-veined, hairy on back, 3.2 mm long; lower lemma 3 mm long, 3-5-veined, membranous, hairy on back; palea absent; upper lemma indurated, apiculate or short-aristate; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oblong, dorsally compressed, obtuse, free within hardened glumes.

Type: India, *Koenig* (LD).

Fl. & Frt.: Aug.-Nov.

Note: "C. B. Clarke in J. D. Hook." IN ERRORE for J. D. Hook. in Forma 41-47.

Occasionally forming clumps in moist places, ditches, cultivated fields.

Meora : 13063.

2n = 18, 36.

Tropical Africa, S. E. Asia.

A good fodder.

EULALIA Kunth, Rev. Gram. 1 : 160. 1829.

T. : *E. aurea* (Bory) Kunth (*Andropogon aureum* Bory).

Pseudopogonatherum A. Camus in Ann. Soc. Linn. Lyon, n. s. 2. 68 : 204. 1921.

LT. : *P. irritans* (R. Br.) A. Camus (*Saccharum irritans* R. Br.) (vide Chase, Index Grass Sp. 3 : 203. 1962).

Puliculum Haines, Botany 3 : 1018. 1924.

T. : *P. articulata* (Trin.) Haines.

Note : Clayton & Renvoize (Genera Graminum : 333. 1986) reduce *Pseudopogonatherum* A. Camus (1921), segregated on the basis of a tough rachis, as a congeneric synonym of *Eulalia* Kunth and state : "the two species concerned also have varieties with a fragile rachis which are inseparable from *Eulalia* Kunth." Mabberley (1987) reduces *Polytrias* Hackel as a synonym of *Eulalia* Kunth, but Clayton & Renvoize (1986) treat them as two distinct genera.

Those who treat the two as generically distinct (vide Fl. Hassan : 705), diagnose them as :

Glume 2 aristate or short-awned	PSEUDOPOGONATHERUM
Glume 2 acute, not aristate or awned	EULALIA

Eulalia Kunth is therefore represented by two species in Bilaspur district and can be diagnosed as (adapted from the generic key above) :

1a.	G 2 aristate or short-awned ; rachis tough	*E. contorta*
1b.	G 2 acute, not awned or aristate ; rachis fragile	*E. trispicata*

Eulalia contorta (Brongn.) Clayton & Renvoize ex Panigr., comb. nov. *Pogonatherum contortum* Brongn. in Duperr., Voy. Coq. Bot. 90 : 17. 1831. *Pseudopogonatherum contortum* (Brongn.) A. Camus in Lecomte, Fl.

Gen. Indo-China 7 : 255. 1922; Hara *et al.*, Enum. 1 : 144. 1978; Karthikeyan *et al.*, Flor. Ind. Enum. Monocot. : 253. 1989. *Pollinia articulata* Trin., in Mem. Acad. Sci. Petersb. Ser. 6. 2, 273. 1832; J. D. Hook., FBI 7 : 109. 1896. *Puliculum articulatum* (Trin.) Stapf ex Haines, Botany 3 : 1008, 1924. *Eulalia contorta* Clayton & Renvoize, Genera Gram. : 333. 1986, comb. invalid, sans basionym.

Tufted, perennial herbs. Leaf-sheaths glabrous; leaf-blades linear or lanceolate, acuminate, 15-40 cm long, flexuous, glabrous above, hairy beneath; ligule a tuft of hairs. Inflorescences of clustered, spiciform racemes; 2.5-7 cm long; rachis hairy; spikelets 2-2.5 mm long, brown, 2-flowered, deciduous from tip of pedicel or falling with it; pedicels white hairy; lower glumes chartaceous or membranous, oblong or elliptic, truncate, convex on back, margins incurved, keel villous below; upper glume minutely 2-fid at tip, aristate; lower lemma often absent or minute, hyaline, male or empty; upper lemma oblong, 2-fid, awned from sinus, paleate, bisexual; palea lanceolate-oblong, hyaline; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oblong, free.

Fl. & Frt.: Oct.-Feb.

Common in open forests, on grassy slopes.

Madai : 12890; Katghora : 6097.

India, S. E. Asia, China, Malaysia, Australia.

E. trispicata (Schult.) Henr. in Blumea 3 : 453. 1940; Bor, Grasses : 157. 1960; Cope in Fl. Pakistan No. 143 : 275. 1982. *Andropogon tristachyus* Roxb., Fl. Ind. 1 : 261. 1820, non *A. tristachyus* Kunth 1816. *A. trispicatus* Schult., Syst. Veg. Mant. 2 : 452. 1824, based on *A. tristachyus* Roxb. *Eulalia argentea* Brongn., in Duperry, Voy. Coq. Bot. 2 : 92. 1830; Haines, Botany 3 : 1064. *Pollinia argentea* (Brongn.) Trin. in Bull. Acad. Sci. Petersb. Ser. 6. 4(1) : 90. 1836; J. D. Hook., FBI 7 : 111. 1896.

Perennial herbs. Leaf-sheaths 3-10 cm long; leaf-blades flat, linear, flexuous, sub-cordate, with bulbous based hairs towards base, 30-60 cm long. ligule short, membranous, ciliate. Inflorescences 6-15 cm long, simple or rarely branched, of 2-16 spiciform, hairy racemes 5-15 cm long, digitately arranged; rachis and pedicels villous with silvery hairs; spikelets narrowly elliptic-oblong, 2.5-3 mm long, 2-nate, sessile and pedicelled, both similar, dorsally compressed, 2-flowered; lower glumes dorsally flat, villous or glabrate, pale brown, white hairy on keels; upper glumes setose-hairy on margins, obtuse, keeled, golden brown hairy on keels; lemmas narrowly oblong, hyaline, upper 3-veined, 2-fid at apex, awned from

sinus; awns twisted, 7-15 mm long; lodicules 2; stamens 3; styles 2. Grains oblong.

Iconotype: India, *Roxburgh* (K, CAL).

Fl. & Frt.: Oct.-Feb.

Common in sal forest, along forest roads.

Achanakmar : 13216A; Siang : 16832.

2n = 18, 20.

India, Sri Lanka, Burma, Malaysia, Australia.

Cattle graze this grass, when young, also used for thatching and brooms.

HEMARTHRIA R. Br., Prodr. Fl. Nov. Holl. : 207. 1810.

LT.: *H. compressa* (L. f.) R. Br. (*Rottboellia compressa* L. f.) (vide Nash, N. Amer. Fl. 17 : 87. 1909).

Lodicularia P. Beauv., Ess. Agrost. : 108. 1812.

T.: *L. fasciculata* (Lam.) P. Beauv.

X = 9.

Hemarthria compressa (L. f.) R. Br., Prod. : 207. 1810; Haines, Botany 3 : 1109; Cope in Fl. Pakistan No. 143 : 346. 1982. *Rottboeltia compressa* L. f. Suppl. Pl. : 114. 1782; J. D. Hook., FBI 7 : 153. 1896.

Erect or decumbent, stoloniferous perennial herbs. Leaf-sheaths 2.5-3 cm long, mouth hairy; leaf-blades flat, linear, acute, 3-12 cm long; ligule a narrow, fimbriate membrane. Inflorescences a racemes 5-12 cm long, embraced below by subtending sheath, borne in upper axils of culm, tough, dorsally compressed; internodes thickened, clavate, nearly always obliquely articulated, fused to adjacent pedicel; rachis ending in acute lip; spikelets 3-4 mm long, 2-nate, sessile and pedicelled; sessile spikelets: narrowly elliptic-oblong, dorsally compressed, with a triangular callus; lower glumes flat, coriaceous, narrowly elliptic, obtuse or acute, 2-keeled, 7-veined, notched, 3-4 mm long; upper glumes membranous, boat-shaped, acute or short-acuminate; lemma hyaline, oblong, 2-veined, 3 mm long; pedicelled spikelets : sub-similar, lower glume mucronate; upper glume aristate or acuminate, 7-9-veined; stamens 3. Grains oblong or obovoid, sub-compressed dorsally.

Type : Described from India.

Fl. & Frt. : July-Oct.

Common in wet places, forming clumps.

Bilaspur : 19355; Kota : 13096; Achanakmar : 13208.

2n = 18, 20, 36, 54; X = 9.

Iraq, Afghanistan, India, Sri Lanka, Burma, Thailand to Vietnam.

It is grazed by cattle; esteemed as a moist pasture grass in Africa and Australia.

HETEROPOGON Pers., Syn. Pl. 2 : 533. 1807.

LT. : *H. glaber* Pers., *nom. illeg.* [*Andropogon allioni* A. DC., *H. allioni* (A. DC.) Roem. & Schult.] [vide Nash, N. Amer. Fl. 17 : 127. 1912 (= *H. contortus*)].

Note : Bor (Kew Bull. 1954 : 74. 1954) selected *H. hirtus* as lectotype, but Clayton & Renvoize (1986) list *H. glaber* Pers., as the lectotype species.

H. melanocarpus (Ell.) Benth. (2n = 22) is expected in the district.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. 2 : 836. 1817; Haines, Botany 3 : 1088; Bor, Grasses : 163. 1960; Cope in Fl. Pakistan No. 143 : 312. 1982. *Andropogon contortus* L. Sp. Pl. : 1045. 1753; J. D. Hook., FBI 7 : 199. 1896. *Heteropogon glaber* Pers., *l.c. nom. illeg. superfl.* (*Sukal, Kussal*).

Tufted, perennial herbs. Leaf-sheaths 4.5-7 cm long, basal laterally compressed; leaf-blades flat, linear, acute or obtuse, sub-cordate, scabrid above, 10-30 cm long; ligule a truncate, ciliolate membrane. Inflorescences a solitary, terminal raceme, 4-8 cm long, with awns forming a twisted spire; spikelets in pairs, sessile and pedicelled, lowest 2-6 pairs closely imbricate, homogamous, awnless, male or neuter, sessile and pedicelled spikelets of other pairs very different; sessile spikelets; sub-cylindric, 5.5-10 mm long; callus 2-3 mm long, pungent with a barb of hairs; lower glumes coriaceous, 4-5 mm long, elliptic-oblong, brown hispidulous; lower floret reduced to a hyaline lemma; upper lemma with stipiform base, awned, epaleate; awn 5-8 cm long, hirtellous; rachis internodes brown hairy, not or tardily disarticulating between homogamous spikelets, fragile between heterogamous; pedicelled spikelets : 5-15 mm long, male or barren, lanceolate, awnless; lower glumes green with yellowish, mem-

branous margins; upper glumes 3-veined; lemmas hyaline; lodicules 2; stamens 3; styles 2.

Type: India, Illustration in Plukenet, Phyt., t. 191/5. 1692.

Fl. & Frt.: Sept.-Feb.

Common throughout the area.

Madai : 12899; Korbi : 15338; Katghora : 3973, 12870; Kota : 13097.

2n = 20, 39, 40, 44, 50, 60, 69, 70, 80, 90.

Throughout the tropical warm temperate regions.

Note: *H. contortus* has a needlesharp sessile spikelet, pungent callus that readily penetrates the clothing skin and thus has a ferociously dispersal mechanism. The grass is used for thatching and lasts longer than rice-straw. Before flowering, it a very good fodder; hay made from it. is said to be kept for many years. After flowering, it is avoided by stocks for its sharp callus and pungent barbed fruits, since these cause ulcers in the gums of horses and cattle. The awns are hygroscopic and by their contortions and barbed callus, serve to thrust the seed into the ground (Haines, *l.c.* : 1089). These awns unwind when moistened.

IMPERATA Cyrillo, Pl. Rar. Neap. 2 : 26. 1792.

T.: *I. arundinacea Cyr*, *nom. illeg.* [*I. cylindrica* (L.) Raueschel ex P. Beauv; (*Lagurus cylindrica* L.)].

Imperata cylindrica (L.) Raueschel (Nom. Bot. ed. 3 : 10. 1797) ex P. Beauv., Essai Agrost. : 165-166. 1812; Cope in Fl. Pakistan No. 143 : 252. 1982; Nicolson *et al.*, Regnum Veget. 119 : 310. 1988 [as '(L.) P. Beauv'.]. *Lagarus cylindrica* L., Syst. Nat. ed. 10. 2 : 878. 1759. *Saccharum koenigii* Retz., Obs. Bot. 5 : 16. 1788, *Imperata arundinacea* Cyr., Pl. Rar. Neap. 2 : 26, t. 11. 1792, *nom. illeg. superfl.* J. D. Hook., FBI 7 : 106. 1896; Haines, Botany 3 : 1061. *I. koenigii* (Retz.) P. Beauv. var. *major* Nees, Fl. Afr. Austr. 90. 1847. *I. cylindrica* (L.) P. Beauv. var. *major* (Nees) C. E. Hubb., Grass. Maur. Prodr. : 96. 1940; Fl. Hassan : 734. 1976. *Kodi-pullu* Rheede, Hort. Malab. 12 : 107, t. 57. 1693. (Cotton grass, Thatch grass, *Lalong, Alang-alang*).

Perennial, caespitose, rhizomatous herbs; culms with mostly basal leaves; nodes bearded. Leaf-sheaths upto 7.5 cm long; leaf-blades flat, glabrous scabrid, 15-60 cm long; ligule a scarious, erose rim. Inflorescences in contracted, dense, silky, sub-spiciform panicles 8-15 cm long, softly silky hairy; spikelets unequally pedicelled, 2.5-4 mm long, 1-2-flowered, similar, 2-nate, lanceolate to oblong, terete; callus bearded with

white soft hairs; lower glumes chartaceous, lanceolate, dorsally hairy, 5-9-veined, obtuse; upper glumes 3-7-veined, chartaceous or membranous, hairy; lower lemma oblong, hyaline, epaleate, apex ciliate or absent; upper lemma ovate, 1-veined, toothed; palea hyaline, 1-1.5 mm long, enfolding floret; upper floret bisexual; stamens 2; styles 2, connate at base. Grains oblong.

Fl. & Frt.: Apr.-Dec.

Common in open places, forest-edges, sandy river beds, forest clearings, open grasslands; an aggressively rhizomatous weed of burnt-over forests, abandoned pastures.

Pasan : 19116; Korba : 8740.

2n = 20, 40, 52, 60 (var. *major*, 2n = 20).

East and South Africa, warm and temperate Asia, Australia.

This species is suggested for reclamation of land for thatching, hat-making and for making mats and *Asanas*.

Note: Cope (*l.c.*) would treat the different varieties as geographical variants, imperfectly separable. Hara *et al.*, (1978) and Ramamoorthy (Fl. Hassan) cite "(L.) P. Beauv." as the author of the species and (Nees) C. E. Hubb. ex C. E. Hubbard & Vaughan, that of var. *major*. Raeuschel (Nom. Bot. ed. 3 : 10. 1797) did not cite the basionym (cf. Nicolson *et al.* 1988) (Art. 33.2).
While var. *major* is merged in var. *cylindrica*, var. *latifolia* (J. D. Hook.) C. E. Hubbard (Imp. Agri. Bur. Jt.-Publ. No. 7 : 14. 1944) based on *I. arundinacea* var. *latifolia* J. D. Hook. (FBI 7 : 106. 1896), which attains 3 m in height and has leaves c. 3 cm broad, is a distinct taxon growing in the marshes and swamps.

ISACHNE R. Br., Prodr. Fl. Nov. Holl. : 196. 1810.

T.: *I. australis* R. Br. [*I. globosa* (Thunb.) Kuntze].

1a. Ascending herbs; stems reaching upto 45 cm in height; leaves 2.5-6 cm long, linear lanceolate; spikelets 2-3 mm long; pedicels with white banded glands — *I. globose*

1b. Prostrate herbs; stems rarely reaching upto 25 cm in height; leaves 1-2.5 cm long, ovate or ovate-lanceolate; spikelets 1-1.5 mm long; pedicels without glands — *I. miliacea*

Isachne globosa (Thunb.) Kuntze, Rev. Gen. Pl. 2 : 778. 1891; Bor, Grasses : 580. 1960; Hara *et al.*, Enum. 1 : 136. 1978. *Milium globosum* Thunb., Fl. Jap. : 49. 1784. *Isachne australis* R. Br., Prodr. 196. 1810; J. D Hook., FBI 7 : 24. 1896, *pro part.*; Haines, Botany 3 : 1030.

Perennial, tufted herbs. Leaf-sheaths 2-3 cm long, smooth; leaf-blades acute, margins not or slightly thickened, ciliolate; ligule a dense tuft of hairs. Inflorescences in contracted, ovoid or pyramidal panicles, 5-10 cm long; spikelets globose, orbicular, muticous, glabrous or setose, green or purplish, 2-flowered at ends of capillary, flexuous, glabrous or scaberulous branchlets, articulated above glumes; pedicels thickened towards tip; lower glumes herbaceous, 5-6-veined, sparsely minutely, hairy or setulose; upper glumes similar, but somewhat wider; lower lemma elliptic, rounded, membranous, 1.5-2 mm long; lower floret male or bisexual, 1.5-1.8 mm long; upper lemma ovate, acute, chartaceous, tubercled, 1-1.5 mm long; upper floret female or bisexual, 1.5 mm long; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains free within hardened glumes, pale.

Fl. & Frt.: Sept.-Dec.

Common in moist places, near cultivated fields.

Katghora : 3983; Pali : 8725.

2n = 60, c. 90.

Nepal, India, S. E. Asia, Australia.

Tender tips eaten; ploughed as a green manure.

I. miliacea Roth, in R. & S., Syst. Veg. 2 : 476. 1817; et Nov. Sp. Pl. : 58. 1821. Haines, Botany 3 : 1030; Bor, Grasses : 582. 1960; Hara *et al.*, Enum. 1 : 136. 1978.

Slender, perennial herbs. Leaf-sheaths 1-2 cm long; leaf-blades flaccid, acute, glabrous or sparsely hairy; ligule a row of stiff hairs. Inflorescences in terminal panicles, just exserted from subtending sheaths, upto 4 cm long; spikelets oval, glabrous, 2-flowered, articulated above glumes; glumes ovate, 5-7-veined, herbaceous; lower floret male; lower lemma elliptic, membranous, clasping palea, 1.5 mm long; upper floret bisexual; upper lemma ovate, acute, chartaceous, clasping palea, hairy, upto 1.2 mm long; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains pale free within hardened glumes.

Fl. & Frt. : Sept.-Nov.

Occasionally found along forest roads, in muddy places.

Kabirchabutra : 15247.

2n = 20.

Nepal, India, S. E. Asia, Malaysia.

A good fodder grass for cattle and horses.

ISCHAEMUM L., Sp. Pl. : 1049. 1753 & Gen. Pl. ed. 5 : 469. 1754.

LT. : *I. muticum* L. (vide Nash, N. Amer. Fl. 17 : 94. 1909).

Collodoa Cav., Ic. Pl. 5 : 37. 1709.

T. : *C. distachia* Cav. (= *I. rugosum* Salisb.).

Shape of the rhachis segment exposed on the back of the raceme is quite characteristic of *Ischaemum* L. Sessile spikelet dorsally compressed; racemes usually 2.

1a Sessile spikelets rounded in the lower half, 5 mm long; lower glumes of sessile spikelets coriaceous, not rugose, margins flat below middle; pedicelled spikelet laterally compressed — *I. indicum*

1b. Sessile spikelets 2-keeled throughout, 6 mm long; lower glumes of sessile spikelets prominently transversely rugose, never coriaceous, margins narrowly and evenly inturne! from base to apex; pedicelled spikelet dorsally compressed — *I. rugosum*

Ischaemum indicum (Houtt.) Merr. in Jour. Arn. Arb. 19 : 320. 1938; Bor, Grasses : 180. 1960; Fl. Hassan : 737. 1976. *Phleum indicum* Houtt. Nat. Hist. 2. 13 : 198. t. 90. f. 2. 1782. *Ischaemum ciliare* Retz., Obs. Bot. 6 : 36. 1791; J. D. Hook., FBI 7 : 133. 1896, *pro part.*; Haines, Botany 3 : 1068. *I. aristatum sensu* J. D. Hook., FBI 7 : 126. 1896, non L. (1753). (*Kander*-Hindi).

Perennial, sub-stoloniferous herbs; culms erect or decumbent. Leaf-sheaths 3-6 cm long, glabrous or hirsute; leaf-blades 5-15 cm long, linear, subcordate, glabrous or pubescent; ligule membranous, ciliate. Inflorescences of 1-2, opposed or divergent, spiciform racemes, 2-6 cm long, villous, on long peduncles; rachis many jointed; joints of rachis and pedicels strongly compressed, ciliate on one edge; callus and pedicels hairy or not; spikelets 3-4 mm long, 2-nate; sessile spikelets : deciduous with the continuous joint of rachis; lower glumes oblong or lanceolate, chartaceous with 2 membranous wings at top, involute at base,

8-9-veined, 5 mm long; upper glumes shorter, boat-shaped, keeled upwards, 5-veined, aristate, 4 mm long; lower lemma hyaline, membranous, 4 mm long, keeled; palea hyaline; male; upper lemma hyaline, deeply notched, awned from sinus, 3-5-veined; palea hyaline, bisexual; lodicules 2; stamens 3; styles 2; free; stigmas plumose; pedicelled spikelets : sub-similar, deciduous from pedicel; lower glumes with an arista 4 mm long. Grains oblong to lanceolate, dorsally compressed.

Fl. & Frt. : Oct.-Apr.

Common in moist places in forest clearings and secondary grasslands.

Achanakmar : 13213A; Khondra : 12703; Madai : 12875; Kota : 13093; Pali : 8661; Korba to Kudmura : 16804.

2n = 18, 20, 36, 40, 52, 54.

India.

Eaten by cattle, but their milk has undesirable odour.

I. rugosum Salisb., Icon. Stirp. Rar. 1 : t. 1. 1791; J. D. Hook., FBI 7 : 127. 1896; Haines, Botany 3 : 1068; Bor, Grasses : 184. 1960; Cope in Fl. Pakistan No. 143 : 321. 1982. *Colladoa distachia* Cav., Ic. Pl. 5 : 37. 1799. *nom. illeg.* (*Moraro*-Beng.).

Annual, caespitose herbs. Leaf-sheaths inflated, 1.5 cm long; leaf-blades 7-25 cm long, acuminate, base contracted, usually glabrous; ligule erect, 2-4 mm long. Inflorescences terminal and axillary, of 1-2 spiciform racemes 2.5-9 cm long; internodes and pedicels clavate, ciliate; callus bearded; spikelets 3-6.5 mm long, 2-nate; sessile spikelets : oblong-ovate, 4-6 mm long, lower glumes broadly oblong, coriaceous, transversely ridged below, membranous above, 2-keeled; 3 mm long; upper glumes asymmetrically ovate, acute, keeled, 3.5 mm long; lower floret usually male; lemma lanceolate, acute, hyaline, lower 4-5 mm long; palea hyaline, male; upper deeply lobed, with a 10-15 mm long awn in sinus; palea hyaline, bisexual; lodicules 2; stamens 3; styles 2, free; stigmas plumose; pedicelled spikelets : sub-similar; deciduous; upper lemma without an awn. Grains ovoid, brown, 2 mm long.

Type : India, *Koenig* (BM).

Fl. & Frt. : Aug.-Dec.

Common in cultivated fields, sandy alluvium.

Kota to Bilaspur : 13047; Katghora : 6086.

2n = 18, 20, 40, 44, 60.

Tropical Africa and Asia.

A good fodder, also for horses. Grains are eaten by tribals at time of scarcity.

ISEILEMA Anderss., in Nova Acta Soc. Sci. Upsal. Ser. 3.2 : 250. 1856.

LT. : *I. prostratum* (L.) Anderss. (vide Clayton & Renvoize, Genera Gram. : 360. 1986, as 'type').

Note : *Iseilema* Anderss., contains a long polyploid series of chromosome numbers, including an unusual diploid count of 6 and 8; these are probably derived from a basic number 5 (Rao in Nature 255 : 220-221. 1975).

1a. Spatheoles smooth, not tuberculate; nodes, atleast lower, glabrous; sessile spikelets 4-5 mm long; upper glumes of bisexual spikelets acuminate, lower glume 1-veined — *I. laxum*

1b. Tubercles present on spatheoles; nodes bearded sessile spikelets 2.5-3 mm long; upper glume of bisexual spikelet 2-cuspidate, lower glumes 3-veined — *I. prostratum*

Iseilema laxum Hack. in DC., Monogr. Phan. 6 : 682. 1889; J. D. Hook., FBI 7 : 218. 1896; Haines, Botany 3 : 1102; Bor, Grasses : 188. 1960 (*'Musha'*, *Mushan*, *Mushel*-Hindi; *Pandasual*-Oriya).

Tufted, annual herbs; culms erect or ascending, base covered with loose, dry glabrous sheaths. Leaf-sheaths lax, compressed, keeled; leaf-blades 7-15 cm long, acute, base often ciliate, margins scaberulous; ligule membranous, truncate, short-ciliate. Inflorescences of solitary racemes embraced by spatheoles and collected into a false open panicle 5-20 cm long, racemes comprising 2 homoganous pairs of spikelets forming a sort of involucre, 1 spikelet sessile, borne upon a short internode and 2 pedicelled spikelets, sessile and pedicelled spikelets falling together as a unit; homogamous spikelets male or reduced to a scale; branches sometimes bearded at nodes; spathes distant, erect with several spatheoles and clusters, lower spathes passing into leaves; peduncles scarcely exserted; base of clusters white-bearded; sessile spikelets; 2-flowered, lanceolate-elliptic, dorsally compressed; lower glumes narrowly truncate, cartilaginous, bidentate; upper glumes chartaceous, 1-veined; lower floret reduced to a hyaline lemma; upper floret bisexual; upper lemma stipiform, entire or bidentate, awned; palea minute or absent; stamens 3; pedicelled spikelets: narrow oblong, awnless, 4-5 mm long; lower glumes 3-5--veined; upper glumes sub-chartaceous, 1-3-veined; lemma hyaline.

Fl. & Frt. : Oct.-July.

Common in cultivated fields, along roadsides.

Bilaspur : 12997; Champa : 19381.

2n = 8, 10, c. 20, 24, 28, 28+0—6B, 30, 36.

India, Sri Lanka, Burma.

It is a very good fodder grass, relished by cattle both as green and as hay; an excellent soil-binder against erosion.

I. prostratum (L.) Anderss. in Nova Acta Soc. Sci. Upsal. Ser. 3, 2 : 251. 1856; Cope in Fl. Pakistan No. 143 : 315. 1982. *Andropogon prostratus* L., Mant. Pl. 2 : 304. 1771. *Anthistiria prostrata* (L.) Willd., Sp. Pl. 4(2) : 901. 1806. *A. wightii* Nees ex Steud., Syn. Pl. 1 : 400. 1855. *Iseilema wightii* (Nees ex Steud.) Anderss., in Nova Acta Soc. Sci. Upsal. Ser. 3, 2 : 251. 1856; J. D. Hook., FBI 7 : 218. 1896; Haines Botany 3 : 1103.

Perennial, tufted herbs; culms ascending. Leaf-sheaths and base of blades often setose with tubercle-based hairs; leaf-blades flat, acute or acuminate, upto 25 cm long, margin scabrid or sub-spinulose; ligule membranous, truncate. Inflorescences in false panicles of 10-20 cm long racemes; racemes embraced by spatheoles, consisting of 2 homogamous pairs of spikelets, 1-sessile spikelet borne upon a short internode and 2-pedicelled spikelets. deciduous below homogamous spikelets, sessile and pedicelled spikelets falling as a unit; homogamous spikelets : all pedicelled, male, lanceolate, 3-4 mm long, sparsely ciliate; glumes 2, lower 5-veined, scaberulous, upper 1-veined; sessile spikelets : 2.5-3 mm long, bearded at base, otherwise glabrous; lower glumes dorsally smooth below, minutely scabrid above; upper glumes scaberulous on keel; lemma linear, hyaline, truncate, upper awned; stamens 3.

Type : India, *Koenig*.

Fl. & Frt. : Aug.-Dec.

Common on damp ground.

Keonchi : 13259A.

2n = 20.

Pakistan, India, Sri Lanka, Burma.

It is a good fodder grass, preferably as hay; fresh plants are pungent, with an unfavourable odour.

LEERSIA Swartz, Prodr. Veg. Ind. Occ. 1 : 21. 1788, *nom. cons.*

T. : *L. oryzoides* (L.) Sw. (*Phalaris oryzoides* L.) (*typ. cons.*).

Leersia hexandra Swartz, Prodr. : 21. 1788; Haines, Botany 3 : 1026; Clayton & Renvoize, Genera Graminum : 73. 1986. *L. ciliata* (Retz.) Roxb., Fl. Ind. 2 : 207. 1832. *Pharus ciliatus* Retz., Obs. Bot. 5 : 23. 1788 (*Bareet grass*; *Jungli dhan*-Hindi).

Annual, slender, marshy herbs; culms geniculately ascending; nodes villous; rhizomes creeping. Leaf-sheaths striate, scabrid; leaf-blades flat or involute, often scabrid on margin, 8-30 cm long, narrowed at base; ligule a glabrous membrane, truncate. Inflorescences in oblong, nodding panicles, 5-10 cm long with slender, flexuous, distant branches; spikelets laterally compressed, 1-flowered, short-pedicelled, 3.5-4 mm long, green: glumes absent or minute; lemma chartaceous, cymbiform, muticous, caudate or awned, 3.5-4 mm long, 5-veined, keel ciliate; palea like lemma, 3-veined, upto 4 mm long; lodicules 2; stamens 6; styles 2, free; stigmas 2, plumose. Grains oblong, free within palea.

Fl. & Frt. : Oct.-Dec.

Common in marshy places forming mats on wet soil and is a serious rice-field weed; a good fodder for cattle.

Pasan : 13267.

2n = 48.

Pantropical.

Affords good forage, when cut early, may be fed, both as green and as hay, to cattle and buffaloes.

LEPTOCHLOA P. Beauv., Ess. Agrost. : 71. 1812.

LT. : *L. virgata* (L.) P. Beauv. (*Cynosurus virgatus* L.) (vide Nash in N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 1 : 229. 1913).

Note : Clayton & Renvoize (1986) reduce *Diplachne* P. Beauv., *l.c.* : 80, as a section of *Leptochloa* P. Beauv., but Mabbeerley (1987) treats them as alternate generic names. Since Clayton & Renvoize also comment that "the two sections are tolerably distinct", we follow Haines (1924) and treat the two as distinct genera.

Leptochloa chinensis (L.) Nees in Syll. Ratisb. 1 : 4. 1824; J. D. Hook., FBI 7 : 299. 1896; Haines, Botany 3 : 1017. *Poa chinensis* L., Sp. Pl. : 69. 1753, p.p. (*Chanhel*-Hindi).

Tufted, annual herbs; culms geniculately ascending. Leaf-sheaths 4-10 cm long; leaf-blades 15-45 cm long, flat or convolute, flaccid, scaberulous; ligule a hairy membrane, lacerate, 5-6 mm long. Inflorescences in lax panicles of slender, spiciform racemes upto 4 cm long; racemes 5-10 cm long; rhachilla jointed at base and beneath each glume, produced between each glume and often beyond the terminal; spikelets 2.5-3 mm long, 4-6-flowered, laterally compressed, alternate and unilaterally 2-seriate; glumes unequal, membranous, oblong or lanceolate, 1-veined; lower lemma membranous, obtuse and apiculate, 3-veined; palea 1.5 mm long, 2-veined, keeled; keel pilose; lodicules 2, cuneate; stamens 3. Grains obtusely trigonous, brown, 0.7 mm long.

Fl. & Frt. : July-Nov.

Common in wet and marshy places.

Madai to Bijhra : 19485.

2n = 36, 40, 54.

India, S. E. Asia.

A good fodder for cattle; grains eaten in times of scarcity.

MELANOCENCHRIS Nees in Proc. Linn. Soc. Lond. 1 : 94. 1841;

Nair & Nayar in Bull. Bot. Surv. India 16 : 141-144. 1974.

T. : *M. royleana* Nees.

Gracilea J. D. Hook., in FBI 1 : 283. 1897.

LT : *G. nutans* J. D. Hook. (vide Clayton & Renvoize, 1986).

Melanocenchris jacquemontii Jaub. & Spach, Ill. Pl. Or. 4 : 36. t. 325. 1851; Cope in Fl. Pakistan No. 143 : 125. 1982. *M. royleana* Nees ex Steud., Syn. Pl. 1 : 218. 1854. *Gracilea royleana* (Nees ex Steud.) J. D. Hook., FBI 7 : 284. 1896; Haines, Botany 3 : 1010. (*Phulsi*-Hindi).

Tufted, annual herbs. Leaf-sheaths setulose to tubercle-based hairs; leaf-blades filiform, convolute, 1-2.5 cm long. Inflorescences in spicate clusters, 2.5-8 cm long, deciduous; clusters short-peduncled, 10-15 mm long; spikelets in turbinate heads, secund and distant upon a tough, flexuous, trigonous rhachis; heads falling entire, formed of 5-8 spikelets, of which 2 are fertile, others male or neuter; rachilla jointed at base, produced beyond lemmas and bearing 1-2-scales; spikelets green or purple,

2-flowered, awned; lower glumes rigidly coriaceous, ciliate along margins 10-11 mm long, 1-veined, awned; upper glumes 3-veined, with broad, hyaline margin near base; lower lemma membranous, ovate-lanceolate, 3-veined, scabrid on back, 2-toothed, awned from sinus; palea 2-keeled, 2-toothed at apex, as long as lemma, bisexual; upper lemma stalked, 3-toothed at apex, male; lodicules 2; stamens 3, styles 2, free; stigmas plumose. Grains 1.5-1.7 mm long, oblong brown.

Type: India, *Jacquemont* 383 (K.P.).

Fl. & Frt.: Oct.-Nov.

Common in waste places, hard soil, rock-crevices.

Kota : 13056.

2n = 24.

Pakistan, India.

Soil-binder; grazed by cattle when tender.

MNESITHEA Kunth, Rev. Gram. 1 : 153. 1829.

Type: *M. levis* (Retz.) Kunth.

Hackelochloa O. Kuntze, Rev. Gen. Pl. 2 : 776. 1891; Clayton & Renvoize, Gen. Gram. : 366. 1986.

T.: *H. granularis* (L.) Ktze. (*Cenchrus granularis* L.).

Manisuris sensu Hack. in DC., Monogr. Phan. 6 : 314. 1889, non L. (1771).

Rytilix Hutch. in U. S. Dept. Agric. Bull. 772 : 278. 1920. *nom. superfl.*

Type: Same as for *Hackelochloa* O. Kuntze.

Mnesithea granularis (L.) Koning & Sosef in Blumea 31 : 295. 1986. *Cenchrus granularis* L., Mant. Pl. 2 : 575. 1771. *Hackelochloa granularis* (L.) O. Kuntze, Rev. Gen. Pl. 2 : 776. 1891. Bor, Grasses : 159. 1960; Cope in Fl. Pakistan No. 143 : 345. 1982; Clayton & Renvoize, Genera Graminum : 366. 1986. *Manisuris granularis* (L.) L.f., Nov. Gen. Gram. 37. t. 1. f. 4-7. 1779, reimpr. in Amoen. Acad. 10 : 40. 1790; Haines, Botany 3 : 1105. *Rytilix granularis* (L.) Hutchins, *l.c.*, 20. 1913.

Annual coarse herbs; culms hairy. Leaf-sheaths hispid, keeled on back; leaf-blades flat, linear-lanceolate, acuminate, flaccid, coarsely hispid, base cordate, 10-20 cm long; ligule a raised ciliate membrane. Inflorescences a solitary, axillary or terminal spiciform racemes 1.5-3 cm long, fragile; spikelets dorsally compressed, in pairs, 2-nate, sessile and pedicelled, 1.5-2 mm long, 2-flowered, all pedicelled spikelets facing one direction and all sessile the other; pedicels completely fused with adjacent rachis, together forming a cavity; sessile spikelets : globose, about 1 mm long; lower glumes globose, pitted and tuberculate, upto 8-veined; upper glumes narrower, convex, narrowly crested at apex; lower lemmas hyaline, 3-veined, epaleate; upper lemma hyaline, oval; upper floret bisexual; pedicelled spikelets : 1.5-2.5 mm long, narrowly ovate, distichous, lower glumes ovate, acute, winged on one side; upper glumes cymbiform, keeled on back; lemmas often absent, when present then male; lodicules 2; stamens 2; styles 2. Grains sub-globose.

Type : Described from India.

Fl. & Frt. : July-Dec.

Common in wet places.

Pasan : 13267A ; Khootaghat : 19510.

2n = 14.

Throughout the tropics.

Yields fodder of good quality; used against enlarged spleen and liver.

OPHIUROS Gaertn., Fruct 3 : 3. 1805.

T. : *O. corymbosa* (L. f.) Gaertn.

Ophiuros exaltatus (L.) Kuntze, Rev. Gen. Pl. 2 : 780. 1891; Clayton & Renvoize, Gen. Gram. : 367. 1986. *Aegilops exaltata* L., Mant. Alt. Pl. 2 : 575. 1771. *Ophiuros corymbosus* Gaertn., Fruct. 3 : 4. t. 181. 1805; Haines, Botany 3 : 1106.

Slender, perennial, rhizomatous herbs; culms bulbous at base. Leaf-sheaths short, terete; leaf-blades linear to linear-lanceolate, often convolute, glabrous, 15-50 cm long, base rounded; ligule short, membranous. Inflorescences of single cylindrical racemes aggregated into a compound panicle, in axils of spathes; spike 5-15 cm long, sometimes ending in a tail-like portion; pedicels completely fused with internodes; spikelets

solitary and sessile sunken in joints, ovate-oblong, obtuse, 2-flowered, 2 mm long; pedicelled spikelets either absent or rudimentary; lower glumes coriaceous, oblong, obtuse, tip recurved; upper glumes membranous, keeled; lower lemma elliptic, obtuse, 2-veined, hyaline, paleate, male; upper lemma oblong, 2-veined or veinless, bisexual; lodicules 2, cuneate; stamens 3. Grains oblong.

Fl. & Frt.: Aug.-Nov.

Common in forest clearings, inside Sal forests.

Achanakmar : 13211, 13214A.

India, China, Australia.

Young grass eaten by cattle; also used for thatching.

OPLISMENUS P. Beauv., Fl. Oware 2 : 14. Aug. 1810 ("1807"), *nom. cons.*

T.: *O. africanus* P. Beauv. *Orthopogon* R. Br., Prodr. : 194. Apr. 1810, *nom rejic.*

LT.: *O. compositus* (L.) R. Br. (*Panicum compositum* L.) (vide Hitchcock. U.S.D.A. Bull, 772 : 238. 1920).

Note: The sticky secretion of the awn is an unusual means of fruit dispersal in the grasses (Clayton & Renvoize, *op. cit.* : 271), who also put the date of publication as "Sept. 1810").

1a. Annual herbs; spikelets secund, closely imbricate; rachis with long white hairs; awns pale, barbellate, capillary, often flexuous — *O. compositum*

1b. Perennial herbs; spikelets loosely imbricate, not secund; rachis without hairs; own reddish, smooth, viscid, stout and stiff — *O. burmanii*

Oplismensus burmannii (Retz.) P. Beauv., Ess. Agrost. : 54, 168, 169. 1812; Haines, Botany 3 : 1045; Davey & Clayton in Kew Bull. 33(1) : 156. 1978; Cope in Fl. Pakistan No. 143 : 185. 1982. *Panicum burmanii* Retz., Obs. Bot. 3 : 10. 1783. (*Nini*-Hindi; *Kanguria*-Oriya).

Slender annual herbs; culms prostrate, often roots from nodes. Leaf-sheaths glabrous or hairy, loose, upto 1.5 cm long; leaf-blades lanceolate to narrowly ovate, base asymetric, with scattered while hairs on both sides, 2-6 cm long; ligule a membrane. Inflorescences a

panicle, 2.5-10 cm long, inclined or nodding, of 3-6 spiciform, secund racemes 5-15 mm long, on a central axis; rachis triquetrous, hirsute; spikelets lanceolate, 1-3 mm long, pubescent, 1-2-nate, 2-flowered, awned; lower glumes abaxial ciliate, ovate, 3-veined, awn 5-15 mm long; upper glumes 5-veined, awned; lower lemma about 2 mm long, 7-9-veined, empty, awned; upper lemma chartaceous or coriaceous, ovate, 3-veined, paleate; lodicules 2; stamens 3; styles 2; stigmas plumose. Grains oblong, free within glumes.

Type: India, *Koenig* (LD).

Fl. & Frt.: Sept.-Feb.

Common in shady moist places, forming mats.

Khondra : 12705; Achanakmar : 15430.

2n = 18, 20, 36, 40, 44, 54, 72.

Pantropical.

Apparently, cattle do not graze this grass because of its scaberulous short stout awns, but when young, it is much relished ; also yields good hay.

O. compositus (L.) P. Beauv., Ess. Agrost. : 54. 168. 169. 1812; Haines, Botany 3 : 1045; Cope in Fl. Pakistan No. 143 : 185. 1982. *Panicum compositum* L., Sp. Pl. : 57. 1753. *Orthopogon compositus* (L.) R. Br., Prodr. : 194. Apr. 1810.

Slender, perennial herbs; culms decumbent, often roots from nodes. Leaf-sheaths upto 2 cm long; leaf-blades lanceolate to narrowly ovate, base often ciliate, 2-15 cm long; ligule membranous, ciliate. Inflorescences a panicle, 10-20 cm long, of 2-8 spiciform, secund racemes 3-8 cm long; rachis glabrous or loosely pilose, triquetrous; spikelets lanceolate, 2.5-3.5 mm long, 1-2-nate, glabrous or pubescent, 2-flowered, awned; lower glumes abaxial, ciliate, 1.2-2.5 mm long, 3-veined; awns 4-10 mm long; upper glumes 5-7-veined, 2.5 mm long, awns short or absent; lower lemma 3.5 mm long, 7-9-veined, mucronate, tip hispid, barren; palea narrow or absent; upper lemma coriaceous, 2-2.5 mm long; palea 2-veined, shining; lodicules 2; stamens 3; styles 2; stigmas plumose. Grains oblong, free within glumes.

Type: Sri Lanka, *Hermann* (BM).

Fl. & Frt.: Oct.-Dec.

Common in moist places, open forest clearings forming nettled mats, along forest roads.

Khondra : 12780, 12820: Kota : 13079; Katghora : 3978.

2n = 18, 40, 54, 54 + 6 — 13 B, 72; (*compositus* × *burmannii*- 2n = 54).

Pantropical.

Cattle do not graze this grass for reasons stated earlier; horses reject the grass in some areas.

ORYZA L., Sp. Pl. : 333. 1753 & Gen. Pl. ed. 5. : 155. 1754: Sharma & Sastry in Kachroo, Adv. Front. Cytogen : 5-20. 1974.

T. : *O. sativa* L.

Padia Moritzi, Syst. Verzeich, Zoll. : 103. 1845.

T. : *P. meyeriana* Zoll. & Mor.

Note : *Oryza sativa* L. (2n = 24, 26, 36, 38, 48, 33-99) is cultivated in the district. It was probably derived from, *O. rufipogon* Griff., wild in the Nepal-Yunnan area some 2,500 years ago, with some evidence that the two major races, tropical *Indica* and cool-tolerant *Japonica*, were domesticated independently Probably it arose as a selected weed in *Colocasia* fields in several centres of domestication; now principal source of carbohydrate in Asia, the unhusked grain being known as *paddy*; many cvs grouped as low-land (grown under inundation) and upland (dry) rice; some glutinous and used for puddings; others not so; the world's most important food plant eaten with curries and in Eurasia, as *paella* and *risotto*, but often without the husks (*pearl rice*) when much protein and vitamins removed and often 'polished'; the husks and polishing (*Shude*-Sansk.; '*Kunda*'-Oriya) are important cattle-feed; rice flour eaten after cooking and as breakfast foods etc.; and as commercial starch, fermented to give beer and eventually *Sake* (*Saki*).

Oryza glaberrina Steudel (*red rice*) was domesticated in West Africa from *O. barthii* (Chang in Euphytica 25 : 425-441. 1976. et Genet. Sel. Evol. 17 : 89-114. 1985) some 3,500 years ago.

Oryza rufipogon Griff., Notul. 3 : 5. 1851; Bor, Grasses : 605. 1960; Hara *et al.*, Enum. 1 : 138. 1978. *O. sativa sensu* Haines, Botany 3 : 1025, 1924, non L. (*Balunga*-Oriya).

Perennial, coarse, marshy herbs; culms often spongy below; rhizomes white. Leaf-sheaths striate, inflated; leaf-blades flat, 10-50 cm long, acuminate, striated; ligule membranous, 8-12 mm long. Inflorescences an effuse panicle 4-6 cm long, somewhat nodding, branches many, scabrid, racemose with short-pedicelled spikelets; spikelets 7-10 mm long, laterally compressed, 1-flowered, bisexual, pedicelled, long awned, deciduous, pedicel annular at tip, 1-2 mm long; glumes very much reduced or absent; lemma 2-3 mm long, chartaceous lanceolate, acute keeled, many-veined, scabrid, long-awned; awns 5-7 cm long, barbed or hispid; palea of similar texture, keeled, with narrow hyaline wings; lodicules 2; stamens 6; styles 2; stigmas 2, plumose. Grains oblong to elliptic.

Fl. & Frt. : Oct.-Feb.

Occasionally found in marshy places, in rice fields.

Belghana : 16772; Lanmi : 13235A; Kota to Bilaspur : 13062; Khondra : 12750, 12754.

2n = 24.

India, Nepal, Burma.

Eaten by buffaloes; but rejected by cattle because of its coarse foliage.

Note : It is very similar to cultivated rice and hybridizes freely with it. Gamble (Fl. Madras : 1844. 1934) considered this as a variant of *Oryza sativa* L. Spikelets of *O. sativa* L., are persistent and awns are smooth, but in *O. rufipogon*, the spikelets are caducous and awns hispid or barbed. The grains are consumed in time of scarcity. *O. sativa* L. var. *fatua* Prain, Bengal Pl. 2 : 1184. 1903, p.p., is a synonym of *O. nivara* Sharma & Sastry (1965).

PANICUM L., Sp. Pl. : 55. 1753 & Gen. Pl. ed. 5 : 29. 1754.

LT. : *P. miliaceum* L. (vide Hitchcock et Chase, Contr. U. S. Natl. Herb. 15 : 14. 1910).

Note : *Panicum miliaceum* L. (*Proso millet*) is grown as a cereal crop and is used as flour, alcoholic drink and pig-food. *P. sumatrense* Roth ex Roem. et Schult. (*Little millet, Sama*) has also been domesticated, it is derived from the wild species. *P. psilopodium* Trin. (de Wet *et al.*, in Journ. Agric. Trop. Bot. Appl. 30 : 159-168. 1983). *P. maximum* Jacq. (*Guinea grass*) and *P. coloratum* L. (*Buffalo grass*) are widely grown for fodder. *P. turgidum* Forssk., is a desert forage species (Williams & Farias in Econ. Bot. 26 : 13-20. 1972).

P. atrosanguineum Hochst. ex Rich. and *P. tripheron* Schult., are expected in the district.

1a. Leaf-base deeply cordate; lower glumes half or more of the length of spikelets; upper glumes 5-veined or if 7-veined then lower lemma 5-veined — *P. notatum*

1b. Leaf-base sub-cordate; lower glumes less than half the length of spikelets; upper glumes 9-11-veined or if 7-veined then lower lemma 7-9-veined

2a. Perennial herbs; culms below creeping, stoloniferous, spongy; spikelets lanceolate — *P. paludosum*

2b. Annual herbs; culms not stoloniferous and spongy; spikelets ovate-oblong to elliptic

3a. Leaves lanceolate, not tapering from base; panicles effuse; spikelets deciduous; lower glumes ovate — *P. psilopodium*

3b. Leaves linear, tapering from base; panicles contracted, nodding; spikelets persistent; lower glumes orbicular — *P. sumatrense*

Panicum notatum Retz., Obs. Bot. 4 : 18. 1786; Bor, Grasses : 701. 1960; Hara *et al.*, Enum. 1 : 139. 1978. *P. montanum* Roxb., Fl. Ind. 1 : 315. 1820; J. D. Hook., FBI 7 : 53. 1896; Haines, Botany 3 : 1042; Bor, Grasses : 329. 1960.

Perennial herbs; culms smooth, hard, bamboo-like. Leaf-sheaths usually pubescent; leaf-blades 12-15 cm long, lanceolate, deeply cordate, glabrous or pilose, base ciliate. Inflorescences a large terminal effuse panicle, 25-45 cm long; branches capillary, 1-3-nate; spikelets 1.5-2 mm long, solitary, articulate on long capillary pedicels; lower glumes 3-5-veined, ovate, shorter than the upper; upper glumes obtuse, elliptic, as long as spikelets; lower lemma obtuse, elliptic, epaleate; upper lemma crustaceous, polished brown, ovate, acute, 2 mm long, paleate; lodicules 2; stamens 2; styles 2; stigmas 2, plumose. Grains tightly enclosed by hardened glumes.

Fl. & Frt. : Aug.-Nov.

Common in open places and also inside forests.

Madai : 12914; Kabirchabutra : 13306.

2n = 18, 36, 72, 82-84.

Tropics of the Old World.

P. paludosum Roxb., Fl. Ind. 1 : 310. 1820; Bor. Grasses : 329. 1960; Cope in Fl. Pakistan No. 143 : 169. 1982. *P. proliferum sensu* J. D. Hook., FBI 7 : 50. 1896, non Lam. 1797; Haines, Botany 3|: 1041, (*Borati*-Beng.).

Perennial, marshy, creeping herbs; culms spongy, ascending; rooting at lower nodes. Leaf-sheaths striate, glabrous, inflated; leaf-blades linear or ensiform, acute, serrulate, 7-30 cm long: ligule a ridge of stiff hairs. Inflorescences a panicle, ovate or oblong, 7-20 cm long, with erecto-patent, whorled or fascicled, scaberulous branches; spikelets 3-4 mm long, narrowly lanceolate, solitary, sessile or short-pedicelled; lower glumes orbicular, hyaline 0.7-0.8 mm long, obtuse or truncate, veinless; upper glumes lanceolate, 7-9-veined, longer than lower; lower lemma similar, paleate or not, male or neuter; upper lemma crustaceous, oblong, acuminate, 2.2 mm long, pale brown, smooth, polished, paleate; lodicules 2; stamens 2; styles 2; stigmas 2, plumose. Grains pale, biconvex to plano-convex.

Type : Described from India.

Fl. & Frt. : July-Nov.

Common in marshy places, along streams.

Katghora : 8733; Pasarkhet to Siang : 19410; Pasan : 13284A.

2n = 36, 54.

Pakistan, Nepal, India, Sri Lanka, Burma to Tropical South-East Asia, Australia.

Elephants and buffaloes are very fond of this species. Grains are used by tribals for making cake-like preparations.

P. psilopodium Trin., Gram Panic : 217. 1826; J D. Hook., FBI 7 : 46. 1896; Haines, Botany 3 : 1039; Bor, Grasses : 329. 1960; Cope in Fl. Pakistan No. 143 : 170. 1982. *P. psilopodium* var. *coloratum* J. D. Hook., FBI 7 : 47. 1896

Slender, annual, broom-like herbs; culms tufted, erect or ascending. Leaf-sheaths glabrous, loose, striate; leaf-blades lanceolate, acuminate, glabrous or with short spreading hairs towards base, 7-25 cm long; ligule a row of hairs. Inflorescences a spreading panicle, ovate or oblong, 4.5-15 cm long, branches capillary, whorled in lower part of panicles; spikelets greenish, geminate, oblong, 1.5-2.5 mm long; lower glumes ovate, acute, 5-veined, shorter than the upper; upper glumes oblong-ovate, 9-11-veined; lower lemma similar, 9-veined, paleate, neuter; upper lemma coriaceous, oblong or narrow-ellipsoid, acute or obtuse, 1.8 mm long, smooth, polished; lodicules 2; stamens 2; styles 2; stigmas 2, plumose. Grains pale.

Type: Described from India.

Fl. & Frt.: July-Jan.

Common near cultivated fields, waste places.

Khuria : 15464, 19353; Bilaspur : 13011.

2n = 36, 40, 54.

India, Nepal, Sri Lanka, Burma, Malaysia.

Used as fodder; grains used in preparation of alcoholic beverages.

Note: This is a variable species. Two varieties have been recognised viz. var. *psilopodium* with greenish spikelets and var. *coloratum* J. D. Hook., with purplish spikelets. Specimens from Bilaspur district are referable to var. *psilopodium*.

P. sumatrense Roth ex Roem. et Schult., Syst. Veg. 2 : 434. 1817; Bor, Grasses : 701. 1960; Hara *et al.*, Enum. II : 139. 1978. ***P. miliare*** Lam., Ill. 1 : 173. 1791; Haines, Botany 3 : 1039; Bor, Grasses : 329, 1960. (*Little millet*; *Suniva*-Oriya; *Sava*-Marathi; *Sama*).

Slender, annual herbs. Leaf-sheaths glabrous or hirsute; leaf-blades linear, 15-50 cm long, base broad, glabrous or finely hairy; ligule a narrow row of hairs. Inflorescences a panicle, contracted or thyrsiform, often nodding, 10-25 cm long; spikelets solitary or geminate, acute, 2-3 mm long, mostly paired on unequal pedicels, sometimes solitary: lower glumes broad amplexicaul, sub-truncate, acute, 3-5-veined; upper glumes elliptic or ovate-lanceolate, obtuse 9(-13)-veined; lower lemma similar, paleate, neuter; upper lemma coriaceous, elliptic, oblong to broadly ovate, shining, white or pale brown; lodicules 2; stamens 2; styles 2; stigmas 2, plumose. Grains pale brown.

Fl. & Frt.: July-Feb.

Commonly cultivated, also occurs as escape, feral and wild.

Pasarkhet : 19386, 19440; Terhapani : 16727.

2n = 18, 36.

India, Nepal, S. E. Asia, Malaysia.

Fresh leaves contain carotine 18.50 mg/100g. Grains used like rice for puddings and cakes or cooked as rice.

Note: It is thought to be the cultivated form of *P. psilopodium* from which it differs by its slightly larger, sub-persistent spikelets and contracted panicle.

PASPALIDIUM Stapf in Prain, Fl. Trop. Afr. 9 : 582. 1920.

LT. : *P. geminatum* (Forssk.) Stapf (*Panicum geminatum* Forssk.) (vide E. P. Phillips, Gen. S. African Fl. Pl. ed. 2. 96. 1961).

Note : Mabberley (1987) lists this genus as an alternate name for *Setaria* P. Beauv. *nom. cons.*

1a. Annual herbs; racemes shorter than internodes; spikelets 1.5-2.5 mm long; lower floret male, with a palea; upper lemma granular, not rugulose — *P. flavidum*

1b. Perennial herbs; racemes longer than internode; spikelets 3-3.5 mm long; lower floret sterile, without a palea; upper lemma rugulose — *P. punctatum*

Paspalidium flavidum (Retz.) A. Camus in Lecomte, Fl. Gen. Indo-China 7 : 419. 1922; Haines, Botany 3 : 1047; Bor, Grasses : 333. 1960; Cope in Fl. Pakistan No. 143 : 190. 1982. *Panicum flavidum* Retz., Obs. Bot. 4 : 15. 1786; J. D. Hook., FBI 7 : 28. 1896. (*Bilainangi*-Oriya).

Annual, decumbent herbs. Leaf-sheaths inflated, lower tumid, mouth hairy; leaf-blades sub-bifarious, linear or linear-lanceolate, obtuse or suddenly acute, 7-15 cm long; ligule a ciliolate rim or absent. Inflorescences 5-20 cm long, of several, alternate, spiciform, straight racemes 1.5-2.5 cm long, on a common axis, distant by 2-4 times their own length; rachis narrowly winged from a triquetrous mid-rib, glabrous; spikelets ovoid, dorsally compressed, sub-distichously secund, 2-3 mm long, sessile; lower glumes abaxial, sub-orbicular, 0.8-1 mm long, 3-veined, membranous; upper glumes 7-veined, 2-2.5 mm long; lower lemma sub-orbicular, often short-cuspidate, 5-veined; upper lemma crustaceous, acute, orbicular, white or brownish; palea acute, tightly embraced by lemma; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains tightly enclosed in lemma and palea, elliptic, dorsally compressed.

Type : Sri Lanka, *Koenig*.

Fl. & Frt. : July-Oct.

Common on moist shady gruond; in forest undergrowths, roadsides ditches.

Pasan to Pendra : 19134; Lamni : 13253, 19219; Madai : 12928; Keonchi : 15381.

2n = 18, 36, 44, 54, 56.

Tropical Asia.

Grains are used during famine. Cattle graze this grass with fervour.

P. punctatum (N. Burm.) A. Camus in Lecomte, Fl. Gen. Indo-China 7 : 419. 1922; Haines, Botany 3 : 1047; Bor, Grasses : 333. 1960; Cope in Fl. Pakistan No. 143 : 188. 1982. *Panicum punctatum* N. Burm., Fl. Ind. : 26 1768; J. D. Hook., FBI 7 : 29. 1896.

Perennial, decumbent herbs; culms fistular and spongy below, rooting at lower nodes. Leaf-sheaths inflated; leaf-blades sub-bifarious, linear, bluntly acute or usually acuminate, flat or folded, 10-20 cm long; ligule a ring of hairs. Inflorescences 10-25 cm long, of several, alternate, spiciform, straight racemes 1-4.5 cm long on a common axis, internodes shorter than or as long as racemes; rachis narrowly winged, 3-quetrous, glabrous, with 2-seriate depressions in which spikelets lie; spikelets dorsally compressed elliptic, acute, secund, pale, 2-3 mm long, sessile; lower glumes abaxial, 0.7 mm long, truncate, membranous; upper glumes obovate or sub-orbicular, 1.4 mm long, 3-veined; lower lemma elliptic or ovate, 3-5-veined; upper lemma ovate, cuspidate, crustaceous; palea acute, embraced by lemma; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains tightly enclosed in lemma and palea, elliptic, dorsally compressed.

Type: India, *Plukenet* (BM).

Fl. & Frt.: Sept.-Nov.

Common in muddy places, in water.

Keonchi : 13261; Khondra : 12749.

2n = 36, 54.

N. Africa, Tropical Asia.

Cattle graze this grass.

PASPALUM L., Syst. Nat. ed. : 10. 855. 1759.

LT.: *P. dimidiatum* L., *nom. illeg.* [*Panicum dissectum* L. *Paspalum dissectum* (L.) L. (vide Nash in N. L. Britton et. A. Brown, Ill. Fl. N.U.S. ed. 2.1 : 126. 1913)].

Note: *Paspalum distichum* L. and *P. vaginatum* Sw., are found in coastal and inland salt marshes. A race of the weedy wild species, *P. scrobiculatum* L., has been domesticated as a cereal ('Kodo') in India, probably some 3,000 years ago and is an animal feed. (de Wet *et al.*, in Econ. Bot. 37 : 159-163. 1983). *P. dilatatum* Poiret (*Dallis grass*) and *P. notatum* Fluegge (*Bahia grass*), introduced from

America are grown for fodder. *P. conjugatum* Berg. (*Sour grass*) and *P. dilatatum* Poir. are sometimes troublesome weeds.

1a. Perennial, aquatic herbs with rhizome and long creeping stolons; spikelets ovate-oblong, acute; rachis narrower than 2-seriate spikelets; upper glumes herbaceous, appressed pubescent — *P. distichum*

1b. Annual herbs, not aquatic, without stolons; spikelets rotundate-elliptic or broadly elliptic to almost orbicular, obtuse; rachis as broad as 2-seriate spikelets; upper glumes papery, glabrous — *P. scrobiculatum*

Paspalum distichum L., Syst. Nat ed. 10.2 : 855. 1759; Nicolson *et al.*, *Regnum* Veget. 119 : 312. 1988. *Digitaria paspalodes* Michaux, Fl. Bor. Amer. 1 : 46. 1803. *Paspalum paspalodes* (Michaux) Scribn., in Mem. Torrey Bot. Club 5 : 29. 1894 (as '*paspaloides*'); Cope in Fl. Pakistan No. 143 : 211. 1982. Karthikeyan *et al.*, Flor. Indic. Enum. Monocot. 244. 1989. *Tereta-pullu* Rheede, Hort. Malab. 12 : 81, t. 44. 1693.

Decumbent herbs; culms creeping and rooting. Leaf-sheaths flattened, inflated; leaf-blades flat, linear or narrowly lanceolate, 5-10 cm long, narrow distichous, strict, glabrous or sparsely hairy; ligule short, membranous. Inflorescences of 2(-4) conjugate, spiciform racemes, each 1.5-4 cm long on elongated central axis; spikelets 2.5-3 mm long, plano-convex, ovate, in 2 rows, appressed to flattened rachis 1-2 mm wide; lower glumes reduced to a scale; upper glumes membranous, puberulous, epaleate; lower lemma similar, glabrous, ovate, mid-vein distinct; lower floret barren, epaleate; upper lemma elliptic, sub-coriaceous, whitish; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains oblong.

LT. : Described from South Carolina, USA (Linn. Herb. 79.9, second sample as the left hand spec. : LINN) (vide Guedes in Taxon 25 : 513. 1976).

Fl. & Frt. : Oct.-Nov.

Occasionally found in marshy places, along ditches, canals.

Kota : 13067; Achanakmar : 13211A.

2n = 20, 40, 48, 60, 43-60.

Native to America but naturalized in Pantropics.

A valuable pasture grass and a soil-binder.

Note : Proposal to reject *Paspalum distichum* L. (Taxon 29 : 339-340. 1980) was unanimously rejected (cf. Taxon 32 : 28. 1983). Mabberley (1987) lists *P. vaginatum* Sw., as a synonym of *P. distichum* L. but Brummitt (Taxon 32 : 281 1983) and Karthikeyan *et al.*, (1989) treat them as distinct.

P. scrobiculatum L., Mant. Pl. 1 : 29. 1767; J. D. Hook., FBI 7 : 10. 1896; Haines, Botany 3 : 1046; Bor, Grasses : 340. 1960; Clayton in Kew Bull. 30(1) : 101. 1975; Cope in Fl. Pakistan No. 143 : 213. 1982. *P. commersonii* Lam., Encycl. Meth. Bot. 1 : 175. t. 43. f. 1. 1791; Bor, Grasses : 335. 1960. *Paspalum orbiculare* Forst., Fl. Insul. Austr. Prodr. : 7. 1786. (*Kodo-millet*; *Kodoa dhan*-Beng.; *Kodika*-Hindi)

Erect or decumbent herbs. Leaf-sheaths inflated; leaf-blades flat, linear, 5-20 cm long, distichous, glabrous or sparsely hairy, acuminate; ligule of long hairs. Inflorescences of 2-6 spiciform racemes, digitate or borne on an axis upto 6 cm long; racemes 4-10 cm long, with spikelets borne singly on a flattened rachis; rachis scabrid on edges; spikelets 1.5-3.5 mm long, plano-convex, in 2, rarely 3-4 rows, imbricate; lower glumes absent; upper glumes 3-7-veined, membranous, epaleate not winged; lower lemma similar; lower floret barren, epaleate; upper lemma crustaceous, 5-veined with inflexed margins embracing edges of coriaceous palea; palea with lower margins broadly inflexed, shallowly lobed and embracing grains; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains plano-convex, oblong.

Type: India, cultivated at Uppsala (LINN).

Fl. & Frt.: July-Nov.

Commonly cultivated as a livestock feed; also grows wild.

Korbi : 19103; Khondra : 12774.

2n = 20, 40, 50, 54, 50-63, 60, 90, 120 (as *P. commersonii*); n = 40, 56, 80 (as *P. scrobiculatum*).

Palaeotropics.

Grains, after preservation for six months, should be cooked, as the freshly harvested ones are poisonous.

Note: It is a highly polymorphic species, but with variations apparently continuous; possibly, it represents a swarm of apomicts (Cope, *l.c.*).

PENNISETUM L. C. Rich. in Pers., Syn. Pl. 1 : 72. 1805.

LT.: *P. typhoideum* L. C. Rich. *nom. illeg.* [*Holcus spicatus* L., *P. spicatum* (L.) Koern.] (vide Hitchcock, U.S. Dept. Agric. Bull. 772 : 245. 1920). [=*Pennisetum americanum* (L.) Leeke].

Note: The nomenclature of *Pearl millet, Bajra,* has been most confused over the several centuries. Recent studies have straightened out the correct nomenclature as set out below:

Pennisetum americanum (L.) Leeke, Zeischr. fue Naturw. 79 : 52. 1907; Terrel in Taxon 25(2) : 297-304. 1976. Karthikeyan *et al.*, Flor. Indic Enum. Monocot. 245. 1989. [as (Art. 34-1) (L.) K. Schum. 1895]. *Panicum americanum* L., Sp. Pl. : 56. 1753. Syst. Nat. ed. 10. 1759. Type: LINN. 1212.1, labelled HU & 1212.2. A native of Africa & America, *Sphalm. Holcus spicatus* L., Syn. Fl. ed. 10. 1305. 1759; Sp. Pl., ed. 2. 1762. *Pennisetum spicatum* (L.) Koernoke in Koern. & Werner, Handb. Getreidebaues 1 : 284. 1885. *P. typhoides* (N. Burm.) Stapf & C. F. Hubbard in Kew Bull. 1933 : 271. 1933. *Alopecurus typhoides* N. Burm. Fl. Ind. : 27. 1768. *P. typhoideum* L. C. Rich., in Pers. Syn. Fl. 1 : 72. 1805 (*Pearl* or *Spiked millet, Bulrush, Bajri*).

It is the most drought-tolerant of the tropical cereal crops, domesticated in West Africa about 2,000-3,000 B.C., from wild ruderal species, *P violaceum*, with which it hybridises readily. It is a food crop, as also used in the beer-making. Spikes of *P. typhoides* are 12-34 mm wide; those of *P. americanum* L. 18-50 mm wide.

Setaria glauca (L.) Beauv. (*Panicum glaucum* L., Sp. Pl. : 56. 1753. var. γ) is the correct name for yellow foxtail.

1a. Perennial herbs; upper and lower lemma alike, lower not 3-lobed; upper floret not deciduous; rachis ribbed, ribs not winged — *P. hohenackeri*

1b. Annual herbs; lemmas hetero-morphous, lower often 3-lobed; upper floret deciduous; rachis with decurrent wings on ribs below pedicels

2a. Spikelets pedicelled or in groups of 2-5 with one sessile and other pedicelled; lower glumes at least half length of lower lemma; upper lemma smooth — *P. pedicellatum*

2b. Spikelets sessile; lower glumes minute; upper lemma ciliate at tip — *P. polystachion*

Pennisetum hohenackeri Hochst. ex Steud., Syn. Pl. 1 : 103. 1854; Bor, Grasses : 344. 1960; Cope in Fl. Pakistan No. 143 : 237. 1982. *P. alopecuros* Steud., Syn. Pl. 1 : 102. 1854, non Jacq. 1844; J. D. Hook, FBI 7 : 84. 1896. (*Moya grass*).

Robust, tufted herbs. Leaf-sheaths flattened, keeled, often villous; leaf-blades 30-45 cm long, linear, convolute, base often villous; ligule of hairs. Inflorescences of linear, spiciform panicles 10-25 cm long; rachis with shallow angular ribs below cupular scars, scaberulous; branches short, simple with solitary spikelets; bristles glabrous; spikelets 6-8.5 mm

long, narrowly lanceolate, 2-flowered, deciduous with subtending involucre of bristles; lower glume hyaline, acute or rotund or often suppressed; upper glume hyaline, 1-3-veined, acute or emarginate; lower lemma lanceolate, 7-11-veined if palea present, then male; upper lemma like the lower, 5-veined; palea 2-veined; lodicules absent; stamens 3; styles 2; stigmas 2, plumose. Grains oblong or orbicular.

Type: India, "In montibus Nilagiri", *Hohenacker* 930 (K).

Fl. & Frt.: Oct.-Feb.

Common in open places, near cultivated fields.

Achanakmar : 13210A; Kabirchabutra : 13379.

2n = 18, 36.

Tropical Africa, Madagascar, India, Nepal.

This species is suggested for paper-making, cordage and brooms.

P. pedicellatum Trin. in Mem. Acad. Sci. Petersb. Ser. 6. 3 : 184. 1834; J. D. Hook., FBI 7 : 86. 1896; Haines, Botany 3 : 1032; Bor, Grasses : 346 1960. *P. araneosum* Edgew. in Cat. Fl. Banda Dist. : 56, et in J. Asiat. Soc. Beng. 21 : 180. 1852. Type: Grows along the granite rocks on the hills about Banda.

Robust herbs; culms often fastigiately branched above. Leaf-sheaths compressed, often hairy; leaf-blades 15-25 cm long, linear, flaccid. Inflorescences spiciform panicles, reddish, 4-10 cm long; bristles densely plumose; spikelets solitary, 3.2 mm long, narrowly lanceolate, geminate, deciduous with subtending involucre of bristles; lower glumes minute, oblong, woolly or reduced to a tuft of villi; upper glumes hyaline or chaffy, lanceolate, short-awned or cuspidate, 5-veined; sparsely villous lower lemma 2.5-3 mm long, oblong, 3-5-veined; lower floret male or barren; upper lemma coriaceous, lanceolate, margins infolded, tip acute, shining, paleate; lodicules absent; stamens 3; styles 2; stigmas 2, plumose. Grains oblong.

Type locality : Africa.

Fl. & Frt.: Oct.-Nov.

Common in rocky places, open ground.

Katghora : 6068.

2n = 18, 36, 42, 48 54.

W. Africa, India.

A good fodder grass both for cattle and horses; gives good fodder and hay when harvested before flowering.

Note : Despite the extraordinary discontinuous distribution, the specimens from both areas seem to be identical (Bor, *l.c.*).

P. polystachion (L.) Schult. Syst. Veg. : 146. 1824; Bor, Grasses : 346. 1960; Hara *et al.* Enum. 1 : 140. 1978. *Panicum polystachion* L., Syst. Nat. ed. 10. 2 : 870. 1759 (as '*polystachyon*'). *Pennisetum setosum auct.* non (Swartz.) L. C. Rich. 1805; J. D. Hook., FBI 7 : 87. 1896; Haines, Botany 3 : 1032. (*Thin or Dryland Napier grass*).

Tall herbs; culms fastigiately branched above. Leaf-sheaths compressed, often hairy; leaf-blades 15-25 cm long, linear, flaccid, glabrous or hairy. Inflorescences of linear, spiciform, panicles 4-8 cm long, bristles sparsely ciliate or scabrid, rachis deeply pitted, glabrous; spikelets solitary, sessile, 2.5 mm long, deciduous with subtending involucre of bristles; lower glumes minute or absent; upper glumes hyaline, lanceolate, 5-veined, tip truncate, 3-toothed; glabrous; lower lemma 2.5 mm long, truncate, 5-veined, 3-toothed; lower floret male or barren; upper lemma coriaceous, ovoid, margins infolded, covering about half of palea; lodicules absent stamens 3; styles 2; stigmas 2, plumose. Grains oblong.

Type : Rumph. 6. t. 7, f. 28.

Fl. & Frt. : Oct.-Dec.

Common in open places, near cultivated grounds.

Katghora : 6034.

2n = 34, 36, c. 48, c. 52, 54, 63.

Palaeotropics.

It is a good fodder grass when young; drought-resistant, can be grown under harsh conditions in poorest soils under rainfed conditions.

Note : *Pennisetum purpureum* Schum, is the Napier grass or Elephant grass and is occasionally cultivated in the district.

PEROTIS W. Ait., Hort. Kew. ed. 1. 1 : 85. 1789.

T. : *P. latifolia* W. Ait. *nom. illeg.* [*Saccharum spicatum* L., *P. spicata* (L.) T. & H. Durand].

Perotis indica (L.) Kuntze, Rev. Gen. Pl. 2 : 787. 1891; Nicolson *et al.*, Regnum Veget. 119 : 312. 1988. *Anthoxanthum indicum* L., Sp. Pl. : 28. 1753. *Saccharum spicatum* L., Sp. Pl. : 54. 1753. *Perotis latifolia* W. Ait., Hort. Kew. 1 : 85. 1789, *nom. illeg.* Haines, Botany 3 : 1024 *Tsjeria-kuren-pullu* Rheede, Hort. Malab. 12 : 117. t. 62. 1693.

Perennial, tufted herbs; culms usually geniculate and ascending. Leaf-sheaths short glabrous; leaf-blades 2-2.5 cm long, flat, ovate, acute, base amplexicaul and ciliate, margin spinulose; ligule absent or ciliate rim. Inflorescences in terminal, slender spike-like racemes, 7-15 cm long, often purplish, rachis and short pedicels pubescent; spikelets often purplish, linear-lanceolate, scattered all around rachis, short-pedicelled, 1.5-1.7 mm long, 1-flowered, awned; rachilla disarticulating below glumes; lower glumes laterally compressed, lanceolate, membranous, 1-veined, hairy, awned; upper glumes similar; lower lemmas hyaline, lanceolate, 1-veined, paleate; palea 2-veined, hyaline lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains longer than glumes, linear-lanceolate.

Fl. & Frt. : July-Dec.

Common in open dry places.

Karidongri : 19316; Pasarkhet : 12969; Katghora : 6094.

2n = 20, 40.

India, Nepal, Sri Lanka, Burma, Malaya.

A good fodder grass, relished by cattle.

Note : It is very similar to *P. hordeiformis* Nees except that in *P. indica* the callus is more pronounced, 0.2-0.5 mm long and the hairs on the glumes are scattered instead of being in rows.

PHRAGMITIES Adans., Fam. Pl. 2 : 34, 559 1763.

T. : *P. australis* (Cav.) Trin. ex Steud. [Fund. Agrost. : 134. 1822 ('1820'); *Arundo phragmites* L.].

Phragmites karka (Retz.) Trin. ex Steud., Nom. Bot. ed. 2, 2 : 324. 1841; Haines, Botany 3 : 997. Nicolson *et al.*, Regnum Veget. 119 : 312. 1988. *Arundo karka* Retz., Obs. Bot. 4 : 21. 1786. *Trichoon karka* (Retz.) Roth, Arch. Bot. (Leipzig) 1(3) : 39. 1798. *Nain-canna* Rheede, Hort. Malab. 12 : 139, t. 73. 1693. [*Danube grass* (Eng.); *Reed, Nala* (India)].

Robust, perennial reed-like herbs; culms fistular; rhizomes creeping. Leaves flat, distichous, linear to lanceolate, 30-60 cm long; ligule a ridge of

short hairs. Inflorescences in large, compound, dense, profusely branched panicles, 15-60 cm long, silky hairy, lowest node often many-branched in a whorl, branches bare of spikelets for some distance from their base, bearded at base of lowest branches; spikelets grey or brown, 3-10-flowered, 1-1.5 cm long; rachilla disarticulating between lemmas, white, ciliate, rachilla-hairs 4-6 mm long; lowest floret abortive, succeeding ones bisexual, upper-most almost reduced; glumes unequal, membranous, ovate-lanceolate, acute to sub-acute, 3-5-veined, 3-6 mm long, spreading, persistent; lowest lemmas abortive, 3-veined, 1-1.3 cm long, persistent; palea membranous, 2-keeled; upper lemmas linear, tip acuminate, 3-veined, 7-10 mm long; palea bisexual, 2-keeled; lodicules 2; stamens 3 or 2 in lowest floret; styles 2; stigmas 2, plumose. Grains oblong, terete.

Type: India, *Koenig* (LD).

Fl. & Frt.: Sept.-Feb.

Common in marshy places, along rivers.

Achanakmar : 13233; Pasan to Semra : 15360.

2n = 36, 38, 48.

Tropical Africa, Pakistan, India, Nepal, Sri Lanka, S. E. Asia, Australia.

Pulp is used for paper, cellophane, cardboard, synthetic textiles, fibre-board, fuel, alcohol, insulation and fertiliser, leaves used for mats (durma mats) in India; grains consumed by North Americans-Indian and the young shoots, by the Japanese.

Note: According to Cope (*l.c.*), *P. australis* (Cav.) Steud., *P. communis* Trin., and *P. karka* (Retz.) Trin. ex Steud., are allopatric for most of the range, the former temperate and the latter tropical. Pakistan (and India) lie on the ecotone and the taxonomic problems are, therefore, considerable. It is probable that introgression occurs in this region and, as a result, determination of specimens is largely arbitrary. Maberley (1993) reduces *P. communis* Trin., as a synonym of *P. australis*.

POGONATHERUM P. Beauv., Ess. Agrost. : 56. 176. 1812.

T.: *P. saccharoideum* P. Beauv., *nom. illeg.* [*Saccharum paniceum* Lam., *P. paniceum* (Lam.) *Hack.*].

Pogonopsis Presl, Rel. Haenk. 1 : 333. 1830.

T.: *P. tenera* Presl.

Note : 2-3 species, India to Japan ; Anthers 2 only.

1a. Spikelets upto 2 mm long ; callus-hairs about 2.5 mm long ; lower floret empty or reduced ; upper floret with 1 stamen — *P. crinitum*

1b. Spikelets 2.5-3 mm long ; callus-hairs upto 1.5 mm long ; lower floret male ; upper floret with 2 stamens — *P. paniceum*

Pogonatherum crinitum (Thunb.) Kunth, Enum. Fl. 1 : 478. 1833 ; J. D. Hook., FBI 7 : 141. 1896 ; Bor, Grasses : 200. 1960 ; Cope in Fl. Pakistan No. 143 : 273. 1982. *Andropogon crinitus* Thunb, Fl. Jap. 40. t. 7. 1784. *A. monandrus* Roxb., Fl. Ind. 1 : 264. 1820. *Pogonopsis tenera* Presl, Rel. Haenk. 1 : 333. 1830.

Slender, tufted herbs ; culms wiry, often trailing. Leaf-sheaths bearded ; leaf-blades 2.5-5 mm long, lanceolate or linear, acuminate, bearded at base. Inflorescences in solitary, terminal, spike-like racemes 1.5-5 cm long, dense, borne upon a flexuous peduncle bearing numerous long delicate yellow-brown awns ; rachis hairy, compressed ; spikelets 1-2 mm long, narrowly elliptic oblong, 2-nate, sessile, 1-2-flowered and pedicelled ones 1-flowered, pale, awned ; callus bearded with white hairs, 2 mm long ; lower glumes oblong, membranous, truncate, unawned ; upper glumes compressed, tip 2-toothed, awned, awns squarrose ; lower floret reduced to a hyaline lemma or absent ; upper lemma hyaline, keeled, tip 2-fid, long awned ; awns 8-20 mm long ; palea hyaline ; lodicules absent, stamen 1 or 2 ; styles 2 ; stigmas 2, plumose. Grains oblong.

Type : Described from Japan.

Fl. & Frt. : Oct.-Feb.

Common on slopes, between rock-boulders in streams, along roads in shady situations.

Achanakmar : 13223A.

2n = 20.

Afghanistan, Pakistan, India, Nepal, Burma, Thailand to vietnam, China, Malaysia, Japan.

Ashes of the plant is used in skin troubles.

P. paniceum (Lam.) Hack. in Allg. Bot. Zeit. 12 : 178. 1906 ; Cope in Fl. Pakistan No. 143 : 271. 1982. *Saccharum paniceum* Lam., Encycl. Meth. Bot. 1 : 595. 1785, et Ill. 1 : 155. t. 40, f. 3. 1791. *Pogonatherum saccharoideum* P. Beauv., Ess. Agrost. : 176, 177. 1812. *nom. illeg.* ; J. D. Hook., FBI 7 : 141. 1896 ; Haines, Botany 3 : 1063. (*Bonga-Carec*-Sansk.).

Slender, tufted perennial herbs; culms wiry, stiff, polished, usually erect. Leaf-sheaths bearded on margins; leaf-blades 2-7 cm long, lanceolate, bearded at base. Inflorescences in solitary, terminal, spike-like racemes, 2-5 cm long, dense, borne upon a flexuous peduncle bearing numerous long delicate yellowish-brown awns; rachis slender, hairy; pedicels bearded; spikelets elliptic-oblong, 2-3 mm long, 1-2-flowered, 2-nate, sessile 1-2-flowered and pedicelled 1-flowered, awned; callus bearded with white hairs upto 1.5 mm long; glumes membranous, dissimilar, lower oblong, truncate, rounded on back, unawned, upper compressed, keeled, with a long awn from notched tip; lower lemma absent or present, hyaline, epaleate; lower floret male, rarely bisexual; upper lemma hyaline, keeled, tip 2-fid, long-awned; awns flexuous, 10-15 mm long; palea hyaline, lodicules absent; stamens 2; styles 2; stigmas 2, plumose. Grains oblong.

Type: East Indies, *Sonnerat* (P).

Fl. & Frt.: July-Feb.

Common on slopes, sometimes on rocky substratum, gregarious near banks of streams.

Siang : 16831; Korbi : 19105.

2n = 40.

Afghanistan, Pakistan, India, Nepal, Sri Lanka, Burma, Thailand to Vietnam, China, Australia.

PSEUDOSORGHUM A Camus in Bull. Mus. Hist. Nat. Paris 26. : 662. 1920.

LT.: *P. fasciculare* (Roxb.) A. Camus (vide Clayton & Renvoize, Genera Gramineum : 340. 1986).

Note: 2 species; tropical Asia.

Pseudosorghum fasciculare (Roxb.) A. Camus in Bull. Mus. Hist. Nat. Paris 26 : 662. 1920; Bor, Grasses : 205. 1960; Hara *et al.* Enum. 1 : 144. 1978. *Andropogon fascicularis* Roxb., Fl. Ind. 1 : 269. 1820; J. D. Hook., FBI 7 : 177. 1896. *Sorghum fasciculare* (Roxb.) Haines, Botany 3 : 1034. 1924.

Annual herbs; culms erect, slender, nodes sparsely villous. Leaf-sheaths with tubercle-based hairs on margins, mouth bearded; leaf-blades 4-30 cm long, glabrous or hairy, linear, setaceously acuminate, base with tubercle-based hairs; ligule short-ovate. Inflorescences in lax, oblong panicles, branches fascicled; joints and pedicels equally compressed, densely villous

on margin; rachis fragile; spikelets 2-nate, white; sessile spikelets: 3.5-5 mm long, shining; callus bearded with white hairs; lower glumes coriaceous elliptic-oblong, truncate, hispid on keel above, 6-8-veined; upper glumes equal or slightly longer, coriaceous, cymbiform, 5-9-veined; lower lemma lanceolate, obtusely acuminate, hyaline, ciliate; upper lemma 2-fid, ciliolate, awned from sinus, paleate; stamens 3; pedicelled spikelets; 3-5 mm long, male; lower glumes 9-11-veined; upper glumes cymbiform, keel ciliolate; lower lemma lanceolate, ciliolate; upper lemma absent or narrowly oblong. Grains oblong, fusiform, dark brown.

Fl. & Frt.: Oct.-Nov.

Occasionally found along forest edges.

Madai : 12895A.

2n = 20.

India, Nepal, Burma, S. E. Asia.

SACCHARUM L., Sp. Pl. : 54. 1753 & Gen. Pl. ed. 5. 28. 1754.

LT.: *S. officinarum* L. ('*officinarum*') (vide Nash, N. Amer. Fl. 17 : 89. 1909).

Erianthus Michaux, Fl. Bor. Am. 1 : 54. 1803; Mukherjee, Loydia 21 : 157-188. 1958.

T.: *E. saccharoides* Michx.

Narenga Bor in Indian For. 66 : 267. 1940.

T.: *N. porphyrocoma* (Hance) Bor.

Note: 1. Clayton & Renvoize (1986) comment:

Traditional division of *Saccharum* L., into awned (*Erianthus*) and awnless species of *Saccharum* L., seems wholly artificial, *Narenga*, with its coriaceous glumes seems no more than the extreme expression of a trend found elsewhere in the genus.

2. *Saccharum* L., will hybridise with *Sorghum* L. (Gupta *et al.* Amer. J. Bot. 65 : 936-942. 1978). Hybrids with *Zea* L., remains unproven; those with *Bambusa* are definitely false, the reports being based on apomictic reproduction of *Saccharum* parent (Nair & Rathambal in Vistas Pl. Sci. 3 : 1-62, 1978).

3. *S. officinarum* L. (*Sugar cane; Noble cane*) is cultivated in the district. It seems to have originated in New Guinea and

comprises a complex of aggregate of hybrids based principally on *S. robustum* and *S. spontaneum* (Stevenson, Genetics and breeding of *Sugar cane*, 1965).

Sugar cane is the source of half of world's sugar; in the last century almost all cvs grown were derived from *S. officinarum* L., a cultigen, '*Noble cane*', but now hybrids with other species or cultigens are also grown, especially in the West Indies, Howaii etc. In refining sugar, uncrystallisable sugars, a by-product molasses or treacle from unrefined (muscovado); fermented juice gives *betsa-betsa* (Madagascar), and when distilled, *Rum*, the depth of its colour depends on level of caramel; the crushed fibre after extraction (*bagasse*) mixed with molasses, is used as cattle-feed; alone, it is used as fuel in mills, or for fibre-board and for some kinds of paper; wax is yielded by leaves; at times of high oil prices (1970-1980), used as alcohol source for automobiles; *Uba-cane*, an old cv is now used for fodder only.

1a. All spikelets pedicelled; glumes coriaceous, blunt at tip — *S. narenga*

1b. Spikelets 2-nate, one sessile and the other pedicelled; glumes membranous, atleast in upper part, acute — *S. spontaneum*

Saccharum narenga (Nees ex Steud.) Hack. in DC., Monogr. Phan. 6 : 119. 1889; Cope in Fl. Pakistan No. 143 : 261. 1982. *S. narenga* Wall., Num. List 298. No. 8856B. 1848. *nom. nud.*; J D. Hook., FBI 7 : 120. 1896; Haines, Botany 3 : 1060. *Eriochrysis narenga* Nees ex Steud., Syn. Pl. 1 : 411. 1855, based on *Saccharum narenga* Wall. *E. porphyrocoma* Hance ex Trin. in Jour. Bot. Lond. 14 : 294. 1876 *Saccharum porphyrocomum* (Hance ex Trin.) Hack. in DC., Monogr. Phan. 6 : 120. 1889. *Narenga porphyrocoma* (Hance ex Trin.) Bor in Indian For. 66 : 267. 1940, et Grasses : 198. 1960; Hara *et al.*, Enum. 1 : 138. 1978. (*Ronsa, Ganeria*-Hindi).

Tall, perennial herbs; culms pubescent above, glabrous below; nodes bearded. Leaf-sheaths with tubercle-based hairs; leaf-blades flat or folded, linear-lanceolate, sparsely hairy or glabrous, upto 180 cm long, mid-vein white, margins scabrid, narrowed at base into false petiole; ligule a fringe of hairs. Inflorescence a strict contracted panicle, 30-60 cm long, purplish or greyish-purple, lanceolate or oblong, with 1-4-nate, short, ascending branches 2-8 cm long on all sides of a central axis, all except central one breaking up at maturity; hairs on rachis of spikes and callus of spikelets usually red or purple; racemes spike-like; spikelets in pairs, 2.5-3 mm long, covered by silky hairs from callus, 1-2-flowered, 2-nate, sessile and

pedicelled, both similar, on articulate, fragile rachis; sessile spikelets falling with adjacent internode and pedicel; pedicelled spikelets falling from pedicel; lower glumes brown, coriaceous, 2-keeled, margins ciliolate; upper glumes 1-keeled, obtuse or apiculate; lower lemma hyaline, oblong-elliptic, ciliate, epaleate, awnless; upper lemma hyaline, ciliate, paleate; upper floret bisexual; lodicules 2; stamens 3; styles 2. Grains oblong.

Type: China, *Galbraith* 19285.

Fl. & Frt.: Aug.-Nov.

Common along roadsides, edges of forests, in damper valleys.

Achanakmar : 13209A.

2n = 30.

Tropical S. E. Asia.

Young leaves browsed by cattle. Culms tough and used for thatching, rough mats and screens; a good soil-binder.

S. spontaneum L., Mant. Pl. 2 : 183. 1771; Haines, Botany 3 : 1057; Cope in Fl. Pakistan No. 143 : 263. 1982. Nicolson *et al.*, Regnum Veget. 119 : 312, 1988. *Kerpa* Rheede, Hort. Malab. 12 : 85, t. 46. 1693. (*Kāsa-Kansa*-Hindi).

Tall perennial herbs; culms hairy above, glabrous below. Leaf-sheaths glabrous or villous at mouth; leaf-blades upto 1 m long, linear-lanceolate, flat or convolute above, gradually tapering towards base into a narrow wing on either side of petiole, glaucous, glabrous; ligule an ovate or deltoid membrane. Inflorescences in contracted or spreading, silvery white panicle of spike-like racemes, 30-60 cm long; with 1-4-nate short, ascending branches on all sides of a central axis, all except central one breaking up at maturity; racemes 3-15 cm long; internodes and pedicels hairy; callus-hairs longer than spikelets; spikelets in pairs, 3-5 mm long, lanceolate, covered by silky hairs from callus, 2-flowered, 2-nate, both similar, one pedicelled, falling from pedicel and one sessile, falling with adjacent internode and pedicel; glumes chartaceous below, membranous upward, 2-keeled, ciliate on margins above; lower lemma hyaline, lanceolate-elliptic, awnless, epaleate, empty; upper lemma absent or hyaline, muticous, paleate, bisexual; lodicules 2; stamens 3; styles 2. Grains oblong.

Type: India, *Koenig* (LINN).

Fl. & Frt.: Aug.-Nov.

Common in waste places, along river banks, in marshy areas.

Achanakmar : 13231.

Warmer regions of Old World.

2n = 40, 42, 44, 48, 54, 56, 64, 66, 80, 88, 96, 112, 124, 128.

Due to its extensive root-system, this species is a good soil binder and specially its flowers and fruits after rains so capable of colonising the bare areas. Pulp used for paper-making; also used for thatching. A valuable species for hybridisation.

Note : Asian plants with the leaves narrowed to the mid-vein towards the base and with a more or less triangular ligule, are referable to subsp. *spontaneum* and African subsp. *aegyptiacum* (Willd.) Hack., has the leaves laminate to the base and the ligule is crescent-shaped (Cope, *l.c.*).

SACCIOLEPIS Nash in N.L. Britton, Man. Fl. North. States : 89. 1901.

T. : *S. gibba* (S. Elliott) Nash (*Panicum gibbum* S. Elliott).

1a. Spikelets sub-globose, blunt at apex — *S. myosuroides*

1b. Spikelets obliquely lanceolate, acute at apex

2a. Culms slender, not spongy. spikes 2-3 cm long, not interrupted; spikelets 2.5-3.5 mm long, hairy; lower glumes half as long as spikelet, 3-veined — *S. indica*

2b. Culms robust, usually spongy below; spikes 15-25 cm long, in interrupted, crowded fascicles: spikelets 4-5 mm long, glabrous; lower glumes less than half length of spikelet, 5-veined — *S. interrupta*

Sacciolepis indica (L.) A. Chase in Proc. Biol. Soc. Wash. 21 : 8. 1908; Haines, Botany 3 : 1036; Bor, Grasses : 357. 1960; Hara *et al.*, Enum. 1 : 145. 1978. *spicata* L., Sp. Pl. : 63 1753, non L., Sp. Pl. : 64. 1753. 4. *indica* L., Sp. Pl. 1753 "Errata"; Sp. Pl. ed. 2. 1 : 94. 1762. *Panicum indicum* L., Mant. Pl. 2 : 184. 1771; J. D. Hook., FBI 7 : 41. 1896 non Mill. 1768.

Annual, marshy, tufted herbs. Leaf-sheaths smooth; leaf-blades linear, acuminate, 5-8 cm long, glabrous; ligule short, membranous. Inflorescences in contracted, spike-like cylindrical panicles, green or purplish, 2-5 cm long; spikelets longer than their pedicels, solitary, 2-flowered, articulated with pedicels; lower glumes ovate, acute; upper glumes as long as spikelets, cymbiform, often hairy, curved, gibbous at base, 7-11-veined, hyaline along margins; lower lemma oblong, 8-veined; palea 2-keeled male or barren; upper lemma crustaceous, ellipsoid, 1.5-1.8 mm long, white,

involute at margins; palea of same texture, bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains elliptic, with almost flat back and convex face.

Fl. & Frt. : Sept.-Nov.

Common in marshy places, bunds of paddy-fields, and forms a component of any good grazing ground.

Achanakmar : 13206; Kabirchabutra : 13292A.

2n = 18, 36.

Tropical Asia, Polynesia, Australia.

S. interrupta (Willd.) Stapf in Prain, Fl. Trop. Afr. 9 : 757. 1920, *pro part*: Haines, Botany 3 : 1036; Bor, Grasses : 358. 1960; Hara *et al.*, Enum. 1 : 145. 1978. *Panicum interruptum* Willd., Sp. Pl. 1 : 341. 1798; J. D. Hook., FBI 7 : 40. 1896. (*Nardula*-Beng.).

Slender, perennial marshy herbs. Leaf-sheaths smooth; leaf-blades linear-lanceolate, 15-30 cm long, rounded or sub-cordate, glabrous; ligule short, membranous. Inflorescence a contracted, spike-like, cylindrical panicle, 15-25 cm long, green; spikelets spreading, 4-4.5 mm long, longer than their pedicels, 2-flowered, articulated with pedicels; lower glumes broadly ovate or orbicular, acute; upper glumes elliptic-lanceolate or oblong, almost as long as spikelets, gibbous at base, hyaline along margins, 7-9-veined; lower lemma oblong; palea 2-keeled, male or barren; upper lemma crustaceous, elliptic-lanceolate, involute at margins; palea of same texture, bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains elliptic, plano-convex.

Fl. & Frt. : Oct.-Feb.

Common in marshy places, in mud.

Kota to Bilaspur : 13040; Keonchi 15377.

2n = 36, 54.

Tropical S. E. Asia.

This grass is greedily eaten by buffaloes and elephants. Grains eaten in times of scarcity; also a soil-binder.

S. myosuroides (R. Br.) A. Camus in Lecomte, Fl. Gen. Indo-China 7 : 460. 1922; Haines, Botany 3 : 1036; Bor, Grasses : 358. 1960; Hara *et al.*, Enum. 1 : 145. 1978. *Panicum myosuroides* R. Br., Prodr. : 189. 1810; J. D. Hook., FBI 7 : 42. 1896. (*Kodela*-Hindi).

Slender, perennial marshy herbs; rhizomes creeping; culms striate, polished. Leaf-sheaths smooth, loose; leaf-blades linear-lanceolate, acuminate, 5-22 cm long, glabrous; ligule a membranous rim. Inflorescences in contracted, spike-like panicles, upto 15 cm long, purple, longer ones often nodding; spikelets 1.6-2 mm long, oblong-ovoid, suberect in flower, spreading in fruits, mostly 2-nate; lower glumes ovate, 3 (-5)-veined; upper glumes convex, 7-9-veined, gibbous at base; lower lemma similar; palea male or barren; upper lemma pale or white, 1-1.5 mm long, shining, elliptic; palea bisexual, 2-keeled; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains plano-convex, elliptic.

Fl. & Frt.: Sept.-Feb.

Common in wet mud, marshy places.

Pasarkhet : 12952; Pasan : 15298; Katghora : 6087, 12873.

2n = 18, 36.

Tropical Asia and Australia.

A good fodder grass.

SCHIZACHYRIUM Nees, Agrost. Bras. : 331. 1829.

LT.: *S. bevifolium* (Sw) Nees ex Buese (*Andropogon brevifolius* Swartz (vide Nash, N. Amer. Fl. 17 : 100. 1912).

Note: Important for erosion control and grazing.

1a. Slender, divaricately branched herbs; leaves linear, rounded or obtuse; joints of racemes 2-3 mm long; spikelets glabrous or sparsely hairy — *S. brevifolium*

1b. Robust, fastigiately branched herbs; leaves lanceolate, acuminate; joints of racemes 4-6 mm long; spikelets silky hairy — *S. exile*

Schizachyrium brevifolium (Swartz) Nees ex Buese in Miq., Pl. Jungh. : 359. 1854; Haines, Botany 3 : 1090; Bor, Grasses : 215. 1960; Hara *et al.*, Enum. 1 : 145. 1978. *Andropogon brevifolius* Swartz, Prodr. Veg. Ind. Occ. 26. 1788; J. D. Hook., FBI 7 : 165. 1896.

Straggling, annual, flaccid herbs; culms filiform, ascending. Leaf-sheaths spathe-like; leaf-blades linear, 2.5-8 cm long, margins and veins beneath scabrid. Inflorescences in solitary racemes, peduncled, in axil of spathiform leaf-sheaths, several racemes to each axil, 2-2.5 cm long; joints and pedicels glabrous or sparsely hairy; spikelets 3-4 mm

long; sessile spikelets; dorsally compressed, linear-oblong; callus short; lower glumes keeled, coriaceous, tip 2-fid; upper glumes acuminate or cuspidate; lower lemma hyaline, empty, epaleate; upper lemma hyaline, deeply 2-fid, awned from sinus; awns 8-10 mm long; stamens 3; pedicelled spikelets; reduced to a long-awned glume. Grains oblong.

Fl. & Frt.: Oct.-Dec.

Common inside the forest in drier localities in waste places.

Pasan : 13281A.

Palaeotropics.

Serves as a fodder grass, but is of less food-value.

S. exile (Hochst.) Pilger in Engl., Bot. Jahrb. 54 : 284. 1917; Stapf in Prain, Fl. Trop. Afr. 9 : 191. 1917; Haines, Botany 3 : 1090; Bor, Grasses : 216. 1960. *Andropogon exilis* Hochst., in Flora 27 : 241. 1844; J. D. Hook., FBI 7 : 166. 1896.

Stout, tufted, annual herbs. Leaf-sheaths spathiform; leaf-blades linear, acuminate 2.5-8 cm long, glabrous or sporsely hairy. Inflorescence a raceme 2.5-3.5 cm long, solitary, peduncled, several racemes in axil of spathiform leaf-sheaths; joints densely silky hairy; sessile spikelets: 4-5 mm long, subulate, lanceolate, dorsally compressed; lower glumes coriaceous, dorsally villous, tip 2-fid; upper glumes linear-lanceolate, 1-veined, cuspidate or short-awned; lower lemma hyaline, epaleate; upper lemma hyaline, 2-fid, awned from sinus; awns 5-12 mm long; stamens 3; pedicelled spikelet : subulate; lower glumes short-awned. Grains oblong.

Fl. & Frt.: Oct.-Dec.

Common in open places.

Pasan : 13275.

Palaeotropics.

Used for thatching and mat-making; the grass may be chopped and mixed with clay to build huts.

SEHIMA Forssk., Fl. Aegypt.-Arab. : 178. 1775.

T.: *S. ischaemoides* Forssk.

Hologamium Nees in Edinb. New Phil. J. 18 : 185. 1835.

T. : *H. nervosum* (Rottler) Nees.

Sehima nervosum (Rottl.) Stapf in Prain, Fl. Trop. Afr. 9 : 36. 1917; Haines, Botany 3 : 1069; Cope in Fl. Pakistan No. 143 : 323. 1982. *Andropogon nervosus* Rottl., in Willd., Verh. Ges. Naturf. Freund. Berlin, Neue Schr. 4 : 218. 1803. *Ischaemum laxum* R. Br., Prodr. 205. 1810; J. D. Hook., FBI 7 : 136. 1896; Shukla & Jain in Bull. Bot. Surv. Ind. 20 : 68. 1978. *Hologamium nervosum* (Rottler) Nees in Edinb. New Phil. J. 18 : 185. 1835. (*Sedwa*; *Saina*, *Send*-Hindi).

Perennial, tufted, wiry herbs. Leaf-sheaths ribbed; leaf-blades flat, linear, acuminate, glaucous, 15-30 cm long, margins scabrid; ligule of hairs. Inflorescences solitary, terminal, spike-like racemes 7-12 cm long, exserted from sheaths; internodes and pedicels thickened; joints of rachis and pedicels ciliate on both edges; spikelets 5-8.5 mm long, compressed, paired, 2-nate, 2-flowered; sessile spikelets : oblong; lower glumes chartaceous below, membranous towards apex, narrowly oblong-elliptic, 2-keeled, lyrately veined with 2-3 closely spaced veins adjacent to each keel, obtuse or keel produced into 2 short cusps; upper glumes cymbiform, keeled, narrowly winged on keel near tip, awned; lower lemma hyaline, paleate, male or empty; upper lemma oblong hyaline, stipiform, bifid, awned from sinus; awns 2-4 cm long; palea oblong, 2-veined, bisexual; lodicules 2; stamens 3; styles 2; stigmas 2; plumose; pedicelled spikelets : lanceolate, 6-10 mm long, purplish, ciliate; lower glumes convex with strong mid-vein, margins involute, 2-tipped, winged; upper glume acute, 3-veined; lemmas and paleas membranous, 2-veined, male. Grains oblong.

Type : India, *Rottler* s.n. (K).

Fl. & Frt. : Sept.-Nov.

Common in open hilly places.

Lafa : 13032.

2n = 20, 34, 40.

Tropical Africa, Arabia, India, China, Australia.

It is a good hill fodder grass., palatable and nutritious; made into silage and hay; also used for thatching.

SETARIA P. Beauv., Ess. Agrose : 51. 178. 1812, *nom. cons.*

T. : *S. virdis* (L.) P. Beauv. (*Panicum viride* L.) (*typ. cons.*).

Tansaniochloa Rauschert in Taxon 31 : 561. 1982.

T. : *Acrochaete pseudaristata* Peter.

Note : 1. *Setaria glauca* (L.) P. Beauv., Ess. Agrost. : 51. 178. 1812; Terrell in Taxon 25 : 297-304. 1976. *Panicum glaucum* L., Sp. Pl. : 56. 1753 (var. γ) Syst. Nat. ed. 10 : 870. 1759; Sp. Pl. ed. 2 : 83. 1762. (*Yellow foxtail, Pigeon grass, Cat-tail millet*), is used mainly as a fodder grains for making alcohol, when cooked as food.

2. *Setaria italica* (L.) Pal Beauve (*Foxtail millet; Italian* or *Hungarian millet*)—a cultigen derived perhaps from *S. viridis* (L.) Pal- Beauv., is a major cereal crop in China and is grown as a minor cereal crop or for birdseed in Europe and elsewhere. It was probably domesticated at several European and Asian centres independently some 7,000 years ago and is suited to semi-arid warm-temperate conditions.

1a. Leaves plicate, inflorescences a narrow or widely spreading panicle; bristles below spikelets solitary — *S. homonyma*

1b. Leaves not plicate; inflorescences a dense, cylindric or sometimes lobed, interrupted, spiciform panicle; bristles below spikelets clustered

2a. Bristles retrorsely barbed — *S. verticillata*

2b. Bristles antrorsely barbed

3a. Inflorescences an interrupted, loosely lobed panicle; spikelets up to 2 mm long — *S. intermedia*

3b. Inflorescences a continuous, cylindric, spiciform panicle; spikelets 2.5-3 mm long — *S. pumila*

Setaria homonyma (Steud.) Chiov. in Nuov. Giorn. Bot. Ital. n.s. 26. 78. 1919; Bor, Grasses : 361. 1960. *Panicum homonymum* Steud., Syn. Pl. 1 : 48. 1854. *P. rhachitrichum sensu* J. D. Hook., FBI 7 : 56. 1896, non Hochst. 1844. *Setaria rhachitricha* T. Cooke, Fl. Bombay Presid. 2 : 919. 1908.

Tufted, annual herbs; culms erect or decumbent; nodes pubescent. Leaf-sheaths villous at mouth; leaf-blades lanceolate, 15-20 cm long; flaccid, glabrous or sparsely hairy, base rounded; ligule of stiff hairs. Inflorescences in spiciform panicles, 5-15 cm long, sub-pyramidal, branches slender, flexuous; rachis flexuous; spikelets about 2 mm long, dorsally compressed, ellipsoid, awnless, 1-2-seriate, secund; lower glumes orbicular, membranous, pale, 5-veined; upper glumes ovate-oblong, obtuse, 6-7-veined, membranous; lower lemma similar, paleate; lower floret barren; upper lemma crustaceous, transversely rugulose, ellipsoid, tip rounded,

white, hardening at maturity, paleate, bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains pale, free within hardened palea.

Fl. & Frt. : Oct.-Nov

Frequently found on slopes, edges of forests.

Kabirchabutra . 13311.

2n = 20, 36.

East Tropical Africa, India.

A good fodder grass.

S. intermedia Roem. & Schult., Syst. Veg. 2 : 489. 1817; J. D. Hook, FBI 7 : 79. 1896; Haines, Botany 3 : 1035; Bor, Grasses (Repr. ed.) Add. & Corrig. II. 1973; Cope in Fl. Pakistan No. 143 : 183. 1982. *Panicum tomentosum* Roxb., Fl. Ind. 1 : 303. 1820. *Setaria tomentosa* (Roxb.) Kunth, Rev. Gram. 1 : 47. 1829; Bor, Grasses : 365. 1960; Hara *et al.*, Enum. 1 : 146. 1978.

Annual, herbs; culms erect or ascending, rooting at nodes. Leaf-sheaths ciliate above; leaf-blades linear, flaccid, 10-20 cm long, sparsely hairy; ligule of stiff hairs. Inflorescences 5-10 cm long; rachis flexuous, angular, scabrid; bristles 3-4, 3-10 mm long, stiff; spikelets broadly ovoid, awnless; lower glumes hyaline, sub-orbicular, obtuse or acute, 0.6-0.8 mm long, 3-veined; upper glumes orbicular, concave, truncate, 1-1.5 mm long, 5-veined; lower lemma membranous, ovate, paleate; lower floret barren; upper lemma brown, crustaceous, broadly oblong or ovate, often apiculate, rugose, hardening at maturity, 5-veined, paleate, bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains pale, oblong, free within hardened palea.

Type : India, *Heyne*.

Fl. & Frt. : July-Nov.

Common in grassy places.

Pasan 13268A.

2n = 18, 36, 54.

Tropical and warm temperate regions of the Old World.

Grass is liked by cattle, but grains have low viability.

S. pumila (Poir.) Roem. & Schult., in L., Syst. Veg. 2 : 891. 1817; Clayton in Tutin *et al.*, Fl. Eur. 5 : 263. 1980; Cope in Fl. Pakistan No. 143 : 181. 1982. *Panicum pumilum* Poir., in Lam. Encycl. Meth. Bot. Suppl. 4. 273. 1816. *P. pallide-fuscum* K. Schum., Beskr. Guin. Pl. 58. 1827. *Setaria pallide-fusca* (K. Schum.) Stapf et C. E. Hubb. in Kew Bull. 1930 : 259. 1930; Bor, Grasses : 363. 1960; Hara *et al.*, Enum. 1 : 145. 1978. *S. glauca auct.* non (L.) P. Beauv. 1812; J. D. Hook., FBI 7 : 78. 1896; Bor, Grasses : 360. 1960.

Loosely tufted herbs; culms ascending, geniculate at base. Leaf-sheaths glabrous or ciliate above; leaf-blades linear-lanceolate, flat, 15-30 cm long, glabrous or sparsely hairy, scabrid; ligule of stiff hairs. Inflorescences 5-15 cm long; rachis villous or scabrid; bristles usually 8, 3-12 mm long, slender, commonly fulvous; spikelets ovoid, 2-flowered; lower glumes ovate, herbaceous, 3-5-veined; upper glumes 5-9-veined, oblong or orbicular; lower lemma herbaceous, ovate, paleate, male or barren; upper lemma crustaceous, rugose, 5-veined, hardening at maturity; palea similar, bisexual; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains pale, oblong, free within hardened palea.

Type: Locality unknown but probably France or North Africa, Desfontaines (P ?) (vide Cope, *l.c.*).

Fl. & Frt. : July-Nov.

Common in open places, on slopes.

Lamu : 13255; Pasan to Semra : 15366; Karidongri : 19319.

2n = 18, 36, 72 (as *S. pallide-fusca*).

Palaeotropics.

Note : It is a polymorphic species, segregating into regional populations. These overlap to such an extent that the recognition of more than one species cannot be upheld, though there may be a case for distinguishing between tropical and Mediterranean populations at infra-specific level (Clayton in Kew Bull. 33 : 501. 1979) and for nomenclatural discussion, see Terrell (in Taxon 25 : 297-304. 1986).

S. verticillata (L.) P. Beauv., Ess. Agrost. : 51. 178. 1812; J. D. Hook., FBI 7 : 80. 1896; Haines, Botany 3 : 1035; Bor, Grasses : 365. 1960; Cope in Fl. Pakistan No. 143 : 179. 1982. *Panicum verticillatum* L., Sp. Pl. ed. 2. 1 : 82. 1762. (*Bur, Rough bristles grass.*).

Loosely tufted, annual herbs; culms geniculately ascending, rooting from lower nodes. Leaf-sheaths keeled, pubescent; leaf-blades linear or

linear-lanceolate, flaccid, 8-25 cm long, scabrid; ligule a fringe of hairs. Inflorescences a spiciform panicle, 4-12 cm long; rachis pubescent; bristles 3-8 mm long; spikelets oblong, obtuse, 1.5-2.5 mm long, pale green; lower glumes 0.8-1 mm long, ovate, hyaline; upper glumes membranous, 2 mm long, 5-veined; lower lemma 5-7-veined; lower floret barren; upper lemma oblong, coriaceous, rugose, bisexual, hardened at maturity; palea of similar texture; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains elliptic, whitish.

Type: Based on Scheuchzer, Agrost. : 47. 1719., not on specimen in LINN (Cope, *l.c.*).

Fl. & Frt.: July-Nov.

Common in open grassy places, in hedges, weed of gardens.

Lamni : 19209, 19210.

2n = 18, 36, 54; 2n = 20 (as *Panicum verticillatum*).

Tropical and warm temperate regions of the Old World.

Young grass grazed by cattle; when mature, the stalks with stiff bristles is used as a cover over granaries to protect grains from rats. Grains used for alcoholic drink.

SORGHUM Moench., Methods Pl. : 207. 1794, *nom. cons.*

T.: *S. bicolor* (L.) Moench (*Holcus bicolor* L.).

Andropogon subgen. *Sorghum* Hack; J. D. Hook., FBI 7 : 181. 1896.

Note: *S. bicolor* (*Great millet*) is an important tropical cereal derived from *S. arundinaceum* (Desv.) Stapf. It was perhaps domesticated in Sudan zone over 3,000 years ago. *Durra* Group [*Jowar—S. durra* (Forssk.) Stapf] is the principal grain sorghum of India and Africa. It has as many as 10 vars., in India and is the best sorghum used both as fodder and grain the latter used for flour for bread and beer etc. *Saccharatum* Group [*S. dochna* (Forssk.) Snowden] has culms to 4 m high, with juicy sweet pith and is cultivated for syrup, forage and silage and is represented in by seven vars. The wild progenitor is probably *S. arundinaceum* (Desv.) Stapf. Sorghum, is the world's fourth important cereal crop after wheat, rice and maize and provides staple food in Africa, India and China, thriving under drier conditions than does maize; major groups of cultivars grown for grain (non-saccharine sorghum),

sweet juice for forage [Saccharine sorghums—*S. bicolor* (L.) Moench]; brush manufacture (broom corns) is from *S. nitidum* (Vahl) Pers. *Caudatum* Group (*S. caudatum* Stapf) yields yellow, red grains and its flour mixed with wheat flour, is suitable for bread-making.

Stalks and leaves cut after flowering, are fed to cattle, not when young as they contain a cynogenetic glycoside, *dhurrin*. Sorghum oil obtained from the germ, is used after ripening, in salads or for general cooking.

1a. Sheaths and nodes densely bearded — *S. nitidum*

1b. Sheaths and nodes glabrous or finely pubescent, not bearded

2a. Annual; inflorescences dense and compact; racemes tough; mature spikelets not deciduous; sessile spikelets broadly ovate — *S. cernuum*

2b. Perennial; inflorescences loose and spreading; racemes fragile; mature spikelets deciduous; sessile spikelets elliptic to elliptic-lanceolate — *S. halepense*

Sorghum cernuum (Ard.) Host, Gram. Austr. 4 : 2. t. 3. 1809; Snowden in Kew Bull. Misc. Inf. 1935 : 252. 1935; Bor, Grasses : 228. 1960; Bullock in Kew Bull. 15 : 390. 1962. *Holcus cernum* Ard. in Saggi. Sci. Lettr. Acad. Padova, 1 : 128. t. 3. f. 1-2. 1786. *Andropogon sorghum* Brot. var. *cernuus* (Ard.) Koern., Handb. Getreit. 1 : 314. 1885, *pro part.*: J. D. Hook., FBI 7 : 183. 1896. (*Race durra, White durra*).

Tall, stout herbs. Leaf-blades linear, setaceously acuminate, 20-55 cm long, base sub-amplexicaul. mid-vein white; ligule 2 mm long, erose. Inflorescences a thyrsiform, decompound panicle with whorls of erect or decurved branches, up to 25 cm long; spikelets 2-nate; sessile spikelets: 5-6 mm long, dorsally compressed and tomentose; lower glumes coriaceous, 5-11-veined, hairy; upper glumes 7-veined, sub-coriaceous, margin ciliolate; lower lemma broadly lanceolate, hyaline, 2-veined; upper lemma hyaline, ovate, obtuse, entire or 2-fid, awned from sinus or not; palea hyaline, linear-oblong, ciliate; stamens 3; pedicelled spikelets : neuter, linear-lanceolate; lower glumes, 5-9-veined, keel hispid; upper glumes cymbiform, acuminate, 5-veined, inflexed margins silky; lower lemma glabrous, 2-keeled. Grains obovoid to oblong

Fl. & Frt.: Nov.-Feb.

Commonly cultivated; often found as escape in waste places

Pasan to Korbi : 15317.

2n = 20.

India, Burma.

Note : Snowden recognises as many as seven varieties in this species in India. Forms with sweet stems are much used as fodder after the plants have flowered. Young plants possess hydrocyanic acid (HCN) harmful to stocks.

S. halepense (L.) Pers., Syn. Pl. 1 : 101. 1805 ; Haines, Botany 3 : 1080 ; Bor, Grasses : 222. 1960 ; Cope in Fl. Pakistan No. 143 : 295. 1982 *Holcus halepensis* L., Sp. Pl. 2 : 1047. 1753. *Andropogon halepensis* (L.) Brot., Fl. Lusit. 1 : 89. 1804 ; J. D. Hook., FBI 7 : 182. 1896, *pro part. A. miliaceus* Roxb., Fl. Ind. 1 : 276. 1820. *Sorghum miliaceum* (Roxb.) Snowden in Jour. Linn. Soc. Bot. 55 : 207. 1955 ; Bor, Grasses : 223. 1960 ; Hara *et al.*, Enum. 1 : 146. 1978. (*Johnson grass ; Baru*-Hindi).

Rhizomatous, stoloniferous perennial herbs. Leaf-sheaths loose ; leaf-blades linear-lanceolate, 20-60 cm long, setaceously acuminate, base subimplexicaul ; ligule about 2 mm long. Inflorescence a decompound panicle, upto 30 cm long, pyramidal ; primary branches compound, ultimate bearing racemes of 1-5 spikelet pairs ; spikelets 2-nate ; sessile spikelets ; elliptic, 5-6 mm long ; lower glumes dorsally flattened, hairy, 11-veined, keeled above ; upper glumes acute or cuspidate, keel scabrid ; lower lemma broadly lanceolate, hyaline ; upper lemma broadly oblong, obtuse, awned ; awns 10-15 mm long ; stamens 3 ; pedicelled spikelets : usually male, lanceolate, 4.5-6.5 mm long ; lower glumes 7-veined, keel hispid ; upper glumes cymbiform-lanceolate, 5-veined, silky ; lower lemma glabrous, 2-keeled ; upper lemma absent or hyaline. Grains obovoid.

Syntype : Described from Syria and Mauritania.

Fl. & Frt. : Oct.-Feb

Common along streams, slopes ; cultivated fields and may be a troublesome weed and a fodder species, but injurious to cattle when young ; dieuretic and demulcent ; wild sorghum.

Kabirchabutra to Pendra : 15276.

2n = 18, 20, 20 + 4—6B, 40, 40-43.

Mediterranean region eastwards to Kashmir and southwards to Madras.

Note : Although Cope (*l.c.*) reduced *S. miliaceum* as a synonym of *S. halepense*, Snowden (1955) considered that *S. halepense* reaches the eastern limit of its range in Kashmir and that it is not native in India. Endrezzi (Bot. Gar. 119 : 1. 1957) considers that *S. hale-*

pense arose as a segmental allotetraploid from a cross involving *S. propinquum* (Kunth) Hitchc. (2n = 20) and a member of subsect. *Arundinaceae* (2n = 20). *S. propinquum* extends from China to the Malay Peninsula, but does not occur in India and is the only diploid Halepensia. *Andropogon halepensis* J. D. Hook., p.p. is a synonym of *S. controversum* (Steud.) Snowden (*A. laxus* Roxb., non Willd.).

Because of its tenacious rhizomatous habit, *S. halepense* has earned a bad reputation as a weed of cultivated fields. Its tissues contain hydrocyanic acid and, therefore, the grass is a positive danger to stock (Cope, *l.c.*).

S. nitidum (Vahl) Pers., Syn. Pl. 1 : 101. 1805; Haines, Botany 3 : 1081; Bor, Grasses : 245. 1960; Cope in Fl. Pakistan No. 143 : 299. 1982. *Andropogon serratus* Thunb., Fl. Jap. : 41. 1784; J. D. Hook., FBI 7 : 185. 1896, var. *nitidus* Hack. *Holcus nitdus* Vahl, Symb. Bot. 2 : 102. 1791. *Sorghum serratum* (Thunb.) Kuntze, Rev. Gen. Pl. 2 : 792. 1891, non *Holcus serratus* Thunb. 1784, *nec Sorghum serratum* (Thunb.) Roem. & Schult. 1817. *Andropogon miliaceus* Roxb., Fl. Ind. 1 : 276. 1820. *Sorghum miliaceum* (Roxb.) Snowden, in J Linn. Soc. Bot. 55 : 207. 1955; Bor, *l.c.* : 223.

Tufted, perennial herbs; culms wiry, erect. Leaf-sheaths keeled upward, mouth silky; leaf-blades linear, 15-60 cm long, setaceously acuminate; ligule short, scarious truncate. Inflorescences in sub-simple, oblong panicle, 12-30 cm long, branches simple, conspicuously whorled; racemes borne at tip of branches, composed of 2-4 spikelet-pairs; pedicels and callus villous with rufous or purple hairs; spikelets black, shining, hairy, 2-nate; sessile spikelets : 3-4 mm long; lower glumes coriaceous, broadly oblong, 7-veined; upper glumes cymbiform; lower lemma hyaline, 2-keeled, ciliate; upper lemma linear-oblong, 1.8 mm long, awned or not; stamens 3; pedicelled spikelets 3 mm long, papyraceous lower glumes oblong, 2-veined; upper glumes obtuse, 3-veined; lower lemma paleate, male; upper lemma linear, or absent. Grains obovoid, dorsally compressed.

Type : Described from India.

Fl. & Frt. : Sept.-Dec.

Common on rocky slopes, in shady places.

Achanakmar : 13215; Madai : 12892.

2n = 10, 20, 10 + 1B.

India to China, Australia.

Used for brooms.

SPODIOPOGON Trin., Fund. Agrost. : 192. 1822 ('1820').

T. : *S. sibiricus* Trin.

Spodiopogon rhizophorus (Steud.) Pilger in Engl. & Prantl, Natur. Pflanzenfam. Aufl. 2. 14e : 119. 1940; Bor, Grasses : 246. 1960; Fl. Hassan : 753. 1976. *Andropogon rhizophorus* Steud., Syn. Pl. 1 : 381. 1854. *Spodiopogon albidus* (Wall.) Benth., in Jour. Linn. Soc. Bot. 19 : 66. 1881; J. D. Hook., FBI 7 : 108. 1896.

Annual herbs; culms ascending. Leaf-sheaths 6 cm long; leaves lanceolate, acuminate, flaccid, long-petioled, 15-25 cm long; ligule oblong, glabrous. Inflorescences in panicle of racemes; rachis jointed, compressed, silky villous; spikelets laterally compressed, 4 mm long, 2-3-nate, 1-sessile and 1-2 pedicelled, all similar, 2-flowered; lower glumes membranous, 7-9-veined; upper glumes broader, 7-veined; lower lemma hyaline, truncate, tip erose, paleate or not, male or empty; upper lemma hyaline, bifid, with a long awn from sinus; palea hyaline; lodicules 2; stamens 3; styles 2; stigmas 2, plumose. Grains fusiform, free within lemma.

Fl. & Frt. : Sept.-Nov.

Occasionally found on sandy alluvium, edges of forests.

Keonchi : 13298; Kabirchabutra : 15235; Kota : 13081.

2n = 20.

India.

SPOROBOLUS R. Br., Prodr. Fl. Nov. Holl. : 169. 1810.

LT. : *S. indicus* (L.) R. Br. (*Agrostis indica* L.) (vide Nash in N. L. Britton et A. Brown, Ill Fl. N.U.S. ed. 2. 1 : 194. 1913).

Spermachiton Llanos, Frag. Pl. Filip. : 25. 1851.

T. : *S. involutum* Llanos.

1a. **Panicle effuse; spikelets upto 1.75 mm long; glumes truncate, veinless, stamens 2** — *S. indicus* var. *diandra*

1b. **Panicle contracted,** sub-spiciform, often interrupted; **spikelets 2-2.5 mm long**; glumes obtuse, 1-veined; **stamens 3** — *S. indicus* var. *fertilis*

Sporobolus indicus (L.) R. Br. var. **diander** (Retz.) Jovet & Guedes in Bull. Centre et Rech. Sc. Biarritz 7 : 65. 1968, et in Taxon 22 : 163. 1973. *Agrostis diandra* Retz., Obs. Bot. 5 : 19. 1789. *Sporobolus diander* (Retz.) P. Beauv. Ess. Agrost. 26 : 147, 178. 1812; J. D. Hook., FBI 7 : 247. 1896; Haines, Botany 3 : 1019; Bor, Grasses : 629. 1960; Cope in Fl. Pakistan No. 143 : 136. 1982.

Tufted, perennial herbs; culms erect or geniculately ascending. Leaf-sheaths smooth, ribbed; leaf-blades linear-filiform, convolute, 10-25 cm long; ligule a narrow ridge of hairs. Inflorescences in panicle, upto 25 cm long, narrowly pyramidal, branches in scattered fascicles 1.5-5 cm long; spikelets fusiform, awnless, 1-flowered, racemosely arranged on branches 1-1.5 mm long; lower glumes 0.3-0.5 mm long, broadly oblong, veinless, hyaline; upper glumes 0.6-0.8 mm long, broadly elliptic, acute, 1-veined; lower lemma 1.5 mm long, obtuse or sub-acute, obscurely 1-3-veined; palea hyaline, 2-veined; upper lemma absent; lodicules 2; stamens 2; styles 2; stigmas 2, plumose. Grains oblong, truncate at tip, 0.7 mm long.

Type: India, *Koenig* (LD).

Fl. & Frt.: July-Feb.

Common in open places, along roads.

Khondra : 12702; Pasarkhet : 16818; Pasarkhet to Madanpur : 19427; Pasan to Pendra : 19129; Achanakmar : 19274.

2n = 24, 36, 54.

India, Burma, Sri Lanka, Australia.

Fodder for horses and cattle; used for making brooms; a good fodder and a soil-binder.

S. indicus (L.) R. Br. var. **fertilis** (Steudel) Jovet & Guedes in Bull. Centre et Rech. Sc. Biarritz 7 : 65. 1968, et in Taxon 22 : 163. 1973. *Agrostis fertilis Steud.* Syn. Pl. 1 : 171. 1854. *Sporobolus fertilis* (Steudel) Clayton in Kew Bull. 19 : 291. 1965. *Sporobolus indicus auct.*, non (L.) R. Br.; Haines, Botany 3 : 1019. *Spermachiton involutum* Llanos, Frag. Pl. Filip. : 25. 1851.

Stout, perennial herbs. Leaf-sheaths smooth, ribbed; leaf-blades linear-lanceolate, flat or convolute, 20-60 cm long; ligule a few hairs. Inflorescences in narrow, contracted, panicle, upto 30 cm long, branches short, erect., appressed, 2-2.5 cm long; rachis stout, erect or curved; spikelets terete, awnless, 1-flowered, racemosely arranged on branches; lower glumes

broadly oblong, membranous, 0.6-0.8 mm long; upper glumes elliptic, acute, 1 mm long, 1-veined; lower lemma 2-2.5 mm long, acute, 3-veined; palea hyaline, 2-veined; upper lemma absent; lodicules 2; stamens 3; styles 2: stigmas 2, plumose. Grains broadly obovoid.

Fl. & Frt. : July-Nov.

Common in moist sandy places.

Lamni : 13251A; Keonchi : 13262; Khondra : 12817.

2n = 24, 36, 48.

Indo-malaysia.

A good fodder grass. *S. indicus* R. Br., var. *indicus* does not occur in India.

THEMEDA Forssk., Fl. Aegypt.-Arab. : 178. 1775.

T. : *T. triandra* Forssk.

Anthisteria L. f., Nov. Gen. Gram. : 35. 1780, et Suppl. Pl. 13. 1782.

T. : *A. ciliata* L. f..

1a. Pairs of involucral spikelets inserted at different levels, involucral spikelets over 9 mm long — *T. caudata*

1b. Pairs of involucral spikelets in whorls, inserted at same level; involucral spikelets 5-7.5 mm long

2a. Panicles very loose, leafy; branching effuse; clusters very few in a few fascicles — *T. laxa*

2b. Panicles dense, contracted, not leafy; branching strict; clusters very numerous in numerous fascicles

3a. Annual; clusters in erect racemiform, partial axillary inflorescence; involucral and sessile spikelets under 6 mm in length; lower glumes of pedicelled spikelets flat — *T. quadrivalvis*

3b. Perennial; clusters in drooping, spatheate fascicles; involucral and sessile spikelets over 6 mm in length; lower glumes of pedicelled spikelets convolute — *T. triandra*

Themeda caudata (Nees) A. Camus in Lecomte, Fl. Gen. Indo-China 7 : 364. 1922; Haines, Botany 3 : 1100; Bor. Grasses : 250. 1960; Hara *et al.*, Enum. 1 : 147. 1978. *Anthistiria caudata* Nees in Hook. & Arn., Bot. Beechey Voy. : 245. 1938. *Themeda gigantea* Hack. ssp. *caudata* (Nees) Hack. in DC., Monogr. Phan. 6 : 676. 1889, *pro parte*,

Anthistiria gigantea Cav. ssp. *caudata* (Hack.) J. D. Hook., FBI 7 : 217. 1896.

Tufted perennial herbs ; culms flattened, greenish-yellow. Lower leaf-sheaths compressed ; leaf-blades 60-80 cm long, scabrid, acuminate ; ligule membranous, hairy. Inflorescences 30-60 cm long, composed of solitary racemes embraced by sheathing spatheoles, these gathered into a leafy, false panicle ; racemes comprising of an outer set of 2 homogamous pairs of sessile spikelets forming a sort of involucre and an inner set of 2-3-nate spikelets, sessile and pedicelled ; sessile spikelets separately deciduous ; rachis tardily disarticulating between homogamous pairs of spikelets ; involucral spikelets : 1-1.5 cm long, persistent, awnless, male or barren spikelets ; lower glumes 9-veined ; upper glumes 3-veined, scaberulous ; lemmas hyaline, ciliate ; sessile spikelets : 1 cm long, terete, 2-flowered, bisexual ; callus pungent, bearded ; lower glumes coriaceous, involute, obtuse, grooved along center, 11-veined ; upper glumes coriaceous, involute, with hirsute keel ; lower lemmas hyaline, brown hairy, 1-veined epaleate, empty ; upper lemma stipiform, long awned, paleate ; stamens 3 ; pedicelled spikelets : similar to involucral, male or barren, narrowly lanceolate, awnless ; lower glumes 2-keeled ; lemmas epaleate, hyaline. Grains oblong, brown, 3 mm long.

Fl. & Frt. : Sept.-Dec.

Occasionally found on slopes, edges of forests, ravines.

Lamni : 13234A.

India, Nepal, Burma, Vietnam, China.

T. laxa (Anderss.) A. Camus in Bull. Mus. Hist. Nat. Paris 26 : 423. 1920 ; Haines, Botany 3 : 1099 ; Bor, Grasses : 251. 1960. *Anthistiria laxa* Anderss., in Nov. Act. Sci. Upsal. Ser. 3. 2 : 243. 1856 ; J. D. Hook., FBI 7 : 213. 1896.

Tufted, perennial herbs. Leaf-sheaths striate, keeled ; leaf-blades linear, upto 30 cm long ; ligule absent. Inflorescences composed of racemes embraced by long acuminate, cymbiform spatheoles, these gathered into a lax, leafy, false panicle ; racemes comprising an outer set of 2 homogamous pairs of sessile spikelets forming an involucre and an inner set of 2-nate spikelets, 1-sessile and 2 pedicelled ; sessile spikelets separately deciduous ; rachis tardily disarticulating between homogamous pairs of spikelets ; involucral spikelets : 5-6 mm long, male or barren, awnless, persistent ; lower glumes oblong, 9-11-veined ; sessile spikelets : 3.5 mm long, terete, with a pungent bearded callus, bisexual ; lower glumes coriaceous, obtuse, involute, grooved along center, scabrid hispid at apex, truncate,

9-veined; upper glumes coriaceous, involute, with keel rounded; lemmas hyaline, linear, upper stipiform, with 2.5-3.5 cm long awn; stamens 3; pedicelled spikelets : 5-5.6 mm long, similar to involucral, male or barren, awnless; lower glumes many-veined; upper glumes scaberulous on keel; lemmas hyaline, epaleate. Grains oblong, about 2 mm long.

Fl. & Frt. : July-Dec.

Common near cultivated fields, open forest clearings.

Khondra : 12710; Achanakmar : 19281.

2n = 20.

India.

T. quadrivalvis (L.) Kuntze, Rev. Gen. Pl. 2 : 794. 1891; Haines, Botany 3 : 1098; Bor, Grasses : 252. 1960; Hara *et al.*, Enum. 1 : 147. 1978. *Andropogon quadrivalvis* L., in Murr., Syst. Veg. ed. 13. 758. 1774. *Anthistiria ciliata* L. f. Nov. Gen. Gram. : 35. 1780; Suppl. Pl. 113. 1782; J. D. Hook, FBI 7 : 213. 1896. (*Chhirra, Ghonad, Gunkar, Genera*-Hindi).

var. **quadrivalvis**

Tall, annual herbs; culms geniculate at base. Lower leaf-sheaths lax, open, upper keeled; leaf-blades linear, scaberulous or bristly on margins, 7-20 cm long; ligule scarious, 1.5-2 mm long. Inflorescences 3.5-8 cm long, composed of racemes embraced by conduplicate, lanceolate spatheoles, these gathered into a false panicle; racemes comprising an outer set of 2 homogamous pairs of sessile spikelets forming an involucre and an inner set of 3-nate spikelets, 1-sessile and 2-pedicelled; sessile spikelets separately deciduous; rachis tardily disarticulating between homogamous pairs of spikelets; involucral spikelets : 3.5-5 mm long, persistent, male, awnless; lower glumes oblong, 9-veined; lemmas hyaline; sessile spikelets : 3.5-4 mm long, terete, bisexual; callus barbed with long brown hairs; lower glumes coriaceous, margins involute; upper glumes coriaceous, with a rounded keel; lower lemma hyaline, 1-veined, epaleate empty; upper lemma reduced to a 3.5-4.5 cm long awn; stamens 3; pedicelled spikelets : similar to involucral spikelets, 5-6 mm long, lanceolate, awnless; lower glumes 2-keeled; lemmas hyaline, epaleate. Grains oblong, 2.5 mm long.

Fl. & Frt. : Oct.-Feb.

Common in drier situations, on slopes, edges of forests.

Pendra : 15278.

2n = 40, 60, 80.

India. Nepal.

Used for thatching and for paper-pulp; not a good fodder grass.

T. triandra Forssk., Aegypt-Arab. : 178. 1775; Bor, Grasses : 254. 1960; Hara *et al.*, Enum. 1 : 147. 1978. *Anthistiria imberbis* Retz., Obs. Bot 3 : 11. 1783; J. D. Hook., FBI 7 : 211. 1896. *Themeda imberbis* (Retz.) Cooke, Fl. Presid. Bombay 2 : 993. 1906; Haines, Botany 3 : 1097. (*Rooi grass*).

Perennial tufted herbs; culms terete or compressed, yellow polished. Leaf-sheaths below loose and open, upper much compressed and keeled; leaf-blades linear, 30-40 cm long; ligule scarious, lacerate. Inflorescences composed of racemes embraced by 1-2 cm long, glabrous, keeled spatheoles, these gathered into slender, lax, false panicles; panicles in leaf-axils, in fan-shaped fascicles; racemes comprising an outer set of 2 homogamous pairs of sessile spikelets forming an involucre and an inner set of 3-nate spikelets, 1-sessile and 2-pedicelled: sessile spikelets separately deciduous; rachis disarticulating between homogamous pairs of spikelets; involucral spikelets: 6.5-9 mm long, oblong-lanceolate, persistent, awnless, male or barren; lower glumes oblong, 2-keeled; lemmas hyaline; sessile spikelets : 6.5-8 mm long, terete, with a pungent, beared callus, bisexual; lower glumes coriaceous, margins involute, obtuse, grooved along center; upper glumes coriaceous, margins involute; lower lemma hyaline, 1-veined, epaleate, empty; upper lemma stipiform, long-awned, paleate; awns 2.5-5 cm long; stamens 3; pedicelled spikelets : 3-6.5 mm long, linear, acuminate, awnless, similar to involucral spikelet; lower glumes 2-keeled; lemmas hyaline paleate empty. Grains oblong.

Fl & Frt. : Oct.-Feb

Common in drier situations, in the mixed forests, on slopes, sometimes forming as a principal cover in tropical fire-climax steppe.

Achanakmar : 13214; Kenda : 16773; Katghora : 6029.

2n = 20, 30, 40, 56, 60, 80.

It is an important grazing species, a good fodder before flowering, also used as hay, but wilted plants contain hydrocyanic acid and may cause food-poisoning in livestoik; also used for thatching and paper-pulp. Grains eaten in times of scarcity.

Pantropical, but native to Africa (Murti, 1975).

THYSANOLAENA Nees in Edinb. New Phil. Jour. 18 : 180. 1835.

T. : *T. agrostis* Nees *nom. illeg.* [*Agrostis maxima* Roxb., *T. maxima* (Roxb.) Kuntze].

Note : 1 species, distributed throughout the tropical Asia.

Thysanolaena maxima (Roxb.) Kuntze, Rev. Gen. Pl. 2 : 794. 1891; Cope in Fl. Pakistan No. 143 : 37. 1982. *Agrostis maxima* Roxb., Fl. Ind. 1 : 319. 1820. *Thysanolaena agrostis* Nees in Edinb. New Phil. Jour. 18 : 180. 1835, *nom. superfl.*, based on *Agrostis maxima* Roxb. 1820; J. D. Hook., FBI 7 : 61. 1896; Haines, Botany 3 : 1027. (*Broom grass, Tiger grass; Bouquet grass; Phulbadhuni*-Oriya; *Chir*-M.P.).

Tall, reed like perennial herbs; culms woody. Leaf-sheaths hairy at mouth; leaf-blades flat, oblong, lanceolate, acuminate, upto 45 cm long, base cordate sub-amplexicaul; ligule a minute, scarious, ciliate rim. Inflorescences in large, open panicle, upto 60 cm long, decompound, sub-erect; spikelets 1.4-1.5 mm long, greenish, elliptic-lanceolate, ciliate, usually 2-flowered; rachilla tough, tardily disarticulating above glumes and between florets, produced beyond upper floret, pedicel fragile; glumes 0.7-0.8 mm long, membranous, concave, ovate, obtuse, veinless; lower lemma upto 1.5 mm long, lanceolate, acuminate, coriaceous, 1-3-veined, epaleate; lower floret barren; upper lemma membranous, ovate-oblong, acute, ciliate, 3-veined; palea minute, truncate, bisexual; stamens 2 or 1. Grains minute, free within hardened lemma.

Type : Described from India.

Fl. & Frt. : Feb.-July.

Common on shady slopes, ravines and near streams.

Korba to Putka Pahar : 19460; Lamni to Achanakmar : 19532; Kabirchabutra : 15228.

2n = 24, 44.

Pakistan, India, Nepal, S. E. Asia, China, Malaysia. Pakistan represents the western limit of the species (Cope, *l.c.*).

Bundles of panicles tied together are used as brooms. Stems used for reed-pens for writing; stem tips and tender leaves used as fodder.

VETIVERIA Bory in Lema-Lisane in Bull. Sci. Soc. Philom. Paris 1822 : 43. 1822.

T. : *V. odoratissima* Bory, *nom. illeg.* (*Andropogon squarrosus* Linn. f.).

Vetiveria zizanioides (L.) Nash in Small. Fl. Southeast U. S. : 67. 1903 ; Haines, Botany 3 : 1079 ; Cope in Fl. Pakistan No. 143 : 306. 1982. *Phalaris zizanioides* L., Mant Pl. 2 : 183. 1771. *Andropogon squarrosus* Linn. f. Suppl. Pl. : 433. 1782. J. D. Hook., FBI 7 : 186. 1896. *Ramacciam* Rheede, Hort Malab. 12 : 81. t. 44. 1693. (*Vetiver, Khus-khus, Cuscus; Veena*-Oriya).

Coarse, tufted, perennial herbs: rootstock rhizomatous, aromatic. Leaf-sheaths compressed, keeled; leaves closely distichous, imbricate at base, conduplicate, 30-60 cm long; ligule a membranous or hairy rim. Inflorescences in terminal panicle, oblong or pyramidal, 10-30 cm long, with whorls of numerous, slender racemes; racemes fragile, 3-5 cm long; rachis hairy; spikelets in pairs, sessile and pedicelled, 2-flowered; sessile spikelets : yellowish, turning dark purplish, laterally compressed, lanceolate, 3.5-5 mm long; callus rounded and almost truncate, pungent; lower glumes coriaceous spinulose, rounded on back, 4-5-veined; upper glumes cymbiform, coriaceous, margins hyaline, keeled, mucronate or aristate; lower lemma hyaline, 2-veined, empty; upper lemma hyaline, minutely 2-toothed, with a glabrous, geniculate awn from sinus, bisexual; palea minute; lodicules 2; stamens 3; styles 2; stigmas 2, plumose; pedicelled spikelets : similar to spikelets but lower glumes smooth; upper lemma usually male. Grains oblong.

Type : India, *Koenig*.

Fl. & Fr. : July-Feb.

Common near cultivated fields, open places, forest clearings, damp places.

Khuria : 19336; Khondra : 12770: Achanakmar : 15433.

2n = 20.

Pakistan, Isdia, Nepal, Burma, Sri Lanka and S. E. Asia.

A very important economic grass; the fragrant roots are made into mats, handfans, temporary house-roofs and screens hung over doors and give off scent when sprinkled with water. Roots also used to give an aromatic and medicinal oil, "Oil of Veriver", used is perfumery, scent-making.

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