

FLORA OF CHAMOLI

VOLUME-2

B. D. NATHANI

**BOTANICAL SURVEY
OF INDIA**

FLORA OF CHAMOLI

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FLORA OF CHAMOLI

Volume 2

B. D. NAITHANI



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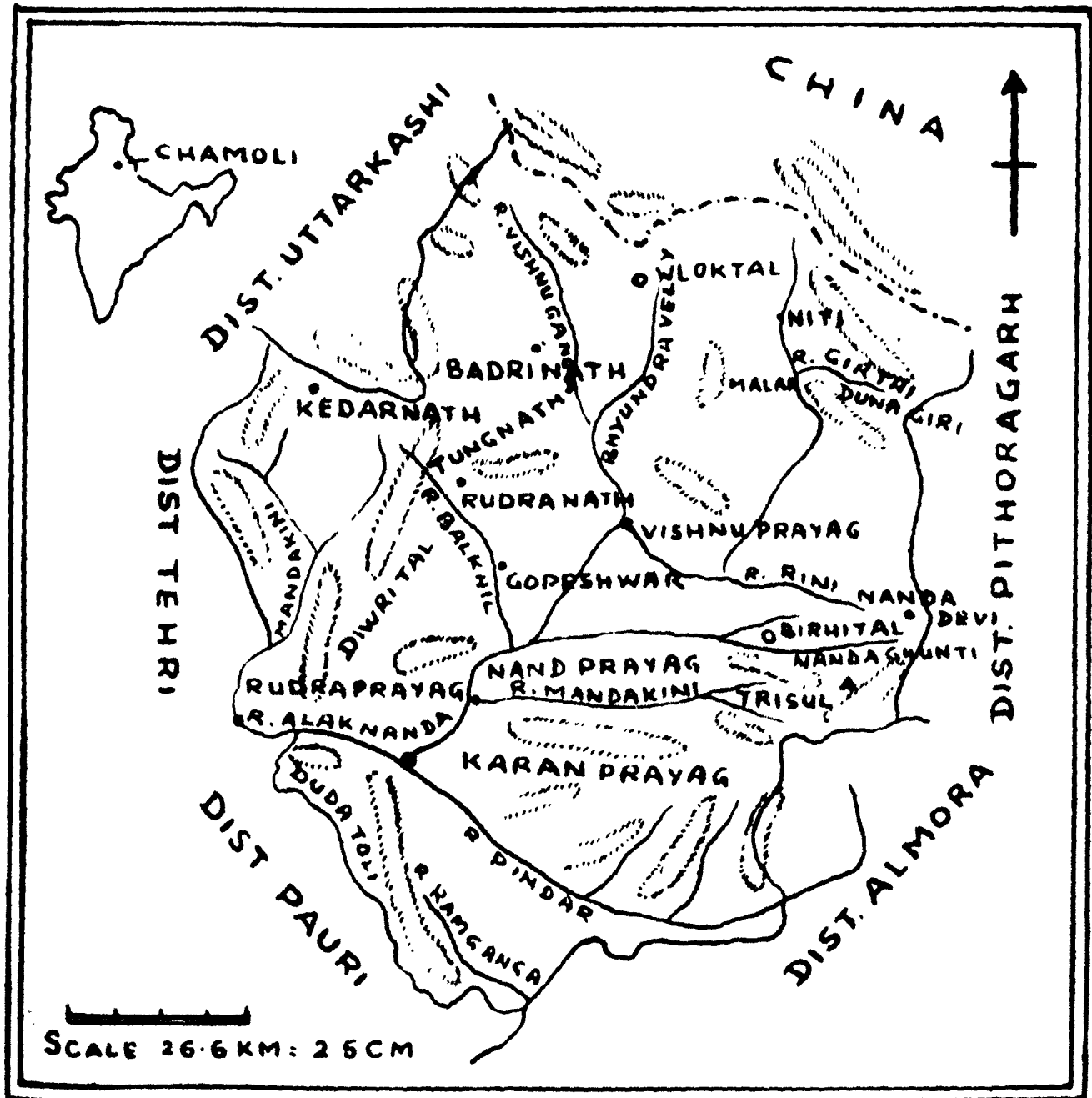
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CHAMOLI DISTRICT



78. CAMPANULACEAE

- 1a. Corolla 2 - lipped, cleft dorsally to the base ; anthers connate ... *Lobelia* 4
- 1b. Corolla regular ; anthers free or imperfectly connate.
 - 2a. Capsules loculicidal within the calyx - teeth.
 - 3a. Corolla campanulate ; capsules with a conical superior beak ... *Codonopsis* 2
 - 3b. Corolla tubular or funnel - shaped ; capsules nearly or quite included in the persistent calyx - tube ... *Cyananthus* 3
 - 2b. Capsules dehiscent at the base or sides below the calyx teeth ... *Campanula* 1

I. CAMPANULA L.

- 1a. Capsules dehiscing by valves at the base.
 - 2a. Seeds much compressed margined ; cauline leaves broadly lanceolate or ovate ... *C. latifolia* 7
 - 2b. Seeds minute, ellipsoid, little compressed.
 - 3a. Erect herbs with slender straight stems ; leaves linear. ... *C. sylvatica* 9
 - 3b. Much branched or with flexuose stems ; leaves lanceolate, oblong or ovate.
 - 4a. Stems and leaves with white needle - like hairs ... *C. argyrotricha* 2
 - 4b. Stems and leaves without white needle - like hairs.
 - 5a. Corolla bright blue ... *C. cashmiriana* 5
 - 5b. Corolla purple or violet.
 - 6a. Leaves pilose on both surfaces.
 - 7a. Leaves lanceolate, repand dentate ... *C. colorata* 6
 - 7b. Leaves oblong ovate, obscurely toothed ... *C. alsinoides* 1

- 6b. Leaves scabrous pilose above. some -
what tomentose beneath ...

C. cana 4

1b. Capsules dehiscing by valves on the sides or towards the top.

- 8a. Stems, 20 - 60 cm tall ; capsules narrowly oblong or sub -
linear ...

C. aristata 3

- 8b. Stems, 5 - 18 cm tall ; capsules obovoid, long attenuate at
the base ...

C. modesta 8

1. ***Campanula alsinoides*** Hook. f & Thoms. in Journ. Linn. Soc.
2 : 24. 1857 ; Hook. f. Fl. Brit. Ind. 3 : 441. 1881.

Slender hairy herbs ; leaves 1.2 - 1.8 cm. thin, pilose, sessile,
pilose ; calyx-teeth small weak ; capsules .3 cm, rounded at the base.

Fl. & Fr. : June - August.

Garhwal, 2500 - 3500 m (Falconer). Lit.

2. ***C. argyrotricha*** Wall. ex DC. Prodr. 7 : 473. 1839 ; Hook. f.
Fl. Brit. Ind. 3 : 441. 1881.

Procumbent, thread-like hairy herbs ; leaves 1.2 cm, sessile, thin,
silvery hairy ; flowers blue, long stalked.

Fl. & Fr. : September - October

Bhuna, Mana, 3200 m (31020).

3.. ***C. aristata*** Wall. in Roxb Fl. Ind. 2 : 98. 1824 ; Hook. f.
Fl. Brit. Ind. 3 : 441. 1881.

Simple erect glabrous herbs ; leaves linear ; flowers deep blue, small.

Fl. & Fr. : June - August

Bhyundar valley. 3500 - 4000 m (Smylie). Lit.

4. ***C. cana*** Wall. in Roxb. Fl. Ind. ed. Carey 2 : 101. 1824 ;
Hook. f. Fl. Brit. Ind. 3 : 440. 1881.

Much branched hispid herbs ; leaves oblong, toothed ; flowers
violet, small, hairy without.

Fl. & Fr. : September - October.

Loharjung. 2300 m (30831).

Rootstock creeping ; flowering stem 10 – 20 cm long ; pale – brown, smooth ; leaves reduced to scales ; flowers yellow.

Fl. & Fr. : July – October.

Ghangaria. 3000 m (31751).

2. ***Epipogium roseum*** (D. Don) Lindl. in Journ. Proc. Linn. Soc. Bot. 1 : 177. 1857. *Limodorum roseum* D. Don, Prodr. Fl. Nep. 30 (Feb. 1825). *E. tuberosum* Duthie in Ann. Roy. Bot. Gdn. Calcutta 9(2) : 151. 1906. *E. nutans* (Bl.) Reich. f. in Bonplandia 5 : 36. 1857 ; Hook. f. Fl. Brit. Ind. 6 : 124. 1890.

Erect herbs, 10 – 30 cm tall ; scape swollen, usually above the base ; racemes laxly 3 – 5 flowered.

Fl. & Fr. : September – October.

Ghangaria. 2500 – 2800 m (31745).

15. *ERIA* Lindl. nom. cons.

- | | | |
|--|-----|---------------------|
| 1a. Flower subglobose, in dense spikes | ... | <i>E. spicata</i> 2 |
| 1b. Flowers few, in lax spikes | ... | <i>E. alba</i> 1 |

1. ***Eria alba*** Lindl. Gen. & Sp. Orch. Pl. 67. 1830 ; Hook. f. Fl. Brit. Ind. 5 : 795. 1890.

Pseudobulbs, crowded, ovoid ; flowers sweet scented, white.

Fl. & Fr. : June.

Sutul. 2500 m (10161).

2. ***E. spicata*** (D. Don.) Hand. – Maz. Symb. Sin. 7 : 1352. 1936. *Octomeria spicata* D. Don, Prodr. Fl. Nep. 31. 1825. *E. convallarioides* Lindl. Gen. & Sp. Orch. 70. 1830 : Hook. f. Fl. Brit. Ind. 5 : 791. 1890.

Pseudobulbs tufted, flattened ; flowers white or greenish – yellow.

Fl. & Fr. : August – October.

Batwalchari, Phata. 1000 – 1800 m (6448).

16. EULOPHIA R. Br. nom. cons.

Eulophia herbacea Lindl. Gen. & Sp. Orch. Pl. 182. 1833 ; Hook. f. Fl. Brit. Ind. 6 : 2. 1890.

Pseudobulbs, broadly ovate ; flowers fragrant ; sepals spreading linear – lanceolate, green.

Fl. & Fr. : July – August.

Garhwal. 1500 – 2500 m (Falconer). Lit.

17. GALEOLA Lour.

Galeola falconeri Hook. f. Fl. Brit. Ind. 6 : 88. 1890.

Rhizomatous herbs with stout stem ; leaves 0 ; flowers bright – yellow.

Fl. & Fr. : July – August.

Garhwal. 1500 – 2000 m (Falconer). Lit.

18. GASTROCHILUS D. Don

- | | | |
|--|-----|-------------------------|
| 1a. Apex of leaves not setulose ; terminal lobe of lip papillose - hairy | ... | <i>G. calceolaris</i> 1 |
| 1b. Apex of leaves setulose ; terminal lobe of lip fleshy and glabrous | ... | <i>G. distichus</i> 2 |

1. **Gastrochilus calceolaris** (Sm.) D. Don, Prodr. Fl. Nep. 32. 1825. *Aerides calceolaris* Buch. – Ham. ex Sm. in Rees, Cyclop 39 : *Aerides* n. 11. 1819. *Saccolabium calceolare* (Sm.) Lindl. Gen. & Sp. Orch. Pl. 223. 1833 ; Hook. f. Fl. Brit. Ind. 6 : 60. 1890.

Herbs with short stems ; racemes, much shorter than the leaves ; flowers crowded, yellowish – green.

Fl. & Fr. : September – October.

Phata. 1600 m (35920).

2. **Gastrochilus distichus** (Lindl.) Kuntz. Rev. Gen. Pl. 2 : 661. 1891.
Saccolabium distichum Lindl. Journ. Proc. Linn. Soc. 3 : 36. 1859 ; Hook.
f. Fl. Brit. Ind. 6 : 64. 1890.

Pseudobulbs branching, slender ; herbs leafy ; leaves fleshy, green, brown spotted, narrowly – lanceolate, acuminate, flowers green, spotted brown.

Fl. & Fr. : May – June.

Bhararisain. 2000 m (98124).

19. GASTRODIA R. Br.

Gastrodia orobanchoides (Falc.) Benth. Gen. Pl. 3 : 617. 1883.
Gamoplexis orobanchoides Falc. in Trans. Linn. Soc. 20 : 293, t. 13; Hook.
f. Fl. Brit. Ind. 6 : 122. 1890.

Tubers large, oblong ovoid, scaly ; leaves reduced to scales ; flowers many, yellow.

Fl. & Fr. : May – June.

Kanol. 2500 m (1037).

20. GOODYERA R. Br.

- | | | |
|---|-----|---------------------|
| 1a. Stem tall, upto 7.5 dm in length, leafy upwards; flowers in dense spikes | ... | <i>G. procera</i> 3 |
| 1b. Stem not exceeding 3 dm in length ; flowers in more or less lax racemes. | | |
| 2a. Lip not setose within ; leaves basal. | | |
| 3a. Sac of lip quite smooth within, not projecting beyond the bases of the sepals | ... | <i>G. repens</i> 4 |

- | | | |
|--|-----|---------------------|
| 3b. Sac of lip with 2 - ridges inside, projecting beyond the bases of the sepals | ... | <i>G. fusca</i> 2 |
| 2b. Lip setose within | ... | <i>G. foliosa</i> 1 |

1. **Goodyera foliosa** (Lindl.) Benth. ex Hook. f. Fl. Brit. Ind. 6 : 113. 1890. *Georchis foliosa* Lindl. Gen. & Sp. Orch. Pl. 496. 1840.

Leaves ovate – lanceolate, very oblique ; flowers pink.

Fl. & Fr. : August – September.

Mondal – Chopta. 1500 m (28588).

2. **G. fusca** (Lindl.) Hook. f. Fl. Brit. Ind. 6 : 112. 1890. *Aetheria fusca* Lindl. Gen. & Sp. Orch. Pl. 491. 1840.

Robust erect herbs, 15 – 30 cm long ; radical leaves broadly ovate ; spike very many, dense flowered ; flowers pubescent, greenish – white.

Fl. & Fr. : September – October.

Baradeoldunga, Bhyundar valley. 3500 – 4000 m (31055).

3. **G. procera** (Ker – Gawl.) Hook. Exot. Fl. 1 : t. 39. 1823. *Neottia procera* Wall. ex Ker – Gawl. in Edgew. Bot. Reg. 8 : t. 639 1822 ; Hook. f. Fl. Brit. Ind. 6 : 111. 1890.

Erect herbs with many leaves, .25 – 1 m tall ; leaves thick ; flowers white, fragrant.

Fl. & Fr. : May – June.

Chamoli. 1800 m (14845).

4. **G. repens** (L.) R. Br. in Aiton, Hort. Kew. ed. 2, 5 : 198. 1813. *Satyrium repens* L. Sp. Pl. 1339. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 111. 1890, *p.p.*

Stoloniferous herbs ; leaves elliptic or ovate – elliptic, reticulated green ; flowers white, flushed brownish – pink.

Fl. & Fr. : August – October.

Bampa, Ghangaria, Malari. 2000 – 4000 m (56086).

21. HABENARIA Willd.

- 1a. Petals bipartite ; lip 3 - partite ... *H. stenopetala* 10
- 1b. Petals entire.
 - 2a. Lip entire or with minute basal lobes.
 - 3a. Lip entire, broad, petaloid ... *H. obcordata* 7
 - 3b. Lip entire or with minute basal lobes, narrow.
 - 4a. Spur longer than the ovary, flexuous.
 - 5a. Petals yellow, erect ; spur rather stout, usually upturned ... *H. edgeworthii* 3
 - 5b. Petals green, spreading ; spur slender, usually deflexed ... *H. latelabris* 5
 - 4b. Spur much shorter than the ovary, clavate ... *H. clavigera* 1
 - 2b. Lip 3 - lobed or 3 - partite.
 - 6a. Side lobes broad, fringed.
 - 7a. Anther tube short ; spur about as long as the ovary ... *H. pectinata* 8
 - 7b. Anther tube long, slender, upright ; spur longer than the ovary ... *H. intermedia* 4
 - 6b. Side lobes very narrow and often filiform.
 - 8a. Anther tube long ... *H. pubescens* 9
 - 8b. Anther tube short.
 - 9a. Leaves 3 or more, pale margined ... *H. marginata* 6
 - 9b. Leaves 2, radical, orbicular, cordate, margined ... *H. diphylla* 2

1. **Habenaria clavigera** (Lindl.) Dandy. Journ. Bot. 68 : 246. 1930.
Platanthera clavigera Lindl. Gen. & Sp. Orch. 289. 1833. *H. densa* Wall.
 ex Lindl. Gen. & Sp. Orch. 326. 1835 ; Hook. f. Fl. Brit. Ind. 6 : 153. 1890.

Stout herbs with oblong tubers ; leaves many ; flowers crowded green.

Fl. & Fr. : July – August.

Garhwal 2500 – 3500 m (Duthie). Lit.

2. **Habenaria diphylla** Dalz. Hook. Journ. Bot. 2 : 1850 ; Hook. f. Fl. Brit. Ind. 6 : 151. 1890.

Tubers small, elongate or globose; radical leaves usually 2, orbicular, cordate, rather fleshy, 2.5 – 5 cm in diam ; flowers white tinged green.

Fl. & Fr. : July – August.

Way to Dunagiri. 2500 m (54041).

3. **H. edgeworthii** Hook. f. ex Collett Fl. Siml. 504. 1902 ; *H. latilabris* Hook. f. Fl. Brit. Ind. 6 : 153. 1890, *p.p.* *Platanthera edgeworthii* (Hook. f. ex Collett) Gupta Fl. Nainitalensis 349. 1968.

Stout herbs with loose sheaths at the base ; flowers crowded, yellow.

Fl. & Fr. : July – August.

Bampa, Gaurikund. 2500 – 3000 m (56035).

4. **H. intermedia** D. Don, Prodr. Fl. Nep. 24. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 138. 1890.

Tall erect herbs with terete stems ; leaves scattered ; flowers white or greenish white.

Fl. & Fr. : July – August.

Bampa, Gaurikund. 2500 – 3000 m (56035).

5 **H. latilabris** (Lindl.) Hook. f. Fl. Brit. Ind. 6 : 153. 1890. *Platanthera latilabris* Lindl. Gen. & Sp. Orch. Pl. : 289. 1835.

Herbs with fusiform tubers ; leaves, scattered, 3 – 4 ; flowers green.

Fl. & Fr. : August – September.

Bhyundar & Mandakini valleys. 1500 – 2500 m (29348).

6. **H. marginata** Colebr. in Hook. Ex. Fl. 2 : 17. t. 136. 1824 ; Hook. f. Fl. Brit. Ind. 6 : 150. 1890.

Tall erect herbs with 1 – 2 – ovoid or elliptic tubers ; leaves few, sessile scattered ; flowers greenish – yellow.

Fl. & Fr. : August – September.

Chamoli. 900 m (29307).

7. **H. obcordata** (Buch. – Ham. ex D. Don) Fyson, Fl. Nil. & Pul. Hill. Tops 1 : 405, t. 258. 1915. *Orchis obcordata* Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 230. 1825, non Willem 1796 ; Hook. f. Fl. Brit. Ind. 6 : 163. 189. *H. galeandra auct non* (Rechb. f.) Benth.

Herbs with small globose tubers, tinged with purple ; flowers pale – purple.

Fl. & Fr. : July – August.

Govindghat. 1800 m (29316).

8. **Habenaria pectinata** D. Don, Prodr. Fl. Nep. 24. 1825. *H. ensifolia* Lindl. Gen. & Sp. Orch. Pl. : 321. 1835 ; Hook. f. Fl. Brit. Ind. 6 : 137. 1890.

Herbs with stout $\pm$ winged stem ; leaves oblong linear strongly 3 – nerved ; flowers greenish – white crowded.

Fl. & Fr. : July – September.

Bhyundar valley, Gaurikund. 1500 – 2000 m (38753).

9. **H. pubescens** Lindl. Gen. & Sp. Orch. Pl. : 322. 1835 ; Hook. f. Fl. Brit. Ind. 6 : 144. 1890.

Herbs with pubescent stem with elongated stout tubers ; leaves crowded at the base ; flowers small, greenish – yellow.

Fl. & Fr. : July August.

Garhwal upto 1800 m (Falconer). Lit.

10. **H. stenopetala** Lindl. Gen. & Sp. Orch. Pl. : 319. 1835 ; Hook. f. Fl. Brit. Ind. 6 : 134. 1890.

Tall herbs with 1 2 obovoid tubers ; leaves clustered above the middle of the stem ; flowers pale brownish green.

Fl. & Fr. : August.

Bhyundar valley. 2100 m (29342).

22. HERMINIUM R. Br.

1a. Lip 3 - lobed.

2a. Spike short ; leaves broadly lanceolate ... *H. monorchis* 4

2b. Spike long and narrow ; leaves linear lanceolate ... *H. lanceum* 2

1b. Lip entire.

3a. Leaves 2 or 3 ... *H. duthiei* 1

3b. Leaf solitary ... *H. monophyllum* 3

1. **Herminium duthiei** Hook. f. Fl. Brit. Ind. 6 : 130. 1890.

Tubers ellipsoid ; herbs 10 - 25 cm tall ; leaves 2 or 3, linear or oblanceolate, acuminate ; flowers deflexed, pale green ; lip entire.

Fl. & Fr. : July – August.

Badrinath, Kuwari Pass. 3500 – 4000 m (Duthie). Lit.

2. **H. lanceum** (Thunb. ex Sw.) Vuijk, Blumea 11(1) : 228. 1961. *Ophrys lancea* Thunb. ex Sw. in Koeng. Vet. Akad. Handl. Stockh. 21 : 223. 1800. *H. angustifolium* (Lindl.) Benth. ex Cl. in Journ Linn. Soc. Bot. 25 : 73. 1889 ; Hook. f. Fl. Brit. Ind. 6 : 129. 1890.

Tall herbs with small oblong tubers ; leaves 2 – 3 linear ; flowers small, very dense, green.

Fl. & Fr. : July – October.

Anusuyia area, Govindghat. 1500 – 2500 m (41920).

3. **H. monophyllum** (D. Don) Hunt & Summerh. in Kew Bull. 20 : 51. 1966. *Neottia monophylla* D. Don, Prodr. Fl. Nep. 27. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 131. 1890.

Herbs with unequal tubers ; leaves solitary, linear ; flowers minute, yellow - green.

Fl. & Fr. : July – August.

Garhwal. 1500 – 2500 m (Falconer). Lit.

4. **H. monorchis** (L.) R. Br. in Aiton, Hort. Kew ed. 2(5) : 191. 1813. *Ophrys monorchis* L. Sp. Pl. 947. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 1890.

Tubers ellipsoid ; erect herbs, 10 – 25 cm tall ; leaves oblong – lanceolate, ovate ; flowers dull yellow or white.

Fl. & Fr. : July – August.

North of Bampa. 3000 m (56055).

23. KINGIDIUM P. F. Hunt

Kingidium taenialis (Lindl.) Hunt in Kew Bull. 24(1) : 98. 1970. *Aerides taeniale* Lindl. 1833. *Doritis taenialis* (Lindl.) Hook. f. Fl. Brit. Ind. 6 : 31. 1890.

Roots very long flat ; stem short, leafy ; scape short few flowered ; leaves few, obovate – oblong ; flowers mauve – purple.

Fl. & Fr. : May – June.

Mondal area. 1650 m (43958).

24. LIPARIS L. C. Rich. nom. cons.

- | | | |
|--|-----|----------------------|
| 1a. Leaf solitary, thin ; bracts long and slender | ... | <i>L. glossula</i> 1 |
| 1b. Leaves 2 - 5. | | |
| 2a. Bracts very minute ; lip broadly obcordate, apiculate crenulate | ... | <i>L. rostrata</i> 3 |
| 2b. Bracts linear spreading ; lip cuneately obovate, 2 - tubercled at the base | ... | <i>L. nervosa</i> 2 |

1. **Liparis glossula** Reich. f. in *Linnaea* 41 : 44. 1876 ; Hook. f. *Fl. Brit. Ind.* 5 : 693. 1890.

Pseudobulbs large ; stem 2.5 – 7.5 cm tall ; flowers green – purple.

Fl. & Fr. : July – August.

British Garhwal. 2000 – 2500 m (Duthie). Lit.

2. **L. nervosa** (Thunb.) Lindl. *Gen. & Sp. Orch. Pl.* : 26. 1830. *Ophrys nervosa* Thunb. *Fl. Jap.* 27. 1784. *L. paradoxa* (Lindl.) Reich. f. in *Walp. Ann.* 6 : 218. 1861 ; Hook. f. *Fl. Brit. Ind.* 5 : 697. 1890.

Herbs with tufted stem, sometimes pseudobulbs present ; leaves 5 – 20 cm long, elliptic lanceolate.

Fl. & Fr. : July – August.

College Campus, Gopeswar. 1350 m (97. Kala & Gaur). Lit.

3. **L. rostrata** Reich. f. in *Linnaea* 41 : 44. 1876 ; Hook. f. *Fl. Brit. Ind.* 5 : 694. 1890.

Leaves 2, opposite ; flowers yellow – green.

Fl. & Fr. : June – September.

Way to Danagiri. 3900 m (54077).

25. *LISTERA* R. Br, nom. cons.

- 1a. Lip brown, the rest of the flower green, .625 - 1.25 cm long.
- | | | |
|------------------------------|-----|-----------------------|
| 2a. Column, straight | ... | <i>L. tenuis</i> 3 |
| 2b. Column long, much curved | ... | <i>L. pinetorum</i> 2 |
- 1b. Whole flower green, 1.50 cm long
- | | | |
|--|-----|-------------------------|
| | ... | <i>L. longicaulis</i> 1 |
|--|-----|-------------------------|

1. *Listera longicaulis* King & Pant. Journ. As. Soc. Bengal 65 : 126. 1896 ; King & Pant. Orch. Sikkim Himal. in Ann. Roy. Bot. Gdn. Cal. 8(1) : 256. 1898.

Slender erect herbs, 10 – 20 cm tall ; leaves broadly cordate or reniform, acute, sessile ; raceme 2 – 10 flowered ; puberulous ; flowers pale – green.

Fl. & Fr. : August – October.

Ghangaria. 3000 m (31778).

2. *L. pinetorum* Lindl. in Journ. Proc. Linn. Soc. Bot. 1 : 175. 1857. *Listera mucronata* Panigrahi & Wood in Kew Bull. 29 : 731 ; f. 1 1974 ; Hook. f. Fl. Brit. Ind. 6 : 104. 1890.

Tall erect herbs 15 – 30 cm tall ; leaves 2, broadly ovate, acuminate, dark green prominently nerved ; flowers green ; lip 2 – lobed, mucronate.

Fl. & Fr. : June – July.

Amritganga valley. 2500 m (44064).

3. *L. tenuis* Lindl. Journ. Proc. Linn. Soc. Bot. 1 : 176. 1857 ; Hook. f. Fl. Brit. Ind. 6 : 104. 1890.

Herbs, 12 – 15 cm high ; leaves 2, sessile ; column short, slightly curved.

Fl. & Fr. : August – September.

Deodi – Ramni Camp. 3500 – 4000 m (73294, Hazra). Lit.

26. *LUISIA* Gaud.

- 1a. Leaves long and stout, about .5 cm in thickness.
- 2a. Flower 1.0 cm long ... *L. trichorhiza* 3
- 2b. Flowers .6 cm long ... *L. zeylanica* 4
- 1b. Leaves slender, .3 cm or less in thickness.
- 3a. Flowers .7 cm long ; lip nearly flat ... *L. brachystachya* 1
- 3b. Flowers .4 cm long ; lip with a saccate hypochile ... *L. inconspicua* 2

1. *Luisia brachystachya* (Lindl.) Bl. Rumphia 4 : 50. 1848 ; Hook. f. Fl. Brit. Ind. 6 : 23. 1890.

Slender herbs ; leaves 5 – 15 cm long, slender ; flowers rose purple ; lip thin, strongly parallel grooved.

Fl. & Fr. : July – August.

Garhwal. 1200 – 1500 m (Falconer). Lit.

2. *L. inconspicua* Hook. f. ex King & Pant. Orch. Sikkim Himal. in Ann. Roy. Bot. Gdn. Calc. 8(1) : 203. 1898.

Slender herbs, 10 – 15 cm tall ; leaves slender 3 – 6 cm long, .3 cm in diam ; spikes 1 – 3 flowered, pale or yellow – green ; lip flat.

Fl. & Fr. : August – September.

Batwalchari. 1000 m (6427).

3. *L. trichorhiza* (Hook.) Bl. Mus. Bot. Lugd. Bat. 1 : 63. 1849. *Vanda ? trichorhiza* Hook. Exot. Fl. 1 : t. 72. 1823 ; Hook. f. Fl. Brit. Ind. 6 : 23. 1890.

Stem long branching, much stout ; leaves slender 7 – 18 cm long ; flowers purplish, tinged yellowish, 1 cm long.

Fl. & Fr. : July – August.

Garhwal. 1200 – 1500 m (Falconer). Lit.

4. *L. zeylanica* Lindl. Fl. Orch. Luisia 3. 1853. *L. teretifolia* auct non Gaud. sensu Hook. f. Fl. Brit. Ind. 6 : 22. 1890, *p.p.*

Stout branching herbs, 15 – 30 cm long ; leaves terete spreading 6 – 15 cm long ; flowers green, .6 cm long.

Fl. & Fr. : May – September.

Ghat, Nandprayag, Niglol valley. 1200 – 1500 m (10399).

27. *MALAXIS* Soland. ex Sw.

- 1a. Lip slightly convex ; basal auricles sagittate and projecting upwards ; leaves 3 - 4 ... *M. acuminata* 1
- 1b. Lip concave, entire, its apex produced into a beak ; basal auricles absent.
- 2a. Leaf one ... *M. cylindrostachya* 2
- 2b. Leaves two ... *M. musciformis* 3

1. *Malaxis acuminata* D. Don, Prodr. Fl. Nep. 29. 1825.
Microstylis wallichii Lindl. Gen. & Sp. Orch. Pl. : 20. 1830 ; Hook. f. Fl. Brit. Ind. 5 : 686. 1890.

Terrestrials ; leaves usually 3 or 4 ; flowers yellowish – green.

Fl. & Fr. : July – October.

Mondal, Nagnath, Okhimath. 1300 – 2500 m (28590).

2. *M. cylindrostachya* (Lindl.) Kuntz. Rev. Gen. Pl. 2 : 673. 1891.
Microstylis cylindrostachya (Lindl.) Kuntz. Reich. f. Walp. Ann. Bot. Syst. 6 : 207. 1861 ; Hook. f. Fl. Brit. Ind. 5 : 689. 1890.

Tubers small ; leaf solitary ; flowers yellowish – green.

Fl. & Fr. : July – August.

Mandakini valley. 2000 – 3000 m (38655).

3. *M. muscifera* (Lindl.) Kuntz. Rev. Gen. Pl. 2 : 673. 1891.
Microstylis muscifera (Lindl.) Ridl. Journ. Linn. Soc. Bot. 24 : 333. 1888 ;
Hook. f. Fl. Brit. Ind. 5 : 689. 1890.

Flowering stems 15 – 45 cm long; leaves 2, oblong or ovate, obtuse ; flowers pale or yellowish – green.

Fl. & Fr. : June – October.

Bhyundar valley, Bajmora. 3500 – 4000 m (35870).

28. NEOTTIA Guettard nom. cons.

Neottia listeroides Lindl. in Rolye, Ill. Bot. Himal. 368. 1839.
Listera lindleyana (Dcne.) King & Pant. in Ann. Roy. Bot. Gdn. Cal. 8 : 258. t. 343. 1898 ; Hook. f. Fl. Brit. Ind. 6 : 103. 1893.

Erect brown leafless herbs ; lip pendulous much longer than the petals.

Fl. & Fr. : July – October.

Ghangharia. 3000 m (29390).

29. NEOTTIANTHE Schlecht.

Neottianthe secundiflora ((Hook. f.) Schitr. Fedde Repert. 10 : 291. 1891. *Habenaria secundiflora* Hook. f. Fl. Brit. Ind. 6 : 165. 1890.

Herbs, 6 – 15 cm high ; flowers secund, pink ; all perianth except lip connivent to form a hood – like structure.

Fl. & Fr. : July – August.

Himotoli – Dharansi 3000 – 3500 m (73209, Harra). Lit.

30. NERVILIA Comm. ex Gaud. nom. cons.

- | | | |
|---|-----|------------------------|
| 1a. Scape 1 - flowered | ... | <i>N. mackinnoni</i> 3 |
| 1b. Flowers in racemes. | | |
| 2a. Leaves glabrous ; sepals and petals large, pink | ... | <i>N. gammieana</i> 2 |
| 2b. Leaves hairy on the veins ; flowers smaller ; sepals and petals green with purplish veins | ... | <i>N. aragoana</i> 1 |

1. **Nervilia aragoana** Gaud. Frey. Voy. Bot. 422, t. 35. 1829 ; *Pogonia flabelliformis* Lindl. Gen. & Sp. Orch. Pl : 415. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 121. 1890.

Tubers subglobose, white ; leaf appearing after flowers ; flowers drooping, green.

Fl. & Fr. : June.

Gohna. 1800 m (1800 m (10027)).

2. **N. gammieana** (Hook. f.) Schultz. in Engl. Bot. Jahrb. 45 : 404. 1911. *Pogonia gammieana* Hook. f. in Curtis Bot. Mag. 109 : t. 6671. 1883 ; Hook. f. Fl. Brit. Ind. 6 : 120. 1890.

Leaf reniform ; flowers pink, streaked, with white.

Fl. & Fr. : July – August.

Garhwal. 1000 – 1200 m (Falconer). Lit.

3. **N. mackinnoni** (Duthie) Schultz. Engl. Bot. Jahrb. 45 : 402. 1911. *Pogonia mackinnoni* Duthie Journ. As. Soc. Bengal 71(2) : 43. 1902.

Leaf as long as broad, 7 lobed, cordate at the base ; flowers solitary light green blotched with reddish brown outside.

Fl. & Fr. : May.

Mondal area. 1650 m (43925).

31. OBERONIA Lindl. nom. cons.

Oberonia pachyrachis Reich. f. ex Hook. f. Fl. Brit. Ind. 5 : 681. 1888.

Stem short, tufted ; leaves ensiform ; flowers minute pale brown.

Fl. & Fr. : August – October.

Batwalchari, Phata. 1000 – 1500 m (38772).

*Hara, Stearn & Williams, Enum. Flow. Pl. Nep. 1 : 30 58. 1978. treated *Orchis* species under different genera, have been given in the present work within the bracts.

32. ORCHIS L.

- 1a. Stems slender ; leaves 1 - 3 ; lip $\pm$ distinctly 3 - lobed.
- 2a. Leaves 1 - 3 ; lip longer than the sepals ... *O. chusua* 1
- 2b. Leaf usually solitary near the base of the stem ; lip not longer than the sepals ... *O. stracheyi* 3
- 1b. Stems stout ; leaves 3 or more ; lip entire or obscurely 3 - lobed *O. habinarioides* 2

1. *Orchis chusua* D. Don, Prodr. Fl. Nep. 23. 1875 ; Hook. f. Fl. Brit. Ind. 6 : 127. 1890. (*Ponerorchis** *chusua* (D. Don) Soo Act. Bot. Acad. Sci. Hung. 12 : 352. 1966).

Tubers small ellipsoid ; stem with 2 blunt sheaths at the base ; flowers purple or white.

Fl. : Fr. : July August.

Badrinath, Dunagiri. 2500 - 3500 m (53973).

2. *O. habenarioides* King & Pant. Ann. Bot. Gdn. Calc. 8 : 302. Pl. 401. 1898. (*Gymnadenia** *orchidis* Lindl. Gen. & Sp. Orch. 278. 1835).

Herbs, 30 - 50 cm high ; spikes dens flowered ; flowers purplis ; spur slender incurved.

Fl. & Fr. : August - September.

Himtoli. 3500 - 4500 m (73280, Hazra). Lit.

3. *O. stracheyi* Hook. f. Fl. Brit. Ind. 6 : 128. 1890. (*Galearis** *stracheyi* (Hook. f.) P. F. Hunt in Kew Bull. 26 : 172. 1971).

Rhizome without tubers ; erect, slender herbs, 6 - 12 cm tall ; radical leaf solitary, petioled, elliptic, obtuse ; scape naked.

Fl. & Fr. : August - September.

Rogile in Garhwal. 3000 - 3500 m (Strachev & Winterbottom). Lit.

33. OREORCHIS Lindl.

1a. Leaf solitary ; flowers reddish.

2a. Flowers stalked ; lip saccate at the base ... *O. foliosa* 1

2b. Flowers larger and sessile ; lip not saccate at the base ... *O. indica* 2

1b. Leaves 2 or 3 ; flowers white or pale - yellow ... *O. micrantha* 3

1. **Oreorchis foliosa** (Lindl.) Lindl. Journ. Proc. Linn. Soc. Bot. 3 : 27. 1859 ; Hook. f. Fl. Brit. Ind. 5 : 709. 1890.

Pseudobulb, broad - based 15 cm long ; leaf solitary, terminal oblong - lanceolate, acuminate ; flower solitary, red ; lip saccate at the base.

Fl. & Fr. : May - July.

Amritganga valley, Bhuna. 3000 m (44077).

2. **O. indica** (Lindl.) Hook. f. Fl. Brit. Ind. 5 : 709. 1890. *Coral-lorhiza indica* Lindl. in Journ. Lind. Soc. 3 : 26. non Dcne.

Rhizome with 1 or 2 annulated pseudobulbs ; leaf solitary ; flowers reddish.

Fl. & Fr. : September - October.

Ghangaria. 3000 m (31764).

3. **O. micrantha** Lindl in Journ. Proc. Linn. Soc. Bot. 3 : 27. 1859 ; Hook. f. Fl. Brit. Ind. 5 : 709. 1890.

Pseudobulb ovoid - conic ; leaves 2 - 3 linear ; flowers yellow.

Fl. & Fr. : June - July.

Ghangaria, Ramni forest. 2500 - 3500 m (10358).

34. PACHYSTOMA Bl.

Pachystoma senile (Lindl.) Reich. f. Bonplandia 3 : 250. 1858. *Apaturia senilis* Lindl. Gen. Sp. Orch. 130. 1831 ; Hook. Fl. f. Brit. Ind. 5 : 812 1890.

Terrestrial herbs ; leaves oblong lanceolate ; flowers pinkish white.

Fl. & Fr. : March – April.

Garhwal. (Falconer). Lit.

35. PECTEILIS Raf.

Pecteilis susannae (L.) Raf. Fl. Tellur. 2 : 38. 1837. *Orchis susannae* L. Sp. Pl. 939. 1753. *Habenaria susannae* (L.) Bl. Bijdr. Fl. Nederl. Ind. 8. 402. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 137. 1890.

Stout herbs with 2 ellipsoid or ovoid tubers ; flowers white, tinged green, fragrant.

Fl. & Fr. : July – September.

Garhwal. 1000 – 1800 m (Duthie). Lit.

36. PERISTYLUS Bl. nom. cons.

- | | | |
|--|-----|--------------------------|
| 1a. Flowers green ; leaves 2 or 3 ; lower half of lip trough - shaped | ... | <i>P. elisabethae</i> 1 |
| 1b. Flowers white ; leaves clustered above the middle of the stem ; lip broadly triangular | ... | <i>P. goodyeroides</i> 2 |

1. **Peristylus elisabethae** (Duthie) Gupta Fl. Nainitalensis 351. 1968. *Habenaria elisabethae* Duthie in Journ. As. Soc. Bengal 71(2) : 44. 1902.

Tall herbs with ovoid tubers ; leaves 2 or 3, lanceolate finely acuminate ; flowers small sessile, green.

Fl. & Fr. : July – August.

Trijuginarayan. 2000 m (38747).

2. **P. goodyeroides** (D. Don) Lindl. Gen. & Sp. Orch. Pl. : 299. 1835. *Habenaria goodyeroides* D. Don, Prodr. Fl. Nep. 25. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 161. 1890.

Tall herbs with hairy tubers ; leaves clustered ; flowers white, fragrant.

Fl. & Fr. : July August.

Nandakini valley. 1500 m (38616).

37. PHOLIDOTA Lindl.

Pholidota articulata Lindl. Gen. & Sp. Orch. Pl. 38. 1830 ; Hook. f. Fl. Brit. Ind. 5 : 844. 1890.

Perennials ; pseudobulbs with two sessile leaves ; racemes 5 – 10 cm, drooping ; flowers white, tinged purple.

Fl. & Fr. : August October.

Mondal, Phata, Okhimath. 1000 – 1700 m (41964).

38. RHYNCHOSTYLIS Bl.

Rhynchostylis retusa (L.) Bl. Bijdr. Fl. Nederl. Ind. 7 : 286, 1825 ; Hook. f. Fl. Brit. Ind. 6 : 32. 1890.

Stout epiphytes, 10 – 20 cm tall ; leaves linear – oblong, 10 – 45 cm long curved, bluntly 2 – lobed ; racemes longer than the leaves ; flowers white or purplish.

Fl. & Fr. : June July.

Nandprayag. 1000 m (10396).

39. SATYRIUM Swartz nom. cons.

Satyrium nepalense D. Don, Prodr. Fl. Nep. 26. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 168. 1890.

Tall erect herbs with oval tubers ; leaves 2 or 3 fleshy ; flowers dark pink to white fragrant.

Fl. & Fr. : July – October.

Bhyundar valley, Gwaldam. 1800 – 4000 m (42082).

40. SPIRANTHES Rich. nom. cons.

Spiranthes sinensis (Pers.) Ames Orch. 2 : 53. 1908. *Neottia sinensis* Pers. Syn. 2 : 511. 1807. *S. australis* (R. Br.) Lindl. in Edgew. Bot. Regist. 10 Sub. t. 823. 1824 ; Hook. f. Fl. Brit. Ind. 6 : 102. 1890.

Herbs with thick fibrous roots ; leaves clustered near the base ; flowers white or pink.

Fl. & Fr. : June – October.

Chamoli, Mondal area. 1200 – 2800 m (14859).

41. THUNIA Reich. f.

Thunia alba (Lindl.) Reich. f. in Bos. Zeitschr. 10 : 764. 1852. *Phaius albus* Lindl. in Wall. Pl. As. Rar. 2 : 85, t. 198. 1831 ; Hook. f. Fl. Brit. Ind. 5 : 818. 1890.

Stems erect, tufted ; leaves sessile ; flowers pure white.

Fl. & Fr. : June.

Ghat - Nandprayag. 1300 m (10406).

42. VANDA Jones

Vanda cristata Lindl. Gen. & Sp. Orch. Pl. 216. 1833 ; Hook. f. Fl. Brit Ind. 6 : 53. 1890.

Leaves bifarious, crowded ; flowers waxy, fragrant ; sepals and petals incurved.

Fl. & Fr. : August – September.

Mondal, Chopta. 1500 m (28592).

43. ZEUXINE Lindl. nom. cons.

Zeuxine flava (Lindl.) Trimen in Journ. Celyon Br. Roy. As. Soc. 9 : 90. 1885. *Monochilus flavum* Wall. ex Lindl. Gen. & Sp. Orch. Pl. : 487. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 108. 1890.

Leaves membranous, ovate acute ; scape slender, 7 – 14 cm long ; flowers yellow ; terminal lobe of lip 2 – winged.

Fl. & Fr. : February – May.

Mondal area. 1650 m (43926).

138. ZINZIBERACEAE

1a. Lateral staminodes broad.

2a. Connective spurred at the base.

3a. Flowers purple ... *Roscoea* 5

3b. Flowers yellow.

4a. Bracts 1 - flowered ; lip deeply 2 - lobed ... *Cautleya* 1

4b. Bracts several flowered ; lip notched ... *Curcuma* 3

2b. Connective very narrow ; neither spurred nor crested ... *Hedychium* 4

1b. Lateral staminodes smaller or 0, rarely narrow and adnate to the lip.

5a. Filaments short ; anther cells contiguous, crest narrow, as long as the cells ... *zingiber* 6

5b. Filaments forming with the connective an oblong petaloid process, in the middle of which are placed the contiguous linear anther cells ... *Costus* 2

1. CAUTLEYA Royle ex Hook. f.

- | | | |
|---|-----|----------------------|
| 1a. Leaves narrow ; flowers few, distant ; bracts green, shorter than the calyx | ... | <i>C. gracilis</i> 1 |
| 1b. Leaves broad ; flowers many, crowded ; bracts red, as long as the calyx | ... | <i>C. spicata</i> 2 |

1. *Cautleya gracilis* (Sm.) Dandy in Journ. Bot. 70 : 328. 1932. *Roscoeia gracilis* Sm. in Trans. Linn. Soc. Lond. 13 : 460. 1822. *C. luted* (Royle) Royle ex Hook. f. in Curtis, Bot. Mag. 114 : t. 6991. 1888 ; Hook. f. Fl. Brit. Ind. 6 : 208. 1890.

Herbs with 12 – 25 cm long leaves ; flowers few, yellow ; corolla tube longer than the calyx ; seeds angular.

Fl. & Fr. : July – October.

Anusuyia area. 1700 – 2500 m (42025).

2. *C. spicata* (Sm.) Baker in Fl. Brit. Ind. 6 : 209. 1890. *Roscoeia spicata* Sm. in Trans. Linn. Soc. Lond. 13 : 461. 1822.

Herbs with 30 – 45 cm long leaves ; flowers many, yellow ; corolla tube hardly longer than the calyx ; seeds ovoid.

Fl. & Fr. : August – October.

Badrinath. 2000 – 27000 m (49177).

2. COSTUS L.

Costus speciosus (Koenig) Sm. in Trans. Linn. Soc. Lond. 1 : 249. 1791. *Banksia Speciosa* Koenig in Retz. Obs. Bot. 3 : 75. 1783 ; Hook. f. Fl. Brit. Ind. 6 : 249. 1892.

Tall robust herbs ; leaves thinly silky beneath ; flowers white ; capsules globose red.

Fl. & Fr. : August – September.

Soragarh. 600 m (6328).

3. CURCUMA Roxb.

- 1a. Flower's - spike distinct from the leaves ; flower - bracts 2.5 cm *C. angustifolia* 1
- 1b. Flower's - spike in the in the centre of the tuft of leaves; flower-bracts 3.2 cm ... *C. longa* 2

1. **Curcuma angustifolia** Roxb. in As. Res. 11 : 338. t. 3. 1810 ; Hook. f. Fl. Brit. Ind. 210. 1890.

Dwarf herbs ; rootstock globose ; flowers yellow ; empty bracts pink.

Fl. & Fr. : June October.

Ghat, Trisula. 1200 – 1600 m (44230).

2. **C. longa** L. Sp. Pl. 2. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 214. 1890. 'Haldi'

Tubers bright yellow ; leaves elliptic oblong, 10 20 cm broad, glabrous ; flowers yellowish.

Cultivated in lower valleys.

4. HEDYCHIUM Koenig

Hedychium spicatum Buch. Ham. ex Sm. var. **acuminatum** (Roscoe) wall in Hook. Journ. Bot. kew Gdn. Misc. 5 : 328. 1853. *H. acuminatum* Roscoe, Mondr. Pl. t. 47. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 227. 1892.

Tall robust herbs ; leaves broadly lanceolate ending in a tail like tip ; flowers fragrant white.

Fl. & Fr. : July – September.

Govindhghat. 1800 m (29313).

5. ROSCOEA Sm.

- 1a. Flowers dark purple ; corolla tube much longer than the calyx ... *R. alpina* 1
 1b. Flowers lilac ; corolla tube hardly longer than the calyx ... *R. purpurea* 2

1. **Roscoeia alpina** Royle, Ill. Bot. Himal. 361, t. 89, f. 1. 1839 ; Hook. f. Fl. Brit. Ind. 207. 1890.

Slender herbs, 10 – 20 cm tall ; flowers few ; lower staminode 1.2 – 1.8 cm long, 2 – lobed.

Fl. & Fr. : June – July.

Bhyundar valley, Kanol, Masoli. 2500 m (2671).

2. **R. purpurea** J. C. Sm. Exot. Bot. 2 : 97, t. 108. 1806. *R. exilis* Sm. ex Horan. Prodr. Monogr. Scitam. 21. 1862 ; Hook. f. Fl. Brit. Ind. 6 : 208. 1890.

Robust herbs, 30 – 60 cm tall ; flowers several ; lower staminode 3 cm long, obscurely 3 – lobed.

Fl. & Fr. : July – August.

Bhyundar valley. 2000 m (26341).

6. ZINGIBER Boehm.

- 1a. Spikes very short and dense ; leaves more or less pubescent beneath ... *Z. roseum* 2
 1b Spikes more or less elongated ; leaves glabrous beneath ... *Z. officinale* 1

1. **Zingiber officinale** Roscoe in Trans. Linn. Soc. Lond. 7 : 348. 1807 ; Hook. f. Fl. Brit. Ind. 6 : 246. 1892.

Rootstock bearing sessile tubers ; leaves dark green 2.5 – 4 cm broad.

Cultivated.

2. **Zingiber roseum** (Roxb.) Roscoe in Trans. Linn. Soc. Lond. 8 : 348. 1807 ; Hook. f. Fl. Brit. Ind. 6 : 244. 1892. *Amomum roseum* Roxb. Pl. Corom. 286 : 17 – 26, t. 126. 1800.

Perennial herbs ; leaves lanceolate – oblong, punctate above, appressed hairy beneath ; corolla tube pubescent.

Fl. & Fr. : August – October.

Mandakini valley – Phata. 800 m (BNM. 4649) Lit.

139. CANNACEAE

Canna indica L. Sp. Pl. 1. 1753 *C. indica* L. var. *orientalis* (Roscoe) Baker in Hook. f. Fl. Brit. Ind. 6 : 260. 1892.

Rootstock tuberous ; stems tall ; flowers bright red.

Planted in gardens.

140. MUSACEAE

Musa paradisiaca L. Sp. Pl. 1043. 1753. *M. paradisiaca* subsp. *sapientum* (L.) K. Schum. Pflreich. 4 (45) : 20 1900.

Stoloniferous ; stems tall cylindric ; bracts large ovate enclosing flowers.

Cultivated in the area upto 1200 m.

141. HAEMODORACEAE

- | | | |
|---|-----|---------------------|
| 1a. Perianth - lobes short, recurved ; ovules many in each cell | ... | <i>Aletris</i> 1 |
| 1b. Perianth - lobes long, spreading ; ovules 2 in each cell | ... | <i>Ophiopogon</i> 2 |

1. ALETRIS L.

Aletris pauciflora (Klotz.) Hand. – Maz. Symb. Sin. 7 : 1220. 1936. *Stachyopogon pauciflorus* Klotz. in klotz. & Garcke Pr. wald. 49. 862. *A. nepalensis*. Hook. f. Fl. Brit. Ind. 6 : 264. 1892, nom. illegit.

Small scapose herbs ; radical leaves, grass like ; flowers white or pale – pink.

Fl. & Fr. : June August.

Bistola, Bhyundar Valley. 4000 – 4500 m (29491).

2. OPHIOPOGON Ker Gawl.

Ophiopogon intermedius D. Don, Prodr. Fl. Nep. 48. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 269. 1892.

Small herbs ; leaves grass like ; flowers white tinged with lilac ; fruits bright blue.

Fl. & Fr. : May November.

Bhuna - Kanol, Khiraum valley, Tungnath. 2000 3000 m (10606).

142. IRIDACEAE

- | | | |
|---|-----|---------------------|
| 1a Stamens opposite and shorter than the petaloid style arms | ... | <i>Iris</i> 2 |
| 1b. Stamens alternating with the style arms ; rootstock creeping ; perianth tube very short | ... | <i>Belamcanda</i> 1 |

1. BELAMCANDA Adans.

Belamcanda chinense (L.) Redoute, Lilliao 3, t. 121. 1807. *Ixia Chinensis* L. Sp. Pl. 36. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 277. 1892.

Rootstock creeping ; stem erect, leafy ; leaves ensiform ; flowers yellow with red spots.

Fl. & Fr. : August September.

Mondal area, Phata. 1600 1800 m (41948).

2. IRIS L.

Iris kemaonensis D. Don ex Royle, Ill. Bot. Himal. 1 : 372. (Feb. 1839) ; Hook f. Fl. Brit. Ind. 6 : 274. 1892.

Rootstock thick, creeping ; stems tufted ; leaves chiefly radical, linear, entire ; flowers bright lilac.

Fl. & Fr. : June October.

Kedarnath, Khankelia, Tungnath. 3000 3500 m (44166).

143. HYPOXIDACEAE

HYPOXIS L.

Hypoxis aurea Lour. Fl. Coch. 200. 1790 ; Hook. f. Fl. Brit. Ind. 6 : 277. 1892.

Perennial, stemless hairy herbs with globose tubers ; flowers yellow.

Fl. & Fr. : June August.

Masoli on way, Ramni. 2000 2500 m (10154).

144. AGAVACEAE

AGAVE L.

Agave cantula Roxb. Fl. Ind. ed. 2, 2 : 167. 1832. *A. americana* non L. sensu Hook. f. Fl. Ind. 6 : 277. 1892.

Tall erect shrub like herbs with rosette of thick leaves ; bulbils present.

Fl. & Fr. : August - September.

Chandrapuri 800 m (6374).

145. DIOSCORIACEAE

DIOSCOREA L.

1a. Leaves digitately compound.

2a. Leaflets large (upto 15 cm long) ; leaves sparsely pubescent or hairy beneath.

3a. Leaflets narrower, sparsely hairy beneath with long setaceous points ; bracts longer than flowers ... *D. kamaonensis* 4

3b. Leaflets sparsely pubescent beneath ; bracts shorter than the flowers ... *D. pentaphylla* 6

2b. Leaflets small (upto 10 cm long), narrower glabrous ... *D. melanophyma* 5

1b. Leaves simple.

4a. Male spikes solitary ; stems twining to the left ... *D. deltoidea* 3

4b. Male spikes clustered.

5a. Spikes 2.5 - 3.7 cm ; perianth - segments ovate ; stems twining to the right ... *D. belophylla* 1

5b. Spikes 7.5 - 15 cm ; perianth - segments linear ; stems twining to the left ... *D. bulbifera* 2

1. *Dioscorea belophylla* (Prain) Voigt, ex Hains, For. Fl. Chota Nagpur 530. 1910. *D. nummularia* var *belophylla* Prain, Bengal Pl. 2 : 1065, 1067. 1903. *D. belophylla* Voigt, Hort. Suburb. Calc. 653. 1845 nom nud *D. glabra* non Roxb sensu Hook. f. Fl. Brit. 6 : 294. 1892, *p.p.* 'Tairu'.

Glabrous climbers, turning to the right ; leaves simple ; capsules $\pm$ 2.5 cm. as long as broad.

Fl. & Fr. : July September.

Batwalchari Narayankoti. 1200 m (6445).

2. **Dioscorea bujifera** L. Sp. Pl. 1033. 1753. *D. sativa* non L. Sensu Hook. f. Fl. Brit. Ind. 6 : 295. 1892, *p.p.* 'Genthi'.

Glabrous climbers, twining to the left ; leaves simple ; capsules oblong ; seeds winged at the base.

Fl. & Fr. : August September.

Nandprayag, Soragarh. 600 1000 m (10405).

3. **D. deltoidea** Wall. ex Griseli. in Mart. Fl. Brasil. 3 (1) : 43. in nota. 1842 ; Hook f. Fl. Brit. Ind. 6 : 291. 1892.

Glabrous, climbers, twining to the left ; leaves alternate, simple ; capsules winged around.

Fl. & Fr. : May October.

Bhyundar valley, Ramni, Wan. 2000 2500 m (39128).

4. **D. kamaonensis** Kunth Enum. Pl. 5 : 395. 1850 ; Hook. f. Fl. Brit. Ind. 6 : 290. 1892.

Climbing herbs ; stems twining to the right ; leaves 3 5 foliolate ; leaflets lanceolate, tips finely acute ; inflorescence pubescent.

Fl. & Fr. : August September.

Gair forest. 900 m (254, Kala & Gaur). Lit.

5. **D. melanophyma** Prain & Burkill in Journ. Proc. As. Soc. Beng. n.s. 4 : 452. 1908 ; in Ann. Roy. Bot. Gdn. calc. 14 : 143 ; t. t. 61. 1936.

Stems twining to the left ; leaves 3 5 foliolate ; seeds winged at the top.

Fl. & Fr. : July October.

Bhyundar valley, Mondal, Phata. 1500 3000 m (41981).

6. **D. pentaphylla** L. Sp. Pl. 1032. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 289. 1892.

Tubers oblong ; stems slender ; pubescent, prickly at the base ; leaves alternate, 3 5 foliolate, sparsely pubescent ; flowers pale green.

Fl. & Fr. : August September.

Nizmolla. 1500 m 1800 m (70941).

146. LILIACEAE

- 1a. Rootstock creeping or many branched, often tuberous and fiberous.
 - 2a. Scapigerous herbs bearing unilateral racemes or spikes ... *Theropogon* 18
 - 2b. Stem leafy.
 - 3a. Leaves reduced, bearing cladodes in their axils ; flowers axillary ... *Asparagus* 2
 - 3b. Leaves not reduced ; cladodes absent.
 - 4a. Leaves all radical, obovate to oblanceolate ... *Clintonia* 4
 - 4b. Leaves not radical.
 - 5a. Leaves alternate or in numerous whorls.
 - 6a. Flowers in umbels or racemes.
 - 7a. Flowers in umbels, 2.5 cm long. ... *Disporum* 5
 - 7b. Flowers in racemes.
 - 8a. Flowers in axillary racemes.
 - 9a. Perianth cylindric ; lobes short ... *Polygonatum* 15
 - 9b. Perianth rotate ... *Streptopus* 17
 - 8b. Flowers in erect terminal racemes *Smilacina* 16
 - 6b. Flowers solitary, axillary, very large ... *Gloriosa* 8
 - 5b. Leaves in a single, terminal whorl ; flower solitary.
 - 10a. Leaves 3 ; perianth - segments all similar *Trillidium* 19
 - 10b. Leaves 4 - 9 ; perianth - segments in two very dissimilar series ... *Paris* 14
 - 1b. Bulbous herbs ; in *Allium* the bulbs sometimes small and clustered.
 - 11a. Stem scape - like ; leaves radical.
 - 12a. Flowers in umbels or cymcs.
 - 13a. Flowers white, pink or purple ... *Allium* 1
 - 13b. Flowers yellow ... *Gagea* 7
 - 12b. Flowers in racemes ; perianth lobed to the base ... *Urginea* 20

11b. Stem leafy, often very short.

14a. Anthers versatile.

15a. Flowers 3.7 - 15 cm long ; perianth - segments broad.

16a. Stamens not spreading.

17a. Bulb without any outer coats ; style capitate, obscurely 3 - lobed ... *Cardiocrinum* 3

17b. Bulb with dark brown scarious coats ; stigma 3 - fid, lobes short recurved ... *Notholirion* 3

16b. Stamens spreading ... *Lilium* 10

15b. Flowers 1.2 - 1.8 cm long ; perianth - segments linear ... *Iphigenia* 9

14b. Anthers basifixed.

18a. Flowers yellow - green chequered with dull purple.

19a. Flowers solitary ; stigma capitate, 3-lobed ... *Nomocharis* 12

19b. Flowers more than one ; stigma trifid ... *Fritillaria* 6

18b. Flowers white ; perianth - lobes spreading ... *Lloydia* 11

1. ALLIUM L.

1a. Leaves fistular.

2b. Head bearing bulbils and flowers ... *A. cepa* 6

2b. Head bearing only flowers ... *A. semonovii* 3

1b. Leaves flat.

3a. Head bearing bulbils and flowers ... *A. sativum* 7

3b. Head bearing only flowers.

4a. Scale of bulbs membranous, not of reticulated fibres.

5a. Stamens longer than the perianth.

6a. Leaves 12.5 - 25 cm ensiform, recurved ; bulbs large, oblong ; scales coriaceous entire ... *A. carolinianum* 1

- 6b. Leaves 30 cm long ; bulbs small clustered,
narrowly ovoid ; outer scales fibrous produced
into a long neck ... *A. stracheyi* 4
- 5b. Stamens shorter than the perianth or equaling the
perianth ... *A. wallichii* 5
- 4b. Outer scales of the bulb of reticulated fibres ; stamens
shorter than the perianth . . . *A. humile* 2

1. **Allium carolinianum** DC. in Redoute, Liliac. 2 : t. 101. 1804. *A. blandum* Wall. Pl. As. Rar. 3 : 38, t. 260. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 339. 1892.

Bulb solitary, large, oblong ; tall robust herbs ; leaves broadly linear, obtuse ; flowers pale pink.

Fl. & Fr. : June October.

Rajhoti. 4500 5500 m (Duthie). Lit.

2. **A. humile** Kunth, Enum. 4 : 443. 1843. *A. govanianum* Wall. ex Hook. f. Fl. Brit. Ind. 6 : 344. 1892. '*Jimbo*'.

Bulbs subcylindric ; leaves narrow, flat ; flowers white ; segments reflexed.

Fl. & Fr. : June August.

Bhyundar valley. 3800 m (29571).

3. **A. semonovii** Regel in Bull. Soc. Mosc. 41(1) : 449. 1868 ; Hook. f. Fl. Brit. Ind. 6 : 338. 1892.

Bulbs tufted, cylindric ; scales membranous ; leaves 2 3, $\pm$ equaling the stout scape ; flowers pale yellow.

Fl. & Fr. : June July.

Garhwal upto 4000 m (Rau). Lit.

4. **A. stracheyi** Baker, Journ. Bot. 12 : 293. 1874 ; Hook. f. Fl. Brit. Ind. 6 : 341. 1892.

Bulbs small, clustered ; leaves narrowly linear, obtuse ; flowers rosy or pale yellow.

Fl. & Fr. : September October.

Hanumanchatti Badrinath, Kedarnath. 2500 3000 m (10451).

5. **Allium wallichii** Kunth, Enum. Pl. 4 : 443. 1843 ; Hook. f. Fl. Brit. Ind. 6 : 341. 1892.

Bulbs small, clustered ; leaves narrowly falcate, flat ; flowers purple.

Fl. & Fr. : July - October.

Amritganga valley, Hemkund, Malari. 3500 m (42144).

6. **A. cepa** L. Sp. Pl. ed. 1. 300. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 337. 1892. '*Pyaz*'.

Leaves shorter than the inflated scape, fistular ; pedicels shorter than the stellate flowers.

Fl. & Fr. : April - June.

Cultivated in the area.

7. **A. sativum** L. Sp. Pl. 296. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 337. 1892. '*Lassan*'.

Leaves flat ; scape slender ; spathes long beaked.

Fl. & Fr. : April - June.

Cultivated in the area.

2. ASPARAGUS L.

- | | | |
|---|-----|------------------------|
| 1a. Flowers solitary or in small clusters ; stems unarmed ; cladodes flat | ... | <i>A. filicinus</i> 3 |
| 1b. Flowers in racemes ; stems armed. | | |
| 2a. Cladodes spreading, 3 - 6 in each tuft ; prickles curved | ... | <i>A. curillus</i> 2 |
| 2b. Cladodes erect, 6 - 20 in each tuft ; prickles straight | ... | <i>A. adscendens</i> 1 |

1. **Asparagus adscendens** Buch. Ham. ex. Roxb. Fl. Ind. ed. 2, 2 : 153. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 318. 1892. '*Jhirna*'.

Suberect tall undershrubs ; stems white ; flowers white ; berries ; red when ripe.

Fl. & Fr. : August – September.

Patiyaldhar upto 1200 m (674, Kala & Gaur). Lit.

2. **Asparagus curilius** Buch. Ham. ex Roxb. Fl. Ind. ed. 2, 2 : 152. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 318. 1892.

Much branched undershrubs ; cladodes linear flattened.

Fl. & Fr. : June – October.

Debal, Mandakini valley, Phata. 1500 – 1800 m (38601).

3. **A. filicinus** Buch. Ham. ex D. Don, Prodr. Fl. Nep. 49. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 314. 1892.

Tall erect herbs with hollow stems ; spines 0 ; cladodes flat, curved ; flowers in pairs or solitary.

Fl. & Fr. : June – October.

Bhyundar valley, Dunagiri on way, Gohna Ramni. 2500 – 3000 m (24225).

3. CARDIOCRINUM Lindl.

Cardiocrinum giganteum (Wall.) Makino in Bot. Mag. Tokyo 27 ; 125. 1913. *Lilium giganteum* Wall. Tent. Fl. Nap. 21, t. 12 – 13. 1824, excl. Syn ; Hook. f. Fl. Brit. Ind. 6 : 349. 1892.

Stems tall hollow upwards ; leaves broadly ovate, cordate ; flowers white.

Fl. & Fr. : May – August.

Dewalikhhal area, Nizmolla on way Ramni. 2500 – 3000 m (70939).

4. CLINTONIA Rafin.

Clintonia udensis Trautv. & Mey. var. **alpina** (Kunth ex Baker) Hara in Journ. Jap. Bot. 38 : 72. 1963. *C. alpina* Kunth ex Baker in

Journ. Linn. Soc. Bot. 14 : 585. 1875 ; Hook. f. Fl. Brit. Ind. 6 : 361. 1892.

Rootstock creeping ; leaves subradical ; scapes naked or 1 - leaved ; flowers white.

Fl. & Fr. : May - September.

Amritganga & Bhyundar valleys, Mongu. 3000 - 3500 m (31766).

5. DISPORUM Salisb.

Disporum cantoniense (Lour.) Merrill in Philip. Journ. Sci. 15 : 229. 1920. *Fritillaria cantoniensis* Lour. Fl. Cochin. 1 : 206. 1790 ; Salisb. in Trans. Hort. Soc. Lond. 1 : 331. 1812. nom. illegit ; Hook. f. Fl. Brit. 6 : 360. 1892. var. **parviflorum** (Wall.) Hara, Fl. E. Himal. 407. 1966. *Uvularia parviflora* Wall. in As. Res. 13 : 378. 1820.

Tall robust herbs ; leaves ovate - oblong or lanceolate ; flowers white or dull purple.

Fl. & Fr. : April, - October.

Chamoli, Mondal, Ramni Forest. 1500 - 2500 m (10096).

6. FRITILLARIA L.

- | | | |
|---|-----|----------------------|
| 1a. Leaves whorled or opposite, uppermost leaves simple not
cirrhose | ... | <i>F. roylei</i> 2 |
| 1b. Lower leaves opposite, upper whorled, uppermost with cirrhose
tips | ... | <i>F. cirrhosa</i> 1 |

1. **Fritillaria cirrhosa** D. Don, Prodr. Fl. Nep. 51. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 353. 1892.

Bulbous erect herbs ; leaves linear - oblong ; flowers 1 - 2, greenish - yellow, purple spotted.

Fl. & Fr. : June – September.

Bhyundar valley. 3800 m (39098).

2. **Fritillaria roylei** Hook. Ic. '9 : 860. 1892 ; Hook. f. Fl. Brit. Ind. 6 : 353. 1892.

Glabrous bulbous herbs ; leaves linear lanceolate, 3 - 6 in a whorl ; flowers yellow green, solitary or 2 - 4 in racemes.

Fl. & Fr. : June - October.

Bhyundar valley. 2800 - 4000 m (Smythe). Lit.

7. **GAGEA** Salisb.

Gagea elegans Wall. ex D. Don in Royle, Ill. Bot. Himal. 388, t. 95, f. 2. 1840. *G. lutea* non Schultz. f. Sensus Hook. f. Fl. Brit. Ind. 6 : 355. 1892.

Bulbous herbs upto 10 cm ; leaves lanceolate ; flowers yellow in umbels.

Fl. & Fr. : April – July.

Chandrapaduka Valley. 3600 m (2919).

8. **GLORIOSA** L.

Gloriosa superba L. Sp. Pl. 305. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 358. 1892.

Tall glabrous climbers ; leaves oblong, lanceolate, 3 - 4 in a whorl ; flowers solitary, yellowish to bright red.

Fl. & Fr. : August – September.

Langasu, across Alaknanda bank. 800 m (71946).

9. IPHIGENIA Kunth

Iphigenia indica (L.) Kunth, Enum. Pl. 4 : 213. 1843. *Melanthium indicum* L. Mant. Pl. Alt. 226. 1771 ; Hook. f. Fl. Brit. Ind. 6 : 357. 1892.

Herbs with solid bulb or corm ; leaves linear, sessile ; flowers solitary, purple.

Fl. & Fr. : June August.

Govindghat. 1800 m (29323).

10. LILIUM L.

Lilium polyphyllum Don in Royle, Ill. Bot. Himal. 388. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 351. 1892.

Bulbous herbs ; leaves narrowly lanceolate or linear ; flowers greenish white, purple dotted inside.

Fl. & Fr. : June – July.

Kanol Sitale. 2000 – 2500 m (10343).

11. LLOYDIA Salisb.

- | | |
|--|---|
| 1a. Filaments glabrous ; tepals white with dark brown purple veins ;
transverse nectariferous fold above the base present | ...
<i>L. serotina</i> var.
<i>serotina</i> 2 |
| 1b. Filaments hairy at least in the lower part; tepals without nectari-
ferous fold. | |
| 2a. Inner tepal with crest on both sides in the lower part ;
flowers yellow with green veins | ...
<i>L. tibetica</i> 3 |
| 2b. Inner tepals without crest ; flowers white and brown -
purple or orange towards the base | ...
<i>L. longiscapa</i> 1 |

1. *Lloydia longiscapa* Hook. Ic Pl. 9 : t. 834. 1852. *L. serotina* auct. non *L. sensu* Hook. f. Fl. Brit. Ind. 6 : 354. 1892, *p.p.*

Habit and leaves as in *Lloydia Serotina* ; capsules oblong obovate.

Fl. & Fr. : June August.

Hemkund. 4200 m (29474).

2. *L. serotina* (L.) Reich. Fl. Germ. Excurs. 1 : 102. 1830. *Bulbocodium serotinum* L. Sp. Pl. 294. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 345. 1892, *p.p.*

Bulb elongate ; stem with 1 or 2 linear leaves ; capsules roundish - obovate.

Fl. & Fr. : May June.

Badrinath. 3400 m (2890).

3. *L. tibetica* Baker ex Oliver in Hook. Ic - Pl. 23 ; t. 2216. 1892.

Ovary obtuse at the apex ; capsules oblong - obovate.

Fl. & Fr. : June.

Bhyundar valley. 3500 4000 m (Smytye). Lit.

12. NOMOCHARIS Franch.

- | | | |
|--|-----|-----------------------|
| 1a. Leaves elliptic - lanceolate, 3.7 - 7.5 cm long ; style shorter than the ovary ; stem 30 - 45 cm | ... | <i>N. oxypetala</i> 2 |
| 1b. Leaves narrowly linear, 10 - 15 cm long ; style as long as the ovary ; stems 15 - 30 cm | ... | <i>N. nana</i> 1 |

1. *Nomocharis nana* (Klotz.) E. H. Wilson. Lil. E. As. 13. 1925. *Lilium nanum* Klotz. in Klotz. & Garcke, Bot. Reise Pr. Wald. 53. 1862. *Fritillaria stracheyi* Hook. f. Fl. Brit. Ind. 6 : 353. 1892.

Stem 9 18 cm, slender ; leaves 6 9 cm long ; flowers pale blue or purple, solitary.

Fl. & Fr. : June - October.

Bhuna, Hemkund. 3800 m (24272).

2. **Nomocharis oxypetala** (Royle) E. H. Wilson Lil. E. Asia. 13. 1925. *Fritillaria oxypetala* D. Don, in Royle, Ill. Bot. Himal. 388. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 352 53. 1892.

Stem 18 25 cm, stout ; leaves 3.5 7 cm long ; flowers pale - purple.

Fl. & Fr. : June August.

Hemkund, Kaga area, Kedarnath. 3000 4000 m (53903).

13. NOTHOLIRION Wall.

Notholirion thomsonianum (Royle) Stapf in Kew Bull. 1934 : 95. 1934. *Fritillaria thomsonianum* Royle, Ill. Bot. Himal. t. 92, f. 1. 1839 ; *Lilium roseum* Wall. ex Hook. in curtis, Bot. Mag. 79 : t. 4725. 1853 ; Hook. f. Fl. Brit. Ind. 9 : 352. 1892, p.p.

Herbs, 50 cm tall ; leaves oblong linear ; flowers pale lilac.

Fl. & Fr. : March April.

Nigol valley. 1200 m (50383).

14. PARIS L.

Paris polyphylla Sm. in Ress, Cyclop. 26 : paris no. 2. 1813 ; Hook. f. Fl. Brit. Ind. 6 : 362. 1892.

Rootstock thick, creeping ; erect glabrous herbs ; leaves 4 - 9, shortly stalked, whorled ; flower yellow - green.

Fl. & Fr. : April - June.

Bagrigar, Sitapur, Mondal area. 1500 - 3000 m (47912).

15 POLYGONATUM Mill.

1a. Leaves alternate or opposite.

2a. Leaves usually all alternate ... *P. multiflorum* 4

2b. Leaves most or all opposite ; dwarf herbs.

3a. Stems 15 cm long ; stamens inserted near the mouth of the corolla ... *P. graminifolium* 2

3b. Stems 2.5 - 5 cm long ; stamens inserted about the middle of the corolla ... *P. hookeri* 3

1b. Leaves whorled.

4a. Tips of leaves straight ... *P. verticillatum* 5

4b. Tips of leaves tendril - like ... *P. cirrhifolium* 1

1. ***Polygonatum cirrhifolium*** (Wall.) Royle, Ill. Bot. Himal. 1 : 380. 1839. *Convallaria cirrhifolia* Wall. in As. Res. 13 : 382. 1820 ; Hook. f. Fl. Brit. Ind. 6 : 322. 1892.

Tall erect herbs ; stems terete rounded, grooved ; leaves 3 – 6 whorled ; flowers white tinged green or purple.

Fl. & Fr. : May – June.

Gulabkoti, Sitapur, Sutul. 1600 – 4000 m (10160).

2. ***P. graminifolium*** Hook. Ic. Pl. t. 833. 1852 ; Hook. f. Fl. Brit. Ind. 6 : 319. 1892.

Rootstock fleshy, constricted at the internodes ; leaves 3 – 5 cm long ; flowers violet.

Fl. & Fr. : June – July.

Bhyundar valley, Vasudhara. 3800 m (39096).

3. ***P. hookeri*** Baker in Journ. Linn. Soc. Bot. 14 : 558. 1875 ; Hook. f. Fl. Brit. Ind. 6 : 320. 1892.

Dwarf herbs 3 – 6 cm tall ; leaves 1.8 – 8.5 cm long, linear ; flowers solitary, violet.

Fl. & Fr. : June – August.

Bhyundar valley. 3500 – 4000 m (Smythe). Lit.

4. **Polygonatum multiflorum** (L.) All. Fl. Pedem. 1 : 131. 1785. *Convallaria multiflora* L. Sp. Pl. 315. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 319. 1892.

Tall erect herbs ; stems terete ; leaves 8.5 cm long, oblong – ovate ; flowers 2 – 5 in axillary racemes, green.

Fl. & Fr. : April – October.

Bhyundar valley, Ramni, Wan. 2000 – 2500 m (44045).

5. **P. verticillatum** (L.) All. Fl. Pedem. 1 : 131. 1785. *Convallaria verticillata* L. Sp. Pl. 315. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 321. 1892.

Tall erect herbs ; stems angled and grooved ; leaves 4 – 8 linear, 10 – 20 cm long ; flowers 2 – 3 in whorled racemes, greenish – white.

Fl. & Fr. : June – October.

Bhuna, Dunagiri, Niti. 1800 – 4500 m (47977).

16. SMILACINA Desf.

Smilacina purpurea Wall. Pl. As. Rar. 2 : 38, t. 144. 1830. *S. pallida* auct non Royle sensu Hook. f. Fl. Brit. Ind. 6 : 323. 1892, *p.p.*

Tall erect herbs with creeping rootstock ; leaves, 10 – 22 cm long, oblong lanceolate, pubescent beneath ; flowers white.

Fl. & Fr. : May - August.

Bhuna, Dunagiri on way, Ghangaria. 2500 – 3500 m (53942).

17. STREPTOPUS Michx.

Streptopus simplex D. Don, Prodr, Fl. Nep. 48. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 322. 1892.

Tall flexuous forked herbs ; leaves alternate, 5 – 10 cm long, membranous ; flowers white ; berries .6 cm in diam.

Fl. & Fr. : September – October.

Bhuna. 3200 m (31011).

18. THEROPOGON Maxim.

Theropogon pallidus (Kunth) Maxim. in Bull. Acad. Sci. St. Peterb. 15 : 90. 1871. *Ophiopogon pallidus* Wall. ex Kunth, Enum. Pl. 5 : 300. 1850 ; Hook. f. Fl. Brit. Ind. 324. 1892.

Scapigerous herbs with thick root fibres ; leaves radical, linear ; flowers white – pink, drooping ; berries .6 cm in diam.

Fl. & Fr. : June – October.

Gaurikund. Pandukeswar. Trisula on way, 1800 – 2500 m (53942).

19. TRILLIDIUM Kunth.

Trillidium govanianum (D. Don) Kunth, Enum. Pl. 5 : 120. 1850. *Trillium govanianum* Wall. ex D. Don in Royle, Ill. Bot. Himal. 384 – t. 93, f. 1. 1839 ; Hook. f. Fl. Brit. Ind. 6 : 361. 1892.

Glabrous erect herbs ; leaves 3, broadly ovate, 3.5 – 10.5 cm ; flower purple ; berry globose.

Fl. & Fr. : May – August.

Hemkund, Kukinakhal, Tungnath on way. 3000 – 4000 m (29514).

20. URGINEA Steinh.

Urginea indica (Roxb.) Kunth, Enum. Pl. 4 : 333. 1843 *Scilla indica* Roxb. Fl. Ind. ed. 2, 2 : 147. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 347. 1892. '*Jangli – Piyaz*'.

Scapigerous bulbous herbs ; leaves linear, flat, 15 – 45 cm ; flowers greenish – white ; capsules oblong 3 - valved.

Fl. & Fr. : May – June.

Chamoli, Nigol valley, Tharali in Pindar valley. 800 – 1800 m (14855).

147. SMILACEAE

(LILIACEAE Sensu BH)

SMILAX L.

1a. Stems erect.

- 2a. Deciduous ; leaves broadly ovate or suborbicular not
papillose beneath ; flowers brownish ... *S. vaginata* 6
- 2b. Evergreen ; leaves ovate or lanceolate. densely papillose
beneath ; flowers green ... *S. erecta* 2

1b. Stems climbing.

- 3a. Leaves usually armed as well as the stems ; umbels sessile
forming a subracemose inflorescence ... *S. aspera* 1
- 3b. Leaves never armed ; umbels pedunculate.
- 4a. Stems unarmed ; flowers brownish.
- 5a. Deciduous ; sheath extending much more than
halfway down the petiole ... *S. menispermoides* 4
- 5b. Evergreen ; sheath not extending more than half-
way down the petiole ... *S. glaucophylla* 3
- 4b. Stems armed ; flowers greenish ; sheath distinctly
auricled ... *S. ochreatea*

1. *Smilax aspera* L. Sp. Pl. ed. 1, 1028. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 306. 1892. '*Kukardara*'.

Climbing shrubs with prickly zigzag branches ; leaves linear – lanceolate, ovate – lanceolate or orbicular ; flowers white in umbellate spikes ; staminodes 6.

Fl. & Fr. : April – October.

Debal, Okhimath, Phata. 1500 – 2500 m (3588).

2. *S. erecta* Osmaston in Kew Bull. 1925 : 294. 1925, non Merr.

Erect unarmed shrubs ; leaves ovate or lanceolate, papillose beneath ; flowers green.

Fl. & Fr. : May – Juue.

Kulgari Gad, (Nawali, Reserve) Nandakini valley. 2500 – 3000 m (Osmaston), Sagar. 2200 m (589, Kala & Gaur). Lit. Rare.

3. *Smilax glaucophylla* Klotz. in Klotz. & Garcke Bot. Reise Prinz. Wald. 45, t. 91. 1862. *S. parvifolia* Wall. ex Hook. f. in Fl. Brit. Ind. 6 : 304. 1892.

Climbing shrubs ; branches unarmed ; leaves broadly lanceolate, long pointed ; stalks with tendrils ; flowers purple in solitary umbels ; staminodes 3.

Fl. & Fr. : April – October.

Debal, Okhimath, Sitapur. 1500 2000 m (27209).

4. *S. menispermoidea* A. DC. Monogr. Phaner. 1 : 108. 1878. *S. elegans* Wall. ex Hook. f. in Fl. Brit. Ind. 6 : 305. 1892, non Wall. ex A. DC.

Deciduous climbers ; branches slender ; leaves broadly ovate ; sheath with tendrils ; flowers brownish in solitary umbels.

Fl. & Fr. : May – August.

Bhyundar valley, Joshimath, Mondal area. 1600 2000 m (2777).

5. *S. ochreatea* A. DC. Mongr. Phaner. 1 : 193. 1878. *S. roxburghiana* Wall. ex Hook. f. Fl. Brit. Ind. 6 : 311. 1892.

Evergreen, climbers ; branches. terete ; leaves elliptic – ovate, 5 – nerved ; flowers yellowish – green ; berries 2 seeded.

Fl. & Fr. : April – June.

Throughout the hills. 1000 2000 m (Osmaston). Lit. Rare.

6. *S. vaginata* Dcne. in Jacq. Voy. 4 (Bot.) : 169. 1844 ; Hook. f. Fl. Brit. Ind. 6 : 305. 1892.

Leaves without tendrils, ovate or orbicular ; umbels without bracts ; flowers purple ; staminodes 6.

Fl. & Fr. : May – June.

Amritganga valley. 2500 m (44105).

148. PONTEDERIACEAE

MONOCHORIA Presl.

Monochoria vaginalis (Burm f.) Presl, Rel. Haenk. 1 : 128. 1827.
Pontederia vaginalis Burm. f. Fl. Ind. 80. 1768 ; Hook. f. Fl. Brit. Ind. 6 : 363. 1892.

Aquatic herbs ; rootstock, suberect or creeping ; leaves long petioled, linear to ovate, cordate ; flowers lilac – blue.

Fl. & Fr. : June – August.

Agastamuni – Chandrapuri. 800 m (6367).

149. COMMELINACEAE

1a. Fertile stamens 3 ; staminodes 3

2a. Flowers sky - blue ; filaments naked ... *Commelina* 1

2b. Flowers red - blue ; filaments hairy ... *Murdannia* 4

1b. Fertile stamens 6

3a. Stems twining ; cymes scorpioid ; steds paniced or spicate... *Streptolirion* 5

3b. Stems erect or prostrate.

4a. Stems prostrate or creeping ; cymes from imbricating bracts, scorpioid or 1 - few flowered ; corolla tubular... *Cyanotis* 2

4b. Stems erect ; flowers paniced ; petals free ... *Floscopa* 3

1. COMMELINA L.

1a. Leaves ovate ; tip obtuse or rounded ; capsules 5 - seeded ... *C. benghalensis* 1

1b. Leaves lanceolate ; capsules 3 - seeded ... *C. paludosa* 2

1. ***Commelina benghalensis*** L. Sp. Pl. 41. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 370. 1892. '*Kansura*'.

Selender creeping herbs, rooting at the base ; leaves broadly ovate, finely pubescent, obtuse ; flowers pale – blue ; seeds wrinkled.

Fl. & Fr : August – September.

Nandprayag. 800 m (65449).

2. ***C. paludosa*** Bl. Enum. Pl. Jav. 1 : 2. 1827. *C. obliqua* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 45. 1825. non Vahl 1806 ; Hook. f. Fl. Brit. Ind. 6 : 372. 1892. '*Kena*'.

Leaves lanceolate, acute ; flowers pale – blue with one white petal ; seeds minutely dotted.

Fl. & Fr. : July – September.

Bhyundar valley, Bartwalchari – Narainkoti. 1200 – 2000 m (29352).

2. CYANOTIS D. Don, nom. conp.

- | | | |
|--|-----|----------------------|
| 1a. Leaves ovate - oblong ; seeds striate and pitted | ... | <i>C. cristata</i> 1 |
| 1b. Leaves linear - lanceolate ; seeds reticulated | ... | <i>C. vaga</i> 2 |

1. ***Cyanotis cristata*** (L.) Schult. f. Syst. Veg. 7 : 1150. 1830. *Commelina cristata* L. Sp. Pl. 42. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 385. 1892.

Simple or branched purple tinged herbs ; bracts foliaceous, ovate, cordate, acuminate ; capsules 3 – gonous.

Fl. & Fr. : July – August.

Gopeswar. 1350 m (65, Kala & Gaur). Lit.

2. ***C. vaga*** (Lour.) Schult. Syst. Veg. 2 : 1153. 1830. *Tradescantia vaga* Lour. Fl. Cochinch. 1 : 193. 1790. *C. barbata* D. Don, Prodr. Fl. Nep. 46. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 385. 1892.

Tufted, slender hairy herbs ; bracts oblong – falcate, acute ; flowers dark blue clustered.

Fl. & Fr. : July – September.

Bhyundar valley. 2000 m (29321).

3. FLOSCOPA Lour.

Floscopa scandens Lour. Fl. Coch. 1 : 193. 1790 ; Hook. f. Fl. Brit. Ind. 6 : 390. 1892.

Stout creeping herbs ; stem suberect ; leaves lanceolate ; cymes secund ; flowers dull – violet.

Fl. & Fr. : August – September.

Trisula. 1300 m (42259).

4. MURDANNIA Royle nom. cons.

- | | | |
|---|-----|-----------------------|
| 1a. Stems 45 - 90 cm, simple ; capsules .8 cm ; seeds 9-12 | ... | <i>M. divergens</i> 1 |
| 1b. Stems 15 - 45 cm, branched ; capsules .4 cm ; seeds usually upto 7. | | |
| 2a. Leaves flat oblong to ovate - lanceolate ; seeds smooth or minutely scaberulous | ... | <i>M. spirata</i> 3 |
| 2b. Leaves linear or lanceolate ; seeds rugosa and pitted | ... | <i>M. nudiflora</i> 2 |

1. **Murdannia divergens** (Cl.) Bruckn. in Pflanzenfam. ed. 2, 15a : 173. 1930. *Aneilema herbaceum* var. *divergens* Cl. in Journ. Linn. Soc. Bot. 6 : 448. 1871. *A. divergens* (Cl.) Cl. in Commel. Cyrt. Beng. 28. 1874; Hook. f. Fl. Brit. Ind. 6 : 376. 1892.

Glabrous leafy herbs ; leaves linear – lanceolate ; sheaths fringed ; bracts ovate, persistent ; flowers red – blue.

Fl. & Fr. : July – October.

Phata. 1700 m. (8758).

2. **Murdannia nudiflorum** (L.) Brenan in Kew Bull. 1952 : 189. 1952. *Commelina nudiflora* L. Sp. Pl. 41. 1753. *Aneilema nudiflorum* (L.) Wall. Cat. 182, n. 5524. 1831 – 1832 ; Hook. f. Fl. Brit. Ind. 6 : 378. 1892.

Erect branching herbs, rooting at the base ; leaves 5 – 12 cm long, glabrous or so ; flowers crowded ; seeds not more than 6.

Fl. & Fr. : July – September.

Mondal, Langasu area. 800 – 1500 m (41937).

3. **M. spirata** (L.) Bruckn. in Pflanzenfam. ed. 2, 15a : 173. 1930. *Commelina spirata* L. Mant. Pl. Alt. 176. 1771. *Aneilema spiratum* (L.) Wt. ex Wall. Cat. 181. 11. 5211. 1831 – 32 ; Hook. f. Fl. Brit. Ind. 6 : 377. 1892.

Dwarf, tufted, prostrate, branching herbs, 15 – 25 cm long ; leaves glabrous or ciliate, acuminate, amplexicaule at the base ; seeds 3 – 7.

Fl. & Fr. : September – October.

Bartwalchari – Narayankoti. 1300 m (6454).

5. STREPTOLIRION Edgew.

Streptolirion volubile Edgew. in Proc. Linn. Soc. Bot. 1 : 254. 1845 ; Hook. f. Fl. Brit. Ind. 6 : 389. 1892.

Twining flaccid herbs ; leaves ovate, cordate $\pm$ 2 – lobed at the base ; cymes scorpioid ; flowers white.

Fl. & Fr. : October – November.

Pandukeswar. 2300 m (10640).

150. JUNCACEAE

- | | | |
|---|-----|-----------------|
| 1a. Glabrous herbs ; capsules 3 - celled ; seeds numerous | ... | <i>Juncus</i> 1 |
| 1b. Hairy herbs ; capsules 1 - celled ; seeds 3 | ... | <i>Luzula</i> 2 |

1. JUNCUS L.

- 1a. Annuals ; stem copius branched ; leaves not septate ; cymes scattered, few flowered ... *J. bufonius* 3
- 1b. Perennials.
- 2a. Stamens shorter than the perianth.
- 3a. Stems not leafy ... *J. inflexus* 7
- 3b. Stems leafy.
- 4a. Leaves linear - subulate, strongly septate ; seeds not tailed ... *J. articulatus* 1
- 4b. Leaves unitubular, obscurely septate ; seeds long tailed ... *J. sphacelatus* 11
- 2b. Stamens longer than the perianth.
- 5a. Leaves narrow, channelled, terete or filiform.
- 6a. Cyme a solitary sessile head.
- 7a. Flowers white.
- 8a. Herbs not stoloniferous ; leaved at the base of the stem ... *J. leucomelas* 9
- 8b. Tufted, stoloniferous ; leaved above the middle of the stem ... *J. membranaceus* 10
- 7b. Flowers pale - yellow or pale.
- 9a. Leaved at the base of the stem; cyme 3 - 5 flowered ... *J. bracteatus* 2
- 9b. Leaved above the middle of the stem ; cyme 6 - 10 flowered ... *J. leucanthus* 8
- 6b. Cyme compound of several heads.
- 10a. Stoloniferous ; flowers dark brown, .8 cm.
- 10b. Caespitose, not stoloniferous ; very pale, .4 cm long ... *J. concinnus* 5
- 5b. Leaves flat or with involute margins. grass like, strongly nerved ; cymes of several capitate clusters ... *J. clarkei* 4

1. *Juncus articulatus* L. Sp. Pl. 327. 1753. *J. lampocarpus* Ehrh. ex Hoffm. Deutsch. Fl. 1800 : 166. 1800 ; Hook. f. Fl. Brit. Ind. 6 : 395. 1892.

Tufted erect herbs, 15 – 30 cm long ; leaves cylindric, pointed, hollow ; pith divided ; flowers brown in small clusters ; stamens 6, included.

Fl. & Fr. : May – September.

Trijugarayan. 2000 m (48011).

2. **Juncus bracteatus** Buchen in Engl. Bot. Jahrb. 6 : 220. 1885 ; Hook. f. Fl. Brit. Ind. 6 : 397. 1892.

Tufted very slender herbs, fistular herbs 15 – 20 cm long ; leaves few, filiform ; flowers pale or dark ; stamens included ; seeds tailed short.

Fl. & Fr. : June – August.

Above Ramni. 400 m (Duthie). Lit.

3. **J. bufonius** L. Sp. Pl. 328. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 392. 1892.

Small pale, tufted, branching, slender herbs, 2 – 25 cm tall ; leaves few, flat ; flowers solitary or clustered ; stamens included.

Fl. & Fr. : March – October.

Agastamuni, Trijugarayan. 600 – 2000 m (48012).

4. **J. clarkei** Buchen. in Engl. Bot. Jahrb. 6 : 210, t. 2. 1885 ; Hook. f. Fl. Brit. Ind. 6 : 400. 1892.

Stoloniferous, tufted, cylindric leafy herbs ; leaves grass like, flat, longer than the stem ; flowers pale brown ; stamens exerted ; seeds with very long tails.

Fl. & Fr. : August – October.

Bhuna, Tungnath area. 3000 – 3500 m (42201).

5. **J. concinnus** D. Don, Prodr. Fl. Nep. 44. 1825. *J. elegans* Royle ex D. Don in Trans. Linn. Soc. Lond. 18 : 321. 1840. Pro. Syn. ; Hook. f. Fl. Brit. Ind. 6 : 399. 1892.

Perennial, slender leafy herbs, 15 – 45 cm. tall ; leaves 2 – 4, linear, shorter than the stems ; flowers white in clusters ; stamens exerted.

Fl. & Fr. : June – September.

Amritganga valley, Kedarnath on way, Tungnath. 2500 – 4000 m (42096).

6. **Juncus himalensis** Klotz. in Klotz. & Garck. Bot. Reise Pr. Waldem. 60, t. 97. 1862 ; Hook. f. Fl. Brit. Ind. 6 : 398. 1892.

Tufted herbs ; stems cylindric, hollow, 20 – 50 cm. tall ; leaves filiform, single in the middle ; flowers dark brown ; stamens exerted.

Fl. & Fr : July – October.

Badrinath, Bhyundar valley, Gothing. 3500 – 400 m (56205).

7. **J. inflexus** L. Sp. Pl. 326. 1753. *J. glaucus* Ehrh. ex Sibth. Fl. Oxon. 113. 1794 ; Hook. f. Fl. Brit. Ind. 6 : 393. 1892.

Tall erect, pale – green, cylindric, finely grooved herbs ; leaves 0 ; flowers brown, sessile, solitary ; stamens included.

Fl. & Fr. : May – September.

Trijuginarayan area. 2500 m (47986).

8. **J. leucanthus** Royle ex D. Don in Trans. Linn. Soc. Lond. 18 : 318. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 397. 1892.

Tufted, slender herbs ; stems hollow, 15 – 20 cm tall ; leaves very slender ; cymes with solitary sessile heads ; flowers pale – yellow ; stamens exerted.

Fl. & Fr. : August – October.

Hemkund. 4000 m. (24279).

9. **J. leucomelas** Royle ex D. Don in Trans. Linn. Soc. Lond. 18 : 319. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 397. 1892.

Tufted slender herbs ; stems hollow 5 – 15 cm tall ; leaves 1 – 2, tubular very short ; flowers white ; stamens exerted.

Fl. & Fr. : July – August.

Hemkund on way. 3500 m (29496).

10. **J. membranaceus** Royle ex D. Don in Trans. Linn. Soc. Lond. 18 : 320. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 397. 1892.

Tufted herbs ; stems stoloniferous, fistular ; leaves slender, channelled, tubular ; cyme with solitary, sessile heads ; flowers white.

Fl. & Fr. : September – October.

Hemkund. 4200 m (24255).

11. **J. sphacelatus** Dcne. in Jacq. Voy. 4 (Bot.) : 172, t. 172. 1835 ; Hook. f. Fl. Brit. Ind. 6 : 398. 1892.

Tufted, stoloniferous herbs, 20 – 40 cm tall ; leaves straight, obtuse or acute, septate ; flowers dark brown, clustered ; stamens clustered.

Fl. & Fr. : August – September.

Hemkund, Laptal. 4000 – 5500 m. (29490).

2. LUZULA DC. nom. cons.

Luzula multiflora (Retz.) Lej. Fl. Envir. Spa. 1 : 169. 1811. *Juncus multiflorus* Retz. Fl. Scand. Prodr. ed. 2 : 82. 1795. *L. compestris* auct. non DC. Sensus Hook. f. Fl. Brit. Ind. 6 : 401. 1892.

Small hairy herbs ; leaves grass like, white hairy ; flowers dark brown ; capsules one celled ; seeds 3.

Fl. & Fr. : June – August.

Bajmora, Bhyundar valley. 3000 – 4000 m (44131).

151. PALMAE (ARECACEAE)

PHOENIX L.

- | | |
|--|-------------------------|
| 1a. Stem bullbiform, 0 - 15 cm high ; fruiting peduncles very short... | <i>P. acaulis</i> 1 |
| 1b. Stem at length elongate 1.5 - 6.5 m high | ... <i>P. humilis</i> 2 |

1. **Phoenix acaulis** Roxb. ex Buch. – Ham. in Fl. Ind. ed. 2, 3 : 783. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 426, 1892. '*Khajuri*'.

Dwarf palms, stem globose, bulb – like, 0 – 15 cm tall, 15 – 28 cm in diam ; leaves, pinnate ; flowers pale – yellow ; fruits blue – black (ripe).

Fl. & Fr. : October – February.

Nigol valley. 1500 m (63743).

2. **Phoenix humilis** Royle ex Beccari & Hook. f. in Fl. Brit. Ind. 6 : 416. 1892. '*Jhar - khajur*'.

Tall erect palms 2-7 m tall ; flowers yellowish - green ; fruits dull red - black (ripe).

Fl. & Fr. : October - February.

Nigol valley. 1600 m (63729).

152. ARACEAE

1a. Flowers bi - sexual.

1b. Flowers uni - sexual.

2a. Leaves peltate, entire.

3a. Spadix with an apical, barren appendage, adnate to the spathe at base ... *Colocasia* 7

3b. Spadix without an apical appendage, entirely free from the spathe.

4a. Spathe tube ovoid, not constricted, straight ... *Remusatia* 5

4b. Spathe tube constricted and abruptly bent at the middle ... *Gonatanthus* 4

2b. Leaves not peltate, variously dissected.

5a. Spadix without an apical, barren appendage ... *Amorphophallus* 2

5b. Spadix with an apical barren appendage.

6a. Male flowers shortly pedicelled ; plants usually dioecious ... *Arisaema* 3

6b. Male flowers sessile ; plants monoecious ... *Sauromatum* 6

1. ACORUS L.

Acorus calamus L. Sp. Pl. 324. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 555. 1893. '*Baodh*'.

Root thick creeping, aromatic ; erect herbs, 15 – 30 cm tall ; radical leaves very long, oblong, 1 cm broad, shining green ; flowers small yellow – green.

Fl. & Fr. : May – July.

Mondal area. 1600 m (43971).

2. AMORPHOPHALLUS Bl. ex Dcne. nom. cons.

Amorphophallus campanulatus (Roxb.) Bl. ex Dcne. *Nouv. Ann. Mus. Hist. Nat. Paris* 3 : 366. 1834. *Arum campanulatum* Roxb. *Pl. Corom.* 3 : 68. t. 272. 1820 ; Hook. f. *Fl. Brit. Ind.* 6 : 513. 1892.

Tuber depressed – globose ; leaf 1, long petioled, 3 – partite with multifid segments ; fruits orange – red, 3 – seeded.

Cultivated upto 1500 m (Sharma). Lit.

3. ARISAEMA Mart.

1a. Leaves digitately compound,

2a. Leaf solitary.

3a. Leaflets 3.

4a. Spathe gradually narrowed into a long acute point *A. intermedium* rar. *intermedium* 4

4b. Spathe abruptly contracted into a short tail like tip ... *A. propinquum* 6

3b. Leaflets 7 - 15.

5a. Leaflets 15, linear - lanceolate, tips long capillary ; spathe incurved with a long filiform tip ... *A. consanguineum* 2

5b. Leaflets 7 - 11, narrowly - lanceolate, acuminate ; spathe purple striped with white, narrowed into a long decurved tail ... *A. concinnum* 1

2b. Leaves 2 ; leaflets 5 - 7, elliptic or obovate lanceolate ; spathe narrowed gradually into thread like tail ... *A. jacquemontii* 5

1b. Leaves pedately compound.

- 6a. Spadix prolonged in a tail like appendage, protruding from the spathe.

7a. Leaflets linear - lanceolate, sessile ; anthers blue or purple yellow *A. tortuosum* var. *tortuosum* 8

6b. Spadix prolonged in a club - like appendage enclosed within the spathe ... *A. flavum* 3

1. *Arisaema concinnum* Schott, in Bonplandia 7 : 27. 1859 ; Hook. f. Fl. Brit. Ind. 6 : 505. 1893.

Tuberous herbs : tuber globose ; petiole 30 – 60 cm and peduncle green or mottled with purple or brown ; spathe green or purple striped with white, narrowed into decurved tail.

Fl. & Fr. : May – June.

Gohna – Ramni, Sitapur, 1500 – 2500 m (47928).

2. *A. consanguineum* Schott in Bonplandia 7 : 27. 1859 ; Hook. f. Fl. Brit. Ind. 6 : 505. 1893.

Tuber depressed globose ; petiole and peduncle mottled dark pink and red or brown.

Fl. & Fr. : July – August.

Gwaldam. 1800 m (41439).

3. *A. flavum* (Forsk.) Schott, Prodr. Syst. Aroid. 40 1860. *Arum flavum* Forsk. Fl. Aegypt – Arab. Cxx. 157. 1856 ; Hook. f. Fl. Brit. Ind. 6 : 503. 1893.

Erect herbs ; leaves usually 2, pedately compound ; leaflets 9 – 11, unequal, lanceolate ; spathe purple inside ; spadix prolonged, club shaped.

Fl. & Fr. : June – October.

Jumma area. Mana. Patalganga. 2500 – 3500 m (10485).

4. *A. intermedium* Bl. Rumphia 1 : 102. 1836 var. *intermedium* ; Hook. f. Fl. Brit. Ind. 6. 500. 1893.

Erect herbs ; stem sheathed at the base ; leaflets sessile, ovate, long pointed ; spathe green striped with purple or white.

Fl. & Fr. : May – July.

Amritganga valley, Gohna – Ramni. 2500 – 3500 m (44051).

5. **Arisaema jacquemontii** Bl. Rumphia 1 : 95. 1836 ; Hook. f. Fl. Brit. Ind. 6 : 505. 1893.

Erect herbs ; stem spotted sometimes ; leaflets unequal, lanceolate, 7 – 20 cm ; spathe green, striped with white.

Fl. & Fr. : May – August.

Bhyundar valley, Dunagiri. 2000 – 3000 m (29384).

6. **A. propinquum** Schott in Oest. Bot. Wochenb. 7 : 333. 1857. *A. wallichiana* Hook. f. Fl. Brit. Ind. 6 : 500. 1893. *A. costatum* auct. non Mart. : Wall. Cat : 300, n. 8922. 1849.

Tuber depressed ; petiole 15 – 30 cm ; leaflets 3, sessile, broadly ovate ; spathe tube ribbed, dark green on a pale ground ; spadix with a tail like appendage, purple.

Fl. & Fr. : June – July.

Ghangaria Trijuginarayan. 2500 – 3500 m (47984).

7. **A. tortuosum** (Wall.) Schott. in Schott & Endl. Melet. Bot. 17. 1832 ; var. **tortuosum** Hook. f. Fl. Brit. Ind. 6 : 502. 1893.

Tuberous herbs ; leaves 2 – 5 ; leaflets 5 – 19 sessile linear – lanceolate, acuminate ; spathe pale – green.

Fl. & Fr. : June – October.

Bhyundar valley. 1200 – 2500 m (44119).

8. **A. tortuosum** (Wall.) Schott var. **curvatum** (Roxb.) Engler, Pfl. – reich IV 23 F, Ht. 73 : 191. 1920. *Arum curvatum* Roxb. Fl. Ind. ed. 2, 3 : 506. 1832. '*Sarp – Pyaz*'.

Stems 30 – 90 cm ; leaflets 7 – 13, unequal, linear – lanceolate ; spathe pale – green, finely ribbed.

Fl. & Fr. : May – August.

Trisula. 1200 m (44228).

4. GONATANTHUS Klotz.

Gonatanthus pumilus (D. Don) Engl. & Krause in Pfl. – reich 71. 19. 1920. *Cladium pumilum* D. Don, Prodr. Fl. Nep. 21. 1825. *G. sarmentosus*

Klotz. & Otto in Link & Klotz. Ic. Pl. Rar. 1 : 33 t. 14. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 522. 1892.

Tuberous herbs with long slender branches bearing bulbils, covered with fibres ; leaves ovate, cordate, long petioled.

Fl. & Fr. : July – August ; bulbils : September.

Mondal 1650 m (41942).

5. REMUSATIA Schott

1a. Spathe limb reflexed, broadly orbicular, obovate, cuspidate ... *R. vivipara* 2

1b. Spathe limb erect, ovate - oblong, acuminate ... *R. hookeriana* 1

1. **Remusatia hookeriana** Schott in Oester. Bot. Wochenbl. 7 : 133. 1857 ; Hook. f. Fl. Brit. Ind. 6 : 522. 1893.

Rootstock with long slender branches ; radical leaves solitary ovate – oblong, cordate, long pointed ; spathe ovoid green.

Fl. & Fr. : May – June.

Mondal, Gohna – Ramni. 1500 – 2500 m (43992).

2. **R. vivipara** (Roxb.) Schott in Schott & Endl. Melet. Bot. 18. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 521 – 22. 1893.

Viviparous shoots 15 – 28 cm long ; leaves membranous orbicular or ovate ; spathe yellow green.

Fl. & Fr. : ? ; bulbils : September.

Batwal Chari – Narayankoti, Mondal. 1200 – 1600 m (6430).

6. SAUROMATUM Schott

Sauromatum venosum (Ait.) Kunth Enum. Pl. 3, 28. 1841. *Arum*

venosum Ait. Hort. Kew 3 : 315. 1789. *S. guttatum* Schott in Schott & Endl. Melet. Bot. 17. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 508. 1893.

Tuber large globose ; stem spotted with purple ; leaf solitary appearing after flowering ; leaflets 9 – 11. oblong lanceolate, unequal ; spathe green – purple margined, united.

Fl. & Fr. : April – May.

Nandkeshri. 1300 m (35151).

7. COLOCASIA Schott, nom. cons.

Colocasia esculenta (L.) Schott in Schott & Endl. Melet. Bot. 18. 1832. *Arum esculentum* L. Sp. Pl. 965. 1753. *C. antiquorum* Schott in Schott & Endl. Melet. Bot. 18. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 523. 1893.

Leaves large with a broad triangular basal sinus ; spathe pale.

Cultivated for tubers.

153. LEMNACEAE

LEMNA L.

Lemna perpusilla Torr. Fl. N. York. 2 : 245. 1843. *L. paucicostata* Hegelm. Lemnac, 139. 1868 ; Hook. f. Fl. Brit. Ind. 6 : 556. 1893.

Small floating green scale – like plants ; fronds with single root, asymmetrical obovate or obovate – oblong $\pm$ flat on both surfaces.

Fl. & Fr. : August – September.

Langasu across Alaknanda bank. 600 m (71953).

154. JUNCAGINACEAE

TRIGLOCHIN L.

- 1a. Scape slender ; fruits clavate, carpels 3 ... *T. palustris* 2
1b. Scape stout curved ; fruits oblong ; carpels 6 ... *T. maritima* 1

1. **Triglochin maritima** L. Sp. Pl 339. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 563. 1893.

Scapigerous marshy, tuberous or stoloniferous herbs ; stems 15 – 60 cm tall ; leaves 5 – 30 cm long, half cylindric.

Fl. & Fr. : June – September.

Rajhoti. 5000 m (Duthie). Lit.

2. **T. palustris** L. Sp. Pl. 338. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 563. 1893.

Large, stout, tuberous herbs ; carpels grooved on the back.

Fl. & Fr. : June – August.

Rajhoti. 5000 m (Duthie). Lit.

155. POTAMOGETONACEAE

POTAMOGETON L.

- 1a. Upper or all the leaves floating ; submerged leaves (if present)
reduced to phyllodes ... *P. natans* 1
1b. Leaves all submerged.
2a. Leaves ovate oblong or broadly linear, translucent ... *P. perfoliatus* 3
2b. Leaves very narrowly linear or filiform ... *P. pectinatus* 2

1. **Potamogeton natans** L. Sp. Pl. 126. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 565. 1892.

Stem terete ; leaves 5 – 15 cm long, narrow without a limb ; peduncle stout.

Fl. & Fr. : May – October.

Garhwal. 4500 m (Rau). Lit.

2. **P. pectinatus** L. Sp. Pl. 127. 1753 ; Hook. f. Fl. Brit. Ind. 567. 1893.

Thread like much branched aquatic herbs ; leaves grass – like ; flowers, small separate clusters ; drupelets, turgid, smooth hardly beaked.

Fl. & Fr. : May – October.

Gohna – Ramni. 2000 m (10050).

3. **P. perfoliatus** L. Sp. Pl. 126. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 566. 1893.

Robust aquatic herbs ; leaves alternate ; upper leaves opposite, broadly ovate, entire, amplexicaule ; flowers crowded in spikes ; drupelets shortly beaked.

Fl. & Fr. : May – October.

Gohna. 2000 m (100051).

156. ZANNICHELLIACEAE

ZANNICHELLIA L.

- Zannichellia palustris** L. Sp. Pl. 969. 1753 ; Hook. f. Fl. Brit. 6 : 568. 1893.

Slender submerged salt water herbs ; leaves linear ; flowers minute enclosed in leaf sheaths ; achenes reniform crested.

Fl. & Fr. : May – Octobers.

Throughout upto 4500 m (Rau). Lit.

157. ERIOCAULACEAE

ERIOCAULON L.

- 1a. Ovary stipitate ; leaves many nerved, 5 - 7.5 cm long ... *E. nepalense* 1
1b. Ovary sessile ; leaves spongy, .6 - 1.25 cm long ... *E. pumilio* 2

1. *Eriocaulon nepalense* Prescott ex Bong. in Act. Acad. Pentrop. Ser 6, 1 : 610. 1831 ; Hook. f. Fl. Brit. Ind. 6 : 581. 1893, *p. p.*

Dwarf, scapose perennials ; leaves radical, crowded, narrow, .6 cm broad ; scape 10 – 22 cm long ; heads blue – grey ; receptacle glabrous.

Fl. & Fr. : July – October.

Mondal. 1600 m (41989).

2. *E. pumilio* Hook. f. Fl. Brit. Ind. 6 : 581. 1893.

Leaves very short, spongy, green, .6 – 1.2 cm long ; scape 2.5 – 4 cm long ; heads pale or dark, spread with white hairs.

Fl. & Fr. : July – September.

Mondoli. 2000 m (30891).

158. CYPERACEAE

1a. Nut - bearing flowers containing perfect stamens.

2a. Glumes in two opposite rows ... *Cyperus* 3

2b. Glumes imbricated all round the axis.

3a. Flowers with bristles or scales.

4a. Bristles 6 - 9, not longer than the glumes ... *Eleocharis* 4

4b. Bristles divided into numerous segments longer than the glumes ... *Eirophorum* 4

- 3b. Flowers without bristles or scales.
 - 5b. Nuts pointed ; style - base falling off ... *Fimbristylis* 6
 - 5b. Nuts obtuse with the persistent style - base ... *Bulbostylis* 1
- 1b. Nut - bearing flowers without stamens.
 - 6a. Nut partially enclosed in a bract or utricle split nearly to its base on one side ... *Koberesia* 7
 - 6b. Nut wholly enclosed in a bag like bract or utricle ... *Carex* 2

1. BULBOSTYLIS Kunth, nom. cons.

***Bulbostylis barbata* (Rottb.) Cl. in Hook. f. Fl. Brit. Ind. 6 : 651. 1893. *Scripus barbata* Rottb. Descr. Pl. Rar. Progr. 27. 1772.**

Tufted very slender herbs ; leaves half the length of the stem, very linear, needle - like, hairy ; spikelets in a globose head.

Fl. & Fr. : August - September.

Chandrapuri - Guptkashi upto 1500 m (65206).

2. CAREX L.

- 1a. Style 2 - fld.
 - 2a. Terminal spikes female at base, male at top.
 - 3a. Lower bract leaf like.
 - 4a. Utricles, elliptic - lanceolate, membranous, obscurely nerved ; beak somewhat winged ... *C. vulpinaris* 20
 - 4b. Utricles ovoid, glabrous, prominently nerved; beak oblong - linear, usually smooth ... *C. nubigena* 13
 - 3b. Lower bract not leaf like, if present setaceous ; utricles ovoid, nerveless or obscure ... *C. foliosa* 4
 - 2b. Terminal spikes wholly male.
 - 5a. Leaves at culm - bases with long blades, the sheaths not disintegrating into reticulate fibres ; utricles smooth, $\pm$ nerveless apiculate by minute entire beak ... *C. orbicularis* 16

- 5b. Leaves at culm - bases with short blades or none, the ventral side of sheath distintegrating into reticulate fibres ; utricles minutely glandular narrowed suddenly into a short linear slightly notched beak ... *C. notha* 14
- 1b. Style 3 - fid.
- 6a. Terminal spikes not wholly male.
- 7a. Terminal spike female at base, male at top.
- 8a. Spikes sessile, disposed in paniculiform inflorescence.
- 9a. Spikes not elongate, 1 - 2 cm long.
- 10a. Spikes linear, distant ; utricles twice as long as subtending glumes, glabrous ... *C. filicina* 3
- 10b. Spikes oblong, crowded ; utricles as long as subtending glumes, minutely hairy ... *C. cruciata* 2
- 9b. Spikes, elongate, 3 - 6 cm long, cylindrical ... *C. myosurus* 11
- 8b. Spikes long peduncled, fascicled or slightly corymbose at nodes of inflorescence.
- 11a. Stolons present ; upper spikes branched ; utricles ellipsoid, trigonous ... *C. munda* 10
- 11b. Stolons absent ; spikes not branched, utricle ellipsoid, lanceolate ... *C. stracheyi* 19
- 7b. Terminal spike male at base, female at top.
- 12a. Lower bract sheathing ; utricles oval elliptic, suddenly contracted at apex ... *C. nivalis* 12
- 12b. Bracts not sheathing.
- 13a. Utricles obovate or elliptic scarcely or shortly beaked.
- 14a. Pistillate glumes shorter than very inflated utricles which are .2 - .3 cm long.
- 15a. Pistillate spikes oblong 1.5 - 3 cm long ; rhizome not stoloniferous ... *C. obscura* 15
- 15b. Pistillate spikes subglobose, .5 - .7 cm long ; rhizome stoloniferous.
- 16a. All lateral spikes long peduncled ... *C. lehmannii* 9

- 16b. Lateral spikes sessile, but lower occasionally short peduncled ... *C. infuscata* 8
- 14b. Pistillate glumes equalling to slightly longer than moderately inflated utricles which are at least .3 cm long *C. atrata* subsp. *pullata* 1
- 13b. Utricles lanceolate, long beaked ... *C. psychrophila* 17
- 6b. Terminale spikes wholly male.
- 17a. Utricles lanceolate - elliptic or fusiform ; beak elongated rather than deeply lobed at orifice.
- 18a. Utricles pubescent, hispidulous or glabrescent with ciliate margins.
- 19a. Utricles trigonous, not flattened ; staminate spike solitary terminal ... *C. setosa* 18
- 19b. Utricles flattened, becoming plano - convex ; staminate spikes 1 - 2 ... *C. hirtella* 6
- 18b. Utricles glabrous ; trigonous, triquetrous, not inflated ... *C. fusiformis* 5
- 17b. Utricles obovoid or ellipsoid ; beak small, notched ... *C. tnanis* 7

1. *Carex atrata* L. Sp. Pl. 1387. 1753. subsp. *pullata* (Boott) Kuk. in Engler, Pfl. - reich IV - 20, Ht. 38. 400. 1909. *C. atrata* L. var. *pullata* Boott, Illustr. Carex 3 : 114, t. 364, 1862. *C. duthiei* Cl. in Hook. f. Fl. Brit. Ind. 6 : 731. 1894.

Glabrous stoloniferous herbs ; leaves as long as stems, .3 - .4 cm broad ; glumes black with yellow ; nut nearly filling the utricle.

Fl. & Fr. : August - September.

Garhwal. 4200 m (Rau). Lit.

2. *C. cruciata* Wahlenb. in Kongl. Vetensk. Acad. Nya Handl. Stockh. 24 : 149. 1803. *C. condensata* Nees ex Wt. Contrib. 123. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 716. 1894.

Perennials, robust, 30 - 90 cm tall ; leaves as long as the stem ; oblong crowded, red - brown.

Fl. & Fr. : September - October.

Ansuyia, Bhyundar valley. 2000 - 2500 m (24491).

3. **Carex filicina** Nees in Wt. Contrib. 123. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 717. 1894.

Glabrous herbs ; leaves as long as stems, thin, flat, 1.25 cm broad ; female glumes not mucronate.

Fl. & Fr. : September – October.

Balkhil bank. 900 m (507, Kala & Gaur). Lit.

4. **C. folisa** D. Don in Trans. Linn. Soc. Lond. 14 : 327. 1824. **C. muricata** var. **foliosa** (D. Don) Cl. in Hook. f. Fl. Brit. Ind. 6 : 703. 1894.

Large herbs, upto 50 cm tall ; leaves flat when dry ; spikes globose ; utricles yellowish.

Fl. & Fr. : April – May.

Mondal. 2100 m (508, Kala & Gaur). Lit.

5. **C. fusiformis** Nees in Wt. contrib. 128. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 736. 1894.

Glabrous erect herbs, 30 – 45 cm tall ; leaves 30 cm long ; spikes loosely paniced ; utricles glabrous ; beak long.

Fl. & Fr. : May – June.

Way to Mongu. 2500 – 2800 m (48048).

6. **C. hirtella** Drejer, Symb. Carex : 21. 1844 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 744. 1894.

Glabrous herbs ; leaves very narrow. enrolled when dry ; utricles very long.

Fl. & Fr. : July – August.

Garhwal. 300 – 3500 m (Duthie, n. 62). Lit.

7. **C. inanis** Kunth, Enum. Pl. 2 : 522. 1837. **C. schlagintweitiana** Boeck. Cyper. Nov. 1 : 48. 1888 ; Cl. in Hook. f. Fl. Brit. Ind. 743. 1894.

Erect perennials ; rhizome devided ; leaves over topping the stem ; spikes cylindric, dense, green grey ; utricles small, hispid ; beak small.

Fi. & Fr. : April – June.

Bajmora, Bhyundar valley, Kalighat. 2000 – 3000 m (10285).

8. **C. infuscata** Nees in Wt. Contrib. 125. 1834. **C. alpina** subsp. **infuscata** (Nees) Kuk. in Engler, Pfl. – reich IV – 20, Ht. 38 : 546, t. 90. 1909.

Rhizome short, woody, slender ; glabrous slender tufted herbs, 10 – 70 cm tall ; leaves shorter than the stems, smooth ; glumes dark black.

Fl. & Fr. : June – October.

Bhuna, Hemkund, Khankhelia. 3000 – 4000 m (24260).

9. **Carex lehmannii** Drejer, Symb. Caricol. 13, t. 2. 1844 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 730. 1894.

Glabrous herbs ; stem stout, slender ; lowest bract usually overtopping the inflorescence ; spikes oblong.

Fl. & Fr. : June – September.

Brjmora. 3800 m (10284).

10. **C. munda** Boott, Illustr. Carex 1 : 7, t. 20. 1858 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 727. 1894.

Slender herbs, 25 – 45 cm tall ; leaves as long as the inflorescence ; spikes oblong linear, straw colour.

Fl. & Fr. : June.

Hemkund on way. 3600 m (Acc. no. 44834).

11 **C. myosurus** Nees in Wt. Contrib. 122. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 723. 1894.

Robust glabrous herbs, 60 – 90 cm tall ; leaves as long as the stem ; panicles very long, 30 cm ; spikes deep brown.

Fl. & Fr. : August – September.

Chandrapuri – Gulabkoti. 600 m (65204).

12. **C. nivalis** Boott in Journ. Proc. Linn. Soc. Lond. 1 : 256. 1846 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 732. 1894.

Glabrous stout herbs ; leaves as long as the stem ; spikes red – brown.

Fl. & Fr. : May – August.

Bhyundar valleey. 3500 – 5500 m (Smythe). Lit.

13. **C. nubigena** D. Don in Trans. Linn. Soc. Lond. 14 : 326. 1824 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 702. 1894.

Perennial slender herbs, 15 – 75 cm tall ; spikes ovoid, pale ; utricles prominently nerved.

Fl. & Fr. : September – August.

Bhyundar valley, Brahmtal. 3800 m (24415).

14. **Carex notha** Kunth, Enum. Pl. 2 : 421. 1837 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 709. 1894.

Glabrous tufted herbs ; male spikes 5 cm, brown ; glumes green obscurely 3 – nerved.

Fl. & Fr. : June – August.

Garhwal. 3000 m (Rau). Lit.

15. **C. obscura** Nees in Wt. Contrib. 126. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 731. 1894.

Leaves overtopping the stem ; spikes oblong or cylindric, dark chestnut or black ; utricles granular, yellow, smooth.

Fl. & Fr. : June – October.

Bhyundar valley. 2500 – 3500 m (Smythe). Lit.

16. **C. orbicularis** Boott in Journ. Proc. Linn. Soc. Bot. 1: 254. 1845. *C. rigida auct.* non Gooden. sensu Cl. in Hook. f. Fl. Brit. Ind. 6 : 711. 1894.

Tall herbs, 10 – 20 cm tall ; leaves often curved ; spikes 3 or 4 together, cylindric short dense, chestnut purple.

Fl. & Fr. : June – October.

Laptel. 3000 – 4500 m (Duthie). Lit.

17. **C. psychrophila** Nees in Wt. Contrib. 127. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 732. 1894.

Slender glabrous herbs ; leaves as long as the stem ; spikes $\pm$ cylindric, chestnut yellow ; utricles small, thin sparsely nerved.

Fl. & Fr. : May – June.

Dudatoli. 2500 – 3500 m (Duthie). Lit.

18. **C. setosa** Boott, Ill. Carex 3 : 108, tt. 327 – 329. 1862 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 745. 1894.

Perennial tufted glabrous herbs ; leaves hardly half the stem ; spikes slender pale ; utricles small shining brown.

Fl. & Fr. : May – June.

Tungnath on way. 3000 m (44156).

19. *Carex stracheyi* Boott ex Cl. in Hook. f. Fl. Brit. Ind. 6 : 727. 1894.

Glabrous herbs, 30 – 45 cm tall ; leaves as long as stem, solitary ; utricles, yellow – green, obscurely nerved.

Fl. & Fr. : May.

Garhwal. 3500 – 4500 m (Duthie). Lit.

20. *C. vulpinaris* Nees in Wt. Contrib. 121. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 702. 1894, *p.p.*

Erect herbs, 30 – 60 cm tall ; leaves narrow, margins incurved ; glumes brown ; utricles membranous. obscurely nerved.

Fl. & Fr. : June – August.

Garhwal. 3500 m (Duthie). Lit.

3. CYPERUS L.

- 1a. Axis of fruiting spikelets disarticulating and falling off.

- 2a. Style 3 - branched.

- 3a. Rootstock producing stolons ; achenes elliptic-oblong ;
glumes pale to pale green ... *C. paniceus* 11

- 3b. Rootstock without stolons ; achenes linear oblong ;
glumes greenish to olive green ... *C. cyperoides* 4

- 2b. Style 2 - branched.

- 4a. Glumes not winged on keel.

- 5a. Rhizome long creeping ; keel of glumes spinulose ... *C. brevifolius* 2

- 5b. Rhizome short, not stoloniferous ; keel of the
glumes smooth ; straw coloured ; culm with corm
like thickening at base ... *C. triceps* 17

- 4b. Glumes winged on keel, deeply lobed ... *C. metzii* 8

- 1b. Axis of fruiting spikelets persistent.

- 6a. Style 2 - branched.

- 7a. Achenes wrinkled ; spikelets .4 cm wide ; glumes
yellow - brown ... *C. diaphanus* 5

7b. Achenes not wrinkled.

8a. Culms nodose above the base ; glumes furrowed
on both sides ... *C. sanguinolentus* 14

8b. Culms not nodose above the base ; glumes not
furrowed ... *C. pumilus* 12

6b. Style 3 - branched.

9a. Spikelets spicately disposed on conspicuous rhachis.

10a. Rhachilla of spikelets winged with base of
glumes which is decurrent along the rhachilla
internode.

11a. Spikelets .075 cm wide, spreading ... *C. distans* 6

11b. Spikelets .15 cm wide, erect ... *C. nutans* 10

10b. Rhachilla of spikelets without conspicuous wings,
base of glumes not decurrent along rhachilla
internode.

12a. Perennials with elongate stolons ; rhachilla
of spikelets glabrous ; spikelets 20 - 46
flowered ... *C. procerus* 13

12b. Annuals not stoloniferous.

13a. Glumes tightly disposed, ovate or
ovate-lanceolate, acute at apex.

14a. Spikelets 1.25 - 2.5 cm ; flowers
20 - 30 ... *C. compressus* 3

14b. Spikelets .6 - 1.25 cm ; flowers
8 - 20 ... *C. squarrosus* 15

13b. Glumes loosely disposed, ovate -
orbicular, rounded at apex.

15a. Keel of glumes smooth, not
winged ... *C. iria* 7

15b. Keel of glume serrulate, scabr-
ous, wing-like ... *C. alulatus* 1

9b. Spikelets digitate or congested in head like clusters at
apices of rays.

16a. Inflorescence congested in head without rays ;
spikelets .35 cm wide, whitish ... *C. niveus* 9

16b. Inflorescence as a rule open with 1 to several
elongated rays; spikelets .1 - .2 cm wide, greenish
or brownish ... *C. tenuispica* 16

1. **Cyperus alulatus** Kern in Reinwardtia 1 : 463. 1952.

Small erect herbs, 10 – 70 cm tall ; leaves shorter than the stem spikes compressed ; rhachis hispid.

Fl. & Fr. : August – September.

Chandrapuri – Guptkashi, Lobha. 1600 – 2000 m (65205).

2. **C. brevifolius** (Rottb.) Hassk. Cat. Pl. Hort. Bogor. 24. 1844. *Kyllinga brevifolia* Rottb. Descr. & Icon. Pl. 13, 71. 1773 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 588. 1893.

Glabrous herbs ; leaves longer than the stem ; spikes ovoid green or brown, submurconate eglandular.

Fl. & Fr. : August – September.

Chamnau. 950 m (474, Kala & Gaur). Lit.

3. **C. compressus** L. Sp. Pl. 46. 1753 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 605. 1893.

Annual, tufted herbs ; leaves shorter than the stem ; spikelets green ; nuts, black or dark brown.

Fl. & Fr. : September.

Papniyana. 1200 m (508, Kala & Gaur). Lit.

4. **C. cyperoides** (L.) Kuntz. Revis. Gen. Pl. 3(2) : 333. 1898. *Scripus cyperoides* L. Mant. Pl. 181. 1771 non *Mariscus cyperoides* (Roxb.) A. Dietr. 1833 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 622. 1893.

Rootstock shorter ; stolons 0 ; stem 30 – 75 cm long ; spikes long 3 times the breadth ; nuts chestnut brown.

Fl. & Fr. : August – September.

Nandprayag. 1000 m (10401).

5. **C. diaphanus** Schrader ex Roem. & schult. Syst. Veg. Mant. 2 : 477. 1824. *Pycneus latespicatus* (Boeck.) Cl. in Hook. f. Fl. Brit. Ind. 6 : 590. 1893.

Annual tufted herbs ; leaves half or three – fourth as long as stem ; spikelets congested, spreading, oblong lanceolate compressed.

Fl. & Fr. : September.

Tanga. 900 m (426, Kala & Gaur). Lit.

6. *Cyperus distans* L. f. Suppl. Pl. 103. 1781 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 607. 1893.

Perennial glabrous herbs ; leaves often as long as stem ; spikelets very narrow, red – brown.

Fl. & Fr. : July.

Patiyaldhar. 900 m (68, Kala & Gaur). Lit.

7. *C. iria* L. Sp. Pl. 45. 1753 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 606. 1893.

Annual glabrous tufted herbs ; spikelets linear ; rhachis glabrous ; nuts ovoid, pale – brown.

Fl. & Fr. : August – September.

Chandrapuri, Trisula area upto 1200 m (42292).

8. *C. metzii* (Hochst. ex Steud.) Mattfeld & Kuk. in Engler, Pfl. – reich IV – 20, Ht. 101 : 25. 1935. *Kyllinga metzii* Hochst. ex Steud. Synops. Pl. Glum. 2 : 70. 1854. *K. squamulata* Tonn. ex Vahl, 1806 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 589. 1893.

Tufted erect glabrous herbs ; radical leaves longer than the stem ; spikelets ovoid brown – green ; nuts flat circular.

Fl. & Fr. : August.

Guptkashi below. 2000 m (65219).

9. *C. niveus* Retz. Obs. Bot. 5 : 12. 1788 ; Cl. in Hook. f. Fl. Brit. 6 : 601. 1893.

Slender glabrous perennials ; leaves half as long as stem ; spikelets flattened white ; nuts ovoid black.

Fl. & Fr. : May – June.

Bhararisain, Chamoli, Gaucher. 800 – 2000 m (68123).

10. *C. nutans* Vahl, Enum. Pl. 2 : 363. 1806 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 607. 1893.

Perennial tufted herbs ; leaves shorter than the stem ; spikelets linear – oblong, compressed ; nuts apiculate, brown.

Fl. & Fr. : September.

Chamoli. 750 m (189, Kala & Gaur). Lit.

11. *Cyperus paniceus* (Rottb.) Boeck. in *Linnaea* 36 : 381. 1870. *Kyllinga panicea* Rottb. *Descr. & Icon. Pl.* 15, t. 7, f. 1. 1753. *Mariscus paniceus* var. *roxburghianus* Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 621. 1893.

Stem 15 – 60 cm long ; leaves as long as the stem, flacid ; fertile flower one ; nuts black.

Fl. & Fr. : August – September.

Mondal. 700 m (41044).

12. *C. pumilus* L. *Cent. Pl.* 2 : 6. 1756. *Pycneus nitens* (Retz.) Nees in *Nova Acta, Acad. Caes. ... Cur.* 19, Suppl. 1 : 53. 1843 ; Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 591. 1893.

Annual simple erect herbs ; leaves as long as the stem ; spikelets 10 – 30 cm long not clustered ; nuts obtuse ashy black.

Fl. & Fr. : July – August.

Chandrapuri. 600 m. (65208).

13. *C. procerus* Rottb. *Descr. et. Ic.* 29. t. 5, f. 3. 1773 ; Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 610. 1893.

Glabrous herbs ; leaves often three – fourth of stem ; Spikelets straw coloured or red tinged : rhachis of spikelets glabrous.

Fl. & Fr. : August – September.

Bairagana. 1100 m (190, Kala & Gaur). Lit.

14. *C. sanguinolentus* Vahl, *tom. Cit.* 351. 1806. *Pycneus sanguinolentus* (Vahl) Nees ex Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 590. 1893.

Decumbent perennial glabrous herbs ; leaves not longer than the stem ; spikelets linear flattened ; nuts slightly compressed.

Fl. & Fr. : August.

Gopeswar 2000 m (65588).

15. *C. squarrosus* L. *Cent. Pl.* 2 : 6. 1756. *C. aristatus* Rottb. *Descr. Pl. Rar. Progn.* 22. 1772 ; Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 606. 1893.

Annual glabrous slender tufted herbs ; leaves often as long as the stem ; spikelets crowded in red – brown ovoid ; nuts narrowly obovoid pale – brown.

Fl. & Fr. : August – October.

Chandrapuri. 800 – 2500 m (64207).

16. **Cyperus tenuispica** Steud. Syn. Pl. Glum 2 : 11. 1854. *C. flavidus* auct. non Retz. Cl. in Hook. f. Fl. Brit. Ind. 6 : 600. 1893.

Annual, slender, ripe yellow or blackish herbs ; stamen 1 ; nuts plano – convex, ripe nuts marble – white.

Fl. & Fr. : August – September.

Chandrapuri – Guptkashi, Trisula area. 1200 m (42290).

17. **C. triceps** (Rottb.) End l. Cat. Hort. Ac. Vindob. 1 : 94. 1842. *Kyllinga triceps* Rottb. Descr. et. Ic. 14. t. 4, f. (excl. cit. Rheed.) 1773 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 587. 1893.

Glabrous herbs ; leaves much shorter than the stem ; spikelets sub – cylindric straw coloured ; nuts yellow – brown turning to black.

Fl. & Fr. : August.

Paduli. 1000 m (261, Kala & Gaur). Lit.

4. ELEOCHARIS R. Br.

Eleocharis palustris (L.) Roem. & Schult. Syst. Veg. 2 : 151. 1817. *Scirpus palustris* L. Sp. Pl. 4. 1753 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 628. 1893.

Rhizome creeping ; stem 15 – 60 cm tall ; nuts pale yellow or brown, smooth, flattened ; bristles as long as the nut.

Fl. & Fr. : July.

Rhishiganga valley upto 4000 m (2902).

5. ERIOPHORUM L.

Eriophorum comosum (Wall.) Wall. ex Cl. in Hook. f. Fl. Brit. Ind. 6 : 664. 1893. *Scirpus comosum* Wall. in Roxb. Fl. Ind. 1 : 234. 1820.

Glabrous tufted slender herbs ; leafy at the base only ; leaves numerous, linear, overtopping the stem ; spikelets numerous brown, narrowly ovoid, nuts slender pointed.

Fl. & Fr. : August – September.

Jakhmolla, Soragarh. 600 – 1500 m (6310).

6. FIMBRISTYLIS Vahl. nom. cons.

1a. Style 2-fid.

2a. Nuts conspicuously longitudinally striate, gynophore not conspicuous ... *F. dichotoma* subsp. *dichotoma* 1

2b. Nuts smooth, reticulate, gynophore conspicuously developed ... *F. dichotoma* subsp. *podocarpa* 2

1b. Style 3-fid.

3a. Spikelets solitary.

4a. Stems with few (sometimes 3-1) spikelets ; nuts white, trigonous, obpyramidal ... *F. narayani* 4

4b. Stems with many spikelets (in well developed forms) ; nuts pale - brown, trigonous, obovoid.

5a. Spikelets small, ellipsoid-lanceolate, acute ... *F. quinqueangularis* 6

5b. Spikelets small, globose (ultimately cylindric obtuse) ... *F. miliacea* 5

3b. Spikelets in clusters 2-5 ... *F. falcata* 3

1. ***Fimbristylis dichotoma*** (L.) Vahl, Enum. Pl. 2 : 287. 1806. subsp. *dichotoma* *Scripus dichotomus* L. Sp. Pl. 50. 1753. *F. diphylla* (Retz.) Vahl, tom. Cit. 289. 1806 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 636. 1893.

Annual tufted herbs ; stems grooved ; leaves glabrous one – third of the stem ; spikelets cylindric brown ; nuts flattened longitudinally stripped.

Fl. & Fr. : May – August.

Chandrapuri – Guptkashi, Dhauli valley. upto 3000 m (65197).

2. **Fimbristylis dichotoma** (L.) Vahl subsp. **podocarpa** (Nees & Meyen) T. Koyama in *Micronesica* 1 : 87. 1964. *F. podocarpa* Nees & Meyen in *Wt. Contrib.* 98. 1834 ; Hook. f. *Fl. Brit. Ind.* 6 : 637. 1893.

Stems striate, 3 – 5 – angled under umbel ; leaves linear or filiform ; spikelets brownish or reddish ; nuts smooth finely reticular not longitudinally striated ; gynophore very prominent.

Fl. & Fr. : August – September.

Balkhil bank. 800 m (173, Kala & Gaur) Lit.

3. **F. falcata** (Vahl) Kunth, *Enum. Pl.* 2 : 239. 1837. *Scirpus falcatus* Vahl, *Enum. Pl.* 2 : 275. 1806. *F. junciformis* (Nees) Kunth, l.c. 1837 ; Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 647. 1893.

Small tufted glabrous herbs, 10–40 cm tall ; leaves short, stiff obtuse ; spikelets linear red – brown ; nuts smooth.

Fl. & Fr. : June – July.

Ghat – Nandprayag. 1000 m (10409).

4. **F. narayanii** C. E. C. Fischer in *Kew Bull.* 1931 : 46. 1931 ; Gamble, *Fl. Madras Presid.* 3 : 1660. 1931.

Small tufted herbs upto 15 cm tall ; leaves ensiform ; spikelets lanceolate ; upper glumes $\pm$ spirally arranged ; nuts white ob-pyramidal truncate.

Fl. & Fr. : September – October.

Mondal area. 1600 m (41987).

5. **F. miliacea** (L.) Vahl, *Enum. Pl.* 2 : 287. 1806. *Scirpus miliaceus* L. *Syst. Nat.* ed. 10, 2 : 868. 1759. *F. miliacea auct.* non (L.) Vahl *Sensu* Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 644. 1893, *p.p.*

Glabrous annuals ; stem $\pm$ flattened at base ; leaves as long as the stem ; spikelets obtuse.

Fl. & Fr. : August.

Paduli. 1100 m (262, Kala & Gaur). Lit.

6. **F. quinquangularis** (Vahl) Kunth, *Enum. Pl.* 2 : 229. 1887. *Scirpus quinquangularis* Vahl, *Enum. Pl.* 2 : 279. 1806. Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 644. 1893.

Hardly separable from *F. miliacea* but by the more acute spikelets.

Fl. & Fr. : June – July.

Rauli. 1200 m (209, Kala & Gaur). Lit.

7. KOBRESIA Willd.

- 1a. Inflorescence spiciform or paniculaeform with 2 to many spikes, loose, linear subtended by conspicuously bladed leafy bract ... *K. laxa* 4
- 1b. Inflorescence with a single terminal spike.
- 2a. Lateral spikelets bi-sexual *i.e.*, the rhacheola bearing staminate flowers.
- 3a. Lateral spikelets 2-flowered or some becoming merely pistillate with abortion upper staminal flower ... *K. duthiei* 3
- 3b. Lateral spikelets 3-6 flowered.
- 4a. Spikes 3-6 cm long; leafblade hardly canaliculate, .3-.5 wide ... *K. deasyi* 2
- 4b. Spikes 1-3 cm long; leafblade canaliculate, .08 - .2 cm wide.
- 5a. Spikes 1.6 - 2.5 cm long, linear; leaves linear setaceous, sheaths chestnut colour ... *K. capillifolia* 1
- 5b. Spikes 1.25 cm long, ellipsoid, dense; leaves linear channelled; sheath testaceous brown ... *K. nitens* 6
- 2b. Lateral spikelets uni-sexual *i.e.*, the rhacheola not bearing staminate flowers.
- 6a. Leafblade filiform convolute; spikes bi-sexual ... *K. nepalensis* 5
- 6b. Leafblade flattish, linear, .2-.3 cm wide.
- 7a. Spikes androgynous ... *K. seticulmis* 7
- 7b. Spikes dioecious ... *K. trinervis* 8

1. **Kobresia capillifolia** (Dcne.). Cl. in J. Linn. Soc. Bot. 20 : 378. 1884. *Elyna capillifolia* Dcne. in Jacq. Voy. 4 (Bot.) : 173, t. 174 (1835 - 40); Cl. in Hook. f. Fl. Brit. Ind. 6 : 697. 1894.

± Slender herbs; leaves linear setaceous; spikes, brown chestnut - colour or yellow; spikelets mostly 3 - 4 - flowered.

Fl. & Fr. : ?

Garhwal. upto 3600 m (Rau). Lit.

2. **K. deasyi** Cl. in Kew Bull. 1908 : 68. 1909. *K. pamiroalaica* Ivanova in Journ. Bot. U. R. S. S. 24 : 481. 1939. Sine descr. lat.

Stem stout rigid ; leaves linear channelled, incurved ; spikes oblong dense ; spikelets 1 – 5 flowered ; nuts ashy – black.

Fl. & Fr. : ?

Garhwal. upto 4500 m (Rau). Lit.

3. **Kobresia duthiei** Cl. in Hook. f. Fl. Brit Ind. 6 : 697. 1894.

Densely caespitose herbs, 10 – 20 cm tall ; leaves many, shorter than the stem ; spikes linear dense green ; nuts obovoid.

Fl. & Fr. : September – October.

Kailuvinlayak. 4200 m (30944).

4. **K. laxa** Nees in Wt. Contrib. 119. 1834 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 698. 1894.

Slender herbs, 20 – 60 cm tall ; leaves as long as the stem ; spikes loosely paniced ; lowest bract leaf like ; nuts narrow oblong.

Fl. & Fr. : June – October.

Bhyundar valley. 2000 – 4000 m (Smythe). Lit.

5. **K. nepalensis** (Nees) Kuk. in Engler, Pfl. – reich. IV – 20, Ht. 38 : 40, f. 9. 1909. *Uncinia nepalensis* Nees in Wt. Contrib. 129. 1834. subsp. *nepalensis*.

Tufted herbs ; leaves setaceous ; spikes linear greenish – pale or brown ; utricles oblong, glabrous nerveles.

Fl. & Fr. : September – October.

Kailuvenayak, way to Vasukital. 4000 m (38680).

6. **K. nitens** Cl. in Journ. Linn. Soc. Bot. 20 : 379, t. 30, f. 7. 1883 ; Cl. in Hook. f. Fl. Brit. Ind. 6 : 697. 1894.

Stem 5 – 25 cm ; leaves overtopping the stem ; spikes 1. 2 cm ; bracteoles shining chestnut colour, paler on back.

Fl. & Fr. : ?

Garhwal. 4000 – 5000 m (Rau). Lit.

7. **K. seticulmis** Boeck. in Linnaea 39 : 3. 1875. *K. hookeri* auct. non Boeck. Senu Cl. in Hook. f. Fl. Brit. Ind. 6 : 695. 1894.

Caespitose slender herbs, 8 – 30 cm tall ; leaves flat linear –

lanceolate ; spikes rhomboid – ovate, brown yellow ; nuts linear – oblong, brown.

Fl. & Fr. : June.

Bajmora, Hemkund on way. 3000 – 4000 m (39030).

8. **Kobresia trinervis** Boeck. in *Linnaea* 39 : 4, in note, 1875 ; Cl. in Hook. f. *Fl. Brit. Ind.* 6 : 695. 1894.

Slender erect herbs, 5 – 20 cm tall ; leaves very long, 30 – 40 cm long ; spikes dull brown linear or oblong.

Fl. & Fr. : June

Chamoli Garhwal. 3500 m (10236).

159. POACEAE

Key to the groups of Poaceae

- | | |
|---|-----------------------------|
| <p>1a. Spikelets 2-flowered, falling entire at maturity, usually with the upper floret hermaphrodite and the lower male or barren and if the latter, often reduced to lemma or rarely the lemma entirely absent, all alike or more often differing in size, shape and structure, frequently dorsally compressed ...</p> | <p><i>Panicoideae</i> 1</p> |
| <p>1b. Spikelets 1-to many flowered, breaking up at maturity above the more or less persistent glumes, or if falling entire then not 2-flowered with the lower floret male or barren and the upper hermaphrodite, usually more or less laterally compressed or terete ...</p> | <p><i>Poideae</i> 2</p> |

1. PANICOIDEAE

- | | |
|--|-------------------------|
| <p>1a. Male and female spikelets in separate inflorescences or in different parts of the same inflorescence and of different appearance ; lemmas hyaline or membranous and thinner than the glumes ...</p> | <p><i>Maydeae</i> 2</p> |
|--|-------------------------|

- 1b. Spikelets all hermaphrodite or with male or barren and hermaphrodite or barren spikelets is near a hermaphrodite spikelet, or if uni-sexual then the lemma of the fertile floret indurated.
- 2a. Spikelets often paired, with one sessile and the other pedicelled, those of each pair similar or more often dissimilar, rarely solitary more or less rigid and firmer than the lemmas which are both hyaline or membranous; upper lemma usually awned ... *Andropogoneae* 1
- 2b. Spikelets solitary or paired, more or less similar; glumes usually membranous; the lower usually smaller or sometimes suppressed; lower lemma mostly resembling the upper glume in texture; upper lemma papery to very tough and rigid, usually awnless ... *Paniceae* 3

1. ANDROPOGONEAE Dumort.

- 1a. Spikelets of each pair similar, the sessile and the pedicelled hermaphrodite; joints of the panicle thin, linear or somewhat expanded at the top.
- 2a. Spikelets arranged in more or less simple or compound racemes arranged along a central axis; upper lemma awnless or awned from the entire tip or from between two terminal teeth.
- 3a. Rachis or racemes tough or tardily breaking up; spikelets deciduous from their pedicels.
- 4a. Lemmas unawned; spikelets in pairs, one sessile the other pedicelled ... *Imperata* 14
- 4b. Lemmas awned ... *Miscanthus* 17
- 3b. Rachis of the raceme breaking up. ... *Erianthus* 9
- 2b. Spikelets arranged in a single or in several racemes, the latter being digitate or arranged along a very short main axis.
- 5a. Lower glume deeply or shallowly furrowed on back ... *Microstegium* 16
- 5b. Lower glume $\pm$ flat, very shallowly depressed but not furrowed or rounded on the back.
- 6a. Upper lemma two-toothed, awned; stamens three *Eulaliopsis* 11
- 6b. Upper lemma deeply cleft, awned in the cleft, rarely stipitiform.

- 7a. Lower glume 2-keeled, depressed between the keels ... *Eulalia* 10
- 7b. Lower glume convex on the back, at least at maturity ... *Pogonatherum* 19
- 1b. Spikelets in each pair dissimilar, the sessile hermaphrodite, the pedicelled male or sterile, or completely absent or if more or less similar then the joints of the raceme and the pedicel thick and swollen.
- 8a. Joints of rachis and pedicel of the pedicelled spikelet (if not much reduced) swollen, 3-angled, rounded or flattened.
- 9a. Sessile spikelet with a male and a hermaphrodite floret ; upper lemma awned, rarely awnless.
- 10a. Racemes many noded, not contained in a spathe-like sheath ... *Ischaemum* 15
- 10b. Raceme 1-noded, reduced to three heteromorphous spikelets, enclosed in a boat-shaped spathe ... *Apluda* 2
- 9b. Sessile spikelet with a hermaphrodite floret only or occasionally with a male floret below ; upper lemma unawned.
- 11a. Inflorescence of several racemes at the tip of the peduncle ... *Phacelurus* 18
- 11b. Raceme solitary, terminating the culm and branches.
- 12a. Spikelets similar ; rhachis very tough ; joints and pedicels fused ... *Hemarthria* 12
- 12b. Spikelets more or less dissimilar ; rhachis usually breaking up ; joints and pedicels fused or free.
- 13a. Axis of the spikes tough, not breaking up ; spikelets paired ... *Hemarthria* 12
- 13b. Axis of spikes fragile ... *Rottboellia* 20
- 8b. Joints of rhachis and pedicel narrow, seldom thickened upwards, occasionally with a translucent longitudinal groove ; sessile spikelet usually awned.
- 14a. Spikelets in racemes which are not interrupted by spathes or solitary at the ends of the branches ; the racemes collected into whorled panicles ; joints and pedicels not furrowed.
- 15a. Spikelets dorsally compressed ; in panicles of many pairs or in threes of which one is hermaphrodite ... *Sorghum* 21

- 15b. Spikelets compressed from the sides ... *Chrysopogon* 6
- 14b. Panicles of racemes which are interrupted by spathes, or the espatheate racemes digitate or in pairs or solitary and terminal, sometimes the joints and/or pedicels with a translucent median furrow.
- 16a. Upper lemma of the sessile spikelet with a basal awn ; sessile spikelet compressed from the sides ; pedicelled spikelet reduced ... *Arthraxon* 3
- 16b. Upper lemma of the sessile spikelet awned from the tip or from the cleft or upper lemma reduced to the hyaline base of the awn, very rarely unawned.
- 17a. Margins of the lower glume of the sessile spikelets sharply infolded, 2-keeled ; awn glabrous.
- 18a. Upper lemma of the sessile spikelet not cleft, often stipitate and passing into the awn.
- 19a. Spikelets arranged in false racemes terminating the branches and branchlets of a true panicle ; pedicels with a median translucent furrow ... *Capillipedium* 5
- 19b. Spikelets arranged in false racemes which are either solitary and terminal or subsessile, arranged along a central axis but not at the tip of capillary branches.
- 20a. Joints and pedicels with a translucent longitudinal furrow ... *Bothriochloa* 4
- 20b. Joints and pedicels without a translucent furrow... *Dichanthium* 8
- 18b. Upper lemma of the sessile spikelet 2-lobed or 2-cleft, awned in the sinus.
- 21a. Aromatic grasses ; racemes in pairs supported by spathes, often collected into huge panicles ... *Cymbopogon* 7
- 21b. Non aromatic grasses ; racemes in pairs or digitate or solitary... *Andropogon* 1

17b. Margins of the lower glumes inturned and rounded at the sides, at the most keeled upwards ; callus mostly sharp and long ; awn usually hairy.

22a. Racemes solitary at the end of the branches, surrounded at the base by an involucre of homogamous spikelets ...

Themeda 22

22b. Racemes without an involucre ...

Heteropogon 13

1. ANDROPOGON L.

Andropogon munroi Cl. in Journ. Linn. Soc. Bot. 25 : 87, t. 37. (Feb. 1889). *Andropogon tristis* Nees ex Hackl. in DC. Mongr. Phan. 6, 439. (June 1889) ; Hook. f. Fl. Brit. Ind. 7 : 169. 1896 ; Bor, Grass Burma Ceylon, Ind. & Pak. 93. 1960. '*Muslya*'.

Tall erect branching perennials ; leaves very narrow ; awn twice the length of the spikelet.

Fl. & Fr. : August – September.

Gopeswar. 1550 m (304. Kala & Gaur). Lit.

2. APLUDA L.

Apluda mutica L. Sp. Pl. ed. 1, 82. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 150. 1896 ; Bor, l. c. 93. 1960. '*Tachlu*'.

Perennial, leafy branched herbs ; stem solid ; leaves flat, rough, finely pointed ; ligule short, rounded ; spikes sheathed.

Fl. & Fr. : May – October.

Jakhmolla, Punn Village, Trijuginaryan. 2400 m (24539).

3. ARTHRAXON P. Beauv.

- 1a. Lower glume of sessile spikelets rounded on the back, not keeled ; spikelets laterally compressed.
- 2a. Pedicelled spikelets, at least in the upper part of the raceme developed ... *A. lancifolius* 1
- 2b. Pedicelled spikelets not developed ; pedicels more or less reduced ... *A. santapaui* 1
- 1b. Lower glume of sessile spikelet 2 - keeled, sometimes almost flat on the back ; spikelets not laterally compressed ... *A. prionodes* 2

1. *Arthraxon lancifolius* (Trin.) Hochst. in Flora 39 : 188. 1856. *Andropogon lancifolius* Trin. in Mem. Acad. Sci. Petersb. Ser. 6 (2) : 271. 1832. *A. microphyllus* (Trin.) Hochst. in Flora 39 : 188. 1856 ; Hook. f. Fl. Brit. Ind. 7 : 147. 1896 : Bor, l.c. 100. 1960. '*Kangulya*'.

Erect hairy herbs ; leaves oblong lanceolate ; spikes often tinged with purple ; rhachis and joints hairy ; stamens 2.

Fl. & Fr. : September – October.

Narayankoti. 1500 m (6462).

2. *A. prionodes* (Steud.) Dandy in Andrews, Fl. Pl. Sudan 3 : 399. 1956. *Andropogon serrulatus* A. Rich. Tent. Fl. Abyss 2 : 458, 1851 non Link 1827 ; Bor, l.c. 101. 1960.

Tall erect or half climbing herbs ; leaves lanceolate to ovate, minutely toothed ; spikes few or many ; stamens 3 ; awn far projecting.

Fl. & Fr. : May – June.

Bhyundar Valley. 2700 m (24571).

3. *A. santapaui* Bor in Kew Bull. 1951 : 446. 1952 ; Bor. l.c. 102. 1960.

Peduncles long exerted, pilose, curved ; spikelets large.

Fl. & Fr. : August – September.

Gopeswar. 1600 m (Student, Garh. Univ.). Lit.

4. *BOTHRIOCHLOA* O. Kuntz.

- 1a. Lower racemes longer than the rachis.
- 2a. Lower glumes of the sessile spikelets hairy below the middle.
- 3a. Racemes many, 9-15 in number, up to 8 cm long ; leaves mostly cauline ... *B. kuntzeana* 2
- 3b. Racemes few, 2-8, upto 5 cm long ; leaves mostly at the base ... *B. pertusa* 3
- 2b. Lower glume of sessile spikelet glabrous ... *B. kuntzeana* 2
- 1b. Lower racemes shorter than the rachis ... *B. bladhii* 1

1. *Bothriochloa bladhii* (Retz.) Blake in Proc. R. Soc. Queensland 80 : 62. 1869. *Andropogon bladhii* Retz. Obs. Bot. 2 : 27. 1781. *B. intermedia* (R. Br.) A. Camus in Ann. Soc. Linn. Lyon, 1930, n.s. 76, 164. 1931. *Andropogon intermedius* R. Br. Prodr. Fl. Nov. Holl. 202. 1810 ; Hook. f. Fl. Brit. Ind. 7 : 175. 1896 ; Bor, l.c. 108. 1960.

Tall erect perennials ; leaves narrow $\pm$ hairy ; spikelets pale green tinged purple.

Fl. & Fr. : April – June.

Paduli. 950 m (622, Kala & Gaur). Lit.

2. *B. kuntzeana* (Hack.) Henr. in Blumea 3 : 456. 1940. *Andropogon kuntzeanus* Hack. in DC. Monogr. Phan. 6 : 478. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 175. 1896.

Tall perennials ; nodes thickly bearded ; leaves narrowly linear smooth ; spikes long, fescicled, slender, silky purplish.

Fl. & Fr. : ?

Mandakini valley, Sonprayag – Gaurikund. 1500 m (B.N.M. 5948). Lit.

3. *B. pertusa* (L.) A. Camus in Ann. Soc. Linn. Lyon. n.s. 76, 164. 1931. *Holcus pertusus* L. Mant. Pl. 2 : 301. 1771. *Andropogon pertusus* (L.) Willd. Sp. 4 (2) : 922. 1806 ; Hook. f. Fl. Brit. Ind. 7 : 173. 1896 ; Bor, l.c. 109. 1960.

Annual slender creeping herbs ; nodes densely bearded ; leaves linear, dull green ; spikes purple slender, fescicled ; joints and pedicels silky.

Fl. & Fr. : September – October.

Bhyundar valley. 2200 m (24567).

5. CAPILLIPEDIUM Stapf

- | | | |
|--|-----|-------------------------|
| 1a. Lower glume of the sessile spikelet channelled ; leaves slightly narrowed or rounded at the base; panicle large, diffuse, of small spikelets | ... | <i>C. parviflorum</i> 3 |
| 1b. Lower glume of the sessile spikelet flat on the back ; leaves conspicuously narrowed at the base ; panicle large, often dense, of many or few spikelets. | | |
| 2a. Nodes glabrous or or shortly hairy ; callus shortly bearded ; panicle often somewhat open | ... | <i>C. assimile</i> 1 |
| 2b. Nodes densely bearded ; callus villously bearded ; panicles contracted | ... | <i>C. huegelii</i> 2 |

1. **Capillipedium assimile** (Steud.) A. camus in Lecomte, Fl. Gen. de I, Indo – Chine 7 : 314. 1922. *Andropogon assimilis* Steud. in Zoll. Syst. Verz. 58. 1854 ; Hook. f. Fl. Brit. Ind. 7 179. 1896 ; Bor, l.c. 110. 1960.

Tall erect herbs ; stem much branched, creeping at the base ; leaves hairy ; Spikelets in pairs with a basal tuft of hairs.

Fl. & Fr. : September – October.

Narayankoti. 1400 m (35826).

2. **C. huegelii** (Hack.) Stapf in Hook. Jc. Pl. sub. tab. 3085. 1922. *Andropogon huegelii* Hack. in DC. Mongr. Phan. 6 : 492. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 180. 1896 ; Bor. l.c. 111. 1960.

Perennials, branched from the base ; nodes bearded ; leaves much narrowed below ; spikes green or purplish.

Fl. & Fr. : August – September.

Gopeswar. 1350 m (106, Kala & Gaur). Lit.

3. **Capillipedium parviflorum** (R. Br.) Stapf in Prain, Fl. Trop. Africa, 9 : 169. 1917. *Holcus parviflorus* R. Br. Prodr. 199. 1810. *Andropogon micranthus* Kunth Rev. Gram. 1 : 165. 1829 ; Hook. f. Fl. Brit. Ind. 7 : 178. 1896 ; Bor, l. c. 112. 1960. '*Ningalia Ghas*'.

Slender erect herbs ; leaves very narrow, spikelets in threes ; sessile spikelets .2 cm, glabrous or shortly ciliate ; hairs of callus and pedicels very pale – reddish or white.

Fl. & Fr. : October – November.

Bhyundar valley, Dewalikhali – Karanprayag. 2600 m (24561).

6. CHRYSOPOGON Trin. nom. cons.

1a. Pedicels half the length of the sessile spikelet or longer.

2a. Base of the plant creeping ; sessile spikelets .3 - .45 cm long, with a very long pungent callus, decurrent on the peduncle ... *C. aciculatus* 1

2b. Culms erect, not creeping at the base; sessile spikelets .5 - .8 cm long, without a decurrent callus ... *C. gryllus* subsp. *echinulatus* 3

1b. Pedicels shorter than half the length of the sessile spikelet.

3a. Upper glume of the sessile spikelet keeled ; pectinate-ciliate in lower 2/3 or 3/4 with golden or golden-brown rigid hairs ... *C. fulvus* 2

3b. Upper glume of the sessile spikelet glabrous on the back or shortly ciliate in the upper quarter only ... *C. serrulatus* 4

1. **Chrysopogon aciculatus** (Retz.) Trin. Fund. Agrost. 188. 1870. *Andropogon aciculatus* Retz. Obs. Bot. 5 : 22. 1789.

Branching, creeping perennials ; leaves densely tufted ; panicles pale or purplish.

Fl. & Fr. : August – September.

Paduli. 1000 m (132, Kala & Gaur). Lit.

2. **Chrysopogon fulvus** (Spreng.) Chiov. Fl. Somala 1 : 327. 1929. *Pollinia fulva* Spreng, Pugill 2 : 10. 1815. *Andropogon monticola* Roem. & Schult. Syst. Veg. 2, Mant. 605. 1827 ; Hook. f. Fl. Brit. Ind. 7 : 192. 1896 ; Bor, l.c. 116. 1960.

Slender erect herbs ; leaves very narrow ; spikelets in threes on solitary spike ; sessile spikelet .2 cm long.

Fl. & Fr. : September.

Batwalchari. 1000 m (414).

3. **C. gryllus** (L.) Trin. subsp. **echinulatus** (Nees) Cope in Kew Bull. 35 : 701 1980. *Andropogon gryllus* L. subsp. *echinulatus* (Nees) Hook. in DC. Monogr. Phan 6 : 552. 1889. *C. echinulatus* (Nees) W. Wats in Atkins. Gaz. N.W. Ind. 10 : 392. 1882. *Andropogon echinulatus* (Nees) Steud. Syn. Pl. Glum. 1 : 397. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 187. 1896 ; Bor, l.c. 116. 1960.

Simple tufted erect herbs ; leaves very narrow $\pm$ hairy, margins minutely spinous toothed ; spikelets in threes ; sessile spikelets .5 cm ; callus rusty - brown hairy.

Fl. & Fr. : August - October.

Bampa, Jumma area. 2600 m (53869).

4. **C. serrulatus** Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 2 : 318. 1832. *Andropogon monticola* Schult var. *trinii* (Steud.) Hook. f. Fl. Brit. Ind. 7 : 193. 1896 ; Bor, l.c. 118. 1960.

Slender erect herbs ; leaves very narrow ; spikelets in threes ; sessile spikelets .2 cm, villous.

Fl. & Fr. : September - October.

Jakhmolla. 1500 m (42235).

7. CYMBOPOGON Spreng.

1a. Lower glume of the sessile spikelet with a deep slot-like depression occupying most of its length

...

C. ospischilii 4

1b. Lower glume without a slot, either flat, convex, shallowly concave or with a deep narrow slit in the lower half.

- 2a. Lower glume of sessile spikelet with a narrow slit-like groove in the lower half which appears as a rib on the inner surface.
- 3a. Leaves cordate and amplexicaule at the base, linear-lanceolate to lanceolate, tapering ... *C. martinii* 3
- 3b. Leaves linear-acuminate, not cordate, narrow, rounded at the base ... *C. caesius* 1
- 2b. Lower glume of the sessile spikelet flat, slightly convex, shallowly concave, wrinkled or with 1-3 very shallow depressions ... *C. distans* 2

1. **Cymbopogon caesius** (Nees ex Hook. & Arn.) Stapf in Kew Bull. 1906. 341, 360. 1906. *Andropogon caesius* Nees nomen et Nees ex Hook. & Arn. Bot. Beech. Voy. 244. 1838. *A. schoenanthus* L. var. *gracillimus* Hook. f. Fl. Brit. Ind. 7 : 205. 1896 ; Bor, l.c. 125. 1960.

Rootstock aromatic, tall erect smooth herbs ; leaves glabrous, amplexicaule, 1 – 2 cm broad ; spikelets thinly hairy bracts many brown.

Fl. & Fr. : August – September.

Jumma area. 2600 m (53844).

2 **C. distans** (Nees ex Steud.) W. Wats in Atkins. Gaz. N.W. Prov. Ind. 10 : 392. 1882. *Andropogon distans* Nees ex Steud, Syn. Pl. Glum. 1 : 387. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 287. 1896 ; Bor, l.c. 126. 1960. 'Piriya'.

Rootstock aromatic ; perennial tall glabrous herbs ; leaves basal, glabrous, narrow ; spike deflexed, solitary.

Fl. & Fr. : September – October.

Gaurikund. 2200 m (8743).

3. **C. martinii** (Roxb.) W. Wats in Atkins. l.c. 10 : 392. 1882. *Andropogon martinii* Roxb. Fl. Ind. 1 : 280. 1820. *A. Schoenanthus*. L. var. *martinii* Roxb. Hook. f. Fl. Brit. Ind. 7 : 204. 1896 ; Bor, l.c. 129. 1960. 'Piriya'.

Rootstock aromatic, tall erect smooth herbs ; leaves, cordate, 1/2 amplexicaule ; spathe and spikelets pale or reddish.

Fl. & Fr. : September – October.

Trisula. 1400 m (42273).

4. **Cymbopogon pospischilii** (K. Schum.) C. E. Hubb. in Kew Bull. 4 : 175. 1949. *Andropogon pospischilli* K. Schum. in Bot. Jb. 24 : 328. 1897. *C. stracheyi* (Hook. f.) Raizada et Jain in Ind. For. 80 : 44. 1954. *Andropogon nardus* var. *stracheyi* Hook. f. Fl. Brit. Ind. 7 : 207. 1896 ; Bor, l. c. 131. 1960.

Tall slender herbs ; leaves long narrow ; panicles lax spikes 1 – 2.5 cm long, brown ; awn 1.2 cm. long.

Fl. & Fr. : September – November.

Bhyundar valley, Pipalkoti. Trisula. 1400 m (42272).

8. DICHANTHIUM Willemet

Dichanthium annulatum (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178. 1917. *Andropogon annulatus* Forssk. Fl. Aegypt. – Arab. 173. 1775 ; Hook. f. Fl. Brit. Ind. 7 : 196. 1896 ; Bor, l. c. 133. 1960.

Branching often 1/2 climbing perennials ; leaves basal, narrow, rigid, upper surface hairy ; spikelets in pairs.

Fl. & Fr. : January – December.

Gopeswar. 1350 m (720, Kala & Gaur). Lit.

9. EULALIA Kunth

- | | | |
|--|-----|--------------------------|
| 1a. Rhachis and pedicels covered with long silvery-white hairs which conceal the spikelets ; racemes 3-5 cm long | ... | <i>E. mollis</i> 2 |
| 1b. Rhachis and pedicels covered with short golden, pale gold or even pale violet hairs which do not conceal the spikelets ; racemes upto 20 cm long or more. | | |
| 2a. Hairs on the rhachis golden or silvery - grey or pale gold ; lower glume of sessile spikelet 4-nerved, hispid on the keels, golden-brown in colour, acute or truncate at the tip ; nerves green and anastomosing above | ... | <i>E. quadrinervis</i> 3 |
| 2b. Hairs on the rhachis pale - violet ; lower glume of sessile spikelet obscurely 4-nerved ; villous on the keels | ... | <i>E. hirtifolia</i> 1 |

1. *Eulalia hirtifolia* (Hack.) A. Camus in Ann. Soc. Linn. Lyon. n. s. 68. 202. 1922. *Pollinia hirtifolia* Hack. in DC. Monogr. Phan. 6 : 165. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 111. 1896 ; Bor, l. c. 155. 1960.

Spikelets are smaller than the spikelets of *E. quadrinervis*.

Fl. & Fr. : September – October.

Bhyunder valley, Gaurikund. 2200 m (8592).

2. *E. mollis* (Griseb.) Kuntz. Rev. Gen. Pl. 2 : 775. 1891. *Erianthus mollis* Griseb. in Nachr Ges Wiss. Göttingen. 1868 : 92. 1868. *Pollinia mollis* (Griseb.) Hackel in DC. Monogr. Phan. 6 : 158. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 111. 1896 ; Bor, l. c. 156. 1960.

Perennial, slender erect herbs, leafy at the base ; leaves narrowly lanceolate glabrous ; spikes clustered silvery hairy.

Fl. & Fr. : October.

Bhyundar valley. 2600 m (24542).

3. *E. quadrinervis* (Hack.) Kuntz. Rev. Gen. Pl. 2 : 775. 1891. *Pollinia quadrinervis* Hack. in DC. Monogr. Phan. 6 : 158. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 110. 1896 ; Bor, l. c. 156. 1960.

Robust erect leafy herbs ; leaves narrow hairy finely pointed ; spikes densely hairy, red – brown tinged with violet.

Fl. & Fr. : September – October.

Bhyundar valley. 2600 m (24546).

10. *ERIANTHUS* Michx.

Erianthus rufipilus (Steud.) Griseb. in Nachr Ges. wiss. Göttingen. 1868: 93. 1868. *Sacharum rufipilum*. Steud. syn. Pl. Glum 1 : 409. 1855. *E. fulvus* Nees ex Hack. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 123. 1896 ; Bor, l. c. 152. 1960.

Perennial tall silky hairy herbs ; leaves long narrow ; panicles grey white.

Fl. & Fr. : September – October.

Gaurikund. 2100 m (8747).

11. EULALIOPSIS Honda

Eulaliopsis binata (Retz.) Hubb. in Hook. Ic. Pl. 33 : Subtab. 3262. 1935. *Andropogon binatus* Retz. Obs. Bot. 5 : 21. 1789. *Ischaemum angustifolium* (Trin.) Hack. in DC. Monogr Phan. 6 : 241. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 129. 1896 ; Bor, l. c. 158. 1960.

Herbs, woody at the base ; leaves very narrow, rigid, sharp pointed ; spikes clustered.

Fl. & Fr. : June.

Joshimath. 2000 m (2759).

12. HEMARTHRIA R. Br.

Hemarthria compressa (L. f.) R. Br. Prodr. 207. 1810. *Rottboellia compressa* L. f. Suppl. 114. 1781 ; Hook. f. Fl. Brit. Ind. 7 : 153. 1896 ; Bor, l. c. 161. 1960.

Branched leafy herbs ; lemma linear acute ; spikes slender, compressed.

Fl. & Fr. : August – September.

Bairagana. 1500 m (118, Kala & Gaur). Lit.

13. HETEROPOGON Pers.

- | | |
|--|------------------------------|
| 1a. Annuals ; lower glume of the pedicelled spikelets with a row of glands down the centre | ... <i>H. melanocarpus</i> 2 |
| 1b. Perennials ; lower glume of the pedicelled spikelets devoid of glands | ... <i>H. contortus</i> 1 |

1. **Heteropogon contortus** (L.) P. Beauv. ex Roem. et Schult. Syst. Veg. 2 : 836. 1817. *Andropogon contortus* L. Sp. Pl. ed. 1, 1045. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 199. 1896 ; Bor, l. c. 163. 1960. 'Kumrya'.

Densely tufted, erect or decumbent herbs ; leaves narrow rigid, acute, thinly hairy dorsally ; spikes long stalked, umbellately clustered ; spikelets in pairs.

Fl. & Fr. : September – October.

Bhyunder Valley. 2600 m (24547).

2. *H. melanocarpus* (Ell.) Benth. in Journ. Linn. Soc. (Bot.) 19 : 71. 1881. *Andropogon melanocarpus* Ell. Sketch. Bot. S. Carol. 1 : 146. 1816 ; Hook. f. Fl. Brit. Ind. 7 : 200. 1896 ; Bor, l.c. 165. 1960.

Tall erect herbs, branched above ; leaves very long, rigid, green ; spikes green ; callus long bearded.

Fl. & Fr. : August – September.

Batwalchari. 1000 m (6400).

14. IMPERATA Cyr.

Imperata cylindrica (L.) Beauv. Ess. Agrost. 165. 1812. *Lagurus cylindricus* L. Syst. Nat. ed. 10, 2 : 878. 1759. *I. arundinacea* Cyr. Pl. Rar. Neap. Fasc. 2 : 26, t. 11. 1792 ; Hook. f. Fl. Brit. Ind. 7 : 106. 1896 ; Bor, l.c. 169. 1960. 'Siro'.

Perennial herbs ; panicles silky white.

Fl. & Fr. : March – April.

Gopeswar. 1350 m (583, Kala & Gaur). Lit.

15. ISCHAEMUM L.

Ischaemum rugosum Salisb. Ic. Strip. Rar. 1, t. 1. 1791 ; Hook. f. Fl. Brit. Ind. 7 : 127. 1896 ; Bor, l.c. 184 - 85. 1960.

Erect tufted annuals ; leaves narrow, base contracted ; spikes pale yellow.

Fl. & Fr. : August - September.

Mondal. 1400 m (343, Kala & Gaur). Lit.

16. MICROSTEGIUM Nees

- 1a. Spikelets purplish, .3 - .45 cm long ; lower glumes oblong or obovate or oblong ... *M. vagans* 2
- 1b. Spikelets greenish-pale, .2 - .25 cm long ; lower glumes thin linear - oblong truncate dorsally convex shining ... *M. delicatulum* 1

1. *Microstegium delicatulum* (Hook. f.) A. Camus in Ann. Soc. Linn. Lyon, n.s. 68 : 200. 1921. *Pollinia delicatula* Hook. f. Fl. Brit. Ind. 7 : 117. 1896 ; Bor, l.c. 194. 1960.

Very slender roughly geniculately branched leafy herbs; leaves linear-lanceolate.

Fl. & Fr. : September October.

Chamnau. Ascending from 800 1600 m (443, Kala & Gaur). Lit.

2. *M. vagans* (Nees ex Steud.) A. Camus in Ann. Soc. Linn. Lyon, n.s. 68. 200. 1921. *Pollinia vagans* Nees ex Steud. Syn. Pl. Glum. 1 : 410. 1855 ; Hook. f. Fl. Brit. Ind. 7 : 115. 1896 ; Bor. l.c. 195. 1960. 'Jilkonya'.

Laxly branched slender herbs ; leaves very narrow setaceously acuminate.

Fl. & Fr. : September.

Gopeswar. 1400 m (444, Kala & Gaur). Lit.

17. MISCANTHUS Anders.

Miscanthus nepalensis (Trin.) Hack. in DC. Monogr. Phan. 6 : 104. 1889. *Eulalia nepalensis* Trin. in Mem. Sci. Petersb. Ser. 6, 2 : 333. 1832 ; Hook. f. Fl. Brit. Ind. 7 : 107. 1896 ; Bor, l.c. 196. 1960.

Perennial erect herbs ; leaves legule rounded ; spikelets shining golden yellow, hairy.

Fl. & Fr. : September October.

Bhyundar valley, Jakhmolla. 2500 2700 m (24475).

18. PHACELURUS Griseb.

Phacelurus speciosus (Steud.) C. E. Hubb. in Kew Bull. 1928 : 35. 1928. *Andropogon speciosus* Steud. Syn. Pl. Glum. 1, 375. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 152. 1896 ; Bor l.c. 199. 1960.

Tufted grasses ; leaves linear 15 30 cm long ; spikes green or purplish.

Fl. & Fr. : August – September.

Gangolgaon. 1600 m (243, Kala & Gaur). Lit.

19. POGONATHERUM P. Beauv.

1. **Pogonatherum crinitum** (Thunb.) Kunth, Enum. Pl. 1 : 478. 1833. *Andropogon crinitus* Thunb. Fl. Jap. 40, t. 7. 1784 ; Hook. f. Fl. Brit. Ind. 7 : 141. 1896 ; Bor, l.c. 200. 1960. 'Chiru'.

Delicate herbs with capillary peduncles ; leaves erect ; spikelets small ; awns flexuous squarrose.

Fl. & Fr. : September – October.

Chamoli. 750 m (357, Kala & Gaur).

20. ROTTBOELLIA L. f.

Rottboellia exaltata (L.) L. f. Nova Gram. Gen. 40, t. 1. 1779. et in Suppl. Pl. 114. 1781. *Aegilops exaltata* L. Mant. Pl. 2 : 575. 1771. *Stegosia cochinchensis* Lour. Fl. Cochinch. 51. 1790 ; Hook. f. Fl. Brit. Ind. 7 : 156. 1896 ; Bor, l.c. 206. 1960. 'Saraset'.

Annual erect herbs ; leaves very long ; spikes pale - green, jointed on one side, longer than the spikelet.

Fl. & Fr. : August – September.

Soragarh – Agastamuni. 600 m (6324).

21. SORGHUM Moench, nom. cons.

Sorghum miliaceum (Roxb.) Snowden in Journ. Linn. Soc. Bot. 55 : 207. 1955. *Andropogon miliaceus* Roxb. Fl. Ind. 1 : 276. 1820 ; Bor, l.c. 223. 1960.

Perennials with creeping rootstock ; leaf blade $\pm$ broad ; panicles large, spreading, 25–55 cm long.

Fl. & Fr. : September.

Chamoli. 750 m (155, Kala & Gaur). Lit.

22. THEMEDA Forssk.

1a. Sessile spikelets not awned ... *T. anathra* 1

1b. Sessile spikelets awned.

2a. Racemes less than 1.5 cm long ... *T. triandra* 3

2b. Racemes more than 1.5 cm long ... *T. arundinacea* 2

1. **Themeda anathra** (Nees ex Steud.) Hack. in DC. Monogr. Phan. 6 : 669. 1889. *Anthistiria anathra* Nees [ex Royle, Ill. Bot. Himal. 417. 1839. nom. nud.] ex Steud. Syn. Pl. Glum. 1 : 402. 1855. descr. ; Hook. f. Fl. Brit. Ind. 7 : 215. 1896 ; Bor, l.c. 249. 1960.

Slender perennials ; upper leaves erect ; involucre spikelets hispid.

Fl. & Fr. : September – October.

Bhyundar valley. 2400 m (24548).

2. **T. arundinacea** (Roxb.) Ridley in Trans. Linn. Soc. Lond. Ser. 2, 3 : 401. 1893. *Anthistiria intermedia* subsp. *arundinacea* (Roxb.) Hack. in DC. Monogr. Phan. 6 : 674. 1889. *A. arundinacea* Roxb. Fl. Ind. 1 : 256. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 217. 1896 ; Bor, l.c. 250. 1960.

Tall robust reed – like grasses ; panicles nodding ; lower glumes with tubercle – based golden hairs.

Fl. & Fr. : September – October.

Chamnau. 850 m (Kala & Gaur). Lit.

3. **Themeda triandra** Forssk. Fl. Aegypt. – Arab. 123 et 178. 1775. *Anthistiria imberbis* Retz. Obs. Bot. 3 : 11. 1783 ; Hook. f. Fl. Brit. Ind. 7 : 211. 1896 ; Bor, l.c. 254. 1960.

Perennial herbs ; leaves linear green ; involucre lanceolate, red – brown, dorsally hispid.

Fl. & Fr. : October.

Bhyundar valley. 2200 m (24568).

2. MAYDEAE Dumort.

- | | | |
|--|-----|---------------|
| 1a. Female spikelets completely enclosed in a metamorphosed leaf sheath which takes the form of a spherical or cylindrical, osseous or ivory bead-like structure | ... | <i>Coix</i> 1 |
| 1b. Female spikelet not enclosed in a false involucre as above | ... | <i>Zea</i> 2 |

1. *Coix* L.

Coix lacryma-jobi L. Sp. Pl. ed. 1, 972. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 100. 1896 ; Bor, l.c. 264. 1960.

Annual or perennial erect herbs, rooting at base ; nodes glabrous ; leaves lanceolate, glabrous acuminate ; female spikelets solitary, enclosed in ovoid globose whitish bony involucre.

Fl. & Fr. : September – October.

Jakhmolla, Narayankoti. 1500 m (42253).

2. *Zea* L.

Zea mays L. Sp. Pl. ed. 1, 971. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 102. 1896 ; Bor, l.c. 270. 1960.

Tall stout annuals ; leaves broad, flat ; spikelets uni-sexual, terminal.

Cultivated throughout the hotter valleys.

3. PANICEAE R. Br.

- 1a. Spikelets falling singly, not subtended by bristles, or if so, then the bristles persisting after the spikelets have fallen (*Setaria*).
- 2a. Spikelets arranged in more or less open panicles or with the panicles contracted and spike like.
- 3a. Spikelets not subtended by bristle - like branches.
- 4a. Spikelets arranged in open or contracted panicles ... *Panicum* 6
- 4b. Spikelets usually arranged in cylindrical spike - like panicles ... *Sacciolepis* 10
- 3b. Spikelets subtended or replaced by one to many bristle - like branches which remain after the spikelets have fallen ... *Setaria* 11
- 2b. Spikelets arranged in one - sided spikes or spike - like racemes ; spikes or racemes digitate or scattered, rarely solitary.
- 5a. Lemma of the upper floret more or less crustaceous or coriaceous, usually with narrow inrolled margins, exposing much of the palea ...
- 6a. Lower glume (when present) turned away from the rhachis of the racemes or spike ; the back of the upper lemma facing it, i.e. spikelets abaxial.
- 7a. Lower glume developed, although sometimes small.
- 8a. Glumes acuminate or awned, rarely only acute ; upper lemma not mucronate.
- 9a. Leaf blades linear ; racemes dense ; culms erect or sub-erect ... *Echinochloa* 4
- 9b. Leaf blades lanceolate to ovate ; racemes loose to moderately dense ; culms creeping and ascending ... *Oplismenus* 5
- 8b. Glumes awnless, if acuminate, then with the upper lemma mucronate ... *Paspalidium* 7
- 7b. Lower glume usually absent ; spikelets plano - convex ... *Paspalum* 7

- 6b. Lower glume turned towards the rhachis ;
the back of the upper lemma turned away
from it, i.e. spikelets adaxial ... *Brachiaria* 1
- 5b. Lemma of the upper floret thinly cartilaginous
with flat hyaline margins ... *Digitaria* 3
- 1b. Spikelets with an involucre of bristles or subtended by a
solitary bristle and falling with or without the bristles at
maturity, solitary or in clusters.
- 10a. Upper lemma smooth ; bristles caducous.
- 11a. Involucre of free, naked or plumose bristles ... *Pennisetum* 9
- 11b. Involucre of spines or rigid bristles united at
the base into a hard cup ... *Cenchrus* 2
- 10b. Upper lemma transversely rugose ; bristles persis-
tent ... *Setaria* 11

1. *Brachiaria* Griseb.

- 1a. Spikelets 12.5-25 cm long ; solitary ; lower glume acute ... *B. villosa* 2
- 1b. Spikelets 2.5 - 3 cm long ; in pairs ; lower glume ovate-
rounded ... *B. ramosa* 1

1. *Brachiaria ramosa* (L.) Stapf. in Prain, Fl. Trop. Afr. 9 : 542.
1919. *Panicum ramosum* L. Mant. Pl. 1 : 29. 1767 ; Hook. f. Fl. Brit.
Ind. 7 : 36. 1896 ; Bor, l.c. 284. 1960.

Annual decumbent erect herbs ; nodes pubescent ; leaves lanceolate
cordate, ciliate, glabrous or finely pubescent ; pedicels and rhachis hairy.

Fl. & Fr. : August September.

Guptakashi. 1500 m (65210).

2. *B. villosa* (Lam.) A. Camus in Lecomte, Fl. Gen. de l'Indo-
Chine, 7 : 433, 1922. *Panicum villosum* Lam. Tab. Encycl. Meth. Bot. 1
173. 1791, excl. P ; Hook. f. Fl. Brit. Ind. 7 : 34. 1896 ; Bor, 286. 1960.
'*Malchhu*'.

Annual erect hairy herbs ; leaves hairy, amplexicaule ; spikelets
hairy, alternate.

Fl. & Fr. : August September.

Bhyundar valley. 2200 m. (24569).

2. CENCHRUS L.

Cenchrus ciliaris L. Mant. Alt. 302. 1771 ; Hook. f. Fl. Brit. Ind. 7 : 88. 1896 ; Bor, l.c. 287. 1960. '*Biranchhu*.'

Tufted perennial grasses branched from the base ; leaves 15-25 cm long ; spikes pale ; bristles connate at the base only.

Fl. & Fr. : August-September.

Patiyaldhar. 1200 m (365, Kala & Gaur). Lit.

3. DIGITARIA Heist. ex Fabr.

- 1a. Hairs present on the spikelets and always verrucose, i.e. covered with minute warty growths as if sprinkled with fine grains of sand ... *D. longiflora* 4
- 1b. Hairs on the spikelets, if any, never verrucose.
 - 2a. Hairs on the spikelets clavate, i.e. passing abruptly into an obtuse or globular head, much broader than the hair
 - 3a. Tips of pedicels cupuliform with hairs on the rim and below ; hairs exceeding the summit ... *D. stricta* 5
 - 3b. Tips of the pedicels somewhat thickened, without a rim of hairs ... *D. abludens* 1
- 2b. Hairs on the spikelets, if any, without a globular thickening, not clavate
 - 4a. Racemes with interrupted loose groups of spikelets ; pedicels of upper spikelets upto 5 m long, scabrid ; lower glume sometimes missing in the upper spikelets, usually present as a minute triangular scale ... *D. griffithii* 3
 - 4b. Racemes conjugate, digitate or a few false whorls in succession ; common axis if present rather short and much overtopped by the racemes ; lower glume always present and well developed. ... *D. ciliaris* 2

1. **Digitaria abludens** (Roem. & Schult.) Veldkamp in Blumea 21 : 53. 1973. *Panicum abludens* Roem. & Schult. Syst. veg. 2 : 457. 1817. *Digitaria granularis* (Trin.) Henr. Monogr. Gen. *Digitaria* 302. 1950. *Paspalum Pedicellare* Trin. ex Steud. Nom. ed. 2, 2 : 272, 1841. Hook. f. Fl. Brit. Ind. 7 : 19. 1896 ; Bor, l.c. 301. 1960.

Tufted procumbent herbs, rooting at the joints ; leaves glabrous up to 5 cm long ; spikes very slender 2.5 10 cm long, silvery white ; stalks of spikelets smooth.

Fl. & Fr. : August September.

Guptakashi, 1500 2000 m (65216).

2. **D. ciliaris** (Retz.) Koeler, Descr. Gram. 27. 1802. *Panicum ciliare* Retz. Obs. Bot. 4 : 16. 1786. *D. adscendens* (Kunth) Henr. in Blumea 1 : 92. 1934. *Asperella digitaria* Lam. Tab. Encycl. Meth. Bot. 1 : 167. 1791 ; *Panicum adscendens* Kunth in H.B.K. Nov. Gen. et Sp. Pl. 1 : 97. 1816 ; Bor, l.c. 298. 1960.

Prostrate annuals ; leaves scabrid above, white margined with contracted base ; racemes 2 9, digitate or whorled or short axis.

Fl. & Fr. : August.

Sericulture Farm Gopeswar. 1400 m (163, Kala & Gaur). Lit.

3. **D. griffithii** (Hook. f.) Henr. in Blumea 1 : 100. 1934. *Panicum corymbosum* Thw. Enum. Pl. Zeyl. 436. 1864. non Roxb. 1820. *Paspalum sanguinale* (L.) Lam. var. *griffithii* Fl. Brit. Ind. 7 : 15. 1896 ; Bor. l.c. 301. 1960.

Spikes several 5 10 cm long, very slender often drooping ; rhachis filiform trigonous.

Fl. & Fr. : October November.

Sericulture Farm Gopeswar 1400 m (505 Kala & Gaur). Lit.

4. **D. longiflora** (Retz.) Pers. Syn. Pl. 1 : 85. 1805. *Paspalum longiflorum* Retz. Obs. Bot. 4 : 15. 1786 ; Hock f. Fl. Brit. Ind. 7 : 17. 1896 ; Bor l. c. 302. 1960. *Jharwa Ghas*.

Creeping annuals ; leaves lanceolate to linear, acute ; racemes 2 3, erect.

Fl. & Fr. : August September.

Patiyaldhar. 1100 m (362, Kala & Gaur). Lit.

5. **Digitaria stricta** Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817. *Paspalum royleanum* Nees ex Hook. f. Fl. Brit. Ind. 7 : 1896 ; Bor. l.c. 305. 1960.

Decumbent ascending annuals ; nodes glabrous ; leaves glabrous, scabrid, ciliate at base ; racemes 2 3 (4) subdigitate.

Fl. & Fr. : August September.

li. 1100 m (430, Kala & Gaur). Lit.

4. ECHINOCHLOA P. Beauv.

1a. Spikelets 3 - 4 cm long, densely crowded, unawned ; tall, robust grass ; spikes thickened, sometimes incurved ; grains not deciduous ... *E. frumentacea* 2

1b. Spikelets upto .5 cm long (if densely crowded 3 - 35 cm long and awned) ; grains deciduous ... *E. crus-galli* 1

1. *Echinochloa crus galli* (L.) P. Beauv. Eas. Agrost. 53 : 161. 1812. *Panicum crusgalli* L. Sp. Pl. ed. 1, 56. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 30. 1896 ; Bor. l.c. 310. 1960. '*Malchhu*'.

Erect annuals ; nodes glabrous ; panicles upto 15 cm long.

Fl. & Fr. : July September.

Paduli. 1100 m (99, Kala & Gaur). Lit.

2. *E. frumentacea* Link, Hort. Berol. 1 : 204. 1827. *Panicum frumentaceum* Roxb. Fl. Ind. 1 : 304. 1820 non Salisb ; Bor, l.c. 308. 1960.

Annual erect herbs ; nodes glabrous ; leaves scabrid 2 3 cm broad ; ligule 0 ; spikelets elliptic hairy.

Fl. & Fr. : August - September.

Guptakshi. 1500 m (65339).

5. OPLISMENUS P. Beauv.

1a. Awns reddish, smooth, viscid, filiform, Stiff ... *O. compositus* 2

1b. Awns pale, barbellate, capillary, often flexuous ... *O. burmannii* 1

1. *Oplismenus burmannii* (Retz.) P. Beauv. Ess. Agrost. 54 : 168, 169, 1812. *Panicum hirtellum* Burm. Fl. Ind. 24, t. 12. fig. 1. 1768. non L. 1753. *P. burmannii* Retz Obs. Bot. 3 : 10. 1783 ; Hook. f. Fl. Brit. Ind. 7 : 68. 1896 ; Bor, l.c. 317. 1960.

Prostrate or decumbent annuals, often rooting below ; leaves acute, hairy with tubercled- based hairs ; panicles upto 10 cm long.

Fl. & Fr. : August September.

Sagar. 1800 m (156, Kala & Gaur). Lit.

2. *Oplismenus compositus* (L.) P. Beauv. Ess. Agrost. 54 : 168, 169. 1812. *Panicum compositus* L. Sp. Pl. 1, 57. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 66. 1896 ; Bor, l. c. 317. 1960.

Tall hairy slender leafy herbs, rooting at the joints ; leaves thin flat, lanceolate ; spikelets on branched spike in pairs or clusters.

Fl. & Fr. : Sept.

Gaurikund. 2000 m (8578).

6. PANICUM L.

- | | |
|---|-------------------------|
| 1a. Spikelets .4 - .5 cm long, sharply acute ovate to ...
elliptic in back view. ... | <i>P. miliaceum</i> 1 |
| 1b. Spikelets upto .35 cm long, rarely upto .4 cm and if so,
with narrow lanceolate spikelets. | |
| 2a. Dwarf grasses upto 20 (30) cm tall ; spikelets about
.15 cm long ... | <i>P. walense</i> 3 |
| 2b. Tall grasses, .60 - 3 m tall ; spikelets over .15 cm
long. | |
| 3a. Nodes and leaf sheaths hairy ... | <i>P. miliaceum</i> 1 |
| 3b. Nodes and leaf sheaths glabrous ... | <i>P. psilopodium</i> 3 |

1. *Panicum miliaceum* L. Sp. Pl. ed. 1, 58. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 45. 1896 ; Bor, l.c. 327. 1960.

Tufted annual branching herbs : leaves glabrous, ciliate or hirsute ; panicles with filiform branches ; spikelets green erect, turgid.

Fl. & Fr. : August September.

Malari. 3000 m (55928).

2. *P. psilopodium* Trin. Gram. Panic 217. 1826; Hook. f. Fl. Brit. Ind. 7 : 46. 1896; Bor, l.c. 329. 1960.

Annual erect herbs upto 90 cm tall; leaves glabrous ; spikelets greenish or purplish, elliptic, acute, deciduous.

Fl. & Fr. : July August.

Chandrapuri Guptkashi. 800—1500 m. (65202).

3. ***Panicum walense*** Mez in Bot. Jahrb. 34 : 146. 1904; Hook. f. Fl. Brit. Ind. 7 : 48. 1896 non Thunb. ex Trin. 1826 ; Bor l.c. 324. 1960.

Erect annuals ; stems purple tinged; panicles effuse, spikelets 2 nate greenish or purplish.

Fl. & Fr. : August September.

Paduli. 1000 m (14, Kala & Gaur). Lit.

7. PASPALIUM Stapf

Paspalum flavidum (Retz.) A. Camus in Lecomte Fl. Gen. de l'Inde. Chine 7 : 419. 1922. *Panicum flavidum* Retz. Obs. Bot 4 : 15. 1786 ; Hook. f. Fl. Brit. Ind. 7 : 28. 1896 ; Bor, l.c. 333. 1960.

Decumbent erect herbs upto 1 m tall ; nodes glabrous ; leaves 1-1.5 cm broad ; spikelets ovoid ellipsoid.

Fl. & Fr. : August September.

Guptakashi. 1500 m (65214).

8. PASPALUM L.

1a. Spikelets ovate - elliptic, acute ... *P. paspalodes* 1

1b. Spikelets elliptic - rounded to obovate or orbicular,
obtuse ... *P. scrobiculatum* 2

1. ***P. paspalodes*** (Michx.) Scribn. in Mem. Torrey Bot. Cl. 5 : 29. 1894. *Digiteria paspalodes* Michx. Fl. Bor. Amer. 1 : 46. 1803. *P. distichum* auct pl. non L. 1759 ; Bor, l. c. 338. 1960.

Creeping annuals, rooting below; upper lemma greenish white.

Fl. & Fr. : April—October.

Gopeswar. 1350 m (174, Kala & Gaur). Lit.

2. **P. Scrobiculatum** L. Mant. Pl. 1 : 29. 1767. *P. orbiculare* Forst, Fl. Insul. Austr. Prodr. 7, 1786 ; Hook f. Fl. Brit Ind. 7 : 10. 1896; Bor. l. c. 340. 1960.

Decumbent ascending annuals, rooting bellow ; leaves linear-lanceolate, white margined; upper lemma brown, lower lemma 3-nerved.

Fl. & Fr. : June August.

Chaukot (Garhwal). 1300 m (Rajwar). Lit.

9 PENNISETUM Rich.

1a. Involucres decidous; lemmas glabrous; wild grasses.

2a. Rhachis of the spikes villous or woolly ... *P. orientale* 3

2b. Rhachis of the spikes glabrous, often scabrid ... *P. flaccidum* 1

1b. Involucres persistent; lemmas usually, pubescent on margins... *P. glaucum* 2

1. **Pennisetum flaccidum** Griseb. in Nachr. Gottn. 1868 : 86. 1868 ; Hook. f. Fl. Brit. Ind. 84. 1896 ; Bor, l. c. 344. 1960.

Perennial tufted erect herbs with creeping rootstock ; leaves narrowly lanceolate or linear glabrous or thinly hairy; spikes 5-15 cm long; spikelets solitary; bristles unbranched, not fringed.

Fl. & Fr. : August—September

Jelam, Jumma, Malari, Niti. 2500-3000 m (53838).

2. **P. glaucum** (L.) R. Br. Prodr. 1 : 195. 1810. *Setaria glauca* (L.) P. Beauv. Ess. Agrost. 51 : 169, 178. 1812. *Panicum glaucum* L. Sp. Pl. 56, 1753; Hook.f. Fl. Brit. Ind. 7 : 79. 1896; Bor, l.c. 360. 1960. 'Birali'.

Annuals-perennials upto .6 1 m, tall ; leaves ciliate at base ; panicles .4 .5 cm broad; spikelets long, .25 .28 cm.

Fl. & Fr. : September October,

Gopeswar. 1350 m (165, Kala & Gaur). Lit.

3. **P. orientale** L. C. Rich. in Pers. Syn. Pl. 1 : 72. 1805 ; Hook. f. Fl. Brit. Ind. 7 : 86. 1896; Bor, l. c. 345. 1960. 'Biranchhu'.

Rootstock creeping ; parenial tufted erect herbs ; leaves flat, narrowly lanceolate-linear ; spikelets 1-5 on a stalk; bristles unbranched, fringed.

Fl. & Fr. : September October.

Batwalchari. 100 m (6416).

10. SACCIOLEPIS Nash

Sacciolepis indica (L.) A. Chase in Proc. Biol. Soc. Wash. 21 : 8. 1908. *Aira spicata* L. Sp. Pl. ed. 1, 63. 1753. *A. Indica* L. Sp. Pl. ed. 1. 840 1753 in "Errata"; Hook. f. Fl. Brit. ind. 7 : 41. 1896; Bor, l. c. 357. 1960.

Decumbent ascending fistular annuals; leaves with contracted base; rhachis sulcate, punctate with golden brown glands.

Fl. & Fr. : August September.

Paduli. 950 m (242, Kala & Gaur). Lit.

11. SETARIA P. Beauv. nom. cons.

1a. Inflorescent a cylindric and dense or sometimes lobed spiciform panicle; blades folded or flat.

2a. Plants perennial; panicle cylindric, dense ... *S. geniculata* 1.

2b. Plants annual with cylindric panicle or with a loose often lobed panicle.

3a. Bristles retrorsely barbed ... *S. verticillata* 7

3b. Bristles antrorsely barbed.

4a. Upper glume as long as the upper lemma ; the latter quite smooth or minutely rugulose.

5a. Spikelets persistent; lower lemma epaleate ... *S. italica* 4

5b. Spikelete deciduous; lowest lemma paleate ... *S. viridis* 8

4b. Upper glume shorter than the upper lemma, the latter rugose.

- 6a. Inflorescence a cylindric false spike *S. pumila* 6
- 6b. Inflorescence a narrow panicle,
sometimes loosely lobed below and
tapering upwards ... *S. intermedia*
- 1b. Inflorescence a dense or rather loose, narrow or widely spreading panicle ; leaves folded fan-fashion between the longitudinal nerves.
- 7a. Perennials; panicles with branched primary branches ... *S. paniculifera*
- 7b. Annuals; panicles with simple primary branches ... *S. homonyma* 2

Setaria geniculata (Lam.) P. Beauv. Ess. Agrost. 51 : 169, 178. 1812. *Panicum geniculatum* Lam. Encycl. 4 : 727. 1798 ; Bor, 1. c. 360. 1960 'Birali'

Perennials with narrow panicles ; spikelets short.

Fl. & Fr. : September October.

Gopeswar. 1350 m (335, Kala & Gaur). Lit.

2. **S. homonyma** (Steud.) Chiov in Nuovogiorn. Bot. Ital. n.s. 26 : 78. 1919. *Panicum homonymum* Steud. Syn. Pl. Glum. 1 : 48. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 56. 1896 ; Bor, 1. c. 361. 1960.

Tufted erect leafy herbs ; leaves hairy, lanceolate ; spikes crowded in panicles ; spikelets glabrous.

Fl. & Fr. : August September.

Agastamuni. 700 m (6357).

3. **S. Intermedia** Roem. & Schult. Syst. Veg. 2 : 489. 1817. *Setaria tomentosa* (Roxb.) Kunth, Rev. Gram. 1 : 47. 1829. *Panicum tomentosum* Roxb. Fl. Ind. 1 : 303. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 79. 1896 ; Bor, 1. c. 365. 1960. 'Birali'.

Fl. & Fr. : August September.

Naigaur. 1300 m (283, Kala & Gaur). Lit.

4. **S. italica** (L.) Beauv. Ess. Agrost. 51 : 170, 178. 1812. *Panicum italicum* L. Sp. Pl. ed, 1, 56. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 78. 1896 ; Bor, 1. c. 362. 1960.

Tall tufted smooth herbs ; leaves very long flat, lanceolate ; spikelets in dense cylindric panicles ; bristle barbs pointing up ; fruiting glume smooth.

Fl. & Fr. : August September.

Malari. 3000 m (55919).

5. *S. paniculifera* (Steud.) Fourn. ex Hemsl. Biol. Centr. Amer. Bot. 3 : 505. 1885. *Panicum sulcatum* Aubl. Pl. Guian. 1 : 50. 1775 non Bertol. 1820. *P. paniculiferum* Steud. Syn. Pl. Glum. 1 : 54. 1854 ; Bor, l. c. 363. 1960.

Robust grasses with lax panicles ; bristles below the spikelet upto five times as long as the spikelet.

Fl. & Fr. : June August.

Mandakini valley (Sonprayag) Gaurikund). 1500-2000 m (BNM 4896).

6. *Setaria pumila* (Poir.) Roem. & Schult. Syst Veg. 2 : 891. 1817. *Panicum pumilum* Poir. Encyl. Meth. Bot. Supl. 4 : 273. 1816. *S. pallide - fusca* (Schum.) Stapf. et Hubb. in Kew Bull. 1930 : 259. 1930. *Panicum pallide - fuscum* Schum. Beskr. Gum. Pl. 58. 1827 ; Bor. l.c. 363. 1960.

Annual, prostrate or decumbent herbs upto 60 cm. high ; leaves glabrous ; bristles pale-yellowish ; spikelets elliptic acute ; stamens 3.

Fl. & Fr. : August September.

7. *S. verticillata* (L.) P. Beauv. Ess. Agrost. 51. 178, 1812. *Panicum verticillatum* L. Sp. Pl. ed. 2, 1 : 82. 1762; Hook. f. Fl. Brit. Ind. 7 : 80. 1896; Bor, l.c. 365. 1960.

Tall annuals; panicles dense, cylindrical; rhachis groovedly scabrid ;

Fl. & Fr. : August September.

Paduli 1000 m (101, Kala & Gaur). Lit.

8. *S. viridis* (L.) Beauv. Ess. Agrost. 51 : 171, 178. 1812. *Panicum viride* L. Syst. Nat. ed. 10, 2 : 870, 1759 ; Hook. f. Fl. Brit. Ind. 7 : 80. 1896 ; Bor, l.c. 365. 1960.

Leaves glabrous, pale green ; spikelets narrow ; panicles spike like ; fruiting glume smooth ; bristles greenish tinged with red.

Fl. & Fr. : August October.

Jumma area, Mana. 2500 3500 m (10586).

2. POIDEAE

1a. Tall woody arborescent or shrubby bamboos ; leaf blades flat, lanceolate, many-nerved with transverse veins, usually with a petiole-like base and articulated with the sheath ; lemmas several, 5 - many - nerved, awnless ; lodicules usually 3

Bambuseae 21

1b. Perennial or annual herbs with herbaceous culms ; leaf blades sessile and not articulated with the sheath.

2a. Spikelets borne in open or contracted or spike-like panicles less often in racemes or spikes.

3a. Spikelets usually with two or more fertile florets, or if with one fertile floret then with sterile reduced florets above it.

4a. Lemma and rhachilla glabrous or hairy if so, then the lemma with a geniculate awn ; low or moderately tall grass.

5a. Glumes usually shorter than the lowest floret and with the upper floret distinctly exerted, rarely longer ; lemmas, awnless or with a straight or curved from the entire or bifid apex, or several awned or lobed.

6a. Lemmas usually 5 - to many-nerved, awnless or awned ; awn usually simple, not kneeed or twisted below the knee.

7a. Ovary with a hairy appendage at the apex ; styles borne laterally below the appendage.

8a. Inflorescence of racemose or in panicles ; awn inserted below the entire or 2-lobed tip.

Bromeae 6

8b. Inflorescence a raceme ; awn terminal.

Brachypodieae 7

7b. Ovary glabrous at the apex, or if hairy at least without a hairy appendage.

9a. Lemmas dull, membranous to coriaceous exerted from the glumes ; glumes 2 or 1

Festuceae 11

- 9b. Lemmas membranous and shining, the upper represented by a bundle of empty, rudimentary lemmas ; glumes 2 *Meliceae* 14
- 6b. Lemmas 1 - 3-nerved ; inflorescence of panicles or racemes.
- 10a. Inflorescence of panicles, if racemes or spikes, the spikelets not secund *Eragrosteae* 10
- 10b. Inflorescence of racemes or panicle of racemes, the spikelets secund *Chlorideae* 8
- 5b. Glumes usually as long as or longer than the lowest floret, often as long as the spikelet and enclosing the florets.
- 11a. Lemmas awnless or awned from the back, rarely from the tip ; awn usually kneed ; ligules membranous *Aveneae* 5
- 11b. Lemmas awned from the sinus between the two terminal lobes or no trace of an awn, often only a mucro ; ligule a hairy rim *Danthonieae* 9
- 4b. Lemmas or rhachilla - joints bearing long silky hairs which envelop the lemma (at least the fertile florets) ; lemmas awnless usually large plume-like panicles *Arundineae* 3
- 3b. Spikelets with one fertile floret (male or female in uni - sexual 1 - flowered spikelets), with or without one or two male or barren florets below it, the latter often much reduced.
- 12a. Glumes minute (usually represented by two semicircular inconspicuous lips) or suppressed ; fertile lemma and palea very similar in shape and texture ; spikelets firmly compressed ; stamens usually six ; florets hermaphrodite or uni - sexual ... *Oryzeae* 15
- 12b. Glumes well developed ; fertile lemma and palea not similar.

- 13a. Spikelets with 3 florets, the lower two represented by empty lemmas which are often minute and occasionally one of them absent

Phalarideae 16

- 13b. Spikelets with 1 or 2 florets.

- 14a. Spikelets with 2 florets ; the lower, male or barren, the upper hermaphrodite.

- 15a. Lower floret empty and without a palea ; glumes upto half the length of the spikelet ; rhachilla produced beyond the upper floret and sometimes bearing an empty lemma ; spikelets falling with part of the pedicel attached.

Thysanolaeneae 19

- 15b. Lower floret male or barren, usually with a palea, upper glume as long as the spikelet ; rhachilla disarticulating below the upper floret and not produced beyond it ; glumes more or less persistent.

- 16a. Glumes equal in size, obtuse or mucronate ; upper lemma unawned,

Isachneae 13

- 16b. Glumes unequal, the lower acute, the upper acuminate ; upper lemma awned with a perfect awn or at least a bristle.

Arundinelleae 4

- 14b. Spikelets with one fertile floret.

- 17a. Spikelets cylindrical, falling entire ; base of the glumes bearded ; lemma awned (see also spp. of *Agrostideae* and *Polypogon*)

Garnotieae 12

- 17b. Spikelets cylindrical, ellipsoid acute or definitely compressed, not bearded at the base ; rhachilla

disarticulating above the more or less persistent glumes.

18a. Lemma hyaline or membranous at maturity, rarely indurated and the laterally compressed, awnless or awned from low down on the back or from the middle or from the entire or bifid tip.

19a. Lemmas 3 5
nerved, frequently
awned ; glumes
longer and firmer
than the hyaline
lemma or when
the lemma is
longer than the
latter, indurated ;
grains usually
with an adhering
pericarp ...

Agrostideae 1

19b. Lemmas 1 - 3 -
nerved, awnless ;
glumes and lem-
mas very similar
in texture, hyaline
or thinly mem-
branous, shining ;
grain usually with
a free pericarp ...

Sporoboleae 17

18b. Lemmas indurated or rigid at maturity, terete or dorsally compressed ...

20a. Awns trifid ...

Aristideae 2

20b. Awns simple,
sometimes flank-
ed by 2 - bristles

Stipeae 18

2b. Spikeletes sessile or shortly pedicelled along one side of the rhachis of solitary, digitate, or scattered spikes or spike-like raceme (with one fertile floret

and 1 - 3 - nerved lemmas) or on opposite side of the rhachis of solitary spikes or racemes.

21a. Spikelets on opposite sides of the rhachis of solitary spikes or spike-like racemes ... *Triticeae* 20

21b. Spikelets secund or a tough rhachis 1 - 2 florets hermaphrodite with sterile floret above ; inflorescence of a digitate or solitary spike or panicles of spikes ... *Chlorideae* 8

1. AGROSTIDEAE Dumort.

1a. Panicles cylindric, ovoid or spiciform, very dense.

2a. Spikelets firmly flattened ; glumes truncate at the top with the median nerve produced as a mucro ; lemma awnless *Phelum* 6

2b. Spikelets more or less flattened but the glumes pointed at the apex ; lemma awned *Alopecurus* 2

1b. Panicles spreading, if dense, then not cylindric and spiciform.

3a. Glumes long awned ; spikelets articulate below the glume *Polypogon* 7

3b. Glumes not long awned, at most shortly aristate ; articulation above or below the glumes or at the base of the pedicel.

4a. Rhachilla always produced, long, penicillate ; glumes firm, often scabrid, lanceolate-acute ; lemma indurated, often scabrid *Deyeuxia* 4

4b. Rhachilla produced or not ; if produced, other characters not associated.

5a. Glumes equal to or shorter than the lemma *Muhlenbergia* 5

5b. Glumes longer than the lemma ; rhachilla produced or not.

6a. Glumes lanceolate - acuminate, much longer than the lemma ; callus -hairs longer than the lemma ... *Calamagrostis* 3

6b. Glumes lanceolate - or elliptic ; callus hairs very short or absent *Agrostis* 1

1. AGROSTIS L.

1a. Lemmas not awned.

2a. Palea absent or minute, less than one - half the length of the lemma.

- 3a. Anthers less than .1cm long ... *A. nervosa* 2
 3b. Anthers .1 .15 cm long ... *A. vinealis* 5
 2b. Palea half as long as the lemma or longer
 1b. Lemmas awned. ... *A. vinealis* 5
 4a. Lemmas glabrous
 4b. Lemmas hairy.
 5a. Palea nearly as long as the lemma or at least
 longer than half of the lemma. ... *A. munroana* 1
 5b. Palea less than the length of the lemma. ... *A. pilousla* 3

1. **Agrostis munroana** Aitch et Hemsl. in Journ. Linn. Soc. (Bot.) 19 : 192. 1882. *Calamagrostis munroana* Boiss. Fl. Orient. 5 : 523. 1884 ; Hook. f. Fl. Brit. Ind. 7 : 523. 1896 ; Bor, l.c. 388. 1960.

Annual, tufted erect herbs ; leaves smooth, .3 cm broad ; spikelets shining green or tinged purple.

Fl. & Fr. : September October.

Bhyundar valley, Hunuyathar, 4200 m (24577).

2. **A. nervosa** Nees ex Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 6 : 328. 1841. *A. Clarkei* Hook of Fl. Brit. Ind. 7 : 257. 1896. Bor' l.c. 388, 1960.

Suberect grasses ; lowest leaves filiform ; upper leaves flat, narrow, scaberulous ; panicles broadly pyramidal.

Fl. & Fr. : August September.

3. **Agrostis pilosula** Trin. in Mem. Acad. Sni. Petersb. Ser. 6, 6 : 372. 1841. *A. ciliata* Trin. 1. c. 373. 1841 ; Hook. f. Fl. Brit. Ind. 7 : 263. 1896 ; Bor, l.c. 388.

Very slender erect herb ; leaves long, narrow, flat ; spikelets green-membranous ; palea of third glume very short.

Fl. & Fr. : August September.

Bhyundar valley, Bramhtal, Khiraum valley. 2500 3500 m (31363).

4. **A. stolonifera** L. Sp. Pl. ed. 1, 62. 1753. *A. wightii* Nees ex Steud. Syn. Pl. Glum. 1 : 158. 1854. *A. alba auct.* non L. sensu. Hook. f. Fl. Brit. Ind. 7 : 258. 1896 ; Bor, l.c. 390. 1960.

Leaves flat ; margins scabrous ; panicles long capillary.

Fl. & Fr. : August.

Gangolgaon. 1500 m (267, Kala & Gaur). Lit.

5. **A. vinealis**. Schreb. Spicil. Fl. Lips. 47. 1771. *A. canina auct.* non L. sensu Hook. f. Fl. Brit. Ind. 7 : 255. 1896 ; Bor, l.c. 386. 1960.

Very slender herbs ; radical leaves narrow convolute, .1 .2 cm broad ; spikelets green, pale or purple ; third glume awned ; palea 0.

Fl. & Fr. : August - October.

Gastoli. Khiraum valley. 4000 - 5000 m (10560).

2. ALOPECURUS L.

Alopecurus aequalis Sobol. Fl. Petrop. 16. 1799 ; Bor, l.c. 392. 1960.

Caespitose annual, prostrate herbs ; leaves glabrous or thinly pilose ; spikelets ellipsoid, obtuse ; lemma awn present, long as lemma.

Fl. & Fr. : March - May.

Trijuginarayan. 2000 m (48010).

3. CALAMAGROSTIS Adans.

1a. Awn exerted ; palea almost as long as the lemma or about .05 cm shorter ... *C. emodensis*. 1.

1b. Awn included or very shortly exerted; palea half or three-quarters the length of the lemma ... *C. pseudophragmites* 2

1. **Calamagrostis emodensis**. Griseb. in Goett. Nachr. 1868 : 80. 1868 ; Hook. f. Brit. Ind. 7 : 261. 1896 ; Bor, l.c. 396. 1960.

Perennial, tall tufted erect herbs ; leaves 25 - 45 cm long, 1.2 - 2 cm broad, glaucous beneath ; panicles pale grey ; awn protruding.

Fl. & Fr. : August - October.

Bhyundar and Kedarnath glacial valleys. 3500 - 4500 m (29594).

2. **C. pseudophragmites** (Hall. f.) Koeler, Descr. Gram. 106. 1802. *Arundo pseudophragmites* (Hall. f.) Koeler, Descr. Gram. 106. 1802. *Arundo pseudophragmites* Hall. f. in Roem. Arch. Fur. Bot. 1

(2) : 11. 1797. *C. littorea* auct. non DC. Senu Hook. f. Fl. Brit. Ind. 7 : 261. 1896 ; Bor. l.c. 396. 1960.

Leaves .4 cm broad ; panicles purple or pale-yellow ; empty glumes tinged with purple at the base ; awn included.

Fl. & Fr. : August October.

Jumma area, Khiraun valley. 2600 m (53870).

4. DEYEUXIA Clav.

- 1a. Awn inserted above the middle point ; panicles usually congested ; spikelets purplish about ; low grasses decumbent at the base to woody rootstock

D. pulchella

- 1b. Awn median or sub-median ; robust grasses, erect from the base ; tall, with fairly broad scabrid leaves ; spikelets very scabrid

D. scabrescens 2

1. **Deyeuxia pulchella** (Griseb.) Hook. f. Fl. Brit. Ind. 7 : 268. 1896. *Calamagrostis pulchella* Griseb. in Nachr. Ges. Wiss. Göttn. 1868 : Bor, l.c. 399. 1960.

Densely tufted erect herbs ; leaves smooth, flat ; spikelets crowded, dark-purple ; rhachilla densely penicillate hairy.

Fl. & Fr. : August September.

Bhyundar valley, Gothing. 3800 4200 m (24371).

2. **D. scabrescens** (Griseb.) Munro ex Duthie in Atkins. Gaz. N.W. Ind. 628. 1882. *Calamagrostis scabresceus* Griseb. in Nachr. Ges. Wiss. Göttn. 1868 : 79. 1868. *D. filiformis* (Griseb.) Hook. f. Fl. Brit. Ind. 7 : 267 1896 ; Bor, lc. 399. 1960

Tall perennial tufted grasses ; leaves rough ; spikelets green tinged with purple.

Fl. & Fr. : October - November.

Mondal. 1600 m (175, Kala & Gaur). Lit.

5. MUHLENBERGIA Schreb.

- 1a. Lemma twice as long as the glumes

M. huegelii 2

- 1b. Lemma as long as or slightly longer than the glumes ...

M. himalayensis 1

1. **Muhlenbergia himalayensis** Hack. ex Hook. f. Fl. Brit. Ind. 7 : 259. 1896 ; Bor, l.c. 401. 1960.

Perennials ; leaves 10-25 cm long, .3 cm broad ; panicle pale-green, tinged violet ; awn 1.2-2.5 cm.

Fl. & Fr. : September - October.

Bhyundar valley, Dunagiri on way. 2500 m (54053).

2. **M. huegelii** Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 4 : 41. 293. 1841. *M. viridissima* Nees ex Staud. Syn. Pl. Glum. 1 : 178. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 259. 1896 ; Bor, l.c. 401. 1960.

Leaves upto .6 cm broad ; panicles bright green, loose, drooping, 10 - 25 cm ; spikelets crowded.

Fl & Fr. : October - November.

Trijuginagnryan - Gaurikund. 2500 m (8579).

6. PHLEUM L.

Phleum alpinum L. Sp. Pl. ed. 1, 59. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 236. 1896 ; Bor, l.c. 402. 1960.

Perennial solitary herbs ; leaves spreading 2.5 - 15 cm long, .8 cm broad ; spikelets green flattened in ovoid panicles ; empty glumes fringed.

Fl. & Fr. : June - October.

Bhundar valley, Kedarnath, Rudranath, 3500 - 4000 m (42109).

7. POLYPOGON

1a. Awns .5 - .98 cm long, 2 - 3 times the length of the glumes

P. monspeliensis 2

1b. Awns .13 - .37 cm. long, as long as or shorter than the glumes

... *P. fugax* 1

1. **Polypogon fugax**. Nees ex Steud. Syn. Pl. Glum. 1 : 184. 1854. *P. littoralis* vat. *higegsweti* (Steud.) Hook. f. Fl. Brit. Ind. 7 : 246. 1896 Bot. l.c. 403. 1960.

Starved herbs ; first and second glume deeply cleft.

Fl. & Fr : April June.

Mohankhal, Trijuginarayan. 2000 m (48004).

2. **P. monspeliensis** (L.) Desf. Fl. Atlant. 1 : 67. 1798. *Alopecurus monspeliensis* L. Sp. Pl. ed. 1, 61. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 245. 1859 ; Bor. l.c. 403. 1960.

Annual erect herbs ; leaves 7 15 cm long, 6 cm. broad ; panicles pale, shinging, yellow-green, cylindric ; awns long.

Fl. & Fr. : April June.

Paduli, Rudraprayag. 654 m (25739).

2. ARISTIDEAE Hubb.

ARISTIDA L.

Aristida adscensionis L. Sp. Pl. ed. 1, 82. 1753. *A. depressa* Retz Obs. Bot. 4 : 22. 1786. *A. adscensionis*. var. *pumila* (Dcne.) Coss. & Dur. Fl. Alger. Glum. 84. 1855 ; Hook. f. Fl. Brit. Ind. 7 : 224. 1896 ; Bor, l.c. 407. 1960.

Annual or perennial erect herbs ; panicles green or brown, 10 25 cm long, narrow, branches short erect ; awns 2 cm long.

Fl. & Fr. : October.

Vishnuprayag. 1600 m (24994).

3. ARUNDINEAE Dumrot.

ARUNDO L.

Arundo donax L. Sp. Pl. ed. 1, 81. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 302. 1896 ; Bor, l. c. 413. 1960. '*Naltura*'.

Tall perennial erect herbs or creeping near the base ; leaves smooth ; spikelets slightly flattened ; styles 2, distinct, feathery.

Fl. & Fr. : September October.

Anusuyia area, Bhyundar valley. 1600 2500 m (42026).

4. ARUNDINELLEAE Stapf

ARUNDINELLA Raddi

- 1a. Upper lemma with two setae, one on each side of the awn at the tip *A. setosa*
var. *setosa* 4
- 1b. Upper lemma with a single awn or the awn absent.
- 2a. Upper lemma not awned or if so, awn not more than .2 cm long ; base of upper lemma naked *A. bengalensis* 1
- 2b. Upper lemma bearing a geniculate awn
- 3a. Spikelets small, not more than .2 cm long ; leaf blade elliptic - acuminate membranous to chartaceous, 3-25 cm long, .5-2.5 cm wide ; inflorescence a very effuse panicle 10-30 cm long with many spikelets *A. pumila* 3
- 3b. Spikelets well over .2 cm long ; leaves not as above *A. nepalensis* 2

1. *Arundinella bengalensis* (Spreng.) Druce in Rep. Bot. Exch. Club, Brit. Isles, 1916 : 605. 1916. *Panicum bengalensis* Spreng. Syst. Veg. 1 : 311. 1825 ; Hook. f. Fl. Brit. Ind. 7 : 75. 1896 ; Bor, l. c. 421. 1960. 'Talurya'.

Perennial hairy herbs ; nodes bearded ; leaves linear, glabrous or thinly hairy ; panicles cylindric upto 5 cm long.

Fl. & Fr. : October.

Gopeswar, Mondal area. 1650 m (41988).

2. *A. nepalensis* Trin. Gram. Panic. 62. 1826. *A. brasiliensis* non Raddi sensu Hook. f. Fl. Brit. Ind. 7 : 73. 1896 ; Bor, l. c. 73. 1960.

Perennials ; nodes pubescent ; leaves linear with a rounded base, hirsute ; spikelets $\pm$.5 cm. long ; anthers brownish-purple.

Fl. & Fr. : October.

Agastamuni, Bhyundar valley. 700 2500 m (24545).

3. *A. pumila* (Hochst.) Steud. syn. Pl. Glum. 1 : 114. 1854. *Acratherum pumilum* Hochst. ex A Rich. Tent. Fl. Abyss. 2 : 414, t. 100. 1851 ; Hook. f. Fl. Brit. Ind. 7 : 71. 1896 ; Bor, l. c. 423. 1960.

Annual erect or decumbent herbs ; nodes pubescent ; leaves elliptic-lanceolate, acuminate, glabrous ; spikelets upto .2 cm long.

Fl. & Fr. : August September.

Gopeswar, Alaknanda bank upto 1500 m (Duthie,) Lit.

4. *Arundinella Setosa* Trin. Gram. Panic, 63. 1826. var. *setosa*. *A. capillaris* Hook. f. Fl. Brit. Ind. 7 : 74. 1896 ; Bor, l. c. 424. 1960.

Slender hairy herbs ; leaves 15 25 cm long ; spikelets narrowly ovoid, usually in pairs.

Fl. & Fr. : September.

Bhyundar valley. 2700 m (24540).

5. AVENEAE Dumort.

1a. Lower floret male or neuter.

2a. Spikelets lanceolate ; plants smelling strongly of coumarin ; lodicules absent ; lower florets empty

Anthoxanthum 1

2b. Spikelets strongly compressed, not lanceolate, urn-shaped, faintly odoriferous ; lodicules present

Hierochloe 5

1b. Lowest floret bi-sexual, the succeeding similar or reduced.

3a. Ovary hairy above or all over ; awns mostly twisted at the base ; spikelets over .8 cm long.

4a. Spikelets nodding ; annuals ; glumes 7 11 nerved.

Avena 2

4b. Spikelets erect ; perennials ; glumes 1 11 nerved.

Helictotrichon 4

3b. Ovary glabrous ; awns not twisted at the base ; spikelets less than .8 cm long.

5a. Lemmas finely crose-dentate or lobed, awned dorsally ; spikelets 2, rarely 3 - flowered.

Deschampsia 3

5b. Lemmas cleft or 2-toothed or 2 lobed with lobes sometimes prolonged into an awn ; rhachilla of spikelets pubescent or ciliate.

6a. Panicles spiciform, silvery ; lemmas awnless or with a minute bristle

Koeleria 6

6b. Panicles effuse ; lemmas with a perfect awn.

Trisetum 7

1 ANTHOXANTHUM L.

Anthoxanthum odoratum L. Sp. Pl. ed. 1, 28. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 222. 1896 ; Bor, l. c. 431. 1960.

Perennial sweet smelling herbs : leaves flat hairy ; panicles 2.5-12 cm pubescent ; spikelets fascicled, green.

Fl. & Fr. : July August.

Way to Kedarnath. 3000 2500 m (58491)

2. AVENA L.

Avena fatua L. Sp. Pl. ed. 1. 80. 1753 ; Hook. f. Fl. Brit. Ind. 7: 275. 1896 ; Bor. l. c. 434. 1960

Annual erect herbs ; leaves rough ; panicles 15-25 cm ; spikelets 2.5 cm, drooping ; flowering glumes thinly hairy.

Fl. & Fr. : June.

Sutul. 1500 2000 m (10173).

3. DESCHAMPSIA Beauv.

Deschampsia caespitosa (L.) Beauv. Ess. Agrost. 91 ; 160. 1812. *Aira caespitosa* L. Sp. Pl. 64. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 273. 1896 ; Bor. l.c. 435. 1960.

Stout or slender shining herbs ; leaves flat, smooth ; spikelets white and silvery or fulvus purplish.

Fl. & Fr. : September October.

Alkapuri base. 3500 m (10560 A)

4. HELICTOTRICHON Bess. ex Roem. & Schult.

Helictorichon virescens (Nees ex Steud.) Henr. in Blumea 3 ; 425. 1940. *Trisetum virescens* Nees ex Thaw. Enum. Pl. Zeyl. 374. 1864. *Avena aspera* Munro var. *roylei* Hook. f. Fl. Brit. Ind. 7 : 277. 1896 ; Bor, l.c. 439. 1960.

Slender stout glabrous grasses ; leaf sheaths glabrous or softly pubescent ; panicles nodding ; spikelets green or yellowish.

Fl. & Fr. : August September.

Bhyundar Valley. (24571), Mondal. 1600 m (422, Kala & Gaur). Lit.

5. *HIEROCHLOE* R. Br. nom. cons.

Hierochloa laxa R. Br. ex Hook. f. Fl. Brit. Ind. 7 : 222. 1896 ; Bor, l.c. 411. 1960.

Rootstock creeping ; perennial sweet scented herbs ; leaves falcate smooth ; spikelets brown compressed.

Fl. & Fr. : September - October.

Bhyundar valley. 3900 m (24358).

6. *KOELERIA* Pers.

Koeleria macrantha (Ledeb.) Schult. Mant. 2 : 345. 1824. *Aira cristata* L. Sp. Pl. ed. 1, 63. 1753. *K. cristata* auct. non Pers. sensu Hook. f. Fl. Brit. Ind. 7 : 308. 1896 ; Bor, l.c. 444. 1960.

Perennial, tufted erect herbs ; leaves flat, pubescent or hairy, .3 cm. broad ; spikelets green or tinged purple.

Fl. & Fr. : April August.

Dunagiri, Okhimath, Pokhri. 2500 m (54049).

7. *TRisetum* Pers.

1a. Stem below the panicle hairy ; axis also hairy.

T. spicatum 3

1b. Stems below the panicle glabrous ; axis also glabrous.

2a. Panicles very effuse ; lower glume very narrow, acuminate ; branches naked at the base.

T. scitulum 2

- 2b. Panicles more or less dense ; lower glume narrow, acuminate ; branches spiculate to the base; spikelets dark golden-brown ; lower glume .3-.45 cm long ; upper glume .4-.5 cm long.

T. aeneum 1

Trisetum aeneum (Hook. f.) R.R. Steward in Brittonia 5 : 431. 1945. *Avena aenea* Hook. f. Fl. Brit. Ind. 7 : 279. 1896 ; Bor, l.c. 447. 1960.

Slender glabrous herbs ; leaves glabrous or hairy ; spikelets erect ; grain fusiform.

Fl. & Fr. : September October.

Bhyundar valley, Kailuvinayak. 3800-4000 m (30970).

T. scitulum Bor in Kew Bull. 1956 : 212. 1956. *Avena flavescens* non L. Sensus Hook. f. Fl. Brit. Ind. 7 : 279. 1896 ; Bor, l.c. 448. 1960.

Tall slender glabrous grasses ; leaves flat, acuminate ; spikelets brownish or bronze.

Fl. & Fr. : August September.

Rudranath. 3800 m (Joshi s.n.) Lit.

T. spicatum (L.) Richt. Pl. Europ. 1 : 59. 1890. *Aira spicata* L. Sp. Pl. ed. 1, 64. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 278. 1896 ; Bor, l.c. 448. 1960.

Densely tufted slender pubescent herbs ; leaves soft, hairy, panicles very short, cylindric ; spikelets yellowish green or purplish-white.

Fl. & Fr. : August October.

Bhyundar valley, Gothing. 3800 m (56198).

6. RACHYPODIEAE Harz.

BRACHYPODIUM Beauv.

Brachypodium sylvaticum (Huds.) Beauv. Ess. Agrost. 101. 155. 1812. *Festuca sylvatica* Huds. Fl. Angl. 1 : 38. 1762 ; Hook. f. Fl. Brit. Ind. 7 : 362. 1896 ; Bor, l.c. 450. 1960. 'Dhampho'.

Perennial tufted slender herbs ; leaves flat, flaccid, hairy, finely pointed ; spikelets few green, pubescent.

Fl. & Fr. : August October.

Bhyundar valley, Jumma area, 2000-2500 m (29638).

7. BROMEAE Dumort.

BROMUS L.

- 1a. Perennials ; lower glume 1-nerved ; upper glume 5-nerved ; lemma 5-7 nerved ; awn half the length of the lemma or as long, straight. *B. ramosus* 2
- 1b. Annuals ; lower glume 3-5 nerved ; upper glume 5-7 nerved ; awn about as long as the lemma to twice as long, flexous. *B. japonicus* 1

Bromus japonicus Thunb. Fl. Jap. 52, t. 11. 1784. *B. patulus* Mert. & Koch. in Roehl, Deutusch. Fl. ed. 3, 1 (2) : 685. 1823 ; Hook. f. Fl. Brit. Ind. 7 : 361. 1896 ; Bor, l.c. 455. 1960.

Annual smooth herbs, 30-60 cm. tall ; leaves 10-20 cm. long ; panicles oblong ; branches nearly erect ; flowering glume 7-nerved.

Fl. & Fr. : August September.

Malari. 3000 m (56015).

Bromus ramosus Huds. Fl. Angl. 40. 1762. *B. asper* Murr. Prodr. Strip. Gothing 42. 170. 1762 ; Hook. f. Fl. Brit. Ind. 7 : 358. 1896 ; Bor, l.c. 456. 1960.

Tall perennial smooth herbs ; leaves hairy ; panicles pyramidal ; branches drooping ; flowering glume 5- nerved.

Fl. & Fr. : September October.

Bhyundar valley. 3000 m (24379).

8. CHLORIDEAE Agardh

- 1a. Spikelets with one or more fertile florets and one or more imperfect florets above them ; lemmas usually widened upwards. *Chloris* 2
- 1b. Spikelets with one fertile floret and no imperfect florets. *Cynodon* 1

1. CYNODON Rich. nom. cons.

Cynodon dactylon (L.) Pers. Syn. Pl. 1, 85. 1805. *Panicum dactylon* L. Sp. Pl. ed. 1, 58. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 288. 1896 ; Bor, l.c. 469. 1960.

Perennial glabrous prostrate, creeping herbs ; leaves flat ; spikelets green or purple, awnless.

Fl. & Fr. : April October.

Rudraprayag. 600 m (26782).

1. CHLORIS Sw.

Chloris dolichostachya Lagasca, Gen. et Spec. Pl. 5. 1816. *Melica digitata* Roxb. Fl. Ind. 1 : 328. 1820. *C. incompleta* Roth, Nov. Pl. Sp. 60. 1821 ; Hook. f. Fl. Brit. Ind. 7 : 290. 1896 ; Bor l.c. 466. 1960.

Tall branched grasses; leaves long flat ; spikes very slender spreading.

Fl. & Fr. : September.

Gopeswar. 1350 m (366, Kala & Gaur). Lit.

9. DANTHONIEAE Nevski

DANTHONIA DC.

- 1a. Slender grasses ; panicles very short, congested ; anthers .125 - .15 cm long ; lemma with tufts of hairs between the nerves at the base of the lobes

D. cachemyriana 1

- 1b. Robust grasses ; panicles long, congested or racemose ; anthers .35 - 5 cm long ; lemmas hairy on the margins

D. schneideri

1. **Danthonia cachemyriana** Jaub. & Spach. Ill. Pl. Orient. 4 : 46, t. 331. 1851. *D. exilis* Hook f. Fl. Brit. Ind. 7 : 281. 1896 ; Bor, l. c. 478. 1960. Restock creeping ; perennial tufted herbs ; leaves glabrous, very flat narrow ; spikelets shining narrow ; rachilla $\pm$ hairy.

Fl. & Fr. : September October.

Malari, Narparbat, Tungnath area. 3000 4000 m (42213).

D. Schneidri. Pilger in Fedde Repert. 17 : 131. 1921.

D. Jacquemontii Bor. Kew Bull. 1952 : 80. 1952. *D. cachemyriana* non Jaub. & Spach. Sensus Hook. f. Fl. Brit. Ind. 7 : 281. 1896 ; Bor, l. c. 478. 1969. 'Babiyu' ;

Robust herbs ; panicles long, congested ; glumes .18-.25 cm. long ; lemma hairy on the margins.

Fl. & Fr. : September October.

Bhyundar valley, Dunagiri, Patharnachni. 2000 4000 m (30964).

10. ERAGROSTEAE Stapf

- 1a. Lemmas usually entire at the apex, obtuse, acute or acuminate ; cleistogamous spikelets not developed in the axils leaf sheaths.
 - 2a. Spikelets in open, contracted or spike - like panicles, rarely in solitary secund spikes (*Eragrostiella*).
 - 3a. Inflorescence a panicle, sometimes spike - like *Eragrostis* 3
 - 3b. Inflorescence a solitary secund-type *Eragrostiella* 4
 - 2b. Spikelets sessile or very short pedicelled loosely to densely imbricate in digitate or racemosely arranged spikes or spike-like racemes, very rarely in solitary spikes. (*Eleusine* sp).
 - 4a. Axis and branches of the inflorescences ending in a spikele *Eleusine* 2
 - 4b. Axis of spikes terminating in a sharp point ; upper glume mucronate or awned ; spikes digitate rarely racemose *Dactyloctenium* 1
- 1b. Lemmas usually emarginate or 2 - 4 - lobed or toothed at the apex, rarely entire and then hairy along the nerves, frequently mucronate or awned ; cleistogamous spikelets sometimes developed in the axils of leaf sheaths.
 - 5a. Spikelets in panicles or in digitate or racemosely arranged spike-like racemes *Neyraudia* 5
 - 5b. Spikelets in terminal solitary secund spikes *Tripogon* 6

1. DACTYLOCTENIUM Willd.

Dactyloctenium aegypticum L. Willd. Enum. Hort. Berol. 1029. 1809.
Cynosurus aegypticus L. Sp. Pl. ed. 1 : 72. 1753. *Eleusine aegyptica* (L.)

Desf. Fl. Atlant. 1 : 85. 1798 ; Hook. f. Fl. Brit. Ind. 7 : 295. 1896 ; Bor, l.c. 489. 1960.

Stoloniferous annual grasses ; spikes 2-5 cm long ; tip of the rhachis shortly produced upto 2 cm long.

Fl. & Fr. : August - October.

Gangolgaon. 1500 m (222, Kala & Gaur). Lit.

2. ELEUSINE Gaertn.

- 1a. Spikes slender, narrow (.055 cm. wide), straight, nearly glabrous at the base ; seeds oblong, obtusely trigonous *E. Indica* 2
- 1b. Spikes stout, broad (about 1 cm. wide), incurved, hairy at the base ; seeds globose *E. coracana* 1

1. **Eleusine coracana** (L.) Gaertn. Fruct. 1, 8.t. 1, F. 11. 1789.
Cynosurus coracanus L. Syst. Nat. ed. 10, 2, 875. 1759 ; Hook. f. Fl. Brit. Ind. 7 : 294. 1896 ; Bor, l.c. 492. 1960. '*Kodu*'.

Annual ; stout herbs ; leaves broad ; spikes very stout, 15 cm long ; grain globose.

Fl. & Fr. : August - October.

Phata Rampur Chatti. 1500 - 2000 m (65330).

2. **E. indica** L. Gaertn. Fruct. 1 : 8. 1789. *Cynosorus indicus* L. Sp. Pl. ed. 1, 72. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 293. 1896 ; Bor, l.c. 493. 1960. '*Jhanparya Kodu*'.

Stout soft grasses upto 60 cm tall ; leaves distichous ; grain oblong.

Fl. & Fr. : August - October.

Gopeswar. 1300 m (363, Kala & Gaur). Lit.

3. ERAGROSTIS wolf.

- 1a. Spikelets breaking up from above downwards ; rhachis fragile *E. tenella* 7
- 1b. Spikelets breaking up from below up-wards, rhachis tough.

2a. Annuals.

3a. Lemmas up to .15 cm. long.

4a. Plants glandular ; the glands may be raised glands on the keel of the lemma or on the margins of the leaves or sheaths, or are sunk or band-like patches on the culms below the nodes.

5a. Lowest branches of the panicle fascicled or subwhorled with pitted glands just above and below the lowest node ; glandular band below culm nodes ...

E. pilosa 5

5b. Lowest branches not whorled

E. minor 3

4b. Plants eglandular.

6a. Spikelets more or less fascicled on the primary or secondary branches, all pointing forward or shortly pedicelled in narrow racemes ...

E. gangetica 2

6b. Spikelets not fascicled, seated on long pedicels in ample panicles with filiform branches which are fascicled or subwhorled at the lowest node ...

E. pilosa 5

3b. Lemmas over .15 cm. long.

7a. Plants with glands, glands conical or pitted on pedicels and margins of leaves or as large patches on the culm below the panicle ...

E. minor 3

7b. Plants devoid of glands.

8a. Spikelets .2 cm or more wide, ovate or ovate-oblong ...

E. unioloides 8

8b. Spikelets .075-.2 cm wide.

9a. Spikelets .15 cm to just under .2cm wide, pale-green or purplish, often curved ...

E. tremula 6

9b. Spikelets much narrower, spikelets straight, not curved ; branches fascicled or subwhorled at lowest node ; lemmas acute, leaden grey in colour with a purple towards the tip ...

E. pilosa 5

2b. Perennials.

10a. Lemmas upto .18 cm long

E. atrovirens 1

10b. Lemmas .2 cm long and over

E. nigra 4

1. *Eragrostis atrovirens* (Desf.) Trin. ex Steud. Nom. Bot. ed. 2, 1 : 562. 1840. *Poa atrovirens* Desf. Fl. Atlant. 1 : 73, t. 14. 1798 ; Bor, 1. c. 503. 1960.

Inflorescence a more or less contracted panicle of shortly pedicelled spikelets.

Fl. & Fr. : August September.

Gopeswar. 1543 m (195, Kala & Gaur). Lit.

2. *E. gangetica* (Roxb.) Steud. Syn. Pl. Glum. 1 : 166. 1854. *Poa gangetica* Roxb. Fl. Ind. 1. 341. 1820. *E. Stenophylla auct.* non Miq. Sensus Hook. f. Fl. Brit. Ind. 7 : 318. 1896 ; Bor. l.c. 508. 1960.

Densely tufted geniculately ascending grasses ; spikelets crowded, blue grey ; rhachilla tough.

Fl. & Fr. : May June.

Paduli. 1100 m (679, Kala & Gaur). Lit.

3. *E. minor* Host. Gram. Austr. 4 : 15. 1809. *Poa eyides* P. Beauv. Ess. Agrost. 162. 1812 ; Bor. l.c. 512 1960.

Tufted erect grasses ; leaves flat, glandular along the edges ; spikelets narrowly oblong pale green or tinged with purple.

Fl. & Fr. August September.

Garthadhar. 850 m (233, Kala & Gaur). Lit.

4. *E. nigra* Nees ex Steud. Syn. Pl. Glum. 1 : 267. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 324. 1896 ; Bor. l.c. 511. 1960.

Perennial erect herbs ; leaves flat, narrow, edges glandular ; spikelets dark olive-green, few scattered.

Fl. & Fr. : August September.

Bhyundar valley. Jumma area. 2500 2800 m (24543).

5. *E. pilosa* (L.) P. Beauv. Ess. Agrost. 71 : 162, 175. 1812. *Poa pilosa* L. Sp. Pl. 68. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 323. 1896 ; Bor. l.c. 512. 1960.

Tufted erect grasses ; leaves flat, edges not glandular ; spikelets narrowly oblong, pale-green, tipped with purple.

Fl. & Fr. : August September.

Gopeswar. 1350 m (468, Kala & Gaur). Lit.

6. *Eragrostis tremula* (Lam.) Hochst. ex Steud. Syn. Pl. Glum. 1 : 264. 1854. *Poa tremula* Lam. Encl. 1 : 185, 1791. ; Hook. f. Fl. Brit. Ind. 7 : 320. 1896 ; Bor. l.c. 514. 1960.

Densely tufted suberect grasses ; leaves few short ; panicles nodding ; spikelets pale-green or purplish.

Fl. & Fr. : August September.

Gopeswar. 1300 m (195, Kala and Gaur). Lit.

7. *E. tenella* (L). Beauv. ex Roem. & Schult. Syst. Veg. 2 : 576. 1817. *Poa amabilis* L. Sp. Pl. 681. 1753. *P. tenella* L. Sp. Pl. ed. 1, 69. 1753. *E. tenella* var. *plumosa* (Retz.). Stapf in Hook. f. Fl. Brit. Ind. 7 : 315. 1896 ; Bor, l.c. 513 1960.

Densely tufted, slender erect herbs ; leaves narrow ; panicles pale-green or purplish, very branched.

Fl. & Fr. : Septemberr - October.

Batwalchari, Trisula. 1000 1200 m (42294).

8. *E. uniloides* (Retz.) Nees ex Steud. Syn. Pl. Glum. 1 : 264. 1854. *Poa uniloides* Retz. Obs. Bot. 5: 19. 1789. *E. amabilis* auct. non Wt. & Arn. sensu Hook. f. Fl. Brit. Ind. 7. 317. 1896 ; Bor. l.c. 515. 1960.

Annual erect herbs, leaves flat up to .6 cm broad ; panicles oblong ; spikelets ovate, stalked, 20 50 flowered, tinged with purple.

Fl. & Fr. : September October.

Nandprayag. 1000 m (65451).

4. ERAGROSTIELLA Bor.

Eragrostiella nardoides (Trin.) Bor in Indian For. 66 : 270. 1940. *Eragrostis nardoides* Trin. in Mem. Acad. Sci. Ptersb. Ser. 6, 1 : 415. 1830 ; Hook f. Ft. Brit. Ind. 7 : 326. 1896 ; Bor. l.c. 495. 1960. '*Simwati*'.

Perennial slender tufted erect grasses ; leaves hairy very narrow ; margins unrolled ; spikelets narrowly oblong.

Fl. & Fr. : August September.

Patiyaldhar. 1100 m (403, Kala & Gaur). Lit.

5. NEYRAUDIA Hook. f.

Neyraudia ndinacearu (L). Henr. in Meded. Herb. Leid. no. 58 : 8. 1929 in Obs. *Aristida arundinacea* L. Mant. Pl. 2 : 186.

1771. *Neyraudia madagascariensis* (Kunth) Hook. f. Fl. Brit. Ind. 7 : 305. 1896 ; Bor, l.c. 518. 1960. 'Bichuldu'.

Perennial glabrous erect herbs ; leaves linear-filiform, rolled ; spikelets compressed ; rhachilla with bearded nodes.

Fl. & Fr. : September October.

Pipalkoti Gulabkoti. 1400 1600 m (2729).

6. TRIPOGON Roem. & Schult.

Tripogon filiformis Nees ex Steud. Syn. Pl. Glum. 1 : 301. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 288. 1896 ; Bor, l.c. 521. 1960.

Perennial filiform erect herbs ; nodes glabrous ; leaves filiform rolled, densely appressed hairy ; spikelets greenish, oblong.

Fl. & Fr. : July October.

Vishnuprayag. 1600 m (24493).

11. RESTUCEAE Dumort.

1a. Lemma firmly keeled on the back.

- 2a. spikelets broadly ovate, pendulous ; lemmas inflated, awnless, cordate at the base, closely imbricate, boat-shaped, many nerved, horizontally spreading ...

Briza 1

2b. Spikelets and lemmas not as above.

- 3a. Spiketlets borne in dense one - sided clusters on the branches of a panicle ; lemma tipped with a rather stout awn upto .15 cm long ; tufted perennials ...

Dactylis 2

- 3b. Spikelets borne in loose or contracted panicles ; lemmas not awned ...

Poa 5

1b. Lemmas rounded on the back.

- 4a. Delicate annuals ; lemmas rolled, acute or acuminate ; hilum punctiform ...

Eremopoa 3

- 4b. Perennials ; lemmas chartaceous to cartilaginous, awned or awnless ; hilum linear to the length of the grain ...

Festuca 4

1. *BRIZA* L.

Briza media L. Sp. Pl. ed. 1, 70. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 336. 1896 ; Bor, l.c. 528. 1960.

Stoloniferous, very slender, creeping herbs ; leaves flat smooth ; panicles pyramidal ; spikelets green or purplish, orbicular ovate.

Fl. & Fr. : October.

Bhyundar Valley. 3800 m (24378).

2. *DACTYLIS* L.

Dactylis glomerata L. Sp. Pl. ed. 1, 71. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 335. 1896 ; Bor, l.c. 530. 1960.

Perennial smooth, tufted erect herbs ; leaves flat, 15 30 cm. long ; spikelets green or tinged with purple, flattened.

Fl. & Fr. : June September.

Bnyundar valley, Dunagiri on way, Kanol. 2900 m. (53872).

3. *EREMOPOA* Roshev.

Eremopoa persica (Trin.) Roshev. in Komarov, Fl. U.S.S.R. 2 : 430. 1934. *Poa persica* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 1 : 373. 1830 ; Hook. f. Fl. Brit. Ind. 7 : 337. 1896 ; Bor, l.c. 532. 1970.

Very slender glabrous herbs ; leaves narrow linear, smooth ; spikelets green ; flowering glume faintly 3 nerved.

Fl. & Fr. : August September.

Dunagiri on way, Geoldong, Rishiganga valley, 2500 5000 m. (56248).

4. *FESTUCA* L.

1a. Leaves involute or convolute, broad or narrow, finally flat,
at least .3 cm broad

- 2a. Nodes 2 - 3 ; leaf blade .15 .3 cm broad ; ovary minutely hispidulous at tip ... *F. nandadevica* 2
- 2b. Nodes 3 - 5 ; leaf blade .5 1.2 cm broad ; ovary quite glabrous ... *F. gigantea* 1
- 1b. Leaves, especially those of the vegetative shoots, tightly folded, if flat, then under .3 cm wide.
- 3a. Panicle linear, not more than 1 cm broad.
- 4a. Lower glume .25 - .35 cm long ; upper glume .35 - .4 cm long ; lemma .4 - .45 cm long ; awns equal to half the lemma or more ; anthers .15 - .175 (.2) cm long, shorter than the deeply bifid palea ; palea scabrid all along the keels .. *F. polycolea* 3
- 4b. Lower glum .225 cm long ; upper glume .3 cm long ; lemma .3 - .35 cm long ; awns less than half the lemma ; anthers .1 .15 cm long ; palea not longer than the lemma, scabrid in upper third ... *F. valesiaca* 5
- 3b. Panicle not linear or dense, much longer and broader ... *F. rubra* 4

Festuca gigantea (L.) Vill. Hist. Pl. Dauph. 2 : 110. 1787. *Bromus giganteus* L. Sp. Pl. ed. 1, 77. 1753; Hook. f. Fl. Brit. Ind. 7 : 353. 1896 ; Bor, l.c. 538. 1960.

Perennial herbs ; joints 3 5 ; leaves flat, amplexicaule ; panicle pyramidal, very loose nodding ; spikelets pale green ; awn longer than the flowering glume.

Fl. & Fr. : September October.

Bhyundar valley, Mondal Chopta. 2000 3500 m (24428).

2. **F. nandadevica** Hazra in Ind. Journ. Forstery 6 (1) : 79 80. 1983.

Herbs, 30 70 cm high ; leaves 3 18 cm long ; panicles 25 30 cm long, lax ; spikelets 1 3 flowered, green, hairy, .8 1.2 cm long.

Fl. & Fr. : August September.

Deodi—Ramni. 3500 3550 m (73285, Hazra). Lit.

3. **F. polycolea** Stapf in Hook f. Fl. Brit. Ind. 7 : 349. 1896 ; Bor, l.c. 540. 1960.

Perennial small herbs, 10 15 cm tall ; panicles contracted 1.2 5 cm long ; flowering glume .3 cm long.

Fl. & Fr. : September October.

Bhyundar valley, 3800 m (23364).

4. *Festuca rubra* L. Sp. Pl. ed. 1, 74. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 352. 1896 ; Bor, l.c. 540. 1960.

Erect or geniculate herbs ; leaves linear flat, thick ; spikelets green, oblong, loose ; ovary glabrous at the top.

Fl. & Fr. : April June.

Patharnachni, 3500 m (30953).

5. *F. valesiaca* Schleich. ex Gaud. Agrost. Helvet. 1 : 242. 1811. *F. ovina* var. *valesiaca* (schleich. ex Gaud.) Link, Hort. Berol. 2 : 267. 1883 ; Hook. f. Fl. Brit. Ind. 7 : 348. 1896 ; Bor, l.c. 542. 1960.

Slender tufted erect herbs : leaves setiform 3 5 nerved ; spikelets oblong, broadly ovate, green or purplish ; awns much shorter.

Fl. & Fr. : August - October.

Geoldong .5000 m (56279).

5. POA L.

1a. Lemmas with a hairy covering on the dorsal surface between the nerves, often this reduced to few hairs at the base of the lemma and dorsal surface of lemma coarsely scabrid, rarely shining.

2a. Upper ligules short, under .15 cm long ... *P. polycolea* 4

2b. Upper ligules longer, over .15 cm long.

3a. Lemmas very broadly hyaline, spikelets pale ; basal sheaths not scarious ; rhachilla - joints not conspicuous ... *P. polycolea* 3

3b. Lemmas not very broadly hyaline, often purple basal sheath not scarious, rhachilla - joints sometimes conspicuous from side ... *P. pagophila* 3

1b. Lemmas not hairy between the nerves.

4a. Anthers .2 cm long or over.

5a. Ligules short, not over .2 cm long ; lemmas prominently 5 - nerved ... *P. polycolea* 4

5b. Ligules longer, .25 - .45 cm long ; lemmas inconspicuously 5 - nerved ... *P. pagophila* 3

4b. Anthers under .2 cm long (or a little longer).

- | | | |
|---|-----|-----------------------|
| 6a. Wool present on the callus | ... | <i>P. nemoralis</i> 2 |
| 6b. No wool on the callus. | ... | |
| 7a. Intermediate nerves of lemma glabrous ;
anthers .12 - .16 cm long. | ... | <i>P. supina</i> 5 |
| 7b. All nerves of the lemm hairy ; anthers less
than .1 cm. long | ... | <i>P. annua</i> 1 |

1. **Poa annua** L. Sp. Pl. ed. 1, 68. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 345. 1896 ; Bor, l.c. 555. 1960.

Annual or perennial slender herbs, 15 30 cm long ; stems zigzag near the base ; leaves flaccid ; panicles; 2.5 7 cm long, stiff.

Fl. & Fr. : May August.

Pandukeswar, Ramni. 15000 - 2000 m (10146).

2. **P. nemoralis** L. Sp. Pl. ed. 1, 69. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 341. 1896 ; Bor, l.c. 558. 1960.

Perennial slender herbs ; leaves 5 30 cm long ; panicles narrow, drooping ; spikelets 2 4 flowered ; outer empty glume 3 nerved.

Fl. & Fr. : August September.

Geoldong, Gothing, Niti. 4000 4500 m (56291).

3. **P. pagophila** Bor in Kew Bull. 1949: 239. 1949. *P. flexuosa* non Sm. sensu Hook. f. Fl. Brit. Ind. 7 : 342. 1896 ; Bor, l.c. 558. 1969.

Erect or geniculately branched herbs ; leaves glabrous ; panicles pyramidal lax, spikelets green, tinged with purple ; flowering glumes 3 nerved.

Fl. & Fr. : September October.

Bhyundar Valley, Hemkund on way. 3800 m (24299).

4. **P. polycolea** Stapf in Hook. f. Fl. Brit. Ind. 7 : 342. 1896 ; Bor, l.c. 559. 1960.

Leaves very narrow, flat or wiry ; spikelets 3 flowered ; outer empty glume 1 nerved.

Fl. & Fr. : September October.

Bhyundar valley. 3800 m (24377).

5. **P. supina** Schrad. Fl. Germ. 1 : 289. 1806 ; Bor, l.c. 561. 1960.

Gregarious glabrous herbs ; leaves linear, smooth ; spikelets greenish-purple ; intermediate nerves of lemma glabrous ; callus glabrous.

Fl. & Fr. : September November.

Bhyunder valley, Bistola, Laxmiban. 2500-3500 m (23622).

12. GARNOTIEAE Tateoka GARNOTIA Brongn.

Garnotia tenella (Arn. ex Miq.) Janowsky in Fedde, Repert. 17 : 86. 1921. *Berghausia tenella* Wt. & Arn. ex Miq. in Verh. Konik. Nederl. Inst. 3, 4. 34. 1851. *G. stricta* auct non Brongn. Sensus Hook. f. Fl. Brit. Ind. 7 : 213. 1896, P.P. ; Bor, l.c. 569. 1960.

Geniculate branched herbs ; leaves lanceolate or linear lanceolate, flat ; panicles very narrow ; spikelets pale, sparsely hairy to the base.

Fl. & Fr. : September October.

Mondal area. 1600 m (42019). Not common.

13. ISACHNEAE Benth ISACHNE R. Br.

Isachne albens Trin. Sp. Gram. 1, t. 85. 1828 ; Hook. f. Fl. Brit. Ind. 7 : 22. 1896 ; Bor, l. c. 579. 1960.

Perennial, tall erect branched herbs ; leaves flat, narrowly lanceolate .5 2 cm broad ; panicles 15 35 cm long : spikelets pale green or white.

Fl. & Fr. : September October.

Jakhmolla. 1500 m (42249). Not Common.

14. MELICEAE Reichb. MELICA L.

Melica persica Kunth, Rev. Gram. 1 : 122. 351, t. 89. 1830.

M. Jacquemontii Dene. in Jacq. Voy. Bot. 4. 174, t. 175. 1844. *M. cupani* non Guss. sensu Hook. f. Fl. Brit. Ind. 7 : 329. 1896, *p.p.* ; Bor, l.c. 592. 1960.

Perennial erect very slender herbs ; leaves narrow flat spikelets pale yellow or dark purple ; flowering glumes solitary silky.

Fl. & Fr. : August September.

Niti. 4200 m (Duthie). Lit.

15. ORYZEAE Dumort.

ORYZA L.

Oryza sativa L. Sp. Pl. ed. 1. 333. 1753. var. *sativa* Hook. f. Fl. Brit. Ind. 7 : 92. 1896 ; Bor, l.c. 605. 1960.

Tall leafy herbs ; leaves long flat, scaberulose ; panicles drooping : spikelets, yellow or reddish shining ; awn. 7 1.2 cm long.

Cultivated all over in hotter valleys.

16. PHALARIDEAE Kunth

PHALARIS L.

Phalaris minor Retz. Obs. Bot. 3 : 8. 1783 ; Hook. f. Fl. Brit. Ind. 7 : 221. 1896 ; Bor. l.c. 616. 1960.

Annual erect herbs, 15 45 cm tall ; leaves glabrous, long, flat ; ligule oblong blunt ; spikelets shortly stalked ; grain free within the glume.

Fl. & Fr. : April May.

Agastamuni Churunga .700-1200 m (35148).

17. SPOROBOLAE Stapf

SPOROBOLUS R. Br.

- 1a. Upper glume distinctly shorter than the lemma (i.e. ... less than three quarter as long).

- 2a. Panicles effuse, at least at maturity ... *S. diander* 1
 2b. Panicles contracted ... *S. fertilis* 2
 1b. Upper glume as long, nearly as long as or longer than ...
 the lemma ... *S. piliferus* 3

1. **Sporobolus diander** (Retz.) P. Beauv. Ess. Agrost. 26 : 147. 178. 1812. *Agrostis diander* Retz. Bot. 5 : 19. 1789 ; Hook. f. Fl. Brit. Ind. 7 : 247. 1896 ; Bor. l.c. 629. 1960.

Perennial grasses ; leaves glabrous ; spikelets pale brown.

Fl. & Fr. : September October.

Patiyaldhar. 1100 m (345, Kala & Gaur). Lit.

2. **Sporobolus fertilis** (Steud). Glayton in Kew Bull. 19 : 291. 1965. *Agrostis fertilis*. Steud. Syn. Pl. Glum. 1 : 170. 1854. *S. indicus auct.* non (L.) R. Br. in Bor, 1. c. 633. 1960 ; Hook. f. Fl. Brit. Ind. 7 : 247. 1896.

Tall perennial herbs ; leaves glabrous, margins entire ; panicles narrow 15 - 45 cm. ; spikelets .2 cm green crowded.

Fl. & Fr. August September.

Phata. 2000 m (58455).

3. **S. piliferus** (Trin.) Kunth, Enum. Pl. 1 (1) : 211. 1833. *Vilfa pilifera* Trin. Diss. Bot. 157. 1824 ; Hook. f. Fl, Brit. Ind. 7 : 251. 1896 ; Bor, l.c. 632. 1960.

Small annual herbs, 7 - 30 cm. tall ; leaves hairy ; margins minutely toothed.

Fl. & Fr. : September October.

Bhyundar valley, Jakhmolla. 1500 - 2500 m (24566).

18. STIPEAE Dumort.

- 1a. Lemmas narrowly linear, longer, slender ; awn kneed, usually twisted below ; callus long and sharp pointed ... *Stipa* 2
 1b. Lemmas elliptic, plump ; awn eventually deciduous, not twisted but curved ; callus short, obtuse, never long and pointed. *Piptatherum* 1

1. PIPTANTHERUM P. Beauv.

Piptantherum munroi (Stapf) in Fedde Repert. 17 : 212. 1921.
Oryzopsis munroi Stapf in Hook. f. Fl. Brit. Ind. 7 : 234. 1896 ; Bor, l.c. 640. 1960.

Tall erect perennials : leaves narrow flat ; ligule oblong hyaline ; panicles 15 30 cm ; spikelets ovate lanceolate, green tipped with purple.

Fl. & Fr. : July October.

Bhyundar & Rishiganga valleys. 2500 3500 m (24538).

2. STIPA L.

1a. Column of awn twisted.

2a. Tip of lemma entire ... *S. sibirica* 3

2b. Tip of lemma 2 - fid ... *S. jacquemontii* 1

1a. Column of awn not twisted ... *S. roylei* 2

1. **Stipa jacquemontii** Jaub. & Spach. III. Pl. Or. 4 : 64. t. 339. 1851.
Lasiagrostis jacquemontii (Jaub. & Spach.) Munro ex Boiss. Fl. Orient. 5 : 506. 1884 ; Hook. f. Fl. Brit. Ind. 7 : 232. 1896 ; Bor, l.c. 645. 1960.

Densely tufted erect very slender herbs : leaves filiform, panicles narrow, branched ; spikelets erect, green or purplish.

Fl. & Fr. August September.

Jumma area. 2600 m (53840).

2. **S. roylei** (Nees) Mez. in Fedde, Rep. Nov. 17 : 207. 1921.

Orthoraphium roylei Nees in Proc. Linn. Soc. Lond. 1 : 94. 841. *S. orthoraphium* Steud. Syn. Pl. Glum. 1 : 141. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 233. 1896 ; Bor, l.c. 646. 1960.

Perennial herbs ; leaves 15 30 cm long, .3 cm broad ; awn very long as the spikelet ; anther tips naked.

Fl. & Fr. : September - October.

Bhyundar valley, Kukinakh. 3800 m (24425).

3. *Stipa sibirica* (L.) Lam. Tab. Encycl. Bot. 1 : 158. 1791.

Avena sibirica L. Sp. Pl. ed. 1, 79. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 231 ; 1896 ; Bor, l.c. 646. 1960.

Tall perennials ; leaves 30 - 60 cm long, .6 cm broad ; awns twice as long as the spikelet ; anther tips bearded.

Fl. & Fr. : August - September.

Malari. 3000 m (55999).

19. THYSANOLAENEAE Hubb.

THYSANOLAENA Nees

Thysanolaena maxima (Roxb.) Kuntz. Rev. Gen. Pl. 2 : 794. 1891.
Agrostis maxima Roxb. Fl. Ind. 1 : 319. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 61. 1896 ; Bor, l.c. 650. 1960. '*Naltura*'.

Perennial reed like erect herbs, upto 3 m tall ; nodes glabrous ; leaves glabrous lanceolate, cordate, acuminate ; spikelets minute greenish or purplish, 2 flowered.

Fl. & Fr. : September - October.

Kund. 900 m (26867).

20. TRITICEAE Dumort.

1a. Spikelets normally solitary at each node of the spike - axis.

2a. Spikelets 2 - flowered ; glumes very narrow, subulate, 1 - nerved ; lemmas stiffly hairy on the keels. ...

Secale 5

2b. Spikelets usually more than 2 - flowered ; glumes broader, usually more than 1 - nerved ; lemmas not stiffly hairy on the keels or mid - rib.

3a. Nerves of the lemmas not confluent at the tip ; annuals ...

Triticum 3

3b. Nerves of the lemmas confluent at the tip ; perennials and annuals ...

Agropyron 1

5. *Euphorbia parviflora* L. Syst. ed. 10, 1047. 1759. *F. indica* Lam. Dict. Bot. 2 : 423. 1786. *E. hypericifolia* non L. sensu Hook. f. Fl. Brit. Ind. 5 : 249. 1887, *p.p.*

Decumbent purplish herbs ; leaves oblong $\pm$ hairy beneath ; glands green ; capsules pubescent.

Fl. & Fr. : July – October.

Jakhmolla, Narayankoti, Soragarh. 600 – 1500 m (42247).

6. *E. pilosa* L. Sp. Pl. 460. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 260. 1887.

Perennial herbs ; leaves alternate, sessile, oblong ; glands not bordered, rounded, entire : capsules hairy, tubercled.

Fl. & Fr. : April – October.

Bhyundar valley, way to Kedarnath. 1600 – 2800 m (38636).

7. *E. prolifera* Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 62. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 264. 1887.

Perennial glabrous herbs ; leaves alternate, sessile, 2.5 – 3.5 cm long ; glands crescent – shaped, yellow ; capsules small.

Fl. & Fr. : April – October.

Nandkeshri. 1300 m (35141).

8. *E. royleana* Boiss. in DC. Prodr. 16(2) : 83. 1862 ; Hook. f. Fl. Brit. Ind. 5 : 251. 1887. '*Sulla*'.

Deciduous shrubs or small trees ; branches whorled, 5 – 7 angled, ridges with stipular spines ; leaves, spatulate, thick fleshy ; capsules pale-grey, 3 – lobed.

Fl. & Fr. : March – April.

Throughout the area. 600 – 1500 m (Osmaston). Lit.

9. *E. sharmae* U.C. Bhatt. in Bull. Bot. Soc. Bengal, 21(1) : 33 – 36. 1967.

Perennial alpine herbs ; leaves small, stalked, ovate – oblong ; involucre green,

Fl. & Fr. : June.

Hemkund. 4500 m (39020). Rare.

10. *E. stracheyi* Boiss. in DC. Prodr. 15(2) : 114. 1866 ; Hook. f. Fl. Brit. Ind. 5 : 259. 1887.

Rootstock, stout, long woody ; perennial pubescent herbs ; leaves obovate, .6 – 1.8 cm long, obtuse ; capsules globose, pubescent, minutely granulate.

Fl. & Fr. : May – August.

Chandrsila, Gothing, way to Khankolia. 3000 – 4000 m (44173).

11. **Euphorbia tibetica** Boiss. in DC. Prodr. 15(2) : 114. 1866 ; Hook. f. Fl. Brit. Ind. 5 : 260. 1887.

Rootstock woody ; glabrous suberect herbs ; cauline leaves variable, linear – spathulate ; capsules stipital, pale – green.

Fl. & Fr. : August.

Laptal. 5000 m (Duthie). Lit.

12. **E. pulcherrima** Willd. ex Klotz. in Otto & Dietr. Allg. Gartenz. 2 : 27. 1834.

Shrubs, with crimson or red oblanceolate, foliaceous bracts.

Planted.

10. EXCOECARIA L.

Excoecaria acerifolia F. Didrichs. Kjoeb. Vid. Meddel. 129. 1857 ; Hook. f. Fl. Brit. Ind. 5 : 473. 1888. '*Dudhila*'.

Erect deciduous shrubs ; leaves narrowly elliptic or oblong, crenulate, flowers small greenish – yellow in spikes.

Fl. & Fr. : May – August.

Bhyundar valley, Mondal, Gulab koti. 1500 – 2500 m (43961).

11. GLOCHIDION Forst. nom. cons.

Glochidion velutinum Wt. Ic. t. 1907. 1852 ; Hook. f. Fl. Brit. Ind. 5 : 322. 1887. '*Kath – Maua*'.

Erect decuduous shrubs or small trees ; leaves broadly – elliptic or

oblong, acute, pubescent ; male flowers yellow ; female flowers green ; capsules orbicular depressed.

Fl. & Fr. : May – October.

Birhi, Mondal, way to Nandprayag. 1200 – 1500 m (10002).

12. JATROPHA L.

Jatropha curcas L. Sp. Pl. 1006. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 383. 1887.

Deciduous shrubs ; leaves variable, broadly ovate, cordate, palmately 3 – 5 lobed ; flowers green ; fruits brown – black, ovoid.

Fl. & Fr. : May – October.

As a hedge plant throughout the area, upto 1500 m (Osmaston).
Lit.

13. MALLOTUS Lour.

Mallotus philippensis (Lam.) Muell. – Arg. in Linnaea 34 : 188. 1865. *Croton Philippensis* Lam. Encycl. Meth. Bot. 209. 1786 ; Hook. f. Fl. Brit. Ind. 5 : 442. 1887. 'Ruina'.

Small evergreen trees ; leaves ovate – oblong, minutely pubescent, closely gland-dotted beneath ; capsules 3 lobed, covered with red powder.

Fl. & Fr. : September – November.

Langasu, Phata. 800 – 1600 m (6478).

14. PHYLLANTHUS L.

1a. Trees ; flowers densely clustered along the branches ; fruits succulent

...

P. embillica 1

1b. Small shrubs or large herbs ; flowers axillary ; fruits capsular.

2a. Diffusely branched erect or decumbent herbs ; capsules
echinate ; seeds transversely furrowed ... *P. urinaria* 3

2b. Small shrubs ; capsules smooth ; seeds minutely mottled
with brown ... *P. parvifolius* 2

1. **Phyllanthus embilica** L. Sp. Pl. 982. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 289. 1887. 'Aonla'.

Medium sized deciduous trees ; leaves small, narrowly oblong ; branchlets pubescent ; flowers green – yellow ; fruits succulent, globose, green or pale – yellow.

Fl. & Fr. : March – May & November – January.

Throughout the area upto 1800 m (Osmaston). Lit.

2. **Phyllanthus parvifolius** Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 63. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 294. 1887.

Small shrubs ; leaves ovate or oblong – ovate, pale beneath ; flowers minute, brown purple ; seeds smooth.

Fl. & Fr. : January – October.

Mondal, Pipalkoti, Phata. 1500 – 2000 m (2733).

3. **P. urinaria** L. Sp. Pl. 882. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 293, 1887.

Glabrous erect herbs ; leaves oblong or linear – oblong, glaucous beneath ; styles with hooked arms ; capsules echinate.

Fl. & Fr. : July – October.

Batwalchari, Mondal. 800 – 1600 m (6398).

15. RICINUS L.

Ricinus communis L. Sp. Pl. ed. 1. 1007. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 457. 1887. 'Arandi'.

Evergreen shrubs or small trees ; leaves palmate, 7 – many lobed, serrate ; capsules echinate.

Fl. & Fr. : March – May, August – December.

Chamoli. Throughout the area upto 1800 m (Osmaston). Lit.

16. SAPIUM P. Br.

Sapium insigne (Royle) Benth. ex Hook. f. in Fl. Brit. Ind. 5 : 471. 1888. *Falconeria insignis* Royle, Ill. Bot. Himal. 354, t. 98, f. 3. 1839. 'Khinmu'.

Small deciduous trees ; bark deeply furrowed ; leaves elliptic – oblong, $\pm$ 12 cm long ; flowers appearing before the leaves, yellow – green ; capsules ovoid.

Fl. & Fr. : February – June.

Agastamuni, Nigol valley. 900 – 1200 m (26848).

17. SECURINEGA Comm. ex Juss. nom cons.

Securinega virosa (Roxb. ex Willd.) Baill. in Adansonia 6 : 334. 1886. *Phyllanthus virosus* Roxb. ex Willd. Sp. Pl. 4 : 758. 1805. *Flueggia microcarpa* Bl. Bijdr. 580. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 328. 1887.

Evergreen shrubs; leaves suborbicular, obovate – elliptic, glabrous; flowers yellowish – green ; dry fruits 6 – valved ; fruits, succulent, white.

Fl. & Fr. : May – June.

Throughout the area. 600 – 1500 m (Osmaston). Lit.

126. BUXACEAE

(EUPHORBIACEAE Sensus BH)

- | | |
|---|---------------------|
| 1a. Leaves alternate, shortly stalked ; drupes dark purple, ovoid ... | <i>Sarcococca</i> 2 |
| 1b. Leaves nearly sessile, opposite ; capsules ovoid ... | <i>Buxus</i> 1 |

1. BUXUS L.

Buxus wallichiana Baill Monogr. Buxaceae. 63. 1859. *B. sempervirens* non L. sensu Hook. f. Fl. Brit. Ind. 5 : 267. 1887, *p.p.* 'Papri'.

Branched shrubs or small trees ; leaves 2.5 – 7 cm long, narrowly – lanceolate or ovate ; flowers yellow – green, scented ; capsules, 1 – 1.2 cm long, 3 – valved.

Fl. & Fr. : May – October.

Pangarbasha, Ramni, Trijuginaryan. 2000 – 2500 m (10138).

2. SARCOCOCCA Lindl.

Sarcococca saligna (Don) Muell. – Arg. in DC. Prodr. 16(1) : 11. 1869. *Buxus saligna* D. Don, Prodr. Fl. Nep. 63. 1825. *S. pruniformis* non Lindl. Sensus Hook. f. Fl. Brit. Ind. 5 : 266. 1887, *p.p.* 'Paliyala or Geru'.

Erect evergreen shrubs ; leaves linear or linear – lanceolate glabrous ; flowers fragrant yellow – green ; drupes. 75 – 1 cm.

Fl. & Fr. : March – October.

Bhyundar valley, Dewalikhali, Mondal. 1600 – 2600 m (43904).

127. ULMACEAE

(URTICACEAE Sensu BH)

- | | | |
|--|-----|-----------------|
| 1a. Fruits winged ; leaves not 3 - nerved from the base | ... | <i>Ulmus</i> 3 |
| 1b. Fruits not winged ; leaves 3 - nerved from the base. | | |
| 2a. Leaves smooth, not scabrid | ... | <i>Celtis</i> 1 |
| 2b. Leaves scabrid, at least on the upper surface | ... | <i>Trema</i> 2 |

1. CELTIS L.

- | | | |
|--|-----|-----------------------|
| 1a. Ovary and young drupes seated on a hairy disk ; leaves thin ;
drupes purplish - black | ... | <i>C. australis</i> 1 |
| 1b. Ovary and young drupes densely tomentose ; leaves thick ;
drupes orange red | ... | <i>C. eriocarpa</i> 2 |

1. **Celtis australis** L. Sp. Pl. 1043. 1753 ; Hook. f. Fl. Brit. Ind. 5
482. 1888. '*Kharik*'.

Large deciduous trees ; leaves ovate or elliptic, caudate – acuminate,
serrate ; drupes ellipsoid, 1 – 1.25 cm long.

Fl. & Fr. : March – April, September – October.

Bhyundar valley. 2400 m (29344).

2. **C. eriocarpa** Dcne. in Jacq. Voy. Inde. 150, t. 152. 1844.
C. eustralis var. *artocarpa* (Dcne.) Hook. f. Fl. Brit. Ind. 5 : 482. 1888.
'*Kharik*'.

Small deciduous trees ; leaves ovate or lanceolate, caudate, acumin-
ate subentire ; drupes .76 cm long.

Fl. & Fr. : March – April, September – November.

Throughout the hills. 1000 – 2000 m (Osmaston). Lit.

2. TREMA Lour.

- 1a. Leaves scabrid on both surfaces ; male cymes compact, not longer than the petiole ... *T. politoria* 1
- 1b. Leaves more or less scabrid above, softly tomentose beneath ; cymes spreading, longer than the petiole ... *T. orientalis* 2

1. *Trema orientalis* (L.) Bl. Muss. Bot. Lugd. – Bat. 2 : 62. 1856. *Celtis orientalis* L. Sp. Pl. 1044. 1753, *p.p.* ; Hook. f. Fl. Brit. Ind. 5 : 484. 1888.

Evergreen shrubs or small trees ; leaves ovate – lanceolate, caudate – acuminate, white or silky tomentose beneath.

Fl. & Fr. : May – June.

Throughout the hills. 800 – 1500 m (Osmaston). Lit. Not Common.

2. *T. politoria* (Planch.) Bl. Mus. Bot. Ludg. Bot. 2 : 58. 1856 ; Hook. f. Fl. Brit. Ind. 5 : 484. 1888.

Small evergreen trees ; leaves thick ovate or ovate – lanceolate, dark glossy green above.

Fl. & Fr. : April – June, December – January.

Bartwalchari, Trisula. 1000 m (42286).

3. ULMUS L.

- 1a. Leaves 7.5 - 15 cm long, scabrid above ; pedicels .25 - .5 cm long ; ovary pubescent ... *U. wallichiana* 2
- 1b. Leaves 5 - 11.25 cm long, usually smooth above ; pedicels less than .125 cm long ; ovary glabrous ... *U. brandisiana* 1

1. *Ulmus brandisiana* Schn. in Osterr. Bot. Zeitschr. 66 : 30. 1816 ; Osmaston For. Fl. Kumaon 490. 1978 (rep. ed.).

Large deciduous trees ; leaves oblong – lanceolate or elliptic lanceolate ; ripe samara .7 – 1 cm in diam.

Fl. & Fr. : February.

Appears throughout the hills. 1500 – 2500 m (Osmaston). Lit.

2. **Ulmus wallichiana** Planch. in Ann. Sci. Nat. Ser. 3, 10 ; 277. 1848 ; Hook. f. Fl. Brit. Ind. 5 : 480. 1888.

Leaves elliptic, elliptic – oblong or obovate, acuminate. doubly serrate ; ripe samara 1 – 1.5 cm. in diam.

Fl. & Fr. : March – June.

Bagrigar – Wan. 2200 m (37254).

128. CANNABACEAE

CANNABIS L.

Cannabis sativa L. Sp. Pl. ed. 1, 1027. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 487. 1888. '*Bhanglyu*'.

Erect tomentose herbs ; leaves stalked palmately lobed ; flowers uni – sexual ; achenes enclosed in the persistent perianth.

Fl. & Fr. : July – September.

Jumma area. 2600 m (53806).

129. MORACEAE

(URTICACEAE SENSU BH. TRIBE MOREAE)

- | | | |
|--|-----|----------------|
| 1a. Male flowers in catkin - like spikes | ... | <i>Morus</i> 2 |
| 1b. Male flowers arranged like the female on the inside of a hollow receptacle (fig) | ... | <i>Ficus</i> 1 |

1. FICUS L.

- 1a. Scandent shrubs, clinging closely to support by means of adventitious roots.
 - 2a. Lateral nerves 4 - 5 pairs including the basal ... *F. hederacea* 4
 - 2b. Lateral nerves 6 - 10 pairs including the basal ... *F. sarmentosa* 12
- 1b. Small or large trees.
 - 3a. Leaves opposite, 5 - 12.5 cm broad, not clustered at the ends of the branches ... *F. hispida* 5
 - 3b. Leaves alternate.
 - 4a. Figs on special leafless branches or in clusters on the old wood.
 - 5a. Leaves very unequal - sided at the base ... *F. semicordata* 13
 - 5b. Leaf bases symmetrical or nearly so.
 - 6a. Basal nerves 5 - 7 ... *F. auriculata* 2
 - 6b. Basal nerves 3 ... *F. oligodon* 8
 - 4b. Figs axillary.
 - 7a. Leaves scabrous on one or both sides.
 - 8a. Leaves rough on both surfaces, glabrous ... *F. subincisa* 14
 - 8b. Leaves only rough on the upper surfaces, pubescent ... *F. palmata* 2
 - 7b. Leaves not scabrous on either side.
 - 9a. Figs pedunculate.
 - 10a. Peduncles and figs hairy ... *F. lacor* 6
 - 10b. Peduncles and figs glabrous.
 - 11a. Leaves 7.5 - 15 cm broad, broadly ovate ... *F. arnottiana* var. *arnottiana* 1
 - 11b. Leaves less than 7.5 cm broad, lanceolate, tips gradually acuminate ... *F. neerifolia* 7
 - 9b. Figs sessile.
 - 12a. Leaves obtuse or shortly acuminate ; figs white, pink or red when ripe ... *F. benghalensis* 3
 - 12b. Leaves caudate acuminate ; figs purplish-black when ripe.

- 13a. Acumen or sharp point less than 2.5 cm long ; lateral nerves 6 - 9 pairs including the basal ... *F. rumphii* 11
- 13b. Acumen or sharp point 2.5 - 7.5 cm long ; lateral nerves 8 - 12 pairs including the basal ... *F. religiosa* 10

1. *Ficus arnottiana* Miq. (Miq). in Ann. Mus. Bot. Lugd. Bat. 3 : 287. 1867. var. *arnottiana*. *Urostigma arnottianum* Miq. in Hook. Journ. Bot. 6 : 564. 1847 ; corner in Gard. Bull. (Sing.) 21 : 11. 1965.

Evergreen glabrous shrubs ; leaves stalked ; figs 1.2 - 2 cm diam.

Figs ripen : June - July.

Masoli. 200 m (44214).

2. *F. auriculata* Lour. Fl. Cochinch. 666. 1790. *F. roxburghii* Wall. ex Miq. in Ann. Mus. Bot. Lugd. Bat. 3 : 296. 1867 ; Hook. f. Fl. Brit. Ind. 5 : 534. 1888. '*Timla*'.

Small evergreen trees ; leaves alternate, broadly ovate, cordate softly pubescent beneath ; figs axillary.

Figs ripen : May - July.

Throughout the hills. 600 - 1800 m (Osmaston). Lit.

3. *F. benghalensis* L. Sp. Pl. 1059. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 499. 1888. '*Bar*'.

Large evergreen trees ; leaves alternate, ovate or elliptic, entire ; figs red, 1.2 - 1.5 cm in diam.

Figs ripen : May - June.

Throughout the area upto 1400 m (Osmaston). Lit.

4. *F. hederacea* Roxb. Fl. Ind. ed. 2, 3 : 538. 1832. *F. scandens* Roxb. Fl. Ind. ed. 2, 3 : 536. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 526. 1888.

Extensive evergreen climbers ; leaves ovate elliptic, acute, entire, very coriaceous, glabrous. quite smooth ; figs .75 - 1 cm in diam. axillary, solitary or in pairs.

Figs ripen : February - April.

Throughout the hills between 700 - 1000 m (Osmaston). Lit.

5. **Ficus hispids** L. f. Suppl. 442. 1781 ; Hook. f. Fl. Brit. Ind. 5 : 522. 1888.

Evergreen trees ; leaves opposite, broadly ovate or obovate – oblong, scabrid hairy ; figs clustered, ovoid, hispid.

Figs ripen : May – July.

Balkhil, Rudraprayag area. 600 m (26812).

6. **F. lacor** Buch. Ham. in Trans. Linn. Soc. 15 : 150. 1826. *F. infectoria auct* non Willd. nec. Roxb. ; Hook. f. Fl. Brit. Ind. 5 : 515. 1888, p.p. '*Pilkha*'.

Deciduous glabrous trees alternate ovate or oblong ; acuminate ; figs white or pink, .6 – .8 cm in diam.

Figs ripen : April – June, October.

Narayanbagar. 1000 m (37268).

7. **F. neerifolia** var. **nemoralis** (Wall. ex Miq) Corner, in Gard. Bull. Singap. 17 : 426. 1960. *F. nemoralis* Wall. ex Miq. Lond. Journ. Bot. 7 : 453. 1848 ; Hook. f. Fl. Brit. Ind. 5 : 534. 1888.

Small subdeciduous trees ; leaves alternate, lanceolate or elliptic – lanceolate, lateral nerves arcuate ; figs, subglobose, .6 cm diam. '*Thelka*'.

Figs ripen : April, October November.

Throughout the hills. 1200 – 2200 m (Osmaston). Lit.

8. **F. oligodon** Miq. in Ann. Mus. Bat. Lugd. Bot. 3 : 234. 1867. *F. pomifera* Wall. ex King in Fl. Brit. Ind. 5 : 535. 1888. '*Gwal – Timla*'.

Evergreen trees ; leaves 12.5 – 30 cm, narrowly ovate, elliptic or oblong, distantly toothed ; puberulous beneath ; figs depressed globose ± pubescent.

Figs ripen : May – June, November December.

North Garhwal upto 1800 m (Osmaston). Lit.

9. **F. palmata** Forssk. Fl. Aegypt – Arab. 179. 1775 ; Hook. f. Fl. Brit. Ind. 5 : 530. 1888. '*Bedu*'.

Small deciduous trees ; leaves 7.5 – 15 cm, ovate, rounded, lobed, crenate, dentate, scabrous pubescent ; figs pyriform dark purple.

Figs ripen : June – August.

Agastamuni, Trisula. 900 – 1200 m (44238).

10. **Ficus religiosa** L. Sp. Pl. ed. 1, 1059. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 513. 1888. '*Peepal*'.

Large deciduous trees ; leaves 10 – 17 cm, broadly ovate, acuminate, shining green ; figs depressed – globose, dark purple.

Figs ripen : April – May, October – November.

Chandranagar. 900 m (26854).

11. **F. rnmphii** Bl. Bijdr. 437. 1825 : Hook. f. Fl. Brit. Ind. 5 : 512. 1888.

Deciduous glabrous trees ; leaves 10 – 17 cm, broadly ovate, acuminate, glossy ; figs 1.25 – 2 cm diam.

Figs ripen : May – July, November.

Throughout the area upto 1400 m (Osmaston). Lit.

12. **F. sarmentosa** Buch. – Ham. ex J. E. Sm. in Rees. Cyclop. 14, n. 45. 1810. *F. foveolata* Wall. ex Moq. in Ann. Mus. Bot. Lugd. – Bat. 3 : 294. 1867 ; Hook. f. Fl. Brit. Ind. 5 : 528. 1888. '*Beduli*'.

Extensive evergreen climbers ; leaves ovate, elliptic or oblong, acuminate, entire ; figs axillary solitary, globose purple (ripe).

Figs ripen : March – April.

Mondal, Satal, Trisula. 1200 – 2500 m (43945).

13. **F. semicordata** Buch. – Ham. ex J.E. Sm. in Rees, Cyclop. 14 : no, 71. 1810. *F. cunia* Buch. – Ham. ex Roxb. Fl. Ind. ed. 2, 3 : 561. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 523. 1888. '*Khaina*'.

Small trees ; leaves 12 – 20 cm, elliptic or oblong – lanceolate, acuminate, entire, pubescent beneath ; figs in pairs globose or pyriform.

Figs ripen : July – September.

Chamoli. 1200 m (14856).

14. **F. subincisa** Buch. – Ham. ex J.E. Sm. in Rees, Cyclop. 14 : Ficus n. 91. 1810. *F. chinha* Roxb. Fl. Ind. 3 : 534. 1832 *F. clavata* Wall. ex Miq. Lond. Journ. Bot. 7 : 431. 1848 ; Hook. f. Fl. Brit. Ind. 5 : 520. 1888. '*Chanchari*'.

Evergreen shrubs or small trees ; leaves 8.5 – 17 cm, obovate – lanceolate ; figs rough glabrous obovoid or globose, 2 – 3 cm. in diam.

Figs ripen : May – June, October.

Mondal area, Nandprayag, Trisula. 1200 – 1600 m (43946).

2. MORUS L.

- 1a. Leaves with small and nearly uniform teeth.
- 2a. Style arms glabrous or nearly so, short, free to the base ... *M. macroura* 2
- 2b. Style arms hairy, long, united for about one quarter of their length ... *M. australis* 1
- 1b. Leaves with large and very unequal teeth. ... *M. serrate* 3

1. *Morus australis* Poir. in Lam. Encycl. Meth. Bot. 4 : 380. 1797.
M. indica auct. non L. sensu Hook. f. Fl. Brit. Ind. 5 : 492. 1888.

Small trees ; leaves rough, long pointed, deeply lobed, often cordate ;
 male and female flowers on different trees.

Fl. & Fr. : April – May.

Sagar. 1100 m (586, Kala & Gaur). Lit.

2. *M. macroura* Miq. Pl Jungh. 42. *M. laevigata* Wall. ex Brandis.
 For. Fl. Ind. 409. 1874 ; Hook. f. Fl. Brit. Ind. 5 : 492. 1888.
 'Kimu'.

Deciduous trees ; leaves ovate – cordate, membranous, often lobed
 and toothed ; fruiting spikes white or red.

Fl. & Fr. : March – April.

Gopeswar. 1300 m (535, Kala & Gaur). Lit.

3. *M. serrate*^o Roxb. Fl. Ind. 3 : 596. 1832 ; Hook. f. Fl. Brit. Ind.
 5 : 492. 1888. 'Kimu'.

Deciduous trees ; leaves broadly ovate, acuminate, serrate 7 – 15 cm.
 long ; flowers deciduous, green ; fruits succulent, sweet, white – pink.

Fl. & Fr. : February – June.

Joshimath, sitapur. 1600 – 1900m (47912).

130. URTICACEAE

(URTICACEAE tribe *Urticeae* Ssensu BH)

1a. Trees and shrubs.

2a. Fruiting perianth dry or membranous or fleshy.

3a. Fruiting perianth dry or membranous ; flower heads in interrupted spikes ... *Boehmeria* 1

3b. Fruiting perianth fleshy.

4a. Leaves broadly ovate ... *Oreocnide* 10

4b. Leaves narrowly oblong - lanceolate or elliptic ... *Debregeasia* 3

2b. Fruiting perianth none ; flower heads cymose ... *Maoutia* 8

1 b. Herbs.

5a. Leaves alternate.

6a. Plants with stinging hairs ... *Girardenia* 5

6b. Plants without stinging hairs.

7a. Flowers in saucer - like receptacles ... *Elatostemma* 4

7b. Flowers in cymose and spiked clusters.

8a. Flowers in spike - clusters ; stems 60 - 90 cm long, erect ; leaves coarsely toothed ... *Neodistemon* 9

8b. Flowers in cymose clusters ; stems 15 - 30 cm diffuse, flaccid ; leaves quite entire ... *Parietaria* 11

5b. Leaves opposite.

9a. Plants with stinging hairs ... *Urtica* 14

9b. Plants without stinging hairs.

10a. Flowers on sucer like receptacles ... *Lecanthus* 7

10b. Flowers in axillary clusters or panicles.

11a. Flowers in panicles ... *Pilea* 12

11b. Flowers in axillary clusters.

12a. Stigma ovate, persistent ... *Chamabainia* 2

12b. Stigma filiform, deciduous.

- 13a. Lobes or segments of the male perianth convex or gibbous at the back ... *Pouzolzia* 13
- 13b. Lobes or segments of the perianth usually abruptly inflexed about the middle ... *Gonostegia* 6

1. BOEHMERIA Jacq.

- 1a. Width of leaves much less than half their length ; leaves alternate, 7.5 - 13 cm long ... *B. rugulosa* 2
- 1b. Width of leaves much greater than half their length ; leaves opposite, 10 - 30 cm long.
- 2a. Leaves orbicular, softly tomentose on both surfaces ... *B. platyphylla* 1
- 2b. Leaves ovate, scabrid on both surfaces ... *B. platyphylla* var *scabrella* 3

1. **Boehmeria platyphylla** D. Don, Prodr. Fl. Nep. 60. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 578. 1888. '*Khagsi*'.

Pubescent shrubs ; leaves narrow caudate, coarsely, serrate, 3-nerved from the base ; flowers uni-sexual, white ; achenes enclosed in dry perianth.

Fl. & Fr. : June - October.

Gaurikund, Mondal, Soragarh. 600 - 2000 m (8586).

2. **B. rugulosa** Wedd. Monogr. Urtic. 370. 1856 ; Hook. f. Fl. Brit. Ind. 5 : 579. 1888. '*Genthi*'.

Glabrous trees ; leaves elliptic - lanceolate, acuminate, crenulate, pale velvety pubescent beneath ; achenes elliptic, ciliate towards the top.

Fl. & Fr. : July - October.

Batwalchari, Trisula. 1000 - 1600 m (42265).

3. **B. platyphylla** D. Don var. **scabrella** (Gaud.) Wedd. Arch, Mus. Hist. Nat. Paris 9 : 365. 1856. *B. scabrella* Gaud. in Freycinet, Voy. 500. 1830, nom. nud ; Hook. f. Fl. Brit. Ind. 5 : 578. 1888. '*Khagsa*'.

Shrubs or undershrubs ; leaves nearly equal ovate elliptic to rounded, acute or acuminate ; achenes brown hairy at the top.

Fl. & Fr. : July – September.

Throughout the area upto 1600 m (Osmaston). Lit.

2. CHAMABAINIA Wt.

Chamabainia cuspidata Wt. Ic. t. 1981. 1853 ; Hook. f. Fl. Brit. Ind. 5 : 580. 1888.

Slender, decumbent branching pubescent herbs ; leaves membranous, ovate, acute, serrate, pubescent beneath ; achenes compressed, ovate, acute.

Fl. & Fr. : August.

Phata – Rampur Chatti. 800 – 2500 m (65317).

3. DEBREGEASIA Gaud.

- | | | |
|--|-----|-------------------------|
| 1a. Mature leaves smooth above ; flower - heads in dichotomous cymes | ... | <i>D. longifolia</i> 1 |
| 1b. Mature leaves scabrid above ; flower - heads sessile or subsessile | ... | <i>D. salicifolia</i> 2 |

1. *Debregeasia longifolia* (Burm. f.) Wedd. in DC. Prodr. 16 (1) : 235. 1869. *Urtica longifolia* Burm. f. Fl. Ind. 197. 1768. *D. velutina* Gaud. Bot. Bonite t. 90, 1843 ; Hook. f. Fl. Brit. Ind. 5 : 590. 1888.

Small shrubs ; barks dark brown ; leaves linear – elliptic, ashy beneath ; flowers monoecious in small heads.

Fl. & Fr. : September – November.

Throughout the Central and outer hill ranges. 600 – 1800 m (Osmaston). Lit.

2. **Debregeasia salicifolia** (D. Don) Rendle in Prain. Fl. Trop. Afr. 6(2) : 295. 1917. *Boehmeria salicifolia* D. Don, Prodr. Fl. Nep. 60. 1825. *D. hypoleuca* (Hochst.) Wedd. Monogr. urtic. 463. 1857 ; Hook. f. Fl. Brit. Ind. 5 : 591. 1888. 'Syanru'.

Large evergreen. shrubs ; leaves oblong lanceolate, serrate, scabrid ; flowers uni-sexual clustered ; drupes small, yellow.

Fl. & Fr. : March – July.

Chamoli, Guptkashi, Mondal. 1200 – 1600 m (14843).

4. ELATOSTEMMA Forst. nom. cons.

- 1a. Prostrate herbs ; stems 30 - 60 cm ; leaves toothed from bases to tips ... *E. sessile* 3
- 1b. Erect herbs ; stems 2.5 - 20 cm.
 - 2a. Leaves all entire ... *E. pusillum* 1
 - 2b. Leaves serrate or toothed.
 - 3a. Stout rigid herbs ; upper leaves serrate from above the middle ... *E. rupestre* 2
 - 3b. Slender herbs ; upper leaves toothed towards the tips ... *E. surculosum* 4

1. **Elatostemma pusillum** Cl. ex Hook. f. Fl. Brit. Ind. 5 : 568. 1888.

Slender erect herbs. 2 – 15 cm tall ; leaves sessile, ovate, .8 cm ; heads 2 cm. in diam.

Fl. & Fr. : September – October.

2. **E. rupestre** (Buch. – Ham. ex D. Don) Wedd. Monogr. Urtic. 304. 1856. *Procris rupestris* Buch – Ham. ex D. Don, Prodr. Fl. Nep. 60. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 564. 1888.

Erect stout branched herbs, 12 – 25 cm tall ; leaves narrowly elliptic or linear lanceolate, 10 – 15 cm long, base acute ; heads 1.2 – 2.5 cm in diam.

Fl. & Fr. : May June.

Nigol valley. 1850 m (14842).

3. **Elatostemma sessile** J. R. & G. Forst. Char. Gen. Pl. Austr. 106. 1776 ; Hook. f. Fl. Brit. Ind. 5 : 563. 1888.

Prostrate herbs ; rooting at the base, often bent at the joints ; leaves sessile, ovate – lanceolate, toothed ; heads .6 – 1.2 cm in diam.

Fl. & Fr. : June – September.

Gohna – Ramni, Phata – Trijuginarayan. 2300 – 2500 m (8507).

4. **E. surculosum** Wt. Ic. t. 2091, f. 4. 1853 ; Hook. f. Fl. Brit. Ind. 5 : 572. 1888.

Tufted slender erect herbs, 5 – 20 cm tall ; leaves lanceolate with a small leaf opposite to it ; lower leaves entire ; heads .25 cm diam.

Fl. & Fr. : June – October.

Gaurikund, Mondal, Ramni – Gohna. 1600 – 2500 m (10150).

5. GIRARDINIA Gaud.

Girardinia diversifolia (Link) Friis in Kew Bull. 36 : 143. 1981. *Urtica diversifolia* Link, Enum. Hort. Berol. 2 : 385. 1822. *G. heterophylla* Dcne. in Jacq. Voy. 4 (Bot.) : 151, t. 153. 1835. excl. basionym. *G. palmata* auct. non Gaud. ; Hook. f. Fl. Brit. Ind. 5 : 550. 1888. '*Ban – Kandali*'.

Robust erect herbs with stinging bristles ; leaves broadly ovate, deeply lobed ; flowers small green uni-sexual : achenes flattened, ovate, black.

Fl. & Fr. : August – September.

Gwaldam, Mondal, Narayankoti. 1600 1800 m (6473).

6. GONOSTEGIA Turcz.

Gonostegia hirta (Bl.) Miq. in Ann. Mus. Bot. Ludg. 4 : 303, t. 10, f. 2. 1869. *Urtica hirta* Bl. Bijdr. 495. 1826. *Pouzolzia hirta* (Bl.) Hassk. 1844 ; Hook. f. Fl. Brit. Ind. 5 : 586. 1888.

Decumbent shrubs : stems slender leaves opposite, sessile, entire, pointed ; fruits ribbed.

Fl. & Fr. : June September.

Bhyundar valley, Soragarh. 600 - 2000 m (6325).

7. LECANTHUS Wedd.

1a. Stems 2.5 - 10 cm ; receptacles .6 - .8 cm diam. ... *L. peduncularis* 1

1b. Stems 30 - 64 cm ; receptacles 1.25 - 3.7 cm diam. ... *L. wallichii* 2

1. **Lecanthus peduncularis** (Royle) Wedd. in DC. Prodr. 16 (1) : 164. 1869. *p.p. Procris peduncularis* Wall. ex Royle, Ill. Bot. Himal. t. 83, f. 2. 1836. *L. wightii* Wedd. in Ann. Sc. Nat. Ser. 4, 1 : 187. 1854 ; Hook. f. Fl. Brit. Ind. 5 : 559. 1888.

Succulent pubescent herbs ; leaves opposite unequal ovate, 1 - 2.5 cm long ; achenes narrowly oblong, longer than the perianth, red.

Fl. & Fr. : August October.

Bhyundar valley, Phata. 1700 - 3000 m (71003).

2. **L. wallichii** Wedd. in DC, Prodr. 16 (1) : 187. 1869, *p.p. L. wightii* Wedd. in Ann. Sci. Nat. Ser. 4, 1 : 187. 1854 ; Hook. f. Fl. Brit. Ind. 5 : 559. 1888.

Robust pubescent herbs ; leaves 2.5 - 10 cm. long ; caudate ; achenes ovoid, shorter than the perianth, purple.

Fl. & Fr. : July October.

Gaurikund, Jakhmolla, Joshimath. 1500 - 2000 m (42259).

8. MAOUTIA Wedd.

Maoutia puya (Hook.) Wedd. in Ann. Sci. Nat. Ser. 4, 1 : 193. 1854.
Boehmeria puya Hook. f. Lond. Journ. Bot. 3 : 316, t. 7. 1851 ; Hook. f.
 Fl. Brit. Ind. 5 : 592. 1888. '*Phur Khagsa*'.

Erect shrubs ; leaves elliptic, caudate, coarsely dentate ; flowers
 minute in small heads ; nuts trigonous.

Fl. & Fr. : June October.

Agastamuni, Soragarh, Trisula. 800 - 1400 m (6321).

9. NEODISTEMON Babu & Henry

Neodistemon indicum (Wedd.) Babu & Henry, Taxon 19 : 651. 1970.
Distemon indicum Wedd. Arch. Mus. Hist. Nat. Paris 9 : 551. t. 20A.
 1857 ; Hook. f. Fl. Brit. Ind. 5 : 588. 1888.

Very slender erect herbs ; leaves broadly ovate, pale whitish, pubescent ; flowers monoecious ; achenes broadly ovoid.

Fl. & Fr. : August September.

Langasu, Soragarh. 800 m (6345).

10. OREOCNIDE Miq.

Oreocnide frutescens (Thunb.) Miq. in Ann. Mus. Bot. Lugd. Bat. 3 :
 131. 1867. *Urtica frutescens* Thunb. Fl. Jap. 70. 1784. *Villebrunea frutescens*
 (Thunb.) Bl. Mus. Bot. Lugd. Bat. 2 : 168. 1857 ; Hook. f. Fl. Brit.
 5 : 590. 1888.

Shrubs ; branches slender pubescent ; leaves ovate, toothed ; pale -
 white, tomentose beneath ; flowers uni-sexual, clustered ; achenes minute
 black.

Fl. & Fr. : May October.

Mondal area. 1650 m (43995).

11. **PARIETARIA L.**

Parietaria micrantha Ledeb. Ic. Pl. Alt. 1 : 7, t. 22. 1829. *P. debilis* auct. non Forst. f. sensu Hook. f. Fl. Brit. Ind. 593. 1888.

Diffuse perennial herbs ; stems slender, matted ; leaves thin, ovate ; flowers minute polygamous.

Fl. & Fr. : August - October.

Bhyundar valley, Malari, Tungnath. 2500 - 3500 m (42187).

12. **PILEA Lindl. nom. cons.**

- | | | |
|--|-----|----------------------|
| 1a. Hairy herbs ; leaves ovate | ... | <i>P. umbrosa</i> 4 |
| 1b. Glabrous herbs. | | |
| 2a. Leaves ovate or broadly ovate ; teeth large. | | |
| 3a. Tall herbs, 30 - 60 cm tall ; leaves caudate ; flowers green | ... | <i>P. kingii</i> 1 |
| 3b. Small herbs, 2.5 - 15 cm tall ; leaves acute or acuminate ; flowers pink | ... | <i>P. racemosa</i> 2 |
| 2b. Leaves lanceolate ; teeth small | ... | <i>P. scripta</i> 3 |

1. **Pilea kingii** C.E.C. Fischer in Kew Bull. 1927 : 76. 1927.

Tall erect glabrous herbs ; leaves broadly ovate, glabrous 3 nerved, dentate, caudate ; fruits white.

Bhuna. 3200 m (31030). Rare.

2. **P. racemosa** (Royle) Tuyama in Fl. E. Himal. 61. 1966. *Procris racemosa* Royle, Ill. Bot. Himal. t. 83, f. 1. 1836. *P. wightii* Wedd. var. ? *roylei* Hook. f. Fl. Brit. Ind. 5 : 555. 1888.

Very small slender herbs ; leaves few rounded ovate, sparsely hairy above ; serratures few large.

Fl. & Fr. : September October.

Bhuna, Hemkund on way. 3300 - 3800 m (31026).

3. ***Pilea scripta*** (Buch. - Ham. ex D. Don) Wedd. in Ann. Sci. Notiser. 4, 1 : 187. 1854. *Urtica scripta* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 59. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 556. 1888.

Tall glabrous herbs ; leaves 7 - 20 cm long, long pointed ; achenes rough.

Fl. & Fr. : May July.

Masoli, Pandukeswar, Shetale Ghat. 1800 m (10378).

4. ***P. umbrosa*** [Wedd. in Ann. Sci. Nat. Ser. 1 : 187. 1854. nom nud.] Bl. Mus. Bot. Lugd. Bat. 2 : 56 Feb. 1856 ; Hook. f. Fl. Ind. Brit 5 : 556. 1888.

Erect hairy herbs ; leaves 7 - 12.5 cm, teeth large, coarse, sharp ; achenes smooth.

Fl. & Fr. : June October.

Bhuna, Mondal, Narayankoti. 1600 - 3300 m (10203).

13. *POUZOLZIA* Gaud.

Pouzolzia zeylanica (L.) Bennett & Brown, Pl. Jav. Rar. 67. 1854. *Parietaria zeylanica* L. Sp. Pl. 1052. 1753. *P. indica* (L.) Gaud. in Freycinet, voy. 503. 1830 ; Hook. f. Fl. Brit. Ind. 5 : 581. 1888.

Semiprostrate branching herbs ; leaves opposite, shortly stalked ovate, entire, pointed ; fruits ribbed.

Fl. & Fr. : August September.

Nizmolla proper. 1500 m (70926).

14. *URTICA* L.

1a. Low tufted undershrubs, 15 - 45 cm tall ; leaves broadly ovate ;
cymes very short, crowded

... *U. hyperborea* 2

1b. Tall erect herbs, '90 - 1.5 m tall.

2a. Plants bearing flowers of both sexes ; leaves with small
irregular teeth ... *U. ardens* 1

2b. Plants bearing either male or female flowers ; leaves with
large, regular teeth ... *U. dioica* 2

1. *Urtica ardens* Link Hort. Berol. 2 : 385. 1822. *U. parviflora*
Roxb. Fl. Ind. 3 : 581. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 548. 1888.
'Kandali'

Tall erect herbs, clothed with stinging hairs ; stems obtusely angled ;
stipules united.

Fl. & Fr. : February August

Bampa, Bhyundar valley. 1600 4000 m (29605).

2. *U. dioica* L. Sp. Pl. 984. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 548.
1888. 'Kandali'.

Stems robust, grooved ; leaves ovate or lanceolate, 5 10 cm, long
pointed ; stipules usually free.

Fl. & Fr. : June October.

Batwalchari, Ghangaria, Pandukeswar. 1000 3000 m (29605).

3. *U. hyperborea* Jacq. ex Wedd. in Ann. Sci. Nat. Ser. 4, 1 : 180.
1854 ; Hook. f. Fl. Brit. Ind. 5 : 548. 1888.

Rootstock woody, stems ; stout, ttfed, ascending ; leaves 2.5 5 cm,
dark green, serrate glandular - puberulous beneath.

Fl. & Fr. : August September.

Way to Geoldong. 4800 m (56241). Not Common.

131. JUGLANDACEAE

1a. Female flowers 1 - 3 in a terminal spike ; fruits not attached to
a wing - like bract ... *Juglans* 2

1b. Female flowers in long pendulous lateral spikes ; fruits attached
to a wing - like 3 - lobed bract ... *Engelhardia* 1

1. ENGELHARDIA Leschen. ex Bl.

1. **Engelhardia spicata** Leschen ex Bl. Bijdr. 528. 1826. var. **colebrookeana** (Lindl. ex wall.) Koord. & Valet. Bijdr. 5 : 169. 1900. *E. colebrookeana* Lindl. ex wall. Pl. As. Rar. 3 : 4, t. 208. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 596. 1888. '*Gadh - Mahwua*'

Small trees ; leaves $\pm$ opposite, elliptic, oblong, obtuse, entire ; nuts small globose, hairy within long fruiting bracts.

Fl & Fr. : April - May.

Sauri. 900 m (26852). Not. Common.

2. JUGLANS L.

2. **Juglans regia** L. Sp. Pl. 997. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 595, 1881. '*Akhor*'.

Large deciduous trees ; leaves large elliptic to oblong - lanceolate ; drupes globose - ovoid, pubescent.

Fl. & Fr. : March - May.

Throughout the hills. 1600 - 3000 m (Osmaston). Lit.

132. MYRICACEAE

MYRICA L.

Myrica esculenta Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 56. 1825. *M. nagi auct.* non Thunb. Sensus Hook. f. Fl. Brit. Ind. 5 : 597. 1888, *p.p.* '*Kaphal*'.

Small glabrous trees ; leaves crowded, lanceolate, entire, rusty coloured beneath ; flowers uni-sexual ; drupes ovoid red, wrinkled.

Fl. & Fr. : May - October.

Agastamuni, Mondal, Sitapur. 900 - 2000 m (26838).

133. BETULACEAE

- 1a. Bracts of the fruiting spikes forming a woody cone ... *Alnus* 1
- 1b. Bracts of the fruiting spikes not forming a cone.
 - 2a. Bracts not greatly enlarged in fruit ; nuts with 2 small membranous wings ... *Betula* 2
 - 2b. Bracts greatly enlarged in fruit.
 - 3a. Nuts small, adnate to the base of a large reticulate wing - like bract ... *Carpinus* 3
 - 3b. Nuts rather large, supported by the large laciniated bracts ... *Corylus* 4

1. ALNUS Mill.

Alnus nepalensis D. Don, Prodr. Fl. Nep. 58. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 600. 1888. '*utis*'.

Large deciduous trees; leaves elliptic, entire or sinuate ; lateral nerves 6 - 15 pairs ; cones 1.2 - 2 cm long.

Fl. & Fr. : October - December.

Bhyundar valley, Mondal, Nagnath. 1680 - 2590 m (47934).

2. BETULA L.

- 1a . Lateral nerves 7 - 9 pairs ; young petioles silky and leaves sticky ; female spikes solitary ... *B. utilis* 2
- 1b . Lateral nerves 9 - 12 pairs ; young petioles and midrib tomentose ; female spikes usually in clusters of 2 - 3 ... *B. alnoides* 1

1. **Betula alnoides** Buch. Ham. ex D. Don, Prodr. Fl. Nep. 58. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 599. 1888. '*Saur*'.

Large deciduous trees ; barks silvery grey ; leaves ovate or ovate lanceolate, serrate, base rounded or subcordate ; male catkins 5 - 17 cm long.

Fl. & Fr. : March - May.

Anusuyia area, Bhyundar valley, Wan. 2200 - 2500 m (29635).

2. **B. utilis** D. Don, Prodr. Fl. Nep. 58. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 599. 1888. '*Bhojpatra*'.

Small deciduous trees ; barks white, peeling off in papery layers ; leaves ovate, acute, serrate, base broadly cuneate or rounded ; male catkins 5 - 7.5 cm long.

Fl. & Fr. : May, October - November.

Bhyundar valley, Baradeoldunga. 3500 - 4000 m (31040).

3. CARPINUS L.

- | | |
|---|---------------------|
| 1a. Shoots and petioles glabrous ; petioles .7 - 1.4 cm long ; mature leaves glabrous ; lateral nerves 10 - 13 pairs ... | <i>C. viminea</i> 2 |
| 1b. Shoots and petioles tomentose ; petioles .25 - .5 cm long ; mature leaves more or less hairy ; lateral nerves 13 - 17 pairs ... | <i>C. faginea</i> 1 |

1. **Carpinus faginea** Lindl. in Wall. Pl. As. Rar. 2 : 5. 1831; Hook f. Fl. Brit. Ind. 5 : 626. 1888.

Small deciduous trees ; leaves ovate oblong, acuminate, sharply serrate ; fruiting bracts broadly triangular.

Fl. & Fr. : March - April, October - November.

Bhyundar valley. 2100 m (39002).

2. **Carpinus viminea** Lindl. in Wall. Pl. As. Rar. 2 : 4, t, 106. 1831 ; Hook. f. Fl. Brit. Ind. 5 : 626. 1888. '*Chamkharik*'.

Deciduous trees ; leaves ovate lanceolate, caudate, acuminate, serrate ; fruiting bracts leaf - like.

Fl. & Fr. : May June.

Amritganga and Bhyundar valleys. 2500 3500 m (44060).

4. CORYLUS L.

Corylus jacquemontii Dcne. in Jacq. Voy. 4 (Bot.) : 160, t. 160. 1835. *C. colurna* non L. sensu Hook. f. Fl. Brit. Ind. 5 : 625. 1888. 'Kabasi'.

Deciduous trees ; leaves ovate or obovate, acuminate, lobed or toothed ; flowers before the leaves ; nuts large, sheathed by much enlarged glandular bracteole.

Fl. & Fr. : April August.

Bhyundar valley, way to Kuwari. 2500 3000 m (24519).

134. FAGACEAE (CUPULIFERAE SENSU BH).

1a. Styles 3.

2a. Involucre forming a cup ; bracteoles not spinous or tubercular	...	<i>Quercus</i> 2
--	-----	------------------

2b. Involucre completely surrounding the nut ; bracteoles spinous or tubercular	...	<i>Castanopsis</i> 1
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1b. Styles 6	...	<i>Castanea</i> 3
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1. CASTANOPSIS (D. Don) Spach nom. cons.

Castanopsis tribuloides (J.F. Sm.) A. DC. in Journ. Bot. 1 : 182. 1863. *Quercus tribuloides* J. E. Sm in Rees Cyclop. 29 : no, 13. 1814 ; Hook. f. Fl. Brit. Ind. 5 : 622. 1888.

Small evergreen trees ; leaves lanceolate or oblong lanceolate, undulate or entire ; lateral nerves 10 - 14 pairs ; fruits spinous.

Fl. & Fr. : July - October.

Throughout the hills. 1000 - 2500 m (Osmaston). Lit. Rare.

2. QUERCUS L.

1a. Mature leaves clothed with white or whitish tomentum beneath.

2a. Lateral nerves 9 - 13 pairs ; stipules broad at the base ... *Q. lanata* 3

2b. Lateral nerves 12 - 20 pairs ; stipules narrowed at the base to a stalk ... *Q. leucotrichophora* 4

1b. Mature leaves glabrous beneath or if hairy not white tomentose.

3a. Leaves glaucous beneath ; petioles 1 - 2.5 cm long ... *Q. glauca* 2

3b. Leaves not glaucous beneath ; petioles 0 - .75 cm long.

4a. Young shoots clothed with brown tomentum ; acorns subglobose ... *Q. semicarpifolia* 5

4b. Young shoots clothed with stellate pubescence ; acorns ovoid ... *Q. dilatata* 1

1. *Quercus dilatata* Royle, Ill. Bot. Himal. t. 84, f. 2. May 1836 (as *dealbata*). *Q. dilatata* Lindl. in Wall. ex DC. Prodr. Syst. 16 (2) : 41. 1864 ; Hook. f. Fl. Brit. Ind. 5 : 602. 1888. '*Moru or Tilonj*'.

Large evergreen trees ; leaves oblong or elliptic lanceolate, serrate ; male catkins 5 - 7 cm long.

Fl. & Fr. : April - October.

Occurrence in Garhwal 2000 - 2800 m (Osmaston) Lit. Rare.

2. *Q. glauca* Thunb. Fl. Jap. 175. 1784 ; Hook. f. Fl. Brit. Ind. 5 : 604. 1888. '*Phaniyant*'.

Large evergreen trees ; leaves oblong, oblong lanceolate, serrate, glabrous beneath ; scales of acorn cup united in rings.

Fl. & Fr. : March May, October December.

Phata, Trisula area. 1400 1700 m (6491).

3. ***Quercus lanata*** Sm. in Rees. Cyclop. 29 : no, 27. 1814. *Q. lanuginosa* D. Don, Prodr. Fl. Nep 57. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 603. 1888.

Large trees ; leaves petioled, oblong lanceolate, acute or acuminate, cuspidate serrate ; male spikes densely woolly.

Fl. & Fr. : April May.

Throughout the hills. 2000 2500 m (Osmaston). Lit. Rare.

4. ***Q. leucotrichophora*** A. Camus in Riviera Sci. 22 : 66. 1935. *Q. incana* Roxb. Fl. Ind. 3 : 642. 1832. non Bartram ; Hook. f. Fl. Brit. Ind. 5 : 603. 1888. '*Banj*'

Large evergreen trees ; leaves, oblong or ovate lanceolate, serrate ; male catkins 5 10 cm long. slender, pubescent ; acorn 2 cm long.

Fl. & Fr. : March May, December February.

Gaurikund, Lohajung. 2000 m (37205).

5. ***Q. semicarpifolia*** J. E. Sm. in Rees. Cyclop. 29 : no, 20. 1814 ; Hook. f. Fl. Brit. Ind. 5 : 601. 1888. '*Kharsu*'.

Large evergreen trees ; leaves elliptic or elliptic oblong, entire or spinous toothed ; acorns 2 2.5 cm diam, cup covering only to the base of the nut.

Fl. & Fr. : May August.

Amritganga valley. Bhuna. Bistola. 3000 4000 m (44078).

3. CASTANEA L.

Castanea sativa Mill. Gard. Dict. ed. 8. 1, 1768.

Trees ; leaves elliptic lanceolate, serrate, pale pubescent beneath ; flowers strongly scented ; fruits spinous.

Gwaldam. 1800 m (41445).

135. SALICACEAE

- | | | |
|---|-----|------------------|
| 1a. Petioles short ; disk of 1 - 2 glands | ... | <i>Salix</i> 2 |
| 1b. Petioles long ; disk flat or cup - shaped | ... | <i>Populus</i> 1 |

1. POPULUS L.

Populus ciliata Wall. ex Royle, Ill. Bot. Himal. 346, t. 84a, f. 1. 1839 ; Hook. f. Fl. Brit. Ind. 5 : 638. 1888. '*Syan*'.

Large deciduous trees ; leaves long petioled, broadly ovate, acuminate, crenate serrulate ; capsules broadly ovoid.

Fl. & Fr. : March June.

Bhyundar valley. Gohna. 2000 3000 m (38667).

2. SALIX L.

1a. Erect trees or shrubs.

2a. Trees or large shrub usually with a single stem.

3a. Stamens 3 - 12.	...	<i>S. acmophylla</i> 1
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3b. Stamens 2.

4a. Filaments connate at least half way up ; capsules pubescent	...	<i>S. sericarpa</i> 8
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4b. Filament free.

5a. Capsules pubescent	...	<i>S. wallichiana</i> 10
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5b. Capsules glabrous	...	<i>S. acutifolia</i> 2
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2b. Small or medium sized shrubs.

- 6a. Shrubs usually 1.20 - 2.4 m high ; stems many from close to the ground.
- 7a. Leaves 1.2- 5 cm broad ; male catkins on short leafy shoots ... *S. denticulata* 3
- 7b. Leaves 2.5 - 5.6 cm broad ; male catkins with a few small leaves at the base ... *S. karelinii* 6
- 6b. Shrubs seldom exceeding 60 cm high.
- 8a. Leaves and capsules quite glabrous.
- 9a. Petioles .125 - .25 cm long ... *S. fruticulosa* 5
- 9b. Petioles .5 - .75 cm long ... *S. flabellaris* 4
- 8b. Leaves never quite glabrous ; capsules hairy ... *S. sclerophylla* 9
- 1b. Undershrubs with prostrate stems, sending up short annual deciduous shoots ... *S. lindleyana* 7

1. **Salix acmophylla** Boiss. Diag. Pl. Or. Ser. 1, 7 : 98. 1846 ; Hook. f. Fl. Brit. Ind. 5 : 628. 1888. '*Bhains or Gad - Bhains*'.

Small deciduous shrubs or trees ; leaves lanceolate, acuminate, entire ; flowers after leaves ; filaments woolly towards base ; capsules glabrous.

Fl. & Fr. : February May.

Probably throughout the Central and outer hills ranges. 800 1800 m (Osmaston). Lit.

2. **S. acutifolia** Willd. Sp. Pl. 4(2) : 668. 1805. *S. daphnoides* Vill. Hist. Pl. Dauph. 3 : 765. 1789 ; Hook. f. Fl. Brit. Ind. 5 : 631. 1888. '*Bhains*'.

Small trees or large shrubs ; young shoots tomentose ; leaves ovate lanceolate, pale, bloomy beneath ; flowers before the leaves ; filaments glabrous.

Fl. & Fr. : March July.

Throughout the area. 1800 3500 m (Osmaston). Lit.

3. **S. denticulata** Anders. in Kungl. svnsk. Vet. Akad. Handl. 1850 : 481. 1851. *S. elegans* Wall. ex Anders. in Journ. Linn. Soc. Bot. 4 : 51. 1860 ; Hook. f. Fl. Brit. Ind. 5 : 630. 1888. '*Bhotiana or Bogchia*'.

Deciduous shrubs ; leaves ovate or oblong, pale white beneath ; flowers after the leaves : filaments villous in the lower half.

Fl. & Fr. : March July.

Hemkund, Rambara, Wan. 2500 4000 m (47965).

4. ***Salix flabellaris*** Anders. Vet. Akad. Handl. 1850 : 497. 1851 ; Hook. f. Fl. Brit. Ind. 5 : 634. 1888.

Procumbent shrubs ; leaves long petioled, obovate or broadly obovate, acute, pale beneath ; capsules ovoid, glabrous, red.

Fl. & Fr. : June July.

Bhyundar valley. 3500 5000 m (Smythe). Lit.

5. ***S. fruticulosa*** Anders. ex parte in Journ, Linn. Soc. 4 : 53. 1860. *S. furcata* Anders in Osmaston For. Fl. Kumaon 532. 1978 (rep. ed.).

Deciduous shrubs, 30 60 cm tall ; leaves glabrous, elliptic oblong or obovate, 3.5 cm long ; flowers with immature leaves.

Fl. & Fr. : May - October.

Alkapuri base. Bhyundar valley. 3500 m (39092).

6. ***S. karelinii*** Turcz Bull. Soc. Nat. Mosc. 27 (1) : 196. 1854. *S. hastata auct*, non L. sensu Hook. f. Fl. Brit. Ind. 5 : 630. 1888.

Deciduous shrubs ; branches from the base, curved ; leaves ovate or elliptic, serrate with gland tipped teeth ; male catkins with few leaves at the base.

Fl. & Fr. : July August.

Bhyundar valley. 3800 m (34985).

7. ***S. lindleyana*** Wall. ex Anders. in Kungl. Svensk. Vet. Akad. Handl. 1850 : 499. 1851 ; Hook. f. Fl. Brit. Ind. 5 : 634. 1888.

Small deciduous prostrate shrubs ; leaves elliptic oblong or oblong - lanceolate, entire or serrulate ; flowers after the leaves.

Fl. & Fr. : June July & October November.

Bhyundar valley, Rudranath, Wan. 3500 - 4500 m (44158).

8. ***S. sericarpa*** Anders. in Journ. Linn. Soc. Bot. 4 : 43. 1860. *S. oxycarpa* Anders. l. c. 45. 1860 ; Hook. f. Fl. Brit. Ind. 5 : 636. 1888.

Large deciduous shrubs ; leaves elliptic oblong, serrulate, pale glaucous beneath ; flowers with the leaves ; capsules .6 cm long.

Fl. & Fr. : April – May.

Hanumanchatti, Pandukeswar. 2500 m (2825).

9. **Salix sclerophylla** Anders. in Journ. Linn. Soc. Bot. 4 : 52. 1860 ; Hook. f. Fl. Brit. Ind. 5 : 630. 1888.

Bushy deciduous branching shrubs, 60 cm tall ; leaves silky pubescent, elliptic – oblong or ovate, entire ; capsules .37 cm long.

Fl. & Fr. : June – August.

Rimkhim. 4500 – 5000 m (Osmaston). Lit.

10 **S. wallichiana** Anders. in Sevensk. Vetensk. Akad. Handl. 1850 ; 477. 1851 ; Hook. f. Fl. Brit. Ind. 5 : 628. 1888. '*Bhains*'.

Deciduous large shrubs or small trees ; leaves lanceolate or ovate – lanceolate, usually entire, caudate, silky pubescent beneath ; flowers before leaves ; capsules .6 cm long.

Fl. : Fr. : May – July.

Throughout the central and inner ranges, Malari. 2000 – 3500 m (Osmaston). Lit.

136. HYDROCHARITACEAE

1a. Flowers uni-sexual ; perianth single	..	<i>Vallisneria</i> 2
1b. Flowers bi-sexual ; perianth double	...	<i>Blyxa</i> 1

1. BLYXA Noronha ex Thouars

Blyxa aubertii Rich. in Mem. Acad. Sci. Inst. France 12(2): 19 & 77, t. 4. 1812. *B. oryzetorum* (Dcne.) Hook. f. Fl. Brit. Ind. 5 : 661. 1888.

Submerged, tufted, stemless scapigerous herbs ; leaves linear 8 – 14 cm long ; flowers 2 – sexual ; stamens 3 ; fruits slender 2.5 cm long.

Fl. & Fr. : August.

Nandprayag near Alaknanda bank. 800 m (71081).

2. VALLISNERIA L.

Vallisneria natans (Lour.) Hara in Journ. Jap. Bot. 49 : 136. 1974.
V. spiralis auct. non L. Sensus. Hook. f. Fl. Brit. Ind. 5 : 660. 1888.

Submerged, stemless stoloniferous herbs ; leaves linear very long ;
flowers dioecious ; fruits linear many seeded.

Fl. & Fr. : June – July.

Gohna. 2000 m (10049).

137. ORCHIDACEAE

1a. Anther 1.

2a. Pollinia waxy.

3a. Pollinia without appendages, free (rarely attached
by their bases to a ball of translucent matters ;
pollinia 4.

4a. Sepals and petals widely spreading; lip diflexed and
decurved ; column not prolonged into a foot.

5a. Lip superior ; column very short.

6a. Leaves equitant fleshy ... *Oberonia* 31

6b. Leaves not equitant membranous ... *Malaxis* 27

5b. Lip inferior ; column long.

7a. Column winged near the apex ; lip with-
out spur ... *Liparis* 24

7b. Column without wings ; lip with a short
spur ... *Didickea* 11

4b. Sepals and petals $\pm$ connivent ; lip erect from the
base ; column prolonged into a foot.

- | | | |
|--|-----|-----------------------|
| 8a. Lip not articulates on the foot | ... | <i>Dendrobinm</i> 10 |
| 8b. Lip articulates on the foot | ... | <i>Bulbophyllum</i> 3 |
| 3b. Pollinia attached either with the appendages or by caudicles. | | |
| 9a. Pollinia not attached by a gland derived from the stigma. | | |
| 10a. Terrestrials without pseudobulbs. | | |
| 11a. Scape from a short, rhizome, flowering before the leaves appear | ... | <i>Pachystoma</i> 34 |
| 11b. Stem leafy ; flowers appearing with the leaves | ... | <i>Thunia</i> 41 |
| 10b. Epiphytes ; pseudobulbs or with jointed stems. | | |
| 12a. Column with a long foot ; pollinia 8 | ... | <i>Eria</i> 15 |
| 12b. Column without a foot ; pollinia 4. | | |
| 13a. Pseudobulbous ; flowering bracts deciduous | ... | <i>Coelogyne</i> 6 |
| 13b. Stems composed of elongate pseudobulb like joints | ... | <i>Pholidota</i> 37 |
| 9b. Pollinia attached by caudicles to a gland derived from the stigma. | | |
| 14a. Terrestrials ; leaves (when present) plicate. | | |
| 15a. Pollinia 8 | ... | <i>Calanthe</i> 4 |
| 15b. Pollinia 2 or 4. | | |
| 16a. Pollinia 2 | ... | <i>Eulophia</i> 16 |
| 16b. Pollinia 4 | ... | <i>Oreorchis</i> 33 |
| 14b. Epiphytes. | | |
| 17a. Pseudobulbs large, fleshy with long linear sheathing leaves ; lip not spurred | | <i>Cymbidium</i> 7 |
| 17b. Pseudobulbs none. | | |
| 18a. Stem short or very short not fleshy | ... | <i>kingidium</i> 23 |
| 18b. Stems elongated, fleshy. | | |
| 19a. Lip not spurred | ... | <i>Luisia</i> 26 |
| 19b. Lip spurred. | | |

- 20a. Column with a long foot, produced into a long spur ... *Aerides* 1
- 20b. Column without a foot or with only a short one.
- 21a. Spur deep, much compressed laterally pubescent at the mouth ; lip with side lobes ... *Rhynchostylis* 38
- 21b. Spur not deep, not compressed.
- 22a. Flowers large ; caudicles of pollinia broad ... *Vanda* 42
- 22b. Flowers small ; caudicles of pollinia narrow ... *Gastrochilus* 18
- 2b. Pollinia granular powdery.
- 23a. Pollinia attached by their sides without caudicles (except *Epipogium*) ; anthers terminal or dorsal.
- 24a. Anther dorsal ; pollinia 4 in pairs ... *Epipactis* 1
- 24b. Anther terminal.
- 25a. Pollinia 2 with caudicles ; lip spurred ... *Epipogium* 14
- 25b. Pollinia 2 or 4 without caudicles ; lip not spurred.
- 26a. Lip flat, pendulous ; sepals and petals free.
- 27a. Leafless scally herbs ... *Neottia* 28
- 27b. Leaves 2 - opposite or subopposite ... *Listera* 25
- 26b. Lip concave or convolute, not pendulous ; sepals united or free.
- 28a. Leafless saprophytes or parasites with brown or yellowish stems.
- 29a. Sepals and petals united into ventricose tube ... *Gastrodia* 19
- 29b. Sepals and petals free *Galeola* 17

- 28b. Non saprophytes or parasites ;
stems and leaves green.
- 30a. Leaf solitary, radical,
appearing after the
flowers ; pollinia 2 or 4... *Nervilia* 30
- 30b. Leaves several ; pollinia
4 in pairs ... *Cephalanthera* 5
- 23b. Pollinia attached to glands.
- 31a. Lip not spurred.
- 32a. Roots fibrous.
- 33a. Spikes spirally twisted ... *Spiranthes* 40
- 33b. Spikes straight, one sided ... *Goodyera* 20
- 32b. Roots tuberous ... *Herminium* 22
- 31b. Lip spurred.
- 34a. Roots fibrous.
- 35a. Leaves thick netted with yellow ;
spikes glandular pubescent ... *Anoectochilus* 2
- 35b. Leaves membranous not netted with
yellow ; spikes glandular pubescent... *Zeuxine* 43
- 34b. Roots tuberous.
- 36a. Glands of pollinia enclosed in a
pouch.
- 37a. Stem stout ; leaves 3 or more ... *Dactylorhiza* 9
- 37b. Stem slender ; leaves 1 - 3 ... *Orchis* 32
- 36b. Glands of pollinia naked.
38. Spur one.
- 39a. Spur long cylindric.
- 40a. Flowers large more
than 5 cm across ;
stigma sessile ... *Pecteilis* 35
- 40b. Flowers small, less
than 3 cm across ;
stigma with distinct
appendage ... *Habenaria* 21
- 39b. Spur scortiform, conical
vermiform or fusiform.

- 41a. Flowers not secund ;
spur very short or
saccate ... *Peristylus* 36
- 41b. Flowers secund ; spur
inflated.
- 42a. Leafless brown
herbs ; lip pendul-
ous, bifid ... *Neottianthe* 29
- 42b. Leaf usually solit-
ary ; lip entire,
decurved beyond
the middle ... *Diphylax* 12
- 38b. Spurs two ... *Satyrium* 39
- 1b. Anthers 2 ; pollen grains not cohering in pollinia ; lip folded,
forming an inflated pouch ... *Cypripedium* 8

1. AERIDES Lour.

Aerides multiflorum Roxb. Corom. Fl. 3 : 68, t. 271. 1820 ; Hook.
f. Fl. Brit. Ind. 6 : 44. 1890.

Epiphytes ; stems stout ; flowers white or rose – purple.

Fl. & Fr. : April – September.

Batwalchari, Kanara – Mohankhal. 1000 – 2000 m (27250).

2. ANOECTOCHILUS Bl. nom. cons.

Anoectochilus roxburghii (Wall.) Lindl. in 'Royle, Ill. Bot. Himal.
368. 1839. *Chrysobaphus roxburghii*. Wall Tent. Fl. Nep. 37, t. 27. 1826 ;
Hook. f. Fl. Brit. Ind. 6 : 95. 1890.

Terrestrial creeping herbs ; leaves petioled ovate or lanceolate, netted
with golden nerves.

Fl. & Fr. : July – August.

Garhwal ascending 2000 m (Duthie). Lit.

3. BULBOPHYLLUM Thouars nom. cons.

- 1a. Leaves thick narrowly oblong, notched at the apex ; fruits narrowly oblong, long stipitate, 2.5 - 3 cm long ... *B. umbellatum* 2
- 1b. Leaves thin broadly oblong acute ; fruits oblong globose, 1-1.5 cm long ... *B. cariniflorum* 1

1. *Bulbophyllum cariniflorum* Rechb. f. Walp. Ann. 6 : 253. 1861.
B. densiflorum Rolfe, Kew Bull. 139. 1892.

Pseudobulbs globose; leaves broadly oblong – lanceolate, acuminate upto 20 cm long ; flowering scape 15 cm long ; flowers yellow.

Fl. & Fr. : September - October.

Mondal area, 1600 m (41986).

2. *B. umbellatum* Lindl. Gen. & Sp. Orch. 56. 1830. *Cirrhopetalum maculosum* Lindl. in Edgew. Bot. Reg. 27, Misc. 81. 1841 ; Hook. f. Fl. Brit. Ind. 5 : 776. 1890.

Pseudobulbs, ovoid, wrinkled ; leaves sessile ; flowers cream – white.

Fl. & Fr. : May – October.

Mondal area, Phata. 1600 m (43963).

4. CALANTHE R. Br. nom. cons.

1a. Flowers without a spur.

2a. Sepals and petals green ; lip orange red, apical lobe with 3 - prominent ridge ... *C. tricarinata* 7

2b. Flowers lavender - coloured ; apical lobe of lip without ridge ... *C. puberula* 6

1b. Flowers with spur.

3a. Spur very short straight, conical.

- 4a. Lip attached to whole length of column ; flowers small
sepals and petals chocolate - brown ... *C. mannii* 3
- 4b. Lip attached to column for half its length; flowers large,
dull purple ... *C. brivicornu* 2
- 3b. Spur as long or nearly as long as the ovary.
 - 5a. Lateral lobes of lip incumbent on the terminal lobe ;
flowers white, the lip with a violet blotch at the base;
spur shorter than the ovary ... *C. alismaefolia* 1
 - 5b. Lateral lobes of lip spreading, not incumbent on the
apical one ; spur slender as long as the ovary.
 - 6a. Flowers small, crowded, greenish-yellow ... *C. pachystalix* 4
 - 6b. Flowers longer, distant, violet ... *C. plantaginea* 5

1. *Calanthe alismaefolia* Lindl. Fol. Orch. Cal. 8. 1854 ; Hook. f. Fl. Brit. Ind. 5 : 849. 1890.

Pseudobulbs thin, cylindric ; flowers white with spurs.

Fl. & Fr. : July – August.

Garhwal. 1500 – 2000 m (Duthie). Lit.

2. *C. brivicornu* Lindl. Gen. & Sp. Orch. 251. 1833 ; Hook. f. Fl. Brit. Ind. 5 : 848. 1890.

Stout herbs, 10 – 20 cm long ; leaves sessile or petioled, oblong lanceolate, acuminate ; flowers red, purple streaked.

Fl. & Fr. : September – October.

Bhyundar valley. 2000 – 2800 m (24507).

3. *C. mannii* Hook. f. Fl. Brit. Ind. 5 : 850. 1890.

Very stout erect herbs ; leaves 2 – 3, lanceolate ; flowers very pubescent, yellow.

Fl. & Fr. : May – June.

Sitapur. 1600 m (47915).

4. *C. pachystalix* Rechb. f. ex Hook. f. Fl. Brit. Ind. 5 : 850. 1890.
Stems short, swollen at the base; flowers greenish – yellow with spur.

Fl. & Fr. : July – August.

Garhwal. 1500 – 2000 m (Duthie). Lit.

5. ***Calanthe plantaginea*** Lindl. Gen. & Sp. Orch. 250. 1833 ; Hook. f. Fl. Brit. Ind. 5 : 853. 1890.

Stems enclosed within long tubular sheaths ; flowers large purple with spur.

Fl. & Fr. : April – May.

Garhwal. 3000 m (F. B. I.). Lit.

6. ***C. puberula*** Lindl. Gen. & Sp. Orch. 252. 1833 ; Hook. f. Fl. Brit. Ind. 5 : 848. 1890.

Flowering stem 30 – 40 cm long ; leaves 5 – 7, very unequal obovate – lanceolate : flowers pale – lavender ; spur none.

Fl. & Fr. : August – September.

Gopeswar – Mondal. 2000 m (28589).

7. ***C. tricarinata*** Lindl. Gen. & Sp. Orch. 252. 1833 ; Hook. f. Fl. Brit. Ind. 5 : 847. 1890.

Pseudobulbs, broadly ovoid ; leaves 2 – 4, oblanceolate ; flowers fgreenish – red with spur.

Fl. & Fr. : May – July.

Amritganga valley, Pangarbasha. 2000 – 3500 m (44120).

5. CEPHALANTHERA Rich.

Cephalanthera longifolia (L.) Fritsch. Oester. Bot. Zeit – Schr. 38 : 81. 1888. *Serapias helleborine* var. *longifolia* L. Sp. Pl. 950. 1753. *C. ensifolia* Rich. in Mem. Mus. Hist. Nat. Paris 4 : 60. 1818 ; Hook. f. Fl. Brit. Ind. 5 : 125. 1890.

Erect herbs with grooved stems ; leaves sessile ; flowers white.

Fl. & Fr. : May – July.

Anusuyia area, Ghangaria. 1500 – 3500 m (39010).

6. COELOGYNE Lindl.

Coelogyne cristata Lindl. Coll. Bot. Sub t. 33. 1824 ; Hook. f. Fl. Brit. Ind. 5 : 829. 1890.

Pseudobulb ovoid, cylindric ; leaves 2 in pairs ; flowers, large white.

Fl. & Fr. : September – October.

Chamoli, Mondal area. 1650 m (41977).

7. CYMBIDIUM Swartz.

1a. Terrestrials.

2a. Leafless and parasitic herbs ... *C. macrorhizon* 4

2b. Leaves linear, their bases forming a short pseudo - stem ;
flowers in racemes ... *C. cyperifolium* 1

1b. Epiphytes ; inflorescence decurved ; flowers large.

3a. Leaves narrowly linear ... *C. erythraeum* 3

3b. Leaves lanceolate, acuminate ... *C. iridioides* 2

1. **Cymbidium cyperifolium** Lindl. Gen. & Sp. Orch. 163. 1833 ; Hook. f. Fl. Brit. Ind. 6 : 13. 1890.

Pseudobulb thin ; leaves linear ; flowers in racemes, fragrant, greenish.

Fl. : & Fr. : July – August.

Garhrwal. 1800 m (Duthie). Lit.

2. **C. iridioides** D. Don, Prodr. Fl. Nep. 36. 1825. *C. giganteum* Wall. ex Lindl. Gen. & Sp. Orch. 163. 1833 non Sw. 1800 ; Hook. f. Fl. Brit. Ind. 6 : 12. 1890.

Robust epiphytes ; leaves linear or elongate linear lanceolate acute ; scape very robust 6 – 12 flowered : flowers green, streaked with red.

Fl. & Fr. : May – October.

Mondal, Narayankoti. 1600 m (43915).

3. **Cymbidium erythraeum** Lindl. in Journ. Proc. Linn. Soc. Bot. 3 : 30. 1859. *C. longifolium* auct. non. D. Don Sensu Hook. f. Fl. Brit. Ind. 6 : 13. 1890.

Leaves very narrow, 60 – 90 cm long ; scape many flowered ; flowers greenish streaked with red or purple.

Fl. & Fr. : July – August.

Garhwal. 1500 m (Duthie). Lit.

4. **C. macrorhizon** Lindl. Gen. & Sp. Orch. 162. 1833 ; Hook. f. Fl. Brit. Ind. 6 : 9. 1890.

Rootstock creeping, branched and jointed ; scape very short ; racemes 6 – 8 flowered ; flowers pale yellow tinged with pink.

Fl. & Fr. : June July.

Masoli – Trisula. 1800 m (44223).

8. CYPRIPIEDIUM L.

1a. Leaves 2, opposite on the stem, plicate ... *C. elegans* 2

1b. Leaves several alternate, plaited.

2a. Sepals and petals green or pale - yellow, lip white ... *C. cordigerum* 2

2b. Sepals and petals streaked with red, lip purplish ... *C. himalaicum* 3

1. **Cypripedium cordigerum** D. Don, Prodr. Fl. Nep. 37. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 170. 1890.

± Glabrous erect herbs ; leaves spreading, ovate lanceolate, acute ; scape 30 – 60 cm long ; flowers solitary, terminal, greenish – white.

Fl. & Fr. : May – October.

Ghangaria, Trijuginarayan. 2500 – 3000 m (47985).

2. **C. elegans** Rechb. f. in Flora 59 : 561. 1886 ; Hook. f. Fl. Brit. Ind. 6 : 169. 1890.

Erect hairy herbs, leafy below ; leaves orbicular ovate ; flower solitary, greenish - purple.

Fl. & Fr. : June.

Bajmora, Bhyundar valley. 3000 - 4000 m (39092).

3. **Cypripedium himalaicum** Rolf apud Hemsl. in Journ. Linn. Soc. 29 : 319. 1892. *C. macranthon* auct. non Swartz. Sensus Hook. f. Fl. Brit. Ind. 6 : 170. 1890, *p.p.*

Erect herbs 20 - 40 cm long ; stem clothed with 2 - 4 loose sheaths ; leaves 3, upto 8.5 cm long, ovate elliptic or oblong ; flower purplish.

Fl. & Fr. : September.

Kedarnath. 3800 m (8703).

9. DACTYLORHIZA Nevski

Dactylorhiza hatagirea (D. Don) Soo Nom. Nov. Gen. Dactylorhiza 4. 1962. *Orchis hatagirea* D. Don, Prodr. Fl. Nep. 23. 1825. *O. latifolia* auct. *Plur.* non L. sensu Hook. f. Fl. Brit. Ind. 6 : 127. 1899. '*Hattazari*'.

Tubers palmate ; stem tall, fistular ; flowers lilac or white.

Fl. & Fr. : June - October.

Amritganga & Bhyundar valleys. 2500 - 4000 m (10288).

10. DENDROBIUM Swartz. nom. cons.

1a. Stems pseudobulbous ; flowers small ... *D. monticola* 4

1b. Stems elongate ; flowers usually large.

2a. Flowers pale yellow, or white with yellow, lilac or purple markings.

3a. Posterior portion of lip convolute.

4a. Lip about as broad as long, without side lobes ... *D. primulinum* 6

- 4b. Lip longer than broad, with convolute side lobes *D. amoenum* 1
- 3b. Lip not convolute, without side lobes ... *D. crepidatum* 2
- 2b. Flowers large yellow, often with purplish blotches on the lip.
- 5a. Petals and lip not fimbriate on the margins ; stems erect ... *D. normale* 5
- 5b. Petals and lip with fimbriate margins ... *D. fimbriatum* 3

1. **Dendrobium amoenum** Wall. ex Lindl. Gen. & Sp. Orch. 78. 1830 ; Hook. f. Fl. Brit. Ind. 5 : 738. 1890.

Stem slender ; inflorescence lateral ; flowers white with violet tip.

Fl. & Fr. : April June.

Mondal area. 1650 m (58402).

2. **D. crepidatum** Lindl. & Pax. Fl. Gard. 1 : 63, fig. 45. 1850 ; Hook. f. Fl. Brit. Ind. 5 : 740. 1890.

Pseudobulbs greenish ; flowers yellow in pairs.

Fl. & Fr. : April May.

Garhwal. 1500 1600 m (Falconer). Lit.

3. **D. fimbriatum** Hook. Ex. Fl. 1 : t. 71. 1823 ; Hook. f. Fl. Brit. Ind. 5 : 745. 1890 ; non *D. fimbriatum* (Bl.) Link. 1830.

Suberect sulcate herbs ; leaves oblong lanceolate, acuminate ; flowers yellow ; lip fimbriate.

Fl. & Fr. : September October,

Mondal area. 1600 m (41969).

4. **D. monticola** Hunt & Summerhayes Taxon 10 : 110. 1961. *D. alpestre* Lindl. in Royle, Ill. Bot. Himal. t. 88, f. 2. 1835 ; op. cit. 370. 1839 ; Duthie in Ann. Roy. Bot. Gdn. Cal. 9 : 65, t. 97. 1906.

Pseudobulbs small, elongate ; leaves linear - lanceolate ; flowers reddish white.

Fl. & Fr. : August October.

Gaurikund, Trijuginarayan. 1600 - 2200 m (38630).

5. **Dendrobium normale** Falc. Proc. Linn. Soc. 1 : 14 : 1839 ; Hook. f. Fl. Brit. Ind. 5 : 784. 1890.

Stem erect, terete ; flowers golden yellow, sweet scented.

Fl. & Fr. : May June.

Mondal area. 1600 m (43978).

6. **D. primulinum** Lindl. Gdn. Chron. 1858 : 400. 1858 ; Hook. f. Fl. Brit. Ind. 5 : 735. 1890.

Short pendulous herbs ; leaves coriaceous, broadly oblong ; flower solitary, purple or white.

Fl. & Fr. : July August.

Garhwal. 1600 – 2000 m (Duthie). Lit.

11. DIDICIEA King & Prain

Didiciea cunninghamii King & Pant. in Journ. As. Soc. Bengal 65 (2) : 119. 1895.

Tuberous herbs ; leaves at the base dirty brown, broadly ovate ; petioled ; flowering scapes, 17 – 28 cm long ; flowers amber coloured.

Fl. & Fr. : August October.

Ghangaria. 3100 m (29389). Rare.

12. DIPHYLAX Hook. f.

Diphylax griffithii (Hook. f.) Krzl. Orch. Gen. & Sp. 1 : 599. 1901.
Habenaria griffithii Hook. f. Fl. Brit. Ind. 6 : 197. 1890.

Slender, flexuous or erect herbs ; spikes densely flowered ; flowers white.

Fl. & Fr. : April - May.

Bagrigar. 1800 m (37210).

13. EPIPACTIS Zinn. nom. cons.

- 1a. Flowers usually in dense racemes, hypochile globular - sccate ;
epichile ovate - cordate ... *E. helleborine* 1
- 1b. Flowers distant ; hypochile trough - shaped ; epichile lanceo-
late ... *E. veratrifolia* 2

1. *Epipactis helleborine* (L.) Crantz, Strip, Austr. ed. 2, 2 : 467. 1769. *Serapias helleborine* L. Sp. Pl. 949. 1753. *E. latifolia* (L.) All, Fl. Pedem. 2 : 152. 1785 ; Hook. f. Fl. Brit. Ind. 6 : 125. 1890.

Tall slender herbs ; leaves orbicular, ovate, glabrous ; flowers in dense raceme, green.

Fl. & Fr. : June October.

Amritganga & Bhyundar valleys. 1500 3000 m (10288).

2. *E. veratrifolia* Boiss. & Hoen. in Boiss. Diagn. Fl. or Nov. Ser. 2, 13 : 11, 1854. *E. consimilis* Hook. f. Fl. Brit. Ind. 6 : 126. 1890, non D. Don.

Leaves lanceolate, acuminate ; flowers orange - green.

Fl. & Fr. : April - May.

Garhwal. 1000 m (Falconer). Lit.

14. EPIPOGIUM R. Br.

- 1a. Roots coralloid ; lip 3 - lobed ... *E. aphyllum* 1
- 1b. Roots tuberous ; lip entire ... *E. roseum* 2

1. *Epipogium aphyllum* (Schmidt) Sw. Summa Veget. Scand. 32. 1814. *Orchis aphylla* Schmidt in May. Sammal. Phys. Aufs. 1 : 240. 1791, non forssk. 1775 ; Hook. f. Fl. Brit. Ind. 6 : 124. 1890.