

FLORA OF CHANDRA PRABHA WILDLIFE SANCTUARY, UTTAR PRADESH



भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA

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Authors

**Achuta Nand Shukla
Nitisha Srivastava**



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MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
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Achuta Nand Shukla

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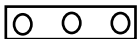
This e-book is a part of the mission to complete quick publication of manuscripts and the research results addressing a portion of the larger prospective on the subject for the projects carried out at Botanical Survey of India. This is for the immediate dissemination of research findings in the public domain for use of the stakeholders and general public. The book has not gone through any editorial process and the entire content, expressed opinions, design, layout etc. solely belong to the authors.

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Front Cover : 1. Vegetation along water bodies

Back Cover :



1. Rajdari waterfall
2. *Cleome viscosa* L.
3. Vegetation along Chandra Prabha River

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निदेशक
A. A. Mao
Director



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भारतीय वनस्पति सर्वेक्षण
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST
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BOTANICAL SURVEY OF INDIA



FOREWORD

Botanical Survey of India, the apex plant taxonomic institution of the country, working relentlessly towards survey and documentation of national floristic wealth. Floristic assessment of protected areas comes directly under the mandate of Botanical Survey of India as it is very crucial towards conservation and management of Endangered, Endemic and Threatened taxa.

Botanical Survey of India has completed the floristic documentation of Chandra Prabha Wildlife Sanctuary in Uttar Pradesh through extensive field survey and research over a period of three years. The Chandra Prabha Wildlife Sanctuary is the first declared sanctuary in Uttar Pradesh and known for its rich floristic composition with mesmerizing scenic beauty. Results of this floristic studies has been presented in the form of an e-book 'Flora of Chandra Prabha Wildlife Sanctuary, Uttar Pradesh' in which 270 plant species under 208 genera and 73 families have been documented. The taxonomic information, morphological features and photographs provided are useful for identification of these plants.

I congratulate the authors for their noteworthy effort in documenting the floristic wealth of such an ecologically sensitive habitat. This e-book is anticipated to be beneficial for the scholars, students, scientists and policy makers who are interested in floristic diversity and conservation aspects of Indian plants.

(A.A. MAO)



PREFACE

Chandra Prabha Wildlife Sanctuary was the first declared wildlife sanctuary in Uttar Pradesh which was recognized in 1957. The sanctuary spread between Chakia and Naugarh of Chandauli District, covering an area of 78 square kilometers. During the period of 1957 to 1970 it was famous for Asiatic Lions and it is also important for palaeoecological studies.

The floristic exploration of Chandra Prabha Wildlife Sanctuary was conducted by the Botanical Survey of India from 2015 to 2017. During the intensive floristic survey total 270 species belonging 73 families of angiosperm and pteridophytes have been recorded. The book is having details of all the forests types in the sanctuary. List of families along with their representative genera and species have also been provided in tabular form. Systematic treatment contains proper and easy key for each genera and species for its delimitations. Each species is provided with its correct nomenclature, proper protologue, citations, descriptions along with flowering-fruiting and specimen examined. Coloured photographs have also been provided for the easy identification of the plants in field.

We hope this book is definitely going to attract readers, forest officials, scholars, policy makers, scientists, teachers and nature lovers. This will also play a key role in making conservation strategies for Chandra Prabha Wildlife sanctuary and also for their biodiversity conservation.

A.N. Shukla
Nitisha Srivastava

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Authors are equally thankful to the Principal Chief Conservator of Forests, Uttar Pradesh and DFO Chandauli district for providing logistic support in the field from time to time.

A.N. Shukla
Nitisha Srivastava

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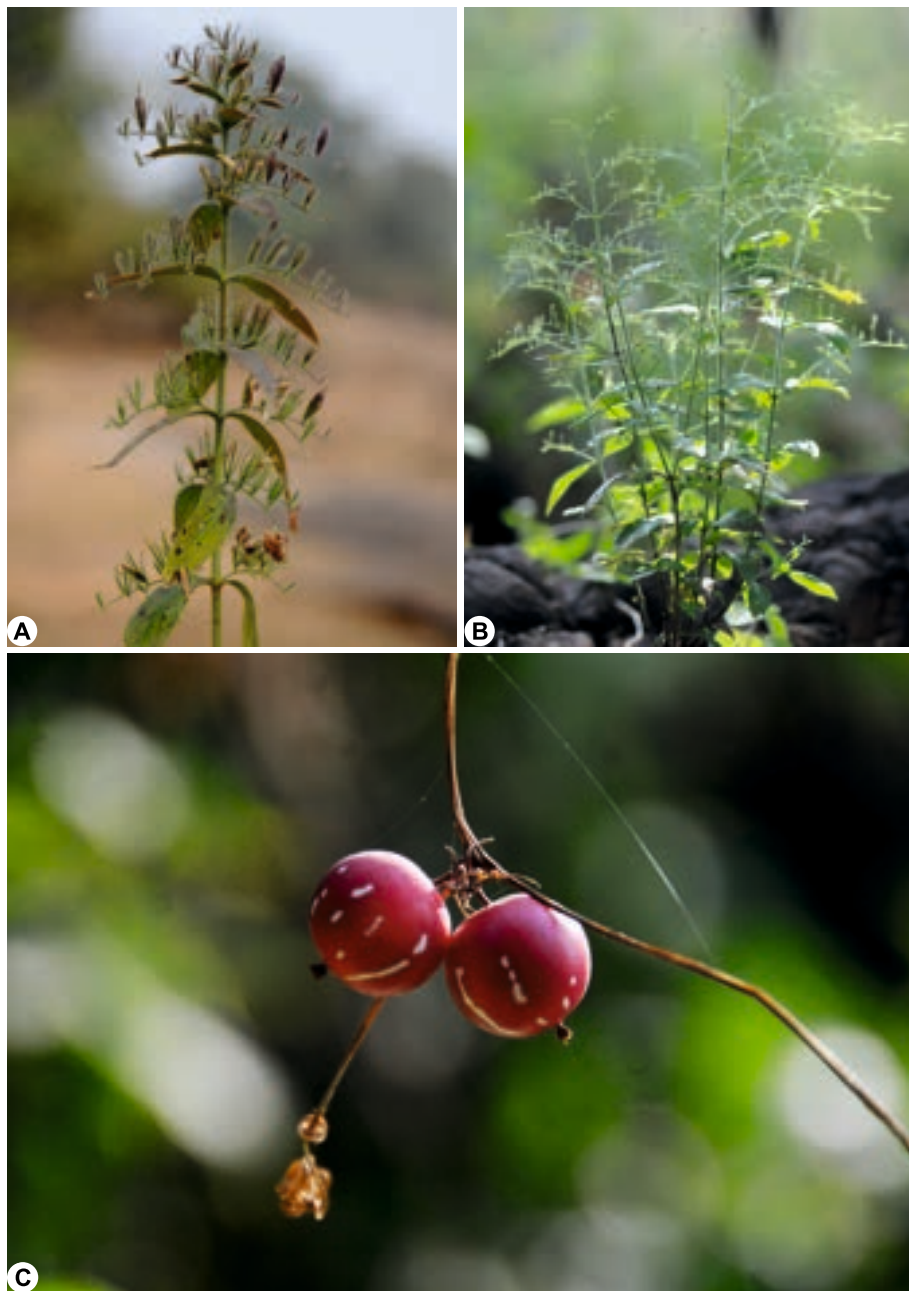


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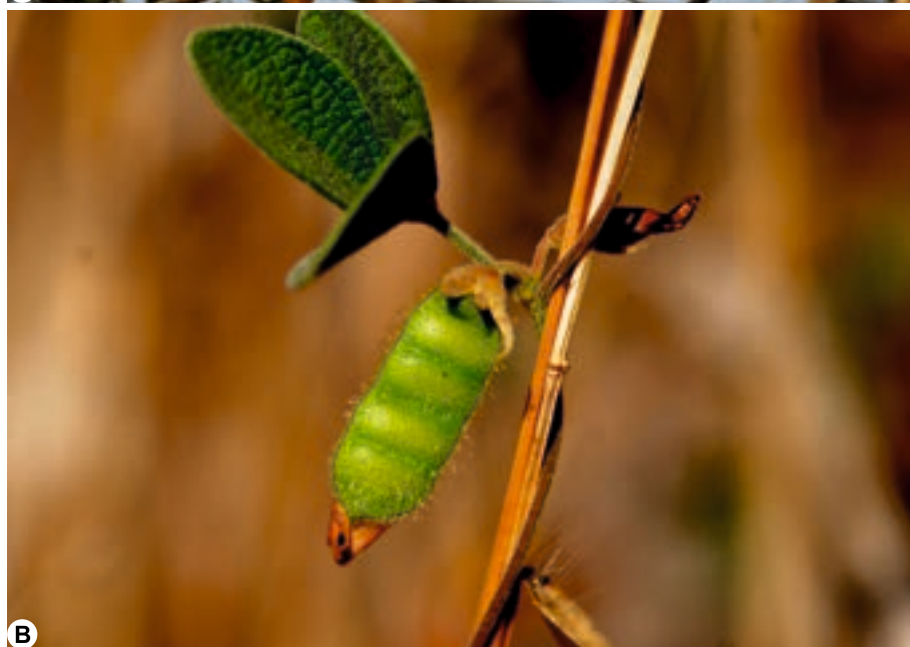


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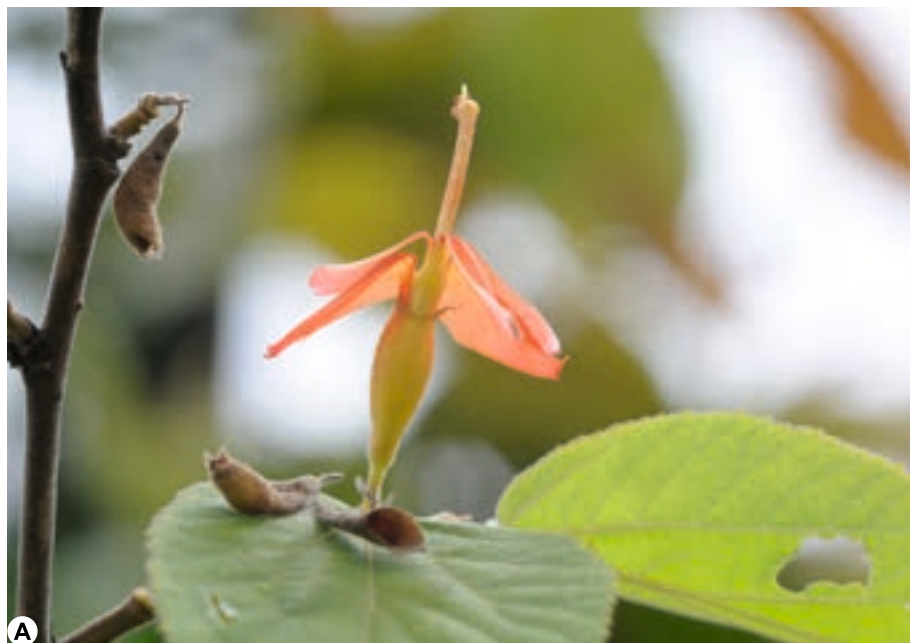


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Photo: K. Ravikumar



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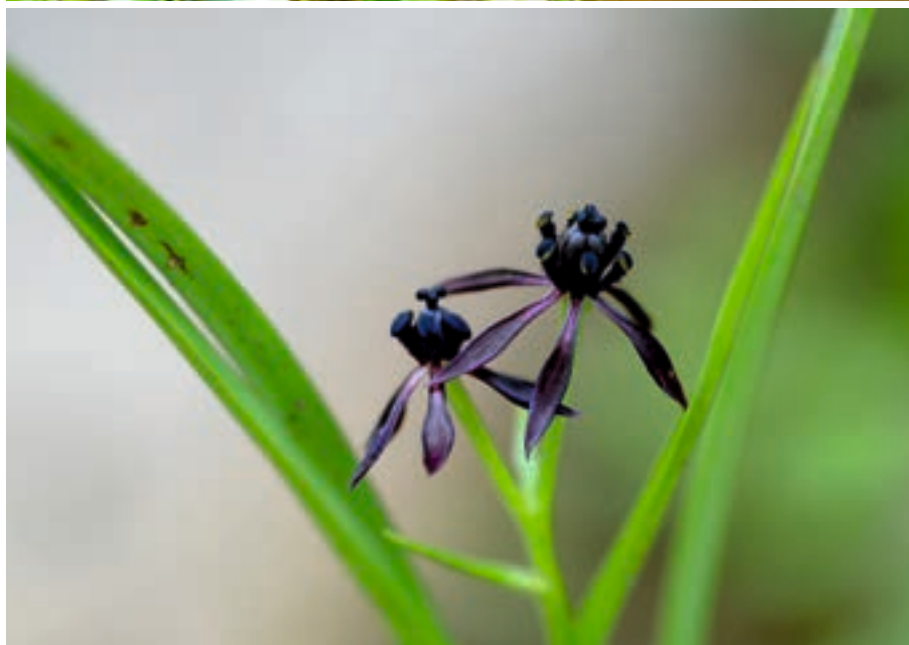


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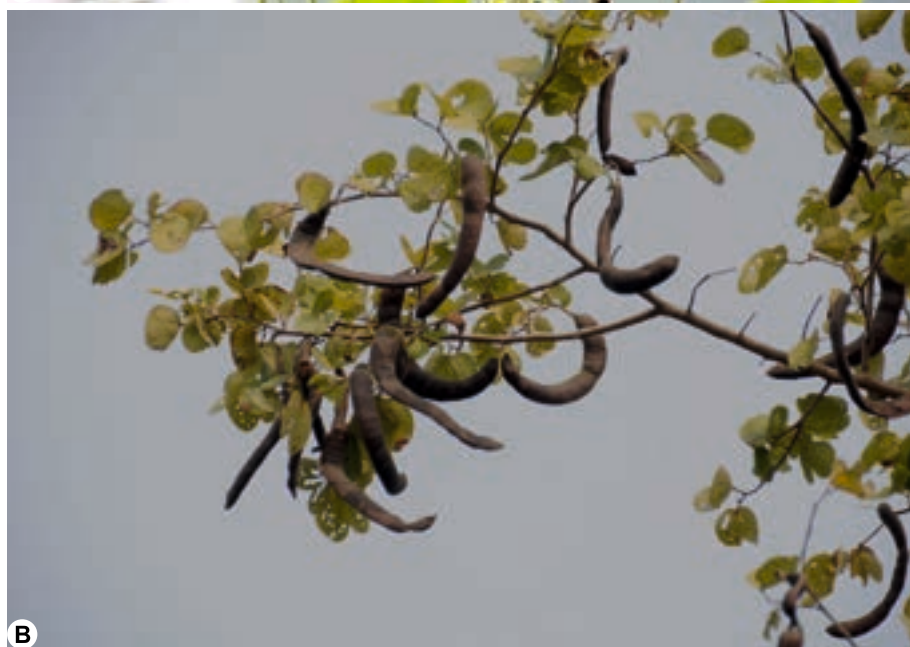


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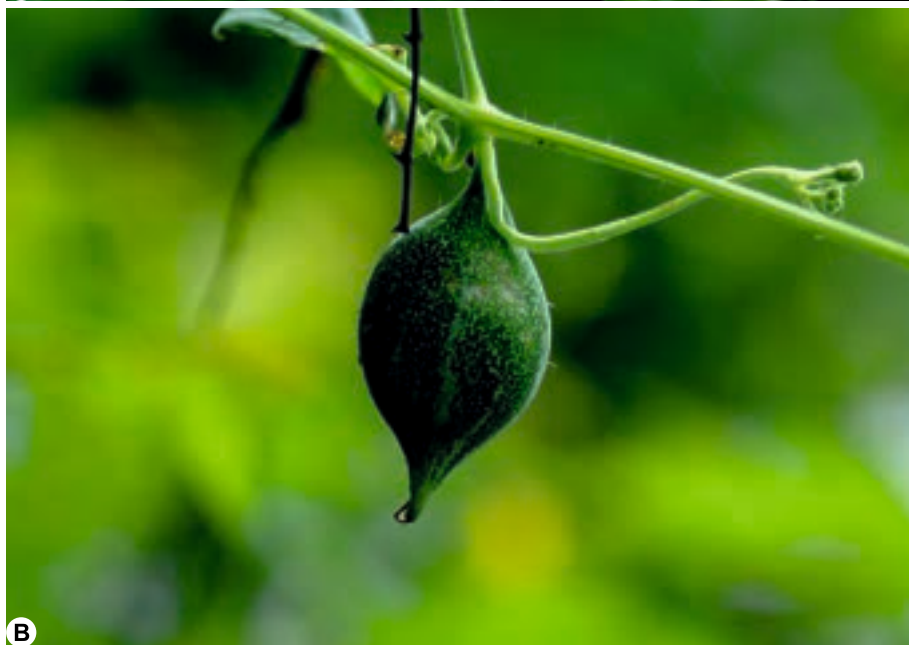


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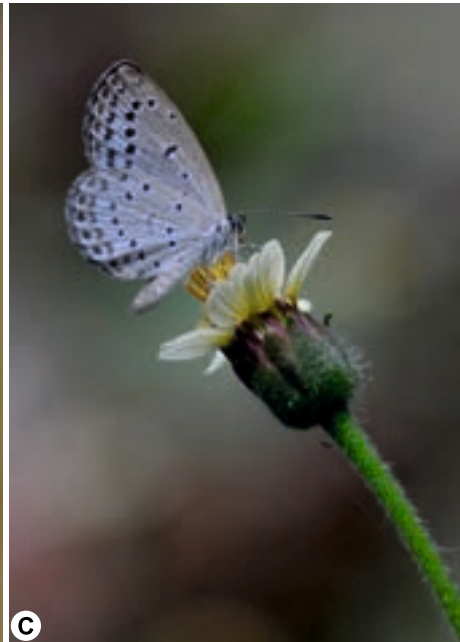


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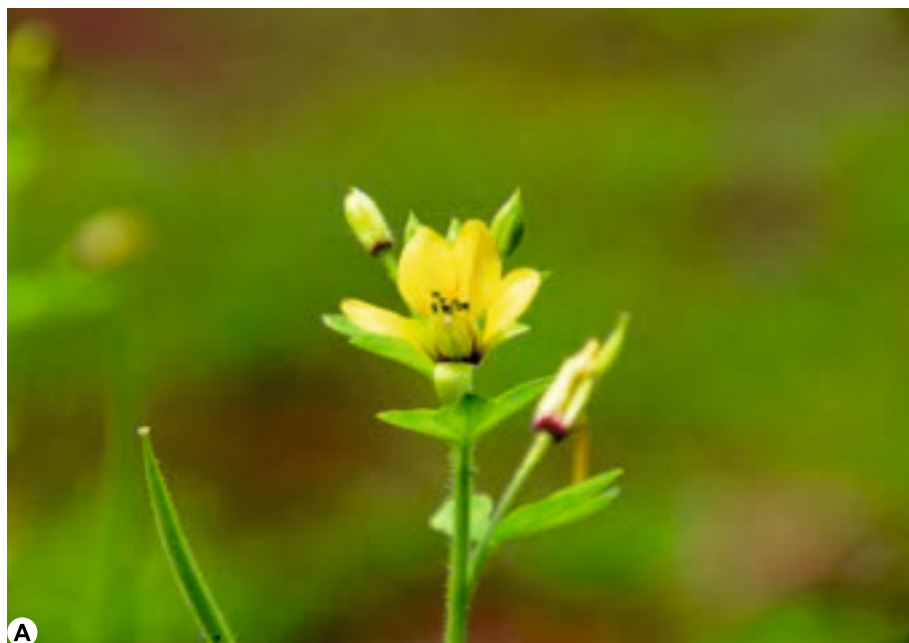


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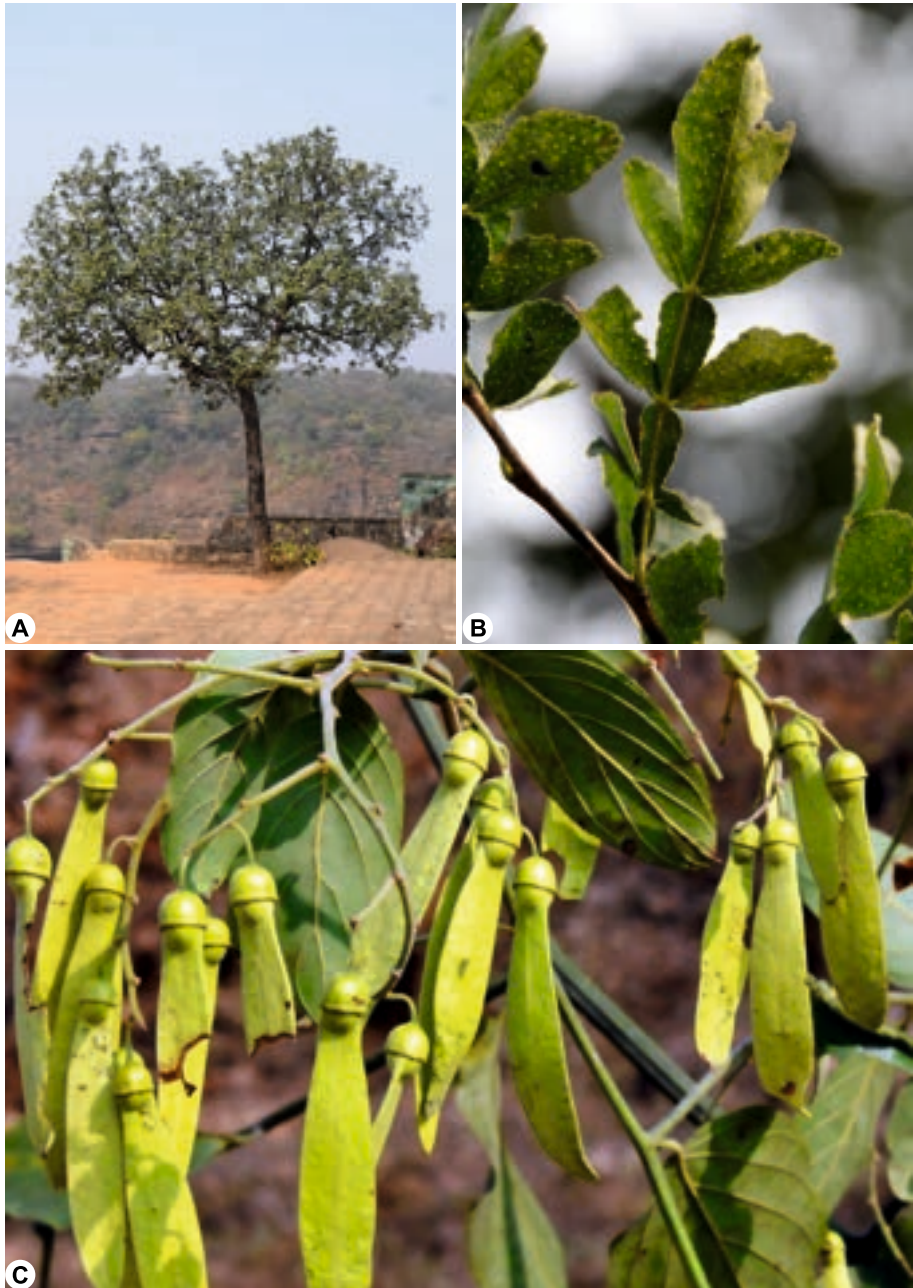


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Photo: V. Sampath Kumar



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INTRODUCTION

Chandra Prabha Wildlife Sanctuary situated in Chandauli district, in the south-eastern part of Uttar Pradesh. The Sanctuary is spread between the area, Chakia and Naugarh (Map 1), having rich vegetation over an area of 78 square kilometres. The area lies (Map 2) between the latitudes 24°52'0''N to 25°3'55'' and 83°03'24''E to 83°22'55'' longitudes. The Sanctuary was recognized in 1957 and it is the first declared Wildlife sanctuary of Uttar Pradesh. It was famous for the Asiatic Lion during 1957 to 1970. The place has also been gifted with attractive natural sceneries, picnic spots, intense forest, river and beautiful waterfalls. Two waterfalls namely Rajdari and Devdari are famous for the picnic spot.

Map 1: Location of Chakia and Naugarh in Chandauli district



Map of India showing location of Uttar Pradesh





Map 2: Chandra Prabha Wildlife Sanctuary area map

Forest Types:

1. Tropical mixed deciduous:

These forests occur on the gentle slopes of hills and valleys and predominant in localities like near Devdari fall, Baliari Block, and Near Jamsoti. They represent three layers viz., trees, shrubs and herbs, intermingled with climbers. The dominant tree species are represented by *Acacia catechu*, *A. leucophloea*, *A. nilotica* subsp. *indica*, *Aegle marmelos*, *Ailanthus excelsa*, *Anogeissus latifolia*, *Azadirachta indica*, *Bauhinia purpurea*, *Bridelia retusa*, *Butea monosperma*, *Cassia fistula*, *Ficus arnottiana*, *F. benghalensis*, *F. racemosa*, *Flacourtia indica*, *Grewia tiliifolia*, *Haldina cordifolia*, *Lagerstroemia parviflora*, *Pongamia pinnata*, *Kavalama urens*, *Terminalia bellirica*, *T. arjuna*, *T. chebula*, *Ziziphus oenoplia*, *Z. xylopyrus*, etc.

The shrubby layer is usually formed by the species like *Carissa opaca*, *Lantana camara*, *Flacourtia indica*, *Helicteres isora*, *Woodfordia fruticosa*, *Nyctanthes arbor-tristis*, etc.

The common climber species are found on trees and shrubs or sometimes spreading on ground and represent species like *Abrus precatorius*, *Ampelocissus latifolia*, *Cissampelos pareira* var. *hirsuta*, *Gymnema sylvestre*, *Hemidesmus indicus*, *Tinospora cordifolia*, etc.

The herbaceous species are abundant in open forest pockets or on its margins, and include *Senna tora*, *Heteropogon contortus*, *Hyptis suaveolens*, *Tephrosia purpurea*, etc. large number of grasses and sedges also contribute to this vegetation. On dry

ridges species like *Euphorbia neriifolia*, *Nyctanthes arbor-tristis*, *Kavalama urens*, etc. are found. *Dendrocalamus strictus*, a common bamboo, often occurs in patches in the forest. *Diospyros melanoxylon*, *Ficus racemosa*, *Terminalia bellirica*, *T. arjuna* are commonly found along perennial streams and moist ravines.

2. Scrub and thorn forests:

These forests represent in the dry parts of the area and are generally on level ground. The biotic interferences and excessive grazing pressure has resulted in sparse tree layers and discontinuous vegetation, while shrubs become comparatively dense. These are characterized by stunted growth, many stemmed trees and shrubs with small thorn bushes. The common plants recorded in this area are *Acacia* spp., *Butea monosperma*, *Carissa opaca*, *Calotropis gigantea*, *Calotropis procera*, *Euphorbia neriifolia*, *Lagerstromia parviflora*, *Mimosa himalayana*, *Woodfordia fruticosa*, etc.

3. Ravinous vegetation:

Along the ravines and steeps, the common plant species are *Tribulus terrestris*, *Butea monosperma*, etc. The flat river bank areas are used as cultivated land and the common trees species in this area are *Acacia nilotica* ssp. *indica*, *Ziziphus mauritiana*, *Mallotus philipensis*, *Carissa opaca*, *Flacourtia indica*, *Mimosa himalayana*, *Bauhinia racemosa*, and *Euphorbia neriifolia*, etc. Climbers and twiners are *Bauhinia vahlii*, *Cissampelos pareira* var. *hirsuta* and many species of Cucurbitaceae and Convolvulaceae. The common herbaceous species in the area are *Blainvillea acmella*, *Tribulus terrestris*, *Rungia pectinata*, etc. The grass cover consists of *Apluda mutica*, *Chrysopogon zizanioides*, *Digitaria ciliaris*, *Heteropogon contortus*, etc.

4. Grasslands:

Grasslands are found in places where clearing of the forests is done or those plain areas where the grass species are growing in abundance. Some common grass species found in these areas are *Apluda mutica*, *Cynodon dactylon*, *Dichanthium annulatum*, *Digitaria ciliaris*, *Mnesithea laevis*, *Saccharum spontaneum*, *Setaria pumila*, *Sporobolus indicus* var. *flaccidus*, *Chrysopogon zizanioides*, *Digitaria ciliaris*, *Heteropogon contortus*, *Echinochloa colona*, *Eragrostis gangetica*, *Eragrostis amabilis*, *Eragrostis uniolooides*, *Ischaemum rugosum*, etc.

Floristic Analysis:

An intensive and extensive survey of the area and critical study of the plants have resulted in the documentation of 270 species, distributed under 208 genera and 73 families. Of these, 5 species, under 5 genera and 5 families belong to Pteridophytes and 265 species of angiosperms distributed over 203 genera and belonging to 68 families. Among them, the dicotyledonous flora represents 202 species from 152 genera belonging to 55 families and the monocotyledonous flora with 63 species from 51 genera belonging to 13 families.

Table 1. Families are arranged according to the number of species

| Sl. No. | Family | No. of Genera | No. of Species |
|---------|-----------------|---------------|----------------|
| 1. | SELAGINELLACEAE | 1 | 1 |
| 2. | ISOETACEAE | 1 | 1 |
| 3. | LYGODIACEAE | 1 | 1 |
| 4. | PARKERIACEAE | 1 | 1 |
| 5. | MARSILEACEAE | 1 | 1 |
| 6. | MENISPERMACEAE | 2 | 2 |
| 7. | NYMPHAEACEAE | 1 | 1 |
| 8. | CLEOMACEAE | 1 | 1 |
| 9. | VIOLACEAE | 1 | 1 |
| 10. | POLYGALACEAE | 1 | 1 |
| 11. | MALVACEAE | 4 | 7 |
| 12. | STERCULIACEAE | 4 | 4 |
| 13. | TILIACEAE | 2 | 3 |
| 14. | ZYGOPHYLLACEAE | 1 | 1 |
| 15. | OXALIDACEAE | 1 | 1 |
| 16. | RUTACEAE | 3 | 3 |
| 17. | SIMAROUBACEAE | 1 | 1 |
| 18. | MELIACEAE | 1 | 1 |
| 19. | CELASTRACEAE | 1 | 1 |
| 20. | RHAMNACEAE | 2 | 5 |
| 21. | VITACEAE | 2 | 2 |
| 22. | FABACEAE | 14 | 15 |
| 23. | CAESALPINIACEAE | 5 | 12 |
| 24. | MIMOSACEAE | 3 | 5 |
| 25. | DROSERACEAE | 1 | 1 |
| 26. | COMBRETACEAE | 3 | 5 |
| 27. | MYRTACEAE | 1 | 1 |
| 28. | LECYTHIDACEAE | 1 | 1 |
| 29. | LYTHRACEAE | 3 | 3 |
| 30. | ONAGRACEAE | 1 | 2 |

| | | | |
|-----|------------------|----|----|
| 31. | CUCURBITACEAE | 3 | 4 |
| 32. | MOLLUGINACEAE | 1 | 1 |
| 33. | RUBIACEAE | 7 | 9 |
| 34. | ASTERACEAE | 16 | 19 |
| 35. | PRIMULACEAE | 1 | 1 |
| 36. | EBENACEAE | 1 | 1 |
| 37. | OLEACEAE | 2 | 2 |
| 38. | APOCYNACEAE | 3 | 3 |
| 39. | ASCLEPIADACEAE | 3 | 4 |
| 40. | LOGANIACEAE | 1 | 1 |
| 41. | GENTIANACEAE | 1 | 1 |
| 42. | BORAGINACEAE | 1 | 2 |
| 43. | CONVOLVULACEAE | 3 | 4 |
| 44. | SOLANACEAE | 3 | 5 |
| 45. | SCROPHULARIACEAE | 5 | 7 |
| 46. | BIGNONIACEAE | 2 | 2 |
| 47. | PEDALIACEAE | 1 | 1 |
| 48. | ACANTHACEAE | 10 | 15 |
| 49. | VERBENACEAE | 4 | 4 |
| 50. | LAMIACEAE | 5 | 5 |
| 51. | NYCTAGINACEAE | 1 | 1 |
| 52. | AMARANTHACEAE | 3 | 3 |
| 53. | CHENOPODIACEAE | 1 | 1 |
| 54. | POLYGONACEAE | 1 | 1 |
| 55. | LAURACEAE | 1 | 1 |
| 56. | LORANTHACEAE | 1 | 1 |
| 57. | EUPHORBIACEAE | 8 | 15 |
| 58. | MORACEAE | 1 | 5 |
| 59. | SALICACEAE | 1 | 1 |
| 60. | CERATOPHYLLACEAE | 1 | 1 |
| 61. | HYDROCHARITACEAE | 3 | 3 |
| 62. | AMRYLLIDACEAE | 1 | 1 |

| | | | |
|-----------|----------------|-----|-----|
| 63. | HYPOXIDACEAE | 1 | 1 |
| 64. | DIOSCOREACEAE | 1 | 1 |
| 65. | ASPARAGACEAE | 2 | 2 |
| 66. | COLCHICACEAE | 1 | 1 |
| 67. | PONTEDERIACEAE | 1 | 1 |
| 68. | COMMELINACEAE | 3 | 3 |
| 69. | ARACEAE | 2 | 2 |
| 70. | ALISMATACEAE | 1 | 2 |
| 71. | ERIOCAULACEAE | 1 | 1 |
| 72. | CYPERACEAE | 8 | 16 |
| 73. | POACEAE | 26 | 29 |
| Total: 73 | | 208 | 270 |

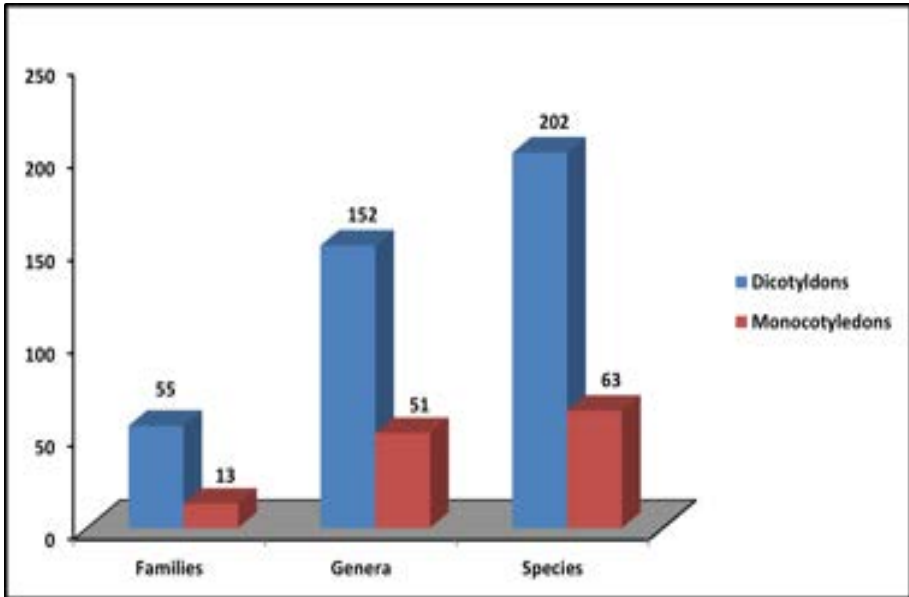


Fig. 1. Number of families, genera and species in Dicotyledons and Monocotyledons

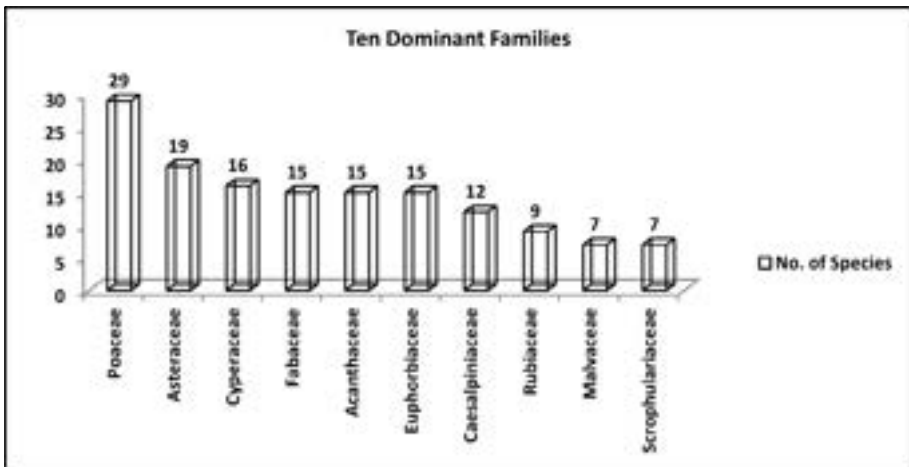


Fig. 2 Ten dominant families with no. of species

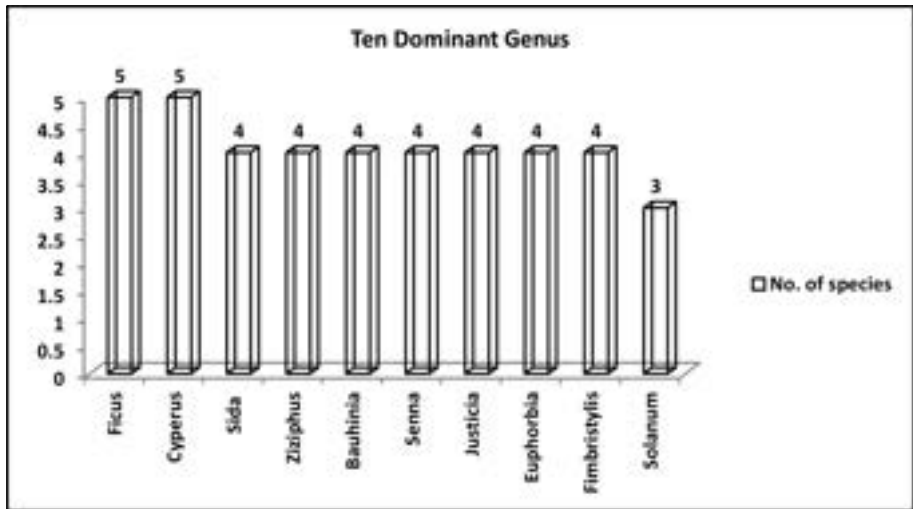


Fig. 3. Ten dominant genus with number of species

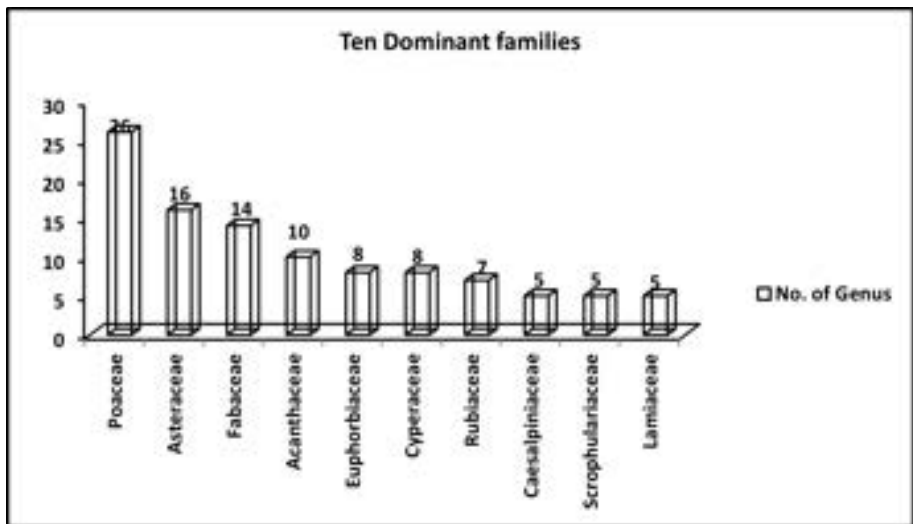


Fig. 4. Ten dominant families with number of genera

Review of Literature

Floristic diversity of Uttar Pradesh has been studied by various workers. Historical accounts of Flora has been kept in Botanical Survey of India, Central Regional Centre, Prayagraj, Uttar Pradesh. Various scientist and taxonomist from Botanical Survey of India and other institution and universities have explored the areas. The historical components include two important floras *i.e.* Flora of British India (Hooker, 1872-1897) and Flora of Upper Gangetic Plains (Duthie, 1903-1929). Besides these there is another important work on floristic account of Uttar Pradesh which is 'Flora of

Uttar Pradesh' in three volumes viz. Vol. I (Singh, K.P., K.K.Khanna & G.P. Sinha, 2016), Vol. II (G.P. Sinha & A.N. Shukla, 2021), and Vol. III (Khanna K.K., A.A. Ansari & A.N. Shukla, 2024). Some other workers like Singh, 2012, Singh, 2018 and Singh & Singh, 2009 have explored Chandauli district flora. Maurya & al (2015) worked on medicinal plants of Chandra Prabha Wildlife Sanctuary, Chandauli district, Uttar Pradesh. Biodiversity of Vindhyan region was explored by various workers viz. Singh & al (2014) studied medicinal plants of Vindhyan Region, Pathak & al. (2017) studied climatology for pteridophytes and Mishra, 2015 studied ethnomedicinal plant resources of the Vindhyan region.

SYSTEMATIC ENUMERATION

Key to the groups

- | | |
|----------------------------|-------------------------|
| 1a. Plants seedless | I. PTERIDOPHYTES |
| 1b. Plants producing seeds | II. ANGIOSPERMS |

I. PTERIDOPHYTES

Key to the families

- | | |
|--|---------------------------|
| 1a. Leaves ulate | 2 |
| 1b. Leaves non-ligulate | 3 |
| 2a. Leaves usually arranged in 4-rows, strobili bearing micro and megasporangia | 1. Selaginellaceae |
| 2b. Leaves awl shaped; outer leaves bearing megasporangia and inner bearing microsporangia | 2. Isoetaceae |
| 3a. Spores of one kind | 4 |
| 3b. Spores of two kinds | 5. Marsileaceae |
| 4a. Rhizome covered by hairs, scales absent | 3. Lygodiaceae |
| 4b. Rhizome scaly | 4. Parkeriaceae |

1. SELAGINELLACEAE

SELAGINELLA

Selaginella bryopteris (L.) Baker in Jour. Bot. 22: 376. 1884. *Lycopodium bryopteris* L., Sp. Pl. 2: 1103. 1753.

Plants xerophytic; stems 5–25 cm, sub-erect to erect, simple in basal region, copiously branched above. Leaves isomorphic on the main stem, dimorphic on the branches; isomorphic leaves distant, ovate, lanceolate, long acuminate, denticulate; heteromorphic leaves contiguous; lateral leaves ovate, oblique at base, acute to acuminate, denticulate and imbricate on the proximal side; axillary leaves somewhat like lateral leaves; median leaves small, ovate, oblique, acute to acuminate, entire to minutely denticulate. Strobili rare, 3–5 × 1–25 mm; sporophylls uniform, ovate, entire to minutely denticulate, acuminate.

Not common in dry places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76376.

2. ISOETACEAE

CALAMARIA Boehm.

Calamaria coromandelina (L.f.) Kuntze, Revis. Gen. Pl. 2: 828. 1891. *Isoetes coromandeliana* L.f., Suppl. Pl. 447. 1781.

Rhizomorph 3-lobed, rarely 4–5-lobed; peripheral strands present; leaves 30–60 (–80) cm long, 20–60 in number, velum absent; megasporangia circular to oval, 12 × 9 mm; megaspores white when dry, grey when wet, dimorphic; larger ones 465–660 µm in diameter, smaller ones 356–458 µm in diameter, surface tuberculate, tubercle ends blunt and rounded, microspores red-brown in colour, 26–33 µm in diameter, smooth or rugulose to papillate.

Not common along the edges of tanks, streams.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Near Rajdari water fall, 20.08.2015, A.N. Shukla & N. Srivastava 75082.

3. LYGODIACEAE

LYGODIUM Sw.

Lygodium flexuosum (L.) Sw., J. Bot. (Schrader) 1800(2): 106. 1801; Bedd., Handb. Ferns Brit. India 457, t. 283. 1883; Dixit, Cens. Indian Pterid. 60. 1984. *Ophioglossum flexuosum* L., Sp. Pl. 2: 1063. 1753.

Primary rachis branches abbreviated; secondary rachis branches alternately pinnate bearing 3–5 leaflets, variously lobed at base, gradually tapering towards apex, subcoriaceous, margins finely toothed; veins free. Fertile pinules slightly narrower than the sterile ones; fertile lobes marginal, 2–5 mm long.

Not common in mixed forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Devdari kind, 21.12.2016, A.N. Shukla 76278.

4. PARKERIACEAE

CERATOPTERIS Brongn.

Ceratopteris thalictroides (L.) Brongn., Bull. Sci. Soc. Philom. Paris 8: 186. 1821. *Acrostichum thalictroides* L., Sp. Pl. 2: 1070. 1753.

Fronds succulent, dimorphic, green, up to 1 m long; stipes fleshy, bearing roots at intervals, copiously branched from the base; sterile fronds pinnatifid; fertile fronds bi-tripinnate with narrow linear segments. Sori copious on the whole lower surface protected by reflexed margins.

Not common in river, ponds.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76210.

5. MARSILEACEAE**MARSILEA L.**

Marsilea minuta L., Mant. Pl. 308. 1771; Dxit, Cens. Indian Pterid. 85. 1984.

Rhizome wide-creeping, rooting in mud. Fronds erect; stipe length depends upon the depth of water, usually 0.5–30 cm; leaflets 4, cruciform, oblanceolate or obovate, size depends upon ecological conditions, thin shining dark-green; margins entire to crenate, if water is plenty, leaflets are of bigger in size, much reduced under xerophytic conditions. Sporocarps plenty, stalked, comprising of two types of spores, the larger megaspore and smaller microspores.

Common in ponds and lakes.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 22.12.2016, A.N. Shukla 76295.

ANGIOSPERMS**MENISPERMACEAE****Key to genera**

1a. Leaves peltate; carpel one

1. Cissampelos

1b. Leaves not peltate; carpels three or more

2. Tinospora

1. CISSAMPELOS (DC.) Miq.

Cissampelos pareira L. var. **hirsuta** (Buch.-Ham. ex DC.) Forman, Kew Bull. 22: 356. 1968; M.Gangop. in B.D.Sharma & al., Fl. India 1: 317. 1993; R.K. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 136. 2016. *C. hirsuta* Buch.-Ham. ex DC., Syst. Nat. 1: 535. 1817. *C. pareira* L., Sp. Pl. 1031. 1753, *p.p.*, *quoad* B; Duthie, Fl. Gangetic Plain 1: 30. 1903; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 103. 1872.

Twining shrubs with young parts usually tomentose or pubescent. Leaves reniform or orbicular, 3–7 × 4–7 cm, cordate or peltate at base, acute or retuse and apiculate at apex, pubescent above, glaucous beneath. Flowers pale green, unisexual. Male flowers in axillary cymes; sepals 4, free, obovate, pilose outside; petals 4, connate into a 4-lobed cup. Female flowers scarlet, ovoid, compressed, ridged along margin; sepal 1, broadly ovate; petal 1, obovate, cuneate. Drupes reddish, compressed, obovoid-globose, hirsute, ridged, 4–6 × 3–4 mm.

Flowering & Fruiting: November–January.

Common in forest area.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Semaria, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75029.

2. TINOSPORA Miers

Tinospora cordifolia (Willd.) Miers in Ann. Mag. Nat. Hist. 2, 7: 35, 38. 1851; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 97. 1872; Duthie, Fl. Gangetic Plain

1: 26. 1903; A. Pramanik in B.D.Sharma & al., Fl. India 1: 347. 1993; S.K. Maurya & al., Intl. J. Biod. 8. 2015; R.K. Singh in Kr. P. Singh & al., Fl. Uttar Pradesh 1: 141. 2016. *Menispermum cordifolium* Willd., Sp. Pl. 4: 826. 1806.

Woody climbers with aerial roots and succulent stem, glabrous. Leaves broadly ovate-cordate, 7–10 × 5–9 cm, sinuate at base, shortly acuminate at apex, entire along margins. Flowers greenish–yellow, glabrous, axillary or on leafless branches, 9–14 cm long. Male flowers fascicled, yellow; outer 3 sepals ovate, 1–1.5 mm long; inner 3 elliptic, 3–4 mm long; petals 6, rhombic–unquiculate, 2–2.5 mm long, green. Female flowers solitary; sepals as in male. Petals spatulate, ca 2.5 mm long. Drupe red, globose–ellipsoid, rounded at both ends, papilose on surface, 5–6 mm long.

Flowering & Fruiting: August–February.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

NYMPHAEACEAE

NYMPHAEA L.

Nymphaea nouchali Burm.f., Fl. Ind. 120. 1768; D.Mitra in B.D.Sharma & al., Fl. India 1: 430. 1993; Kr.P. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 144. 2016. *N. stellata* Willd., Sp. Pl. 2. 1153. 1799; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 114. 1872, incl. Vars.; Duthie, Fl. Gangetic Plain 1: 34. 1903.

Perennial aquatic herbs with small corms. Leaves elliptic–orbicular, sinuate–dentate with broad obtuse teeth, green above, reddish purple beneath, 6–45 × 5–41 cm. Flowers blue, sometimes purple, ca 5 cm across. Sepals triangular–ovate, 2.5–9.0 × 2.6–7.0 cm. Petals 8–15, 2.5–7.5 × 0.8–1.7 cm. Berry 1.5–4.0 cm across. Seeds ellipsoid, ca 1.5 mm long.

Flowering & Fruiting: May–November.

Not common in ponds and marshes.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari, compartment no. 10, 267 m, 19.08.2015, A.N. Shukla & N. Srivastava 75050.

CLEOMACEAE

CLEOME L.

Cleome viscosa L., Sp. Pl. 672. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 170. 1872; Duthie, Fl. Gangetic Plain 1: 50. 1903; Sundararagh. in B.D.Sharma & al., Fl. India 2: 317. 1993; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 172. 2016.

Viscid–pubescent herbs, ca 46 cm tall. Leaves 3–5–foliolate; leaflets sessile, subequal, elliptic–oblanceolate or obovate, 1.5–4.5 × 0.6–2.0 cm, cuneate at base, acute or rarely obtuse at apex, entire and ciliate along margins. Flowers yellow, in axillary racemes. Sepals 4, oblong to lanceolate, glabrous inside, glandular–hairy outside, 5–12 × 2–4 mm. Petals 4, subequal, obovate or oblanceolate to oblong–

spathulate, 8–12 × 3–5 mm. Capsules on 2–3 cm long stalk, beaked, striate, to 7 cm long. Seeds dark brown, numerous, reniform, 1–1.5 mm across.

Flowering & Fruiting: Almost throughout the year.

Common in wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Sikarganj, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75039.

VIOLACEAE

HYBANTHUS Jacq., nom. cons.

Hybanthus enneaspermus (L.) F.Muell., Fragm. 10: 81. 1876; S.P. Banerjee & Pramanik in B.D. Sharma & N.P. Balakr., Fl. India 2: 343, f. 64. 1993; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 173. 2016. *Viola enneasperma* L., Sp. Pl.: 937. 1753. *Ionidium suffruticosum* (L.) Roem. & Schult., Syst. Veg. 5: 394. 1819; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 185. 1872. *Ionidium heterophyllum* Vent., Jard. Malmaison 27. 1803; Duthie, Fl. Gangetic Plain 1: 56. 1903.

Herbs, perennial, with ascending branches, 30–40 cm high, woody at base. Leaves linear-lanceolate to elliptic-lanceolate, 0.5–8 × 1–1.4 cm, acute to subotuse at apex, cuneate at base, entire to crenate, glabrous or pubescent, subsessile; stipules linear-lanceolate. Flowers axillary, solitary; pedicels ca 2 cm long. Sepals subequal, lanceolate, ca 4 mm long, glabrous. Petals red, unequal; upper two symmetric, ca 5 mm long; lateral two triangular, oblong, ca 6 mm long; lower suborbicular, ca 1.9 mm long. Stamens 5; anterior stamens with small, recurved, fleshy appendages. Capsules subglobose, 3-lobed. Seeds yellowish white, ovoidellipsoid, longitudinally ribbed.

Flowering & Fruiting: October–January.

Common, along cultivated fields.

Specimens examined: Chandra Prabha Wildlife Sanctuary Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75131; Semaria, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75013; along sanctuary road, 21.08.2015, A.N. Shukla & N. Srivastava 75106.

POLYGALACEAE

POLYGALA L.

Polygala chinensis L., Sp. Pl.: 704. 1753; R.N. Banerjee in B.D. Sharma & N.P. Balakr., Fl. India 2: 464. 1993; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 188. 2016. *P. glomerata* Lour., Fl. Cochinch. 2: 426. 1790; A.W. Benn. in Hook.f., Fl. Brit. India 1: 206. 1872; Duthie, Fl. Gangetic Plain 1: 63. 1903.

Erect, stout herbs up to 50 cm tall. Leaves elliptic, elliptic-oblongate or obovate, acute or narrowed at base, acute and mucronate at apex, 4–9 × 1.0–2.5 cm. Flowers pale blue in few-flowered supra-axillary racemes. Outer sepals unequal, ciliate along the margins. Lateral petals almost as long as the keel, obovate; keel

crested with filiform appendages. Capsules suborbicular, caruncle hood-shaped with 2 membranous appendages and a short tooth.

Flowering & Fruiting: April–December.

Common in Undergrowth of hill forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary road, 146 m, 21.08.2015, A.N. Shukla & N. Srivastava 75090; compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75055; near Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75162.

MALVACEAE

Key to genera

- | | |
|--|--------------------|
| 1a. Fruit a capsule or aschizocarp | 3 |
| 1b. Fruits always a schizocarp | 2 |
| 2a. Seeds solitary in each mericarp | 3. Sida |
| 2b. Seeds two or more in each mericarp | 1. Abutilon |
| 3a. Style 10; fruit a schizocarp | 4. Urena |
| 3b. Style 1; fruit a capsule | 2. Hibiscus |

1. ABUTILON Mill.

Abutilon indicum (L.) Sweet, Hort. Brit. 1: 54. 1826; Mast. in Hook.f., Fl. Brit. India 1: 326. 1874; Duthie, Fl. Gangetic Plain 1: 83. 1903; T.K. Paul in B.D. Sharma & al., Fl. India 3: 266. 1993; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 217. 2016. *Sida indica* L., Cent. Pl. 2: 26. 1756.

Annual or perennial, tomentose herbs, ca 3 m tall. Leaves broadly ovate or orbicular, 1.0–8.5 × 1–8 cm, cordate at base, acute to acuminate at apex. Flowers solitary, axillary. Calyx campanulate, in fruit stellately spreading, much shorter than the schizocarp, 4–9 mm across. Corolla hairy, yellow or orange yellow, 25–30 mm across. Mericarp mucronate, dorsally hairy, laterally glabrous, smooth, blackish. Seeds brownish black, 2 or 3 per mericarp, glabrous or hairy, 2–3 mm across.

Flowering & Fruiting: October–May.

Common, in hilly slopes, and near habitation.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Latifsah, 24.12.2016, A.N. Shukla 76334.

2. HIBISCUS L.

Hibiscus beddomei Rakshit & Kundu in Sci. Cult. 27: 192. 1961; Raizada in Suppl. Duthie's Fl. Gangetic Plain: 28. 1976; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 324. 1993; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 221. 2016.

Herbs, 30–60 cm high, branchlet covered with rigid stellate hairs. Leaves ovate-cordate, 5–9 × 5–10 cm, 3-angled or slightly 3-lobed; lobes ovate, acute at

apex, serrate-dentate along margins, stellate-hairy on both surfaces; petioles 2.5–5 cm long, pubescent with simple and stellate hairs; stipules linear, hairy. Flowers axillary, solitary; pediceles 2–4 mm long; epicalyx segments 9, ca 8 mm long, linear, hairy, tip spatulate with ca 3 mm long linear appendage on inner surface towards apex, covered with stiff hair throughout. Calyx campanulate, ca 1 cm long; lobes triangular, acuminate, prominently 3-nerved, membranous, hairy, persistent. Corolla with 5 petals, pale purple, stellate-hairy outside towards apex. Staminal column laxly antheriferous throughout. Capsules ovoid, as long as calyx, beaked, densely hairy, dehiscent in to 5 longitudinal valves.

Flowering & Fruiting: September–November.

Common on rocky slopes.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 21.12.2016, A.N. Shukla 76265.

3. SIDA L.

Key to the species

- | | |
|---|---------------------------------|
| 1a. Mericarps 5 | 2. <i>S. cordata</i> |
| 1b. Mericarps 6–12 | 2 |
| 2a. Carpellary awn shorter than the calyx | 3 |
| 2b. Carpellary awn longer than calyx | 3. <i>S. cordifolia</i> |
| 3a. Leaves lanceolate to oblong, glabrous, serrate | 1. <i>S. acuta</i> |
| 3b. Leaves rhomboid, lanceolate or obovate, hairy beneath | 4. <i>S. rhombifolia</i> |

1. *Sida acuta* Burm.f., Fl. Indica 147. 1768; Duthie, Fl. Gangetic Plain 1: 81. 1903; T.K. Paul in B.D. Sharma & al., Fl. India 3: 281. 1993; S.K. Maurya & al., Intl. J. Biod. 7. 2015; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 238. 2016. *S. carpinifolia* auct. non L.f., 1782: Mast. in Hook.f., Fl. Brit. India 1: 323. 1874.

Woody herbs, 0.5–2 m tall. Leaves elliptic–lanceolate or lanceolate, 3–6 × 0.3–1.2 cm, rounded or subacute at base, acuminate at apex, serrate along margins, both surface hairy. Flowers light yellow, solitary, axillary or in clusters of 2–3, 1.0–1.5 cm across. Calyx 5-lobed, campanulate, 5–6 mm across. Corolla light yellow, emarginated ciliate at base, outside sparsely covered with glandular hairs, 8–10 mm across. Mericarps 6–10, tetrahedral, rugose with awns at apex, 3–4 mm long. Seeds dark brown, triangularly ovoid, ca 2 mm long.

Flowering & Fruiting: August–January.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

2. *Sida cordata* (Burm.f.) Borss. Waalk. in Blumea 14(1): 182–184. 1966; T.K. Paul in B.D. Sharma & al., Fl. India 3: 283. 1993; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 238. 2016. *Melochia cordata* Burm.f., Fl. Indica 143. 1768. *Sida veronicifolia* Lam., Encyl. 1: 5. 1783; Duthie, Fl. Gangetic Plain 1: 80.

1903. *Sida humilis* Cav., Diss. 5. T. 134. F. 2. 1788; Mast. In Hook.f., Fl. Brit. India 1: 322. 1874 incl. var. *veronicifolia*.

Trailing, slender herb; branches to 70 cm long. Leaves ovate to orbicular, rarely 3-cordate, 0.5–7.0 × 0.3–4.0 cm, cordate at base, acute to acuminate at apex, crenate, dentate or serrate along margins, stellate or simple-hairy on both surfaces. Flowers solitary, racemed or paniced. Calyx campanulate, ca 5 mm across; lobes 4–6 × 0.2 mm. Corolla yellow, 5–4 mm. Mericarps 5, tetrahedral, awnless, ca 4 × 2 mm. Seeds ovoid, brownish black, glabrous, ca 2 × 1 mm.

Flowering & Fruiting: Throughout the year.

Common in forest undergrowth and forest margins.

Specimens examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75063; before Jamsoti, 175 m, 22.08.2015, A.N. Shukla & N. Srivastava 75145, 75172; near Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75004; Baliari Nala, 20.12.2016, A.N. Shukla 76241; Patariya Nala, 22.12.2016, A.N. Shukla 76292.

3. *Sida cordifolia* L., Sp. Pl. 684. 1753; Mast. in Hook.f., Fl. Brit. India 1: 324. 1874; Duthie, Fl. Gangetic Plain 1: 82. 1903; T.K. Paul in B.D. Sharma & al., Fl. India 3: 285. 1993; S.K. Maurya & al., Intl. J. Biod. 7. 2015; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 239. 2016.

Tomentose herbs, ca 1 m tall. Leaves ovate-oblong or orbicular, shallowly cordate, 2–4 × 1–2 cm, occasionally rounded or truncate at base, obtuse to acute at apex, crenate-serrate along margins, densely velutinous with minute stellate hairs on both surfaces. Flowers solitary, or in axillary clusters of 2–5 flowers. Calyx campanulate, 10-ribbed, 5–9 mm across. Corolla yellow, obliquely obovate, ca 15 mm across. Mericarps 6–9, 3-gonous, ca 3 × 4 mm. Seeds black, reniform, flattened, ca 2 mm across.

Flowering & Fruiting: August–October.

Reported on the basis of Maurya et al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

4. *Sida rhombifolia* L., Sp. Pl. 684. 1753; Mast. in Hook.f., Fl. Brit. India 1: 323. 1874; Duthie, Fl. Gangetic Plain 1: 81. 1903; T.K. Paul in B.D. Sharma & al., Fl. India 3: 289. 1993; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 240. 2016.

Annual or perennial herb or undershrub, ca 1.5 m high. Leaves ovate-oblong, rhomboid or lanceolate, 2.0–4.4 × 0.5–2.0 cm, truncate or cordate at base, acuminate at apex, covered with minute stellate hairs on both surfaces. Flowers yellow-pale orange, axillary, usually solitary. Calyx campanulate, 4–5 mm long. Corolla-lobes oblique, 1.0–1.5 cm across. Mericarps 6–12, with 2 short awns. Seeds brown or black, glabrous, ca 2 mm across.

Flowering & Fruiting: September–October.

Common, in wastelands and along streams.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gardi Nala, 23.12.2016, A.N. Shukla 76327.

4. URENA L.

Urena lobata L., Sp. Pl. 692. 1753; Mast. In Hook.f., Fl. Brit. India 1: 329. 1874; Duthie, Fl. Gangetic Plain 1: 85. 1903; T.K. Paul in B.D. Sharma & al., Fl. India 3: 380. 1993; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 245. 2016.

Annual or perennial, erect undershrub, 2–5 m high. Leaves ovate to orbicular, unlobed, shallowly lobed, 4–8 × 2–6 cm, cordate at base, obtuse to acute at apex, crenate to serrate along margins. Flowers axillary or solitary, 1.5–2.4 cm across. Epicalyx ujube, adnate to the calyx at base, segments 5–8 mm long. Calyx tubular to campanulate; lobes 4–6 × 1.5–2.0 mm, ovate to deltoid, acute to acuminate. Corolla pink with purple centre, 2–3 cm across. Mericarps dorsally and laterally stellate hairy, ca 4 mm high. Seeds brown, reniform, minutely hairy or glabrous, 2–3 mm across.

Flowering & Fruiting: September–December.

Common, in mixed and Sal forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along Chandra Prabha river, 21.12.2016, A.N. Shukla 76275; Girda Nala, 23.12.2016, A.N. Shukla 76318.

STERCULIACEAE

Key to genera

- | | |
|---|----------------------|
| 1a. Leaves palmately-lobed; petals absent | 3. Kavalama |
| 1b. Leaves simple; petals present | 2 |
| 2a. Fruits spirally twisted | 2. Helicteres |
| 2b. Fruits not spirally twisted | 3 |
| 3a. Trees; stamens 15 or many | 1. Eriolaena |
| 3b. Herbs or shrubs stamens 15 or many | 4. Waltheria |

1. ERIOLAENA DC.

Eriolaena candollei Wall., Pl. Asiat. Rar. 1: 51. T. 64. 1830; Mast. in Hook.f., Fl. Brit. India 1: 370. 1874; Duthie, Fl. Gangetic Plain 1: 104. 1903; Malick in B.D. Sharma & al., Fl. India 3: 415. 1993; K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 251. 2016

Shrubs, ca 2 m tall. Leaves broadly ovate, 12.5–17.5 × 7.5–12.5 cm, cordate at base, acute or acuminate at apex, crenate or crenate–dentate along margins, glabrous or sparsely stellate–hairy above, grey tomentose beneath. Flowers yellow, in many-flowered, peduncled, corymbose cymes. Sepals slightly longer than bracteoles, linear–oblong, acute. Petals oblong, apex notched, claw thick, villous. Capsules woody ovoid, acute beaked rounded at the back, villous or rarely glabrous at the margin, 4–5 × 2.0–2.5 cm. Seeds imbricate, embryo erect, cotyledons flat.

Flowering & Fruiting: Throughout the year.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gidhmarwa, 24.12.2016, A.N. Shukla 76336.

2. HELICTERES L.

Helicteres isora L., Sp. Pl. 963. 1753; Mast. in Hook.f., Fl. Brit. India 1: 365. 1874; Duthie, Fl. Gangetic Plain 1: 102. 1903; Malick in B.D. Sharma & al., Fl. India 3: 426. 1993; K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 255. 2016.

Shrubs, 3–5 m tall. Leaves oblong, obovate or orbicular, sometimes slightly lobed, 6–12 × 3–9 cm, rounded or cordate at base, abruptly acuminate or rounded at apex, irregularly crenate–serrate along margins. Flowers reddish turning purplish–grey, axillary, solitary or in clusters. Calyx tubular, ca 2 cm long, 2–lipped, oblique. Petals free, 4–5 cm long, unequal, closely reflexed on calyx. Capsules elongated, spirally twisted, 4–8 × 0.5–1.0 cm. Seeds many, 2 mm long, angular, wrinkled, tomentose.

Flowering & Fruiting: August–June.

Common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Devdari, 19.08.2015, A.N. Shukla & N. Srivastava 75044.

3. KAVALAMA Raf.

Kavalama urens (Roxb.) Raf., Sylva Tellur. 72. 1838. *Sterculia urens* Roxb., Pl. Coromandel 1: 25, t. 24. 1795; Mast. in Hook.f., Fl. Brit. India 1: 355. 1874; Duthie, Fl. Gangetic Plain 1: 100. 1903; S.K. Chandra in B.D. Sharma & al., Fl. India 3: 470. 1993; K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 261. 2016.

Softy woody tree with white papery bark. Leaves clustered at ends of branchlets, palmately 3–5-lobed, 15–30 × 18–31 cm, cordate at base, caudate–acuminate at apex, entire along margins. Flowers small, yellow, 5–9 mm across, glandular–pubescent, terminal panicles. Calyx campanulate, 5-lobed at top, glandular–pubescent within, ca 5 mm long. Follicles 5, spreading, 3–4 × 1.0–1.5 cm, usually oblong or ovoid–oblong. Seeds black, 3–6 in each follicle, oblong, glossy, ca 7 × 5 mm.

Flowering & Fruiting: December–April.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along road side, 21.12.2016, A.N. Shukla 76242.

4. WALTHERIA L.

Waltheria indica L., Sp. Pl. 673. 1753; Mast. in Hook.f., Fl. Brit. India 1: 374. 1874; Duthie, Fl. Gangetic Plain 1: 107. 1903; S.K. Chandra in B.D. Sharma & al., Fl. India 3: 473. 1993; K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 264. 2016.

Herbs, perennial, erect, ca 1 m high. Stems stellate–pubescent. Leaves ovate, elliptic or ovate–oblong, 3–6 × 1.5–4 cm, acute or obtuse at apex, rounded or subcordate at base, serrate, softly stellate–pubescent on both the surfaces; petioles up to 2.5 cm

long; stipules subulate, hairy. Flowers in axillary and terminal clusters; involucre bracts lanceolate, villous. Calyx red-tinged, campanulate; lobes lanceolate, ciliate. Petals yellow, spatulate or ovate, wrinkled on margins. Stamens 5; filaments connate at base; staminodes absent. Ovary 1-locular; stigma penicillate. Capsules pilose, 1-seeded. Seeds *ca* 2 mm long, smooth.

Flowering & Fruiting: June–October.

Common in wastelands and exposed rock crevices.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75095; batwa Khoh, 21.12.2016, A.N. Shukla 76264.

TILIACEAE

Key to genera

1a. Fruit a capsule

1. *Corchorus*

1b. Fruit a drupe

2. *Grewia*

1. CORCHORUS L.

Corchorus capsularis L., Sp. Pl. 529. 1753; Mast. in Hook.f., Fl. Brit. India 1: 397. 1874; Duthie, Fl. Gangetic Plain 1: 119. 1903; P. Daniel & Chandrab. in B.D. Sharma & al., Fl. India 3: 485. 1993; K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 266. 2016.

Annual herbs, 1–2.5 m tall. Leaves linear–lanceolate to ovate, 5–15 × 1.5–8.0 cm, rounded at base, acute or acuminate at apex, serrate along margins. Flowers in 1 or 2-flowered axillary or leaf–opposed cymes, 8–10 mm across. Sepals linear–oblong, 4–5 mm long. Petals yellow, obovate, notched at apex, 3–5 mm long. Capsules depressed globose, ribbed, muricate, 5-valved, *ca* 1 cm across. Seeds brown, few in each cell, wedge-shaped, smooth, *ca* 3 × 1 mm.

Flowering & Fruiting: August–November.

Commonly found in wastelands and along road sides.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75128.

2. GREWIA L.

Key to species

1a. Trees

2. *G. tiliifolia*

1b. Shrubs

1. *G. hirsuta*

1. *Grewia hirsuta* Vahl, Symb. Bot. 1: 34. 1790; Mast. in Hook.f., Fl. Brit. India 1: 391. 1874; Duthie, Fl. Gangetic Plain 1: 117. 1903; P. Daniel & Chandrab. in B.D. Sharma & al., Fl. India 3: 501. 1993; K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 275. 2016.

Hairy shrubs, 3–6 m tall. Leaves ovate, lanceolate or ovate–lanceolate to elliptic, 1–10 × 0.7–4.5 cm, subcordate or subobtusate at base, acute or acuminate at apex,

serrate along margins, pubescent above, tomentose beneath. Flowers white, ca 8 mm across, in about 4 cm long axillary 3-flowered, umbellate cymes. Sepals elliptic-lanceolate, hirsute, ca 6 mm long. Petals oblong, rounded, ca 3 mm long. Drupes subglobose, obscurely 4-lobed, 7–10 mm across.

Flowering & Fruiting: September–June.

Not common in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75153; Bichuliya, 25.12.2016, A.N. Shukla 76365.

2. *Grewia tiliifolia* Vahl, Symb. Bot. 1: 35. 1790; Mast. In Hook.f., Fl. Brit. India 1: 386. 1874, '*tiliaefolia*'; Duthie, Fl. Gangetic Plain 1: 114. 1903; P. Daniel & Chandrab. in B.D. Sharma & al., Fl. India 3: 511. 1993; K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 280. 2016.

Trees, 6–15 m tall. Leaves elliptic-ovate or ovate-rotund, 1.5–36.0 × 1.5–24.0 cm, obliquely cordate at base, acuminate or rounded at apex, serrate to crenate-serrate along margins, glabrescent above. Flowers yellow, in axillary groups of 3-flowered peduncles, cymes 7 cm long. Sepals elliptic-obovate or ovate, with incurved tips, ca 6 mm long. Petals hairy and glandular at base, ca 7 mm long. Drupe bilobed, glabrous or pubescent, to 1 cm across.

Flowering & Fruiting: May–January.

Not common in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari, 267 m, 19.08.2015, A.N. Shukla & N. Srivastava 75002.

ZYGOPHYLLACEAE

TRIBULUS L.

Tribulus terrestris L., Sp. Pl. 387. 1753; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 423. 1874; Duthie, Fl. Gangetic Plain 1: 127. 1903; P. Singh & V. Singh in Hajra & al., Fl. India 4: 55. 1997; S.K. Maurya & al., Intl. J. Biod. 8. 2015; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 291. 2016.

Annual herbs, prostrate to procumbent or suberect. Stem and branches pilose hairy. Leaves opposite, 3–7 cm long, abruptly pinnate; leaflets 8–12 pairs, ovate to elliptic, 4–11 × 2–5 mm, acute or obtuse at apex, oblique at base; stipules subulate to falcate, 2–5 × 1–1.5 mm. Flowers solitary, axillary or leaf-opposed, ca 1 cm across; pedicels ca 10 mm long. Sepals ovate-lanceolate, 2–4 mm long, acute, hairy. Petals yellow, oblong or obovate, 2.5–5 mm long, with a short hairy claw. Stamens 10; anthers oblong. Ovary 5-locular, hirsute. Schizocarps 10–15 mm across excluding spines; mericarps 4–8 × 5–7 mm, dorsally tuberculate; spines 4 or 2.

Flowering & Fruiting: May–June.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

OXALIDACEAE**BIOPHYTUM DC.**

Biophytum sensitivum (L.) DC., Prodr. 1: 690. 1824; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 436. 1874; Duthie, Fl. Gangetic Plain 1: 131. 1903; Manna in Hajra & al., Fl. India 4: 238. 1997; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 297. 2016. *Oxalis sensitiva* L., Sp. Pl. 434. 1753.

Unbranched, annual herbs, up to 25 cm tall. Leaves whorled at the top of the stem, 8–12 cm long; leaflets 6–12 pairs, opposite, variable in size, oblong, nearly straight, 7–10 × 3–5 mm, base equal except terminal one which is obovate and with very oblique base apiculate at apex. Flowers yellow with brick red tinge or red lines inside corolla, 6–8 mm across. Sepals 5, ovate–lanceolate, grooved, glandular hispid, 4–6 × ca 1 mm. Petals lanceolate, 5–7 × 1–2 mm. Capsules ellipsoid, 3–4 mm long. Seeds transversely striate.

Flowering & Fruiting: September–November.

Common, near habitation.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Rajdari guest house, 19.08.2015, A.N. Shukla & N. Srivastava 75103.

RUTACEAE**Key to genera**

- | | |
|--------------------------------|-------------------|
| 1a. Petioles distinctly winged | 3. Naringi |
| 1b. Petioles not winged | 2 |
| 2a. Plants | 1. Aegle |
| 2b. Plants unarmed | 3. Murraya |

1. AEGLE Corrêa

Aegle marmelos (L.) Corrêa in Trans. Linn. Soc. London 5: 223. 1800; Hook.f., Fl. Brit. India 1: 516. 1875; Duthie, Fl. Gangetic Plain 1: 143. 1903; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 264. 1997; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 301. 2016. *Crateva marmelos* L., Sp. Pl. 444. 1753. – *Bael*.

Armed trees, up to 18 m tall; bark black. Leaves alternate, trifoliolate or occasionally 5–foliolate; leaflets subsessile, ovate–elliptic or elliptic–lanceolate, ca 6 × 4 cm, oblique at base, tapering at apex, shallowly crenate–serrate along margins. Flowers greenish–white or yellowish, in lateral and subterminal panicles, 2–2.4 cm across. Calyx cupular, pubescent, obscurely 5–lobed. Petals 4 or 5, oblong, fleshy, deflexed glandular, 1–2 cm long. Berries globose, green changing to yellow on ripening, up to 13 cm across.

Flowering & Fruiting: April–August.

Not common, in mixed forests and near habitation.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Rajdari guest house, 217 m, 19.08.2015, A.N. Shukla & N. Srivastava 75003.

2. MURRAYA L.

Murraya paniculata (L.) Jack in Malayan Misc. 1(5): 31. 1820; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 352. 1997; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 308. 2016. *Chalcas paniculata* L., Mant. Pl.: 68. 1767. *Murraya exotica* L., Mant. Pl.: 563. 1771; Hook.f., Fl. Brit. India 1: 502. 1875; Duthie, Fl. Gangetic Plain 1: 137. 1903.

Evergreen shrubs, 3–6 m tall. Leaves imparipinnate, up to 20 cm long; leaflets alternate, 3–5, varying in size, ovate, obovate or elliptic, obliquely rhomboid, 2–6.5 × 1.5–2 cm, acute to cuneate at base, often notched at apex, entire or obscurely crenate along margins. Flowers white, few, in terminal or axillary corymbs, fragrant. Calyx 5-lobed; lobes oblong, obtuse, glabrous, 0.5–1 mm long. Petals 5, oblong-elliptic, narrow at base, obtuse at apex, 1.2–2 cm long. Berries red, ovoid-ellipsoid, 1.3–2 cm long. Seeds ellipsoid, ca 1 cm long.

Flowering & Fruiting: October–April.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76357.

3. NARINGI Adans.

Naringi crenulata (Roxb.) Nicolson in Saldanha & Nicolson, Fl. Hassan Dist. 387. 1976; K.N. Nair & M.P. Nayar in B.D. Sharma & al., Fl. India 4: 302. 1997; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 308. 2016. *Limonia crenulata* Roxb., Pl. Coromandel 1: 60. t. 86. 1798; Duthie, Fl. Gangetic Plain 1: 139. 1903. *L. acidissima* auct. non L., 1762; Hook.f., Fl. Brit. India 1: 507. 1875, p.p.

Small, spiny trees. Leaves 5–7-foliolate; petiole and rachis auriculate; leaflets elliptic-obovate, obtuse at base, usually notched at apex, 2–5 cm long. Racemes subumbellate, short pubescent, often leafy. Flowers 4-merous, white. Berry bluish-black, globose, ca 1.5 cm across.

Flowering & Fruiting: September–December.

Not common, in scrub forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gidhmarwa, 24.12.2016, A.N. Shukla 76341.

SIMAROUBACEAE

AILANTHUS Desf.

Ailanthus excelsa Roxb., Pl. Coromandel 1: 24, t. 23. 1795; A.W. Benn. in Hook.f., Fl. Brit. India 1: 518. 1875; Duthie, Fl. Gangetic Plain 1: 144. 1903; R.K. Basak in Hajra & al., Fl. India 4: 410. 1997; S.K. Maurya & al., Intl. J. Biod. 4. 2015; B.K. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 311. 2016.

Trees, 15–25 m tall. Leaves unequally or equally pinnate, younger tomentose, older glabrous, on long petioles, 30–60 cm long; leaflets 8–10 pairs, alternate or

subopposite, variable in shape, 4–15 × 3–6 cm, unequal at base, acute or acuminate at apex, coarsely and irregularly toothed or sublobate along margins. Flowers greenish yellow, in branched panicle. Calyx lobes ovate–triangular, ca 2 mm long. Petals ovate–lanceolate, glabrous, 3–4 × 2 mm. Samara reddish brown, lanceolate, acute at both ends, 4–7.5 × 1–1.5 cm. Seeds solitary in the samara.

Flowering & Fruiting: February–April.

Planted along roadsides.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

MELIACEAE

AZADIRACHTA A.Juss.

Azadirachta indica A.Juss. in Mém. Mus. Hist. Nat. 19: 221, t. 2, f. 5. 1830; S.S.Jain & Bennet in Hajra & al., Fl. India 4: 478. 1997; S.K. Maurya & al., Intl. J. Biod. 4. 2015; Kr.P. Singh & G.P. Sinha in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 319. 2016. *Melia azadirachta* L., Sp. Pl. 385. 1753; Hiern in Hook.f., Fl. Brit. India 1: 544. 1875; Duthie, Fl. Gangetic Plain 1: 150. 1903. – *Neem*.

Trees, ca 30 m tall. Leaves imparipinnate, to 35 cm long; leaflets 5–13, obliquely lanceolate, 3–6 × 1–2 cm, cuneate at base, acuminate at apex, dentate along margins. Flowers white, ca 10 mm across. Calyx 5–fid, lobes ovate, broad, rounded, united at base, ca 7 mm long. Petals oblong–obovate, attenuate at base, ca 5 × 1.5 mm. Drupes oblong–ovoid, ca 1.5 × 0.5 cm. Seeds ellipsoid, glabrous.

Flowering & Fruiting: April–June.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

CELASTRACEAE

CELASTRUS L.

Celastrus paniculatus Willd., Sp. Pl. 1: 1125. 1797; M.A.Lawson in Hook.f., Fl. Brit. India 1: 617. 1875; Duthie, Fl. Gangetic Plain 1: 158. 1903; Ramam. in N.P.Singh & al., Fl. India 5: 87. 2000; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 330. 2016.

Large, deciduous, woody climbers with lenticellate branchlets. Leaves elliptic to ovate–oblong, 6–13 × 4.5–6.4 cm, cuneate at base, bluntish or shortly acuminate at apex, crenate–serrulate along margins. Flowers pale greenish, 3–4 mm across. Male flowers: sepals 5–lobed, ca 2 mm long; petals oblong–obovate, 2–3 mm long. Female flowers: sepals and petals as in male flowers. Capsules globose, 3–valved by persistent style, up to 10 × 8 mm. Seeds ellipsoid, smooth, brownish, with fleshy scarlet aril, 3–5 × 2–4 mm.

Flowering & Fruiting: March–August.

Not common, in mixed forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bidhuliya, 25.12.2016, A.N. Shukla 76361.

RHAMNACEAE

Key to genera

- | | |
|--|---------------------|
| 1a. Plants without stipular prickles; leaves symmetrical at base | 1. Ventilago |
| 1b. Plants with stipular prickles; leaves oblique at base | 2. Ziziphus |

1. VENTILAGO Gaertn.

Ventilago denticulata Willd. in Ges. Naturf. Freunde Neue Schriften 3: 417. 1801; Bhandari & Bhansali in N.P.Singh & al., Fl. India 5: 217. 2000; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 336. 2016. *V. calyculata* Tul. in Ann. Sci. Nat. Bot. 4: 124. 1857; M.A. Lawson in Hook.f., Fl. Brit. India 1: 631. 1875.

Liana; branchlets green pubescent. Leaves ovate-lanceolate, 6–12 × 3–6.4 cm, oblique at base, obtuse or subacute at apex, crenate-serrate along margins. Flowers creamy, fragrant in axillary or terminal panicles. Sepals deltoid, 2–2.5 mm long. Petals spatulate, emarginate at apex, 1–1.5 mm long. Samara globose, more than half surrounded by the sepal-tube; wing terminal, oblong or linear flat, 3.5–6.0 × 0.8–2.0 cm. Seeds chamber 6–10 mm across.

Flowering & Fruiting: September–April.

Common, in mixed forest and along water courses.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76221.

2. ZIZIPHUS Mill.

Key to species

- | | |
|--|-------------------------|
| 1a. Branchlets fasciculate | 1. Z. jujuba |
| 1b. Branchlets not fasciculate | 2 |
| 2a. Style 3-cleft, distinct or nearly so | 4. Z. xylopyrus |
| 2b. Style 2-cleft, connate up to the middle | 3 |
| 3a. Straggling or climbing shrubs; spines usually solitary | 3. Z. oenoplia |
| 3b. Trees or diffused shrubs; spines usually paired | 2. Z. mauritiana |

1. Ziziphus jujuba Mill., Gard. Dict. ed. 8. no. 1. 1768; Duthie, Fl. Gangetic Plain 1: 163. 1903; Bhandari & Bhansali in N.P. Singh & al., Fl. India 5: 232. 2000; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 338. 2016. *Z. sativa* Gaertn., Fruct. Sem. Pl. 1: 202. 1788. *Z. vulgaris* Lam., Encycl. 3: 316. 1789; M.A. Lawson in Hook.f., Fl. Brit. India 1: 633. 1875. – *Ber*.

Small trees, glabrous, 6-9 m tall; branches fasciculate; prickles unequal, one straight, the other recurved. Leaves obliquely ovate-lanceolate, 1-5 × 0.6-2 cm, obtusely acute at apex, rounded at base, crenulate, glabrous, 3-nerved at base. Flowers ca 5 mm across, in axillary fascicles. Calyx-lobes 5, keeled within, deltoid, ca 1.5 mm long, triangular at apex. Petals 5, ca 1.2 mm long. Stamens 5. Disc thin, 5-lobed, sometimes faintly 10-lobed, glabrous; lobes emarginate. Ovary bicarpellary; style 2-cleft, connate up to middle, with recurved arms. Drupes dark red or black, ovoid-oblong, ca 1.7 cm across, glabrous. Seeds 2, black, compressed.

Flowering & Fruiting: June–January.

Common in mixed forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76206.

2. *Ziziphus mauritiana* Lam., *Encycl.* 3: 319. 1789; Bhandari & Bhansali in N.P. Singh & al., *Fl. India* 5: 233. 2000; B.K. Shukla in Kr.P. Singh & al., *Fl. Uttar Pradesh* 1: 338. 2016. *Z. Jujuba* (L.) Gaertn., *Fruct. Sem. Pl.* 1: 203. 1788, *non* Mill., 1768; M.A. Lawson in Hook.f., *Fl. Brit. India* 1: 632. 1875.

Small trees, 1–15 m tall with young parts rusty tomentose. Leaves variable, alternate, elliptic–oblong or suborbicular, 1.5–6 × 1–3.6 cm, obliquely rounded at base, rounded to subacute at apex, crenate to entire along margins. Flowers greenish–yellow, 3–4 mm across. Calyx densely tomentose outside, glabrous inside, lobes 1–2 mm long. Petals sub–spathulate, concave, 1–1.5 mm long. Drupe obovoid–globose, orange–red when ripe, pulpy, 1.4–2 cm long. Seeds 1 or 2 compressed.

Flowering & Fruiting: May–August.

Commonly found in waste places & mixed forests

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75054.

3. *Ziziphus oenoplia* (L.) Mill., *Gard. Dict.* ed. 8. 3. 1768; M.A. Lawson in Hook.f., *Fl. Brit. India* 1: 634. 1875; Duthie, *Fl. Gangetic Plain* 1: 164. 1903; Bhandari & Bhansali in N.P. Singh & al., *Fl. India* 5: 236. 2000; B.K. Shukla in Kr.P. Singh & al., *Fl. Uttar Pradesh* 1: 340. 2016. *Rhamnus oenoplia* L., *Sp. Pl.* 194. 1753.

Prickly, straggling or climbing shrub; young parts rusty tomentose. Leaves alternate, ovate or ovate–lanceolate, bifarious, 2–4 × 1–2 cm, obtuse or acute at base, entire or crenate along margins, minutely pubescent above, silky pubescent beneath. Flowers in paniculate cyme. Calyx lobes 3–angled, 1–2 mm long, brownish. Petals spathulate, emarginated, 0.5–1.5 mm long. Drupes black, globose or obovoid–globose, 5–7 mm across. Seeds 1 or 2, to 1 cm long.

Flowering & Fruiting: October–April.

Common in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75045; Baliari Nala, 20.12.2016, A.N. Shukla 76226.

4. *Ziziphus xylopyrus* (Retz.) Willd., *Sp. pl.* 1. 1104. 1798; M.A. Lawson in Hook.f., *Fl. Brit. India* 1: 634. 1875; Duthie, *Fl. Gangetic Plain* 1: 165. 1903; Bhandari & Bhansali in N.P. Singh & al., *Fl. India* 5: 243. 2000; B.K. Shukla in Kr.P. Singh & al., *Fl. Uttar Pradesh* 1: 340. 2016. *Rhamnus xylopyrus* Retz., *Obs. Bot.* 2: 11. 1781.

Prickly shrubs, 5–7 m tall. Leaves ovate or elliptic, serrulate, 4–8 × 2–6.5 cm, oblique at base, rounded at the apex, serrate along margins, pubescent beneath.

Inflorescence a cymose panicle. Flowers yellowish green, 4–6 mm across. Calyx lobes 3–angled, pubescent outside, 2–2.4 mm long. Corolla 5, obovate, 1–2 mm long. Drupes globose, to 2 cm across. Seeds 3, compressed, black, 1–2 × 1–1.5 mm.

Flowering & Fruiting: April–January.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75089; Baliyari Nala, 20.12.2016, A.N. Shukla 76222; near Jamsoti, 22.12.2016, A.N. Shukla 76305.

VITACEAE

Key to genera

1a. Leaves simple

1. **Ampelocissus**

1b. Leaves compound

2. **Cayratia**

1. AMPELOCISSUS Planch.

Ampelocissus latifolia (Roxb.) Planch. in *Vigne Amer. Vitic. Eur.* 8: 374. 1884 & in *A.&C.DC., Monogr. Phan.* 5: 370. 1887; B.V.Shetty & P.Singh in *N.P.Singh & al., Fl. India* 5: 256. 2000; B.K. Shukla in *Kr.P. Singh & al., Fl. Uttar Pradesh* 1: 343. 2016. *Vitis latifolia* Roxb., *Hort. Bengal.*: 18. 1814 & *Fl. Ind. (Carey & Wall. ed.)* 2: 474. 1824; M.A.Lawson in *Hook.f., Fl. Brit. India* 1: 652. 1875; Duthie, *Fl. Gangetic Plain* 1: 171. 1903.

Climbers, rootstock tuberous. Leaves simple, often 5–gonal, sometimes 3–5–lobed, 10–25 × 10–24 cm, usually deeply cordate at base, acute to acuminate at apex, serrate along margins. Flowers reddish brown, 2 mm long. Calyx saucer–like, entire, glabrous. Petals oblong, glabrous, ca 1.5 × 0.8 mm. Berries globose, black when ripe, 2–4–seeded, 7–9 mm across. Seeds elliptic–oblong, 6–7 × 4–5 mm.

Flowering & Fruiting: May–October.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Rajdari, A.N. Shukla & N. Srivastava 75066.

2. CAYRATIA Juss.

Cayratia trifolia (L.) Domin in *Biblioth. Bot.* 89: 370. 1927; B.V.Shetty & P.Singh in *N.P.Singh & al., Fl. India* 5: 275. 2000; B.K. Shukla in *Kr.P. Singh & al., Fl. Uttar Pradesh* 1: 345. 2016. *Vitis trifolia* L., *Sp. Pl.* 203. 1753; Duthie, *Fl. Gangetic Plain* 1: 174. 1903. *Vitis carnos*a (Lam.) Wall., *Numer. List* 206, No. 6018. 1831–1832; M.A.Lawson in *Hook.f., Fl. Brit. India* 1: 654. 1875.

Slender, creeper or climber with pubescent young branches; tendrils forked. Leaves 3–foliolate, pubescent to glabrous; terminal leaflets elliptic–ovate, 3–8 × 2–7 cm, cuneate to rounded at base, acute to rounded at apex, dentate–serrate to subentire along margins; lateral leaflets oblique with apex and margin as in terminal leaflet, 2.4–7 × 2–6 cm. Flowers greenish–white, ca 2 mm long. Calyx tube truncate. Petals

ovate, hairy outside, ca 2 × 1.2 mm. Berries green, globose, 2–4-seeded, to 8 mm across. Seeds triangular-obvoid, ca 6 × 4.5 mm.

Flowering & Fruiting: August–December.

Common climber in mixed forests.

Specimen examined: Chandra Prabha Wild Life Sanctuary, near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75032.

FABACEAE

Key to genera

- 1a. Stipellae absent 2
- 1b. Stipellae present 6
- 2a. Leaves simple or digitately 3-foliolate **7. Croton**
- 2b. Leaves simple or digitately or pinnately 3-many foliolate 3
- 3a. Pods not jointed 4
- 3b. Pods jointed **2. Aeschynomene**
- 4a. Leaves odd-pinnate 5
- 4b. Leaves even-pinnate **1. Abrus**
- 5a. Anthers with an apiculate or gland-tipped connective, hairs fixed by the centre **9. Indigofera**
- 5b. Anthers muticous, hairs basifixed **13. Tephrosia**
- 6a. Pods jointed 7
- 6b. Pods not jointed 9
- 7a. Pods coiled **14. Uria**
- 7b. Pods not coiled 8
- 8a. Joints of pods turgid **3. Alysicarpus**
- 8b. Joints of pods flattened **8. Desmodium**
- 9a. Trees or lianas; pods indehiscent 10
- 9b. Usually climbers, rarely shrubs or trees; pods dehiscent 11
- 10a. Leaflets alternate **11. Pterocarpus**
- 10b. Leaflets opposite **10. Pongamia**
- 11a. Calyx and leaflets gland-dotted beneath; bracteoles absent 12
- 11b. Calyx and leaflets lacking gland-dots; bracteoles present 13
- 12a. Pods 3-many-seeded **5. Cajanus**
- 12b. Pods 1-2-seeded **12. Rhynchosia**
- 13a. Stamens monadelphous **6. Canavalia**
- 13b. Stamens diadelphous **4. Butea**

1. ABRUS Adans.

Abrus precatorius L., Syst. Nat. Ed. 2. 2: 472. 1767; Baker in Hook.f., Fl. Brit. India 2: 175. 1876; Duthie, Fl. Gangetic Plain 1: 262. 1903; Sanjappa, Legum. India 74. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 368. 2016.

Perennial twiners. Leaves pinnate, 5–10 cm long; leaflets 10–20 pairs, linear or linear oblong, apiculate, 10–20 × 4–6 mm, glabrous above, glabrous or minutely silky

beneath. Flowers pinkish white, in 2.6–7 cm long, dense pedunculate racemes. Calyx campanulate, truncate, finely silky, 0.2–0.3 cm long. Corolla pink or white, 0.5–1.2 cm long. Pods oblong beaked, or turgid, 2.5–4.0 × 1.2 cm. Seeds 3–5, sub-globose, scarlet with a black base, sometimes white, ca 0.7 cm across.

Flowering & Fruiting: August–March.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75096; Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75137; Bichuliya, 25.12.2016, A.N. Shukla 76375.

2. AESCHYNOMENE L.

Aeschynomene indica L., Sp. Pl. 713. 1753; Baker in Hook.f., Fl. Brit. India 2: 151. 1876; Duthie, Fl. Gangetic Plain 1: 270. 1903; Sanjappa, Legum. India 75. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 369. 2016.

Annual herbs, ca 1 m tall. Leaves 3–6 cm long, imparipinnate, 50–60-foliolate; leaflets numerous, sessile, linear, oblique at base, obtuse or sub-acute at apex. Flowers 1–4-flowered in axillary racemes, ca 1.5 cm long. Calyx glabrous, deeply bilipped, upper lip bifid, lower minutely 3-toothed, 5–6 mm. Corolla yellow, standard veined with purple. Pods linear-oblong acute, constricted between seeds, 2.5–4.0 × 0.2–0.3 cm.

Flowering & Fruiting: August–December.

Common, in cultivated fields and waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75138, 75130.

3. ALYSICARPUS Desv.

Alysicarpus vaginalis (L.) DC., Prodr. 2: 353. 1825; Baker in Hook.f., Fl. Brit. India 2: 158. 1876; Duthie, Fl. Gangetic Plain 1: 277. 1903; Sanjappa, Legum. India 81. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 377. 2016. *Hedysarum vaginale* L., Sp. Pl. 746. 1753.

Diffuse, procumbent, glabrous herbs. Leaves simple, elliptic lanceolate, oblong or linear-oblong, 0.5–8 × 0.5–3 cm, slightly cordate at base, rounded or apiculate at apex, hairy beneath. Flowers in to 7 cm elongated racemes. Calyx glabrous, 3–4 mm long; teeth linear-lanceolate, exceeding the tube. Corolla pinkish, 3.5–4.5 mm long. Pods subterete, reticulate, pubescent, 4–8-jointed. Seeds brown, ellipsoid, ca 1.8 mm long.

Flowering & Fruiting: Throughout the year.

Common in hilly slopes of mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75099.

4. BUTEA Roxb. ex Willd., nom. cons.

Butea monosperma (Lam.) Taub. Nat. Pflanzenfam. 3(3): 366, f. 131 M–N. 1894; Sanjappa, Legum. India 99. 1992. B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 378. 2016. *Erythrina monosperma* Lam., Encycl. 2: 391. 1786. *Butea frondosa* Roxb. ex Willd., Sp. Pl. 3: 917. 1802; Baker in Hook.f., Fl. Brit. India 2: 194. 1876; Duthie, Fl. Gangetic Plain 1: 240. 1903. – *Palas*.

Medium sized trees, 10–20 m tall. Leaves large, to 40 cm long, 3–foliolate; leaflets obliquely ovate, broadly ovate, 10–15 × 11–16 cm, cuneate or rounded at base, obtuse or emarginated at apex, glabrescent and shining above, silky tomentose beneath. Flowers in dense racemes forming terminal panicles, bright orange–red, 5–7 cm long. Calyx densely brown, pubescent. Petals silvery tomentose outside. Pods oblong, brownish, pubescent containing one distal seed, 10–20 × 3–4 cm. Seeds dark–brown, oval, compressed.

Flowering & Fruiting: January–May.

Common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Patariya Nala, 22.12.2016, A.N. Shukla 76291; Bichuliya, 25.12.2016, A.N. Shukla 76374.

5. CAJANUS Adans.

Cajanus scarabaeoides (L.) A.Thouars, Dict. Sci. Nat. 6: 617. 1817, '*Cajanus scarabaeoides*'; Maesen in Agric. Univ. Wageningen Pap. 85-4: 183, 189. 1985; Sanjappa, Legum. India 103. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 382. 2016. *Dolichos scarabaeoides* L., Sp. Pl. 726. 1753. *Atylosia scarabaeoides* (L.) Benth. in Miq., Pl. Jungh. 242. 1852; Baker in Hook.f., Fl. Brit. India 2: 215. 1876; Duthie, Fl. Gangetic Plain 1: 212. 1903. *Cantharospermum scarabaeoides* (Benth.) Baill. in Bull. Soc. Linn. Paris 1: 384. 1883.

Herbaceous twiners. Leaves 3–foliolate, stipulate, c. 5 cm long; leaflets elliptic or obovate–oblong, 1.4–4.3 × 0.4–3 cm, obtuse and mucronate, pubescent, yellow glandular beneath, margins excurved. Flowers c. 7 mm long, in 2–6–flowered axillary 2 cm long racemes, bracteate. Calyx 6–7 mm long, silky tomentose. Petals yellow with maroon venations, 8–9 × 4 mm. Pods to 3.0 × 0.7 cm. Seeds 4–6, strophiolate.

Flowering & Fruiting: October–February.

Common, in cultivated fields, grasslands & forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75104; Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75141; Gardi Nala, 23.12.2016, A.N. Shukla 76326; Bichuliya, 25.12.2016, A.N. Shukla 76358.

6. CANAVALIA Adans.

Canavalia gladiata (Jacq.) DC., Prodr. 2: 404. 1825; Sanjappa, Legum. India 107. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 383. 2016. *Dolichos gladiatus* Jacq., Coll. Bot. 2: 276. 1788. *C. ensiformis* (L.) DC. var. *virosa* (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 195. 1876.

Perennial large shrubby climbers. Leaves pinnately 3-foliolate; leaflets ovate to rhomboid-elliptic, rounded at base, abruptly acuminate at apex, 5–15 x 3.5–10 cm. Flowers ca 4 cm long, in axillary 10–30 cm long racemes. Calyx ca 13 mm long. Corolla purple or white tinged with purple, 2–5 cm long. Pods linear or oblong, 15–40 x 2–4 cm. Seeds 8–15, pinkish brown.

Flowering & Fruiting: October–February.

Not common, on roadside bushes.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary Dam, 21.08.2015, A.N. Shukla & N. Srivastava 75122; Gidhmarwa, 24.12.2016, A.N. Shukla 76352.

7. CROTALARIA L.

Crotalaria spectabilis Roth, Nov. Pl. Sp. 341. 1821; Sanjappa, Legum. India 130. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 401. 2016. *C. sericea* Retz., Observ. Bot. 5: 26. 1789, *non* Burm.f., 1768; Baker in Hook.f., Fl. Brit. India 2: 75. 1876; Duthie, Fl. Gangetic Plain 1: 205. 1903.

Tall herbs, 0.5–1 m high. Leaves simple, obovate or oblanceolate, 5–10 cm long, cuneate at base, mucronate at apex, glabrous above, silky pubescent beneath. Racemes terminal often paniced, 20–40-flowered, 20–40 cm long. Flowers yellow tinged with purple. Calyx 10–15 mm long, glabrous; teeth lanceolate, longer than tube. Corolla yellow, streaked with purple at base, 20–25 mm long. Pods oblong, 2.5–5 cm long, glabrous, subsessile, 20–30-seeded. Seeds blackish, reniform, 4–5 mm long.

Flowering & Fruiting: July–January.

Not common, along streams and on outskirts of forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 21.12.2016, A.N. Shukla 76267.

8. DESMODIUM Desv.

Desmodium triflorum (L.) DC., Prodr. 2: 334. 1825; Baker in Hook.f., Fl. Brit. India 2: 173. 1876; Duthie, Fl. Gangetic Plain 1: 285. 1903; Sanjappa, Legum. India 163. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 417. 2016. *Hedysarum triflorum* L., Sp. Pl. 749. 1753.

Trailing, annual herbs. Leaves 3-foliolate; leaflets obovate, 4–8 x 3–9 mm, cuneate at base, rounded or mucronate or emarginated at apex; glabrous above, weakly hirsute beneath. Flowers 1–5-together, axillary from upper leaves. Calyx 4.5–5 mm long, pubescent; teeth longer than tube. Corolla pink or white, 5–6 mm long, scarcely

exserted; standard retuse; wings and keels shorter than standard. Podscia 1.5 cm long, curved, on filiform pedicels; joints 2–5, reticulate-veined, indented on lower sutures, glabrous or hairy. Seedspale brown, ca 2 mm long.

Flowering & Fruiting: September–March.

Common, in wastelands and moist places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 20.08.2015, A.N. Shukla & N. Srivastava 75065; Patariya Nala, 22.12.2016, A.N. Shukla 76300; Gardi Nala, 23.12.2016, A.N. Shukla 76328; Patariya Nala, 22.12.2016, A.N. Shukla 76300.

9. INDIGOFERA L.

Key to species

- | | |
|---|--------------------------------|
| 1a. Leaflets more than 10; sepal silky brown | 1. <i>I. cassioides</i> |
| 1b. Leaflets less than 10; sepals not silky brown | 2. <i>I. tinctoria</i> |

1. *Indigofera cassioides* Rottler ex DC., Prodr. 2: 225. 1825; Sanjappa, Legum. India 186. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 432. 2016. *I. pulchella* Roxb., Fl. Ind. 3: 382. 1832; Baker in Hook.f., Fl. Brit. India 2: 101. 1876; Duthie, Fl. Gangetic Plain 1: 256. 1903.

Shrubs, up to 3 m tall. Leaves imparipinnate, 10–20 cm long; leaflets 13–20, elliptic-oblong to obovate, 10–20 × 5–10 mm, obtuse to rounded at base, obtuse to emarginate at apex, glabrescent. Flowers purple, in up to 17 cm long, axillary racemes. Calyx silky brown, 2–3 mm long; teeth unequal, deltoid. Calyx 2–4 mm long, silky brown pubescent; teeth triangular. Corolla pink to lilac-red, 5–12 mm long. Pods subcylindric, 2.5–4 cm long, reflexed, beaked, glabrous, 7–12-seeded. Seeds dark brown, ovoid.

Flowering & Fruiting: July–April.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, before Jamsoti, 175 m, 24.08.2015, A.N. Shukla & N. Srivastava 75181.

2. *Indigofera tinctoria* L., Sp. Pl. 751. 1753; Baker in Hook.f., Brit. India 2: 99. 1876; Duthie, Fl. Gangetic Plain 1: 254. 1903; Sanjappa, Legum. India 196. 1992; S.K. Maurya & al., Intl. J. Biod. 6. 2015; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 440. 2016.

Undershrubs, up to 1.4 m tall. Leaves 4–10 cm long, imparipinnate, 7–13-foliolate; leaflets opposite, elliptic or oblong to obovate-oblong, 10–25 × 5–12 mm, obtuse to cuneate at base, obtuse to rounded at apex, pubescent beneath. Flowers pink, in up to 13 cm long, axillary, subsessile racemes. Calyx 1–2 mm long, pubescent; teeth triangular. Corolla pink to lilac-red, 3–5 mm long. Pods turgid, slightly curved, slightly hairy, 6–12-seeded, 2–3.5 cm long. Seeds dark brown, oblong, 8–12 mm long, truncate at both ends.

Flowering & Fruiting: June–October.

Reported on the basis of Maurya et al. (S.K. Maurya & al., Intl. J. Biod. 6. 2015).

10. PONGAMIA Adans., orth. et nom. cons.

Pongamia pinnata(L.) Pierre, Fl. Forest. Cochinch. t. 385. 1899; Sanjappa, Legum. India 230. 1992 ; S.K. Maurya & al., Intl. J. Biod. 7. 2015; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 456. 2016. *Cytisus pinnatus* L., Sp. Pl. 741. 1753. *Pongamia glabra* Vent., Jard. Malmaison 1: 28. t. 28. 1803; Baker in Hook.f., Fl. Brit. India 2: 240. 1876; Duthie, Fl. Gangetic Plain 1: 267. 1903.

Medium-sized trees. Leaves imparipinnate to 30 cm long; leaflets 5–7, ovate-oblong, 3.5–12.0 × 1.8–8.2 cm, obtuse at base, acute or acuminate at apex. Flowers in peduncled, axillary racemes, shorter than leaves. Calyx brown-pubescent, subtruncate, obscurely toothed. Corolla white, tinged with pink, ca 1.2 cm long; standard silky, appendiculate at base, shortly clawed; wings adnate to keel. Pods woody, obliquely oblong, shortly beaked, 4–5 cm long. Seeds 1–2, reniform, dirty white, with brown streaks.

Flowering & Fruiting: February–March.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

11. PTEROCARPUS Jacq., nom. cons.

Pterocarpus marsupium Roxb., Pl. Coromandel 2: t. 116. 1799; Baker in Hook.f., Fl. Brit. India 2: 239. 1876; Duthie, Fl. Gangetic Plain 1: 266. 1903; Sanjappa, Legum. India 232. 1992; S.K. Maurya & al., Intl. J. Biod. 7. 2015; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 457. 2016.

Evergreen trees, up to 30 m tall. Leaves imparipinnate, up to 37 cm long; leaflets 5–7, elliptic-oblong, 6–10 × 3.2–5.0 cm, obtuse, rounded, narrowed at base, retuse or acuminate at apex, pubescent beneath. Flowers yellow in up to 25 cm long, terminal panicles. Calyx campanulate, 6–7 mm long, 5-toothed. Corolla yellow; standard ovate-orbicular, ca 1.2 cm long; wings clawed; keel oblong. Pods more or less orbicular, up to 5.5 × 5 cm, winged. Seeds solitary, reniform.

Flowering & Fruiting: August–March.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

12. RHYNCHOSIA Lour., nom. cons.

Rhynchosia minima (L.) DC., Prodr. 2: 385. 1825; Baker in Hook.f., Fl. Brit. India 2: 223. 1876; Duthie, Fl. Gangetic Plain 1: 222. 1903; Sanjappa, Legum. India 239. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 460. 2016. *Dolichos minimus* L., Sp. Pl. 726. 1753. *R. minima* var. *laxiflora* (Cambess.) Baker in Hook.f., Fl. Brit. India 2: 223. 1876.

Trailing or twining herbs, prostrate, perennial, with woody rootstock. Stems and branches finely pubescent or glabrescent. Leaves 3-foliolate; rachis 2–12 mm long; central leaflet rounded or broadly ovate, 1.8–2.5 × 1.8–2.5 cm, blunt or subacute; laterals

unequal-sided, glabrous or glabrescent on both the surfaces, gland-dotted beneath; petioles ca 2.5 cm long; stipules linear-lanceolate, ca 3.5 mm long. Flowers 5-8 mm long, in lax, 6-12-flowered, pedunculate, 5-10 cm long, axillary racemes. Calyx 3-5 mm long, pubescent; teeth setaceous, entire or incised. Corolla yellow or pinkish, 5-6 mm long; standard obovate, pubescent, glandular, shortly clawed. Pods oblong, falcate, 1-2 x 0.3-0.5 cm, pubescent or glabrescent, 2-seeded. Seeds grey or black, oblong or reniform.

Flowering & Fruiting: July–April.

Common in scrub forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75135.

13. TEPHROSIA Pers., nom. cons.

Tephrosia purpurea (L.) Pers., Syn. Pl. 2(2): 329. 1807; Baker in Hook.f., Fl. Brit. India 2: 112. 1876; Duthie, Fl. Gangetic Plain 1: 245. 1903; Sanjappa, Legum. India 258. 1992; S.K. Maurya & al., Intl. J. Biod. 8. 2015; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 468. 2016. *Cracca purpurea* L., Sp. Pl. 752. 1753.

Annual or perennial herbs, 2–15 cm high, with rounded glabrous or slightly hairy branches. Leaves imparipinnate, 7–15 cm long; leaflets 9–21, elliptic to oblong or obovate, 18–25 × 6–10 mm, acute or cuneate at base, truncate or mucronate at apex, glabrous above, silky beneath. Flowers in leaf opposed 10–13 cm long, pubescent; teeth acuminate. Calyx ca 3 mm long, pubescent; teeth acuminate. Corolla pink–red to purple, 6–10 mm long, pubescent outside. Pods linear–oblong, 3.5–4 cm long, pubescent, 6–9-seeded. Seeds light yellowish to dark brown, ellipsoid.

Flowering & Fruiting: Throughout of the year.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

14. URARIA Desv.

Uraria picta (Jacq.) Desv. in J. Bot. Agric. 1: 123, pl. 5, f. 19. 1813; Baker in Hook.f., Fl. Brit. India 2: 155. 1876; Duthie, Fl. Gangetic Plain 1: 273. 1903; Sanjappa, Legum. India 268. 1992; S.K. Maurya & al., Intl. J. Biod. 8. 2015; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 477. 2016. *Hedysarum pictum* Jacq., Coll. 2: 262. 1789.

Robust erect perennial suffruticose herbs or undershrubs, 40–70 cm high with pubescent cylindrical branches. Lower leaves 1–3-foliolate, upper ones 5–9-foliolate; leaflets sublinear, 3–10 × 0.4–2 cm, very gradually narrowed from a rounded base, excurved at margins, glabrous above, faintly pubescent below, variegated along the costa on the upper surface. Flowers small in dense terminal, to 25 cm long cylindrical racemes. Calyx bilipped, ca 5 mm long; lobes cordate, acuminate, hirsute. Corolla violet or purple, 7–8 mm long, slightly exerted; standard with two yellow spots. Pods glabrous, 3–6-jointed, folded in one another, 8–10 mm long. Seeds shining white.

Flowering & Fruiting: September–January.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

CAESALPINIACEAE

Keytogenera

- | | |
|---|------------------------|
| 1a. Leaves simple, lobed | 1. Bauhinia |
| 1b. Leaves compound | 2 |
| 2a. Stamens 3, connate; fruits pulpy | 5. Tamarindus |
| 2b. Stamens 5-10, free; fruits dry | 3 |
| 3a. Bracteoles 1 or 2, at or towards the base of pedicel; filaments of 3 abaxial antisepalous stamens sigmoidly curved | 2. Cassia |
| 3b. Bracteoles absent or 2, inserted in the middle of pedicel or above; filaments of all stamens straight or simply incurved | 4 |
| 4a. Bracteoles 2, inserted in the middle of pedicel or above | 3. Chamaecrista |
| 4b. Bracteoles absent | 4. Senna |

1. BAUHINIA L.

Key to species

- | | |
|--|------------------------|
| 1a. Large woody climbers | 3. B. vahlii |
| 1b. Trees or shrubs | 2 |
| 2a. Fertile stamens 10 | 2. B. racemosa |
| 2b. Fertile stamens 3-5 | 3 |
| 3a. Leaves cleft to about half way down; hypanthium shorter than the calyx; fertile stamens 3 | 1. B. purpurea |
| 3b. Leaves cleft to about one-third way down; hypanthium equalling the calyx; fertile stamens 5 | 4. B. variegata |

1. Bauhinia purpurea L., Sp. Pl. 375. 1753; Baker in Hook.f., Fl. Brit. India 2: 284. 1878; Duthie, Fl. Gangetic Plain 1: 300. 1903; Sanjappa, Legum. India 5. 1992; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 489. 2016.

Medium sized trees, 6–10 m tall. Leaves suborbicular, obtuse, subacute at apex, cordate at base, 3.5–13.0 x 3.5–15.0 cm. Flowers rose–purple, in a few flowered terminal corymbose or paniculate tomentose racemes. Calyx oblanceolate with purple claws and mouth, 2.0–2.5 cm long. Petals 5, rose to pink, obovate, 3.5 x 1.5 cm. Pods flat, slightly falcate, 15–25 x 1.5–2.0 cm. Seeds dark brown, flattened.

Flowering & Fruiting: October–March.

Usually planted as an ornamental tree.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along road side, 20.12.2016, A.N. Shukla 76204.

2. Bauhinia racemosa Lam., Encycl. 1(2): 390. 1785; Baker in Hook.f., Fl. Brit. India 2: 276. 1878; Duthie, Fl. Gangetic Plain 1: 298. 1903; Sanjappa, Legum. India 5. 1992; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 490. 2016.

Trees, up to 10 m tall; bark black, fissured. Leaves broader than long, divided 1/3 to 1/2 way down into two lobes, 2–5 x 2.5–7.5 cm, usually cordate at base, rounded at apex, glabrous above, hairy beneath. Flowers white, terminal or leaf opposed simple 5–9 cm long racemes. Calyx spathaceous, up to 8 mm long, reflexed. Petals white, oblanceolate, 9–14 mm long, narrow, acute. Stamens 10, all fertile; filaments hairy at

base. Pods linear-oblong, 13–18 × 1.5–1.8 cm, turgid, falcate, with ca. 1.5 cm long tip. Seeds up to 20, black, oblong, 7–8 mm long.

Flowering & Fruiting: Throughout the year.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75048; Along road side, 20.12.2016, A.N. Shukla 76237.

3. *Bauhinia vahlii* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 297. 1834; Baker in Hook.f., Fl. Brit. India 2: 279. 1878; Duthie, Fl. Gangetic Plain 1: 299. 1903; Sanjappa, Legum. India 6. 1992; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 491. 2016.

Large woody climbers with circinnate tendrils. Leaves alternate, almost orbicular, broader than long, up to 35 cm across, cordate at base, lobed at apex, glabrescent above, densely tomentose beneath. Flowers white or buff, in long-peduncled terminal subcorymbose racemes. Calyx 3–5-lobed, ca 7 mm long, splitting into 2–3 parts, densely villous. Petals 5, white, buff with age, spatulate, 1.7–4 cm long. Pods woody, 22–28 × 5–7 cm, rusty velvety, 6–12-seeded. Seeds dark brown, flat, compressed, polished.

Flowering & Fruiting: May–December.

Common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Devdari kund, 21.12.2016, A.N. Shukla 76262.

4. *Bauhinia variegata* L., Sp. Pl. 375. 1753; Baker in Hook.f., Fl. Brit. India 2: 284. 1878; Duthie, Fl. Gangetic Plain 1: 300. 1903; Sanjappa, Legum. India 6. 1992; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 492. 2016.

Small-medium, deciduous trees, 5–10 m tall. Leaves broadly ovate-suborbicular, 5–10 × 5–8 cm, deeply cordate at base, obtuse or rounded at apex, glabrous and dull green above, glaucous and puberulous along the nerves beneath. Flowers in axillary or terminal racemes. Calyx 5-dentate, ca 2.5 cm long, tomentose. Petals white or pale purple, one petal darker with purple veins, obovate, 5–6 cm long; claw broader. Pods dark brown, 15–25 × 1–2 cm, flat, 10–15-seeded. Seeds brown, ellipsoid, 1–1.2 cm long.

Flowering & Fruiting: March–October.

Common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Sanctuary gate, 20.12.2016, A.N. Shukla 76204.

2. CASSIA L., nom. cons.

Cassia fistula L., Sp. Pl. 377. 1753; Baker in Hook.f., Fl. Brit. India 2: 261. 1878; Duthie, Fl. Gangetic Plain 1: 291. 1903; Sanjappa, Legum. India 15. 1992; V.Singh,

Monograph Indian Cassiinae 25. 2001; S.K. Maurya & al., Intl. J. Biod. 5. 2015; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 496. 2016.

Medium, erect, glabrous trees, 10–15 m tall; branchlets adpressed pubescent; bark grey, smooth with horizontal wrinkles. Leaves to 30 cm long; leaflets 3–8 pairs, opposite, ovate, elliptic–oblong, 5–10 × 3–6 cm, cuneate or rounded at base, acute–short acuminate at apex. Flowers yellow, in to 4–5 cm long drooping racemes. Sepals 5, distinct, ovate, ca 6 mm long, obtuse. Petals 5, bright yellow, obovate, clawed. Pods dark brown or black, cylindrical, drooping, many–seeded, 30–60 cm long. Seeds obovate, embedded in pulp, 6–8 mm long.

Flowering & Fruiting: March–February.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

3. CHAMAECRISTA Moench

Key to species

- 1a. Leaflets 2 pairs, membranous; sepals obtuse or slightly acute **1. C. absus**
 1b. Leaflets more than 2 pairs, rigidly coriaceous; sepals narrowly acute **2. C. mimosoides**

1. Chamaecrista absus (L.) H.S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 664. 1982; V.Singh, Monograph Indian Cassiinae 55. 2001; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 498. 2016. *Cassia absus* L., Sp. Pl. 1: 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 265. 1878; Duthie, Fl. Gangetic Plain 1: 294. 1903; Sanjappa, Legum. India 14. 1992.

Viscid glandular hairy, herbs, to 1.6 m tall. Leaflets obovate to suborbicular or rhomboid to elliptic, membranous, to 3.5 × 2.0 cm, oblique at base, mucronate at apex, gland–dotted and pubescent on both surfaces. Flowers reddish yellow, in 4–10 cm long terminal or leaf opposed racemes. Sepals 5, lanceolate, bristly, imbricate, to 4 mm long. Petals 5, broadly obovate, clawed, glabrous, to 7 mm long. Pods to 4 × 1.2 cm, flat–oblique, glandular hairy, 4–8 seeded. Seeds black, shining ovoid.

Flowering & Fruiting: July–November.

Common in mixed forests and wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75151.

2. Chamaecrista mimosoides (L.) Greene in Pittonia 4: 27. 1899; V.Singh, Monograph Indian Cassiinae 67. 2001; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 498. 2016. *Cassia mimosoides* L., Sp. Pl. 379. 1753; Baker in Hook.f., Fl. Brit. India 2: 266. 1878; Duthie, Fl. Gangetic Plain 1: 296. 1903; Sanjappa, Legum. India 17. 1992.

Herbs, erect or decumbent–ascending, much branched, glabrous or pubescent, annual or perennial, 50–80 cm high. Leaves 7–10 cm long; rachis pubescent with a solitary, sessile gland below the lowest pair of leaflet; leaflets 30–80 pairs, linear–narrowly oblong, 2.5–6 mm long, obtuse or mucronate at apex, ciliate, glabrous, often sensitive to touch. Flowers 1–3 in axillary or leaf–opposed, short racemes. Sepals 5–6

mm long, appressed hairy on the back, tapering at both the ends. Petals bright yellow, 6-7 mm long. Stamens 10, all fertile, alternately long and short. Pods linear or strap-shaped, 3-5 cm long, appressed hairy, 15-22-seeded. Seeds oblong or obovate-oblong, ca 3.2 mm long, narrowed to hilum and without areole.

Flowering & Fruiting: August–November.

Common in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75105.

4. SENNA Mill.

Key to species

- | | |
|---|---------------------------|
| 1a. Herbs or undershrubs | 2 |
| 1b. Shrubs or trees | 1. S. alata |
| 2a. Leaflets 3 pairs | 3 |
| 2b. Leaflets 3-10 pairs | 3. S. occidentalis |
| 3a. Leaves with single gland between the lowest pair of leaflet | 2. S. obtusifolia |
| 3b. Leaves with two glands between two lower pair of leaflet | 4. S. tora |

1. Senna alata (L.) Roxb., Fl. Ind. (ed. 1832). 2: 349. 1832; V.Singh, Monograph Indian Cassiinae 99. 2001; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 504. 2016. *Cassia alata* L., Sp. Pl. 378. 1753; Baker in Hook.f., Fl. Brit. India 2: 264. 1878; Sanjappa, Legum. India 14. 1992; S.K. Maurya & al., Intl. J. Biod. 5. 2015.

Sublignose shrubs, 1–4 m tall; branches pubescent. Leaves to 70 cm long; leaflets 8–12 pairs, larger towards tip, oblong, obovate, unequal base, mucronate at apex, glabrous on both surfaces, 5–10 × 2.5–6 cm. Racemes spiciform, 15–25 cm long, tomentose. Flowers yellow, 3–4 cm across. Pods linear, compressed, membranous, glabrous. Seeds rhombic, flat, ca 10 × 8 mm.

Flowering & Fruiting: August–February.

Reported on the basis of Maurya et al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

2. Senna obtusifolia (L.) Irwin & Barneby in Mem. New York Bot. Gard. 35(1): 252. 1982; V.Singh, Monograph Indian Cassiinae 164. 2001; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 506. 2016. *Cassia obtusifolia* L., Sp. Pl. 377. 1753; Duthie, Fl. Gangetic Plain 1: 293. 1903; Sanjappa, Legum. India 19. 1992. *C. tora sensu* Benth. in Trans. Linn. Soc. London 27: 532. 1871, *p.p. non* L., 1753; Baker in Hook.f., Fl. Brit. India 2: 263. 1878.

Herbs or undershrubs, annual, 50-150 cm high. Stems and branches glabrous except glandular hairy young parts. Leaves 7-10 cm long, with a single subulate gland between the lowest pair of leaflet; rachis deeply grooved; leaflets 3 pairs, obovate or oblong, 1.5-5 x 1-2.5 cm, rounded or mucronate at apex, cuneate at base, glabrous above, appressed hairy beneath; stipules linear. Flowers 1-2; peduncle ca 2 cm long; pedicels 1-2 cm long. Sepals ovate, 5-9 mm long, subequal, ciliate, hairy outside. Petals yellow, unequal, 12-18 mm long. Stamens 7 fertile; staminodes 3. Pods

subcylindrical to tetragonous, 8-20 cm long, slightly falcate, beaked, many-seeded. Seeds rhomboid or obovate, 4-7 mm long.

Flowering & Fruiting: August–April.

Common, in grassland.

Specimen examined: Chandra Prabha Wildlife Sanctuary, before Jamsoti, 175 m, 24.08.2015, A.N. Shukla & N. Srivastava 75185.

3. *Senna occidentalis* (L.) Link, Handbuch 2: 140. 1831; Irwin & Barneby in Mem. New York Bot. Gard. 35(1): 436. 1982; V.Singh, Monograph Indian Cassiinae 170. 2001; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 506. 2016. *Cassia occidentalis* L., Sp. Pl. 377. 1753; Baker in Hook.f., Fl. Brit. India 2: 262. 1878; Duthie, Fl. Gangetic Plain 1: 292. 1903; Sanjappa, Legum. India 19. 1992; S.K. Maurya & al., Intl. J. Biod. 5. 2015.

Herbs or undershrubs, annual or perennial, 0.5-2 m high. Stems and branches angular, striated with reddish purple, glabrous except young parts. Leaves 10-20 cm long, with a single gland at the base of petiole; leaflets 3-5 pairs, ovate to ovate-oblong, 4-12 x 2.5-4.5 cm, acuminate at apex, with a single gland between the uppermost pair; stipules ovate-acuminate. Flowers in short, axillary, corymbose racemes forming a terminal, few-flowered panicle. Sepals 5, distinct, tinged with pink, oblong, 8-10 mm long, obtuse. Petals bright yellow with orange veins, ca 1.5 cm long, unequal, obtuse. Stamens 7 fertile, 3 lower longer than 4 laterals; staminodes 3. Pods 10-15 cm long, laterally compressed, septate between the seeds. Seeds many, pale brown, ovoid, 3-4.5 mm long, laterally compressed.

Flowering & Fruiting: July–April.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

4. *Senna tora* (L.) Roxb., Fl. Ind. 2: 340. 1832; V.Singh, Monograph Indian Cassiinae 222. 2001; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 509. 2016. *Cassia tora* L., Sp. Pl. 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 263. 1878, *p.p.*; Sanjappa, Legum. India 22. 1992; S.K. Maurya & al., Intl. J. Biod. 5. 2015.

Annual, foetid herbs or undershrubs, up to 1.2 m high. Leaves up to 12 cm long; leaflets 2-3 pairs, ovate-elliptic or oblong-obtuse, rounded or cuneate at base, acute-acuminate at apex, 2.4-9.0 x 0.5-4.0 cm. Flowers yellow, 2-3 cm across. Calyx segments elliptic-ovate, obtuse, glabrate. Petals oblong-obovate. Pods sub-tetragonous, curved, many seeded, up to 16.0 x 0.5 cm. Seeds rhomboid, ca 4 mm.

Flowering & Fruiting: August–April.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

5. TAMARINDUS L.

***Tamarindus indica* L.**, Sp. Pl. 34. 1753; Baker in Hook.f., Fl. Brit. India 2: 273. 1878; Duthie, Fl. Gangetic Plain 1: 301. 1903; Sanjappa, Legum. India 36. 1992; B.K. Shukla in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 510. 2016. – *Imli*.

Large, evergreen, unarmed trees, to 20 m tall. Leaves abruptly pinnate to 14 cm long; leaflets opposite, 12–20 pairs, oblong or ovate-oblong, 0.6–1.8 × 0.4–0.6 cm, obliquely cuneate or rounded at base, notched or mucronate at apex. Flowers yellow red, in terminal racemes. Calyx tube turbinate, segments lanceolate, greenish white. Petals yellow streaked, red, margins fringed. Pods to 12 × 2.4 cm, brown oblong, indehiscent. Seeds black, rectangular.

Flowering & Fruiting: January–April.

Not common, occasionally planted.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Rajdari GuestHouse, 24.08.2015, A.N. Shukla & N. Srivastava 75168.

MIMOSACEAE

Keytogenera

- | | |
|------------------------------------|-------------------|
| 1a. Stamens indefinite | 2 |
| 1b. Stamens definite | 3. <i>Mimosa</i> |
| 2a. Filaments free from the base | 1. <i>Acacia</i> |
| 2b. Filaments attached to the base | 2. <i>Albizia</i> |

1. ACACIA Mill.

Key to species

- | | |
|---|--------------------------|
| 1a. Flowers in elongated cylindrical spikes | 1. <i>A. catechu</i> |
| 1b. Flowers in globose heads | 2 |
| 2a. Climbing or scandent shrubs | 3. <i>A. torta</i> |
| 2b. Tall shrubs or medium-sized trees | 2. <i>A. leucophloea</i> |

1. *Acacia catechu* (L.f.) Willd., Sp. Pl. 4: 1079. 1806; Baker in Hook.f., Fl. Brit. India 2: 295. 1878; Duthie, Fl. Gangetic Plain 1: 316. 1903; Sanjappa, Legum. India 38. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 513. 2016. *Mimosa catechu* L.f., Suppl. Pl. 439. 1782. – *Khair*.

Trees, up to 1 m tall; bark black; stipular spines up to 6 mm long. Leaves bipinnate; rachis ca 15 cm long with a large gland at base of the petiole; pinnae 7–30 pairs, 1.3–4 cm long, pubescent; leaflets 6–40 pairs, linear, up to 4.0 × 0.8 mm, oblique at base, obtuse at tip. Flowers white in axillary pedunculate 2.5–10 cm long spikes. Calyx campanulate, toothed, pubescent. Corolla ovate-oblong. Pods up to 8.5 × 1.7 cm, flat, beaked. Seeds 3–10.

Flowering & Fruiting: August–February.

Common in scrub forest.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliyari, 267 m, 19.08.2015, A.N. Shukla & N. Shukla 75016; Jalebiya mode, 22.08.2015, A.N. Shukla & N. Srivastava 75140; Pindra Road, 24.12.2016, A.N. Shukla 76339.

2. *Acacia leucophloea* (Roxb.) Willd., Sp. Pl. 4: 1083. 1806; Baker in Hook.f., Fl. Brit. India 2: 294. 1878; Duthie, Fl. Gangetic Plain 1: 315. 1903; Sanjappa, Legum.

India 41. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 517. 2016. *Mimosa leucophloea* Roxb., Pl. Coromandel 2: 27. t. 150. 1800.

Medium-sized trees with yellowish bark. Leaves alternate or clustered; leaflets 10–30-pairs, linear-oblong, oblique at base, acute at apex, 2.0 x 0.5 mm. Flowers in terminal leafless paniced heads; heads white. Calyx campanulate, 5-lobed. Petals 5, yellow. Pods linear, 8–19 x 0.6–0.8 cm. Seeds 10–20.

Flowering & Fruiting: August–January.

Common in scrub forests and along road side.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75078; Along road side, 20.12.2016, A.N. Shukla 76238.

3. *Acacia torta* (Roxb.) Craib in Bull. Misc. Inform. Kew 1915(9): 410. 1915; Sanjappa, Legum. India 44. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 520. 2016. *Mimosa torta* Roxb., Fl. India 2: 556. 1832. *Acacia pennata auct. non* (L.) Willd., 1806: Baker in Hook.f., Fl. Brit. India 2: 297. 1878, p.p.

A large climbing shrubs; branches prickly, grayish and pubescent; prickles to 2.5 mm long. Leaf rachis up to 32 cm long with conical glands; pinnae 5–20 pairs, 5–10 cm long; leaflets up to 50 pairs, linear-oblong, 4–8 × 2–3 mm, truncate at base, pubescent beneath. Flowers white, globose terminal heads. Calyx. 2 mm long, pubescent. Corolla cream-coloured, ca 3 mm long, 5-lobed. Pods strap-shaped, flat, rusty brown tomentose when young, glabrous on maturity, 8–15 × 1.5–2.5 cm. Seeds 5–7, ovoid.

Flowering & Fruiting: October–March.

Common, in mixed and scrub forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, 217 m, 19.08.2015, A.N. Shukla & N. Srivastava 75036.

2. **ALBIZIA** Durazz.

Albizia lebbek (L.) Benth. in Hook., Lond. J. Bot. 3: 87. 1844, p.p. '*lebbek*' & Trans. Linn. Soc. London 30: 562. 1875, p.p.; Baker in Hook.f., Fl. Brit. India 2: 298. 1878; Duthie, Fl. Gangetic Plain 1: 320. 1903; Sanjappa, Legum. India 56. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 524. 2016. *Mimosa lebbek* L., Sp. Pl. 516. 1753. – *Siris*.

Trees, up to 25 m tall; bark grey, young shoots and inflorescence pubescent. Leaves bipinnate, rachis up to 18 cm long; pinnae 2–4 pairs, 5–20 cm long; leaflets 4–10 pairs, oblong-obovate, 2.5–4 × 1.2–2 cm, unequal at base, obtuse-emarginate at apex, adpressed pubescent beneath. Flowers creamy, in axillary globose heads. Calyx campanulate, 3–3.5 mm long; teeth deltoid. Corolla infundibuliform, 7–8 mm long. Pods straw-coloured, linear-oblong, 8–12-seeded, 10–30 × 2–5 cm. Seeds pale brown, ovoid-oblong, ca 1 cm long.

Flowering & Fruiting: March–August.

Common in forests and wastelands and along the roadsides.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Sanctuary gate, 20.12.2016, A.N. Shukla 76202.

3. MIMOSA L.

Mimosa himalayana Gamble in Bull. Misc. Inform. Kew 1920(1): 4. 1920; Sanjappa, Legum. India 68. 1992; B.K. Shukla & A.N. Singh in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 528. 2016. *M. rubicaulis* auct. non Lam., 1783; Baker in Hook.f., Fl. Brit. India 2: 291. 1878, p.p.; Duthie, Fl. Gangetic Plain 1: 311. 1903.

Prickly shrubs, up to 5 m tall. Leaves 2-pinnate, up to 24 cm long; pinnae 4–10 pairs, 2–6 cm long; leaflets 6–10 pairs, linear-oblong, obtuse, hairy below. Flowers red in leaf axils and terminal panicles or head. Calyx campanulate, ca 1 mm long, glabrous. Corolla ca 2.5 mm long; lobes 4. Pods pale or dark brown, strap-shaped, slightly curved, with 4–10 joints, 4–10-seeded, 5–9 × 0.9–1.2 cm.

Flowering & Fruiting: September–February.

Common, in open forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusaria, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75149.

DROSERACEAE

DROSERA L.

Drosera burmannii Vahl, Symb. Bot. 3: 50. 1794; C.B. Clarke in Hook.f., Fl. Brit. India 2: 424. 1878; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 543. 2016.

Perennial, insectivorous herbs. Leaves radical resulate, obovate-orbicular, spatulate, 0.5–1 × 0.3–0.6 cm, abruptly narrowed in to a flat petiole, reddish green, covered with glandular tentacles above; tentacles elongate, with rounded tip. Racemes 5–20 cm long, many-flowered. Flowers white, up to 1 cm across, bracteate. Sepals 5, oblong-broadly lanceolate. Petals 5, oblong-lanceolate, spatulate, clawed, obcordate. Capsules ellipsoid, 5 valved. Seeds black, reticulate.

Flowering & Fruiting: September – January.

Not common in marshy places and riverbanks.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Gardi Nala, 243 m, 20.12.2016, A.N. Shukla 76232; Gardi Nala, 23.12.2016, A.N. Shukla 76312.

COMBRETACEAE

Key to genera

- | | |
|------------------------------|----------------------|
| 1a. Flowers in globose heads | 1. Anogeissus |
| 1b. Flowers in spikes | 2 |
| 2a. Petals present | 2. Combretum |
| 2b. Petals absent | 3. Terminalia |

1. ANOGEISSUS (DC.) Wall. ex Gull., Perr. & A.Rich.

Anogeissus latifolia (Roxb. ex DC.) Wall. ex Bedd. Fl. Sylv. S. India 1: 15. 1869; C.B. Clarke in Hook.f., Fl. Brit. India 2: 450. 1878; Duthie, Fl. Gangetic Plain 1: 339. 1903; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 544. 2016. *Conocarpus latifolia* Roxb. ex DC., Prodr. 3: 16. 1828. *Anogeissus latifolia* var. *glabra* & var. *villosa*. C.B. Clarke in Hook.f., Fl. Brit. India 2: 450. 1878.

Trees, up to 20 m tall; bark grey smooth. Leaves alternate or sub-opposite, elliptic or ovate-elliptic, glabrous, 4.5–10 × 3–6 cm, obtuse or truncate at base, obtuse at apex, pubescent beneath. Flowers creamy, in axillary and terminal racemes. Calyx–stalk glabrous or sparsely hairy, 4–5 mm long; calyx–cup 1–2 mm long, glabrous. Petals absent. Fruits up to 4.5 × 6.0 mm, persistent sepals stalk 5–6 mm long, curved.

Flowering & Fruiting: April–August.

Common along road side.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along road side, 21.12.2016, A.N. Shukla 76254.

2. COMBRETUM Loebl., nom. cons.

Combretum album Pers., Syn. Pl. 1: 411. 1805; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 547. 2016. *Combretum roxburghii* Spreng., Syst. Veg. 2: 331. 1825. *C. decandrum* Roxb., Pl. Coromandel t. 59. 1796, non. Jacq., 1760; C.B. Clarke in Hook.f., Fl. Brit. India 2: 452. 1878; Duthie, Fl. Gangetic Plain 1: 338. 1903.

Gigantic, evergreen, scandent shrubs. Leaves opposite, elliptic, elliptic–lanceolate or obovate–oblong, 7–13 × 3–6 cm, obtuse or cuneate at base, abruptly acuminate at apex, more or less glabrous. Flowers pentamerous, greenish white, brownish red or purplish brown, 3–4 mm across. Calyx pubescent, cup-shaped, lobes linear, acuminate, ca 2 mm long. Petals 5, pubescent, exceeding the calyx lobes, oblong. Fruits oblong or elliptic, 5-winged, to 3.0 × 1.6 cm.

Flowering & Fruiting: September–March.

Commonly found in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 21.12.2016, A.N. Shukla 76273.

3. TERMINALIA L.

Key to species

- | | |
|--|------------------------|
| 1a. Leaves clustered on branch tip | 2. T. bellirica |
| 1b. Leaves not clustered on branch tip | 2 |
| 2a. Fruits 5-ridged when dry | 3. T. chebula |
| 2b. Fruits winged | 1. T. arjuna |

1. Terminalia arjuna (Roxb. ex DC.) Wight & Arn., Prodr. Fl. Ind. Orient. 34. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 2: 447. 1878; A. Kumar in Kr.P. Singh

& al., Fl. Uttar Pradesh 1: 551. 2016. *Pentaptera arjuna* Roxb. ex DC., Prodr. 3: 14. 1828. *Terminalia glabra* Wight & Arn., Prodr. Fl. Ind. Orient. 314. 1834; Duthie, Fl. Gangetic Plain 1: 336. 1903. – *Arjun*.

Trees, up to 20 m high. Bark greyish white, smooth. Leaves subopposite, elliptic-oblong, 7-20 x 2.5-8.5 cm, acute or obtuse at apex, rounded or subcordate at base, create-serrate in the upper part, glabrous; petioles 6-9 mm long with 1 or usually 2 glands at apex. Flowers in axillary, 3-7 cm long spikes or terminal panicles. Calyx greenish yellow or cream-coloured, campanulate, 3-4.5 mm long, 5-lobed; lobes triangular. Petals absent. Stamens 10, 2-seriate. Fruits 2-5 x 1.5-4.5 cm, fibrous-woody, with 5, arcuately veined, stiff wings.

Flowering & Fruiting: April–March.

Common, along banks of streams and rivers, and in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75015; Gidhmarwa, 24.12.2016, A.N. Shukla 76346.

2. *Terminalia bellirica* (Gaertn.) Roxb., Pl. Coromandel 2: 54. 1805; C.B. Clarke in Hook.f., Fl. Brit. India 2: 445. 1878; Duthie, Fl. Gangetic Plain 1: 335. 1903; S.K. Maurya & al., Intl. J. Biod. 8. 2015; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 552. 2016. *Myrobalnus bellirica* Gaertn., Fruct. Sem. Pl. 2: 90. t. 97. f. a–b. 1791.

Deciduous trees, 25–40 m tall; bark grayish black, fissured. Leaves whorled at the end of branches, obovate to broadly elliptic, 5–10 × 4–9 cm, obtusely cuneate at base, abruptly acuminate at apex, glabrous above, glaucous beneath. Flowers yellowish, foetid, smelling, ca 6 mm across. Calyx hairy outside, woolly within; limb cup-shaped with 5 teeth. Drupes pyriform, brown tomentose, to 3.5–2.0 cm across.

Flowering & Fruiting: September–March.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

3. *Terminalia chebula* Retz., Observ. Bot. 5: 31. 1789; C.B. Clarke in Hook.f., Fl. Brit. India 2: 446. 1878, p.p.; Duthie, Fl. Gangetic Plain 1: 336. 1903; S.K. Maurya & al., Intl. J. Biod. 8. 2015; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 553. 2016. – *Harra*.

Trees, up to 20 m high; young parts pubescent. Bark brown. Leaves alternate or subopposite, elliptic or ovate-elliptic, 5-17.5 x 3-9.5 cm, acute or subacuminate at apex, subacute or acute at base, silky hairy when young, glabrescent later on; petioles 1-2 cm long, with 2 glands at apex. Flowers bisexual, in 9-15.5 cm long, terminal panicles. Calyx campanulate, hairy inside, 5-lobed; lobes white, ovate-deltoid, short. Petals absent. Stamens 10, 2-seriate. Fruits pendulous, ellipsoid or obovoid, 1.8-3 x 1-2 cm, obscurely 5-ribbed on drying.

Flowering & Fruiting: February–August.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

MYRTACEAE

SYZYGIUM P.Browne ex Gaertn.

Syzygium cumini (L.) Skeels, U.S.D.A. Bur. Pl. Industr. Bull. 248: 25. 1912; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 556. 2016. *Myrtus cumini* L., Sp. Pl. 471. 1753. *Eugenia jambolana* Lam., Encycl. 3: 198. 1789; Duthie in Hook.f., Fl. Brit. India 2: 499. 1879 & Fl. Gangetic Plain 1: 342. 1903. – *Jamun*.

Large, glabrous, evergreen trees, up to 25 m tall with umbrella-shaped crown. Leaves ovate to obovate, oblong-elliptic, oblanceolate-elliptic, 7–14 × 4–8 cm, narrowed at base, acute subobtusely, abruptly acuminate at apex, entire along margins. Flowers greenish white, 6–8 mm across. Calyx tube turbinate, 3–5 mm long. Petals calyptrate, fugacious, ca 1.2 cm long. Berries ellipsoid-oblong, up to 2.8 cm long. Seeds solitary with thick rounded fleshy cotyledons.

Flowering & Fruiting: February–August.

Common, along rivers, streams and in forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76218.

LECYTHIDACEAE

BARRINGTONIA J.R.Forst. & G.Forst., nom. cons.

Barringtonia acutangula (L.) Gaertn., Fruct. Sem. Pl. 2: 97. t. 101. 1791; C.B. Clarke in Hook.f., Fl. Brit. India 2: 508. 1879; Duthie, Fl. Gangetic Plain 1: 343. 1903; S.K. Maurya & al., Intl. J. Biod. 8. 2015; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 560. 2016. *Eugenia acutangula* L., Sp. Pl. 471. 1753.

Small trees, up to 20 m high. Leaves elliptic, subsessile, tapering at base, acute at apex, 6–12 × 2–6 cm. Racemes terminal, pendulous, densely flowered, ca 50 cm long. Flowers 2–3 cm across. Sepals 4, free. Petals 4 or 5. Fruits ovoid, bluntly quadrangular, 2–6 × 1.0–2.5 cm.

Flowering & Fruiting: May–September.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

LYTHRACEAE

Key to genera

- | | |
|---|-------------------------|
| 1a. Trees or shrubs; fruits more than 5 mm long | 2 |
| 1a. Herbs; fruits less than 3 mm long | 2. Rotala |
| 2a. Petals subulate; hypanthium tubular | 3. Woodfordia |
| 2b. Petals obovate or spatulate; hypanthium copular | 1. Lagerstroemia |

1. LAGERSTROEMIA L.

Lagerstroemia parviflora Roxb., Pl. Coromandel 1: 47. T. 66. 1795; C.B. Clarke in Hook.f., Fl. Brit. India 2: 575. 1879, incl. vars. *majuscula* and *benghalensis*; Duthie,

Fl. Gangetic Plain 1: 353. 1903; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 567. 2016.

Deciduous, tall trees, to 30 m high. Leaves ovate, ovate–elliptic or ovate–lanceolate, 3–9 × 2–4.2 cm, rounded at base, acute or acuminate at apex, entire along margins, glabrous above, puberulous along the nerves beneath. Flowers white, in axillary and terminal panicles. Calyx not ribbed; tube copular with 6 teeth. Petals 6, 5–6 mm long, clawed. Capsules ellipsoid or ovoid, to 3.5 × 1.8 cm. Seeds with terminal wings.

Flowering & Fruiting: May–October.

Common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Chandra Prabha river, 21.12.2016, A.N. Shukla 76282.

2. ROTALA L.

Rotala mexicana Schltld. & Cham. in *Linnaea* 5: 567. 1830. *Ammannia pygmaea* Kurz in Seem, *J. Bot.* 5: 376. 1867; C.B. Clarke in Hook.f., *Fl. Brit. India* 2: 568. 1879; Duthie, *Fl. Gangetic Plain* 1: 349. 1903; A. Kumar in Kr.P. Singh & al., *Fl. Uttar Pradesh* 1: 570. 2016.

Erect or prostrate, marshy herbs, 2–4 cm long, branches tufted quadrangular. Leaves linear–oblong, opposite, occasionally ujubeated, obtuse at apex, 0.5–0.1 cm long. Flowers pale green, axillary, solitary. Calyx minute, 4-toothed, teeth ovate. Petals absent. Stamens 2, as long as calyx; ovary globose, glabrous, style columnar, stigmas ujubeat. Capsules ovoid–oblong, many seeded, 2–3-valved. Seeds black, numerous, minute, 3-angular.

Flowering & Fruiting: October–November.

Common in moist and shady places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Girda Nala, 23.12.2016, A.N. Shukla 76319, 76323.

3. WOODFORDIA Salisb.

Woodfordia fruticosa (L.) Kurz in *J. Asiat. Soc. Bengal* 40: 56. 1871; S.K. Maurya & al., *Intl. J. Biod.* 8. 2015; A. Kumar in Kr.P. Singh & al., *Fl. Uttar Pradesh* 1: 572. 2016. *Lythrum fruticosum* L., *Syst. Nat.* ed. 10. 1045. 1759. *W. floribunda* Salisb., *Parad. Lond.* t. 42. 1806; C.B. Clarke in Hook.f., *Fl. Brit. India* 2: 572. 1879; Duthie, *Fl. Gangetic Plain* 1: 351. 1903.

Shrubs, with spreading long branches and reddish brown bark, ca 1 m high. Leaves opposite, subsessile, linear–lanceolate, 5.5–8 × 1.4–2.3 cm, rounded at base, acuminate at apex, puberulous above, pubescent and gland dotted beneath. Flowers scarlet, in fascicled axillary racemes. Calyx red, tube tubular, oblique at mouth, 1–1.5 cm long. Petals white, 6, small rarely exceeding the calyx lobes. Capsules ellipsoid, ca 1.2 cm long. Seeds obovoid.

Flowering & Fruiting: January–May.

Reported on the basis of Maurya & al. (S.K. Maurya & al., *Intl. J. Biod.* 5. 2015).

ONAGRACEAE

LUDWIGIA L.

Key to species

- 1a. Seeds uniseriate in each cell **2. L. prostrata**
 1b. Seeds pluriseriate in each cell **1. L. octovalvis**

1. Ludwigia octovalvis (Jacq.) P.H.Raven in Kew Bull. 15: 476, f. 6d–e, 1962; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 577. 2016. *Oenothera octovalvis* Jacq., Enum. Syst. Pl. 19. 1760. *Jussiaea suffruticosa* L., Sp. Pl. 1: 388. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 2: 587. 1879; Duthie, Fl. Gangetic Plain 1: 355. 1903.

Branched herbs or undershrubs, up to 1.5 m tall. Leaves alternate, elliptic to lanceolate, 3.5–6.5 × 0.5–2.5 cm, narrowed at base, acute at apex, thin glabrous on both surfaces. Flowers yellow, solitary axillary, ca 2 cm long. Sepals 4, ovate or lanceolate, 4–6 × 1 mm. Petals 4, obovate, emarginate, 4–5 mm long. Capsules cylindrical, 8-ribbed, up to 4.5 × 0.8 cm. Seeds reddish brown, pluriseriate in each cell, ovoid.

Flowering & Fruiting: Throughout the year.

Common, along edges of ponds.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76234; Jamsoti, 22.12.2016, A.N. Shukla 76301.

2. Ludwigia prostrata Roxb., Fl. Ind. 1: 441. 1820; C.B. Clarke in Hook.f., Fl. Brit. India 2: 588. 1879; Duthie, Fl. Gangetic Plain 1: 356. 1903; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 578. 2016.

Small, prostrate to erect annual herbs, sub-glabrous, 30–60 cm high. Leaves alternate, elliptic to lanceolate, 2.5–3.0 × 1.0–1.5 cm, narrowed at base, acute at apex, thin glabrous on both surfaces. Flowers yellow, solitary, axillary, 4-merous. Sepals 4, deltoid, glabrous, 1.2 × 0.5–1 mm. Petals yellow, 4, spatulate, 1–3 × 0.3–0.7 mm. Capsules 4 angled, irregularly loculicidal, to 2.3 × 0.3 cm. Seeds pale brown, ovoid, uniseriate.

Flowering & Fruiting: November–March.

Common, along edges of ponds and tanks.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76208.

CUCURBITACEAE

Key to genera

- 1a. Tendrils branched (2-3 fid) 2
 1b. Tendrils imple **2. Muckia**
 2a. Petals fimbriate on margins **3. Trichosanthes**
 2b. Petals not fimbriate on margins **1. Diplocyclos**

1. DIPLOCYCLOS (Endl.) Post & Kuntze

Diplocyclos palmatus (L.) C.Jaffrey in Kew Bull. 15(3): 352. 1962; Chakrav. in Fasc. Fl. India 11: 48. 1982; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 591. 2016. *Bryonia palmata* L., Sp. Pl. 1012. 1753, excl. syn.

Herbs, annual, climbing, monoecious. Tendrils 2-fid. Leaves 3-8.5 x 5-11.5 cm, cordate at base, upper surface punctate, 3-lobed; lobes acute or subacuminate at apex, entire or distantly serrate. Flowers fasciculate, small. Male flowers: Calyx campanulate, 5-lobed; lobes narrow, short; tube with a nectar within. Corolla yellow, campanulate, 5-partite. Stamens 3, free; one anther 1-locular, two anthers 2-locular, loculi linear, slightly flexuose. Female flowers: Calyx and corolla as in the male. Staminodes 3. Ovary with slender style and 3 bilobed stigmas; ovules few, horizontal on 3 parietal placentae. Fruits green with white vertical stripes, baccate, globose, 0.6-1.3 cm across. Seeds many, ovoid, attenuate, conspicuous belted with a partition wall.

Flowering & Fruiting: March–December.

Common in waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Latifsah, 24.12.2016, A.N. Shukla 76332.

2. MUKIA Arn.

Mukia maderaspatana (L.) M. Roem., Fam. Nat. Syn. Monogr. 2: 47. 1846; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 597. 2016. *Cucumis maderaspatana* L., Sp. Pl.: 1012. 1753. *Melothria maderaspatana* (L.) Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 623. 1881; Duthie, Fl. Gangetic Plain 1: 379. 1903; Chakrav. in Fasc. Fl. India 11: 83. 1982. *Bryonia scabrella* L.f., Suppl. Pl.: 424. 1782. *Mukia scabrella* (L.f.) Arn. in Hook., J. Bot. 3: 276. 1841; C.B. Clarke in Hook.f., Fl. Brit. India 2: 623. 1879.

Climbers, annual, monoecious. Tendrils simple, striate. Leaves ovate-deltoid, 3-7.5 x 5-10 cm, acute at apex, cordate at base, entire or dentate, scabrid, 5-angled or 3-5-lobed. Male flowers in fascicles on short peduncles. Calyx narrowly campanulate, 5-lobed; lobes subulate, ca 1.5 mm long; tube ca 2 mm long, hirsute. Corolla yellow, 3-4.5 mm long, 5-partite; segments ovate-oblong, ca 2 mm long. Stamens 3; filaments very short; anthers oblong, one anther 1-locular, two anthers 2-locular. Female flowers solitary or subfasciculate. Calyx and corolla as in the male. Ovary globose; style short, surrounded by an annular disc; stigmas 3; ovules horizontal on 3 placentae. Fruits globose, 4-9 mm across. Seeds ovoid-oblong or ellipsoid, scrobiculate, indistinctly marginate.

Flowering & Fruiting: August–January.

Common, near habitations.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75038.

3. TRICHOSANTHES L.

Key to species

- 1a. Male racemes minutely bracteate or ebracteate **2. *T. cucumerina***
 1b. Male racemes with large bracts **1. *T. cordata***

1. *Trichosanthes cordata* Roxb., Fl. Ind. 3: 703. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 2: 608. 1879; Duthie, Fl. Gangetic Plain 1: 363. 1903; Chakrav. in Fasc. Fl. India 11: 110. 1982; S.K. Maurya & al., Intl. J. Biod. 8. 2015; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 599. 2016.

Climbers, dioecious. Stems robust. Tendrils 3-fid. Leaves broadly ovate, 12-18 x 8-12 cm, shortly acuminate at apex, cordate at base, entire, membranous. Male racemes 4-8-flowered; peduncles 12-18 cm long; pedicels 1-2 mm long; bracts obovate, ca 4 x 1.2 cm, entire. Calyx-lobes erect, ca 1.5 cm long; tube ca 5 cm long, villous. Petals papillose. Filaments ca 1 mm long, glabrous. Female flowers subsessile. Ovary oblong. Fruits red, globose, smooth. Seeds thick, transversely broad.

Flowering & Fruiting: August–December.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

2. *Trichosanthes cucumerina* L., Sp. Pl. 1008. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 2: 609. 1879; Duthie, Fl. Gangetic Plain 1: 364. 1903; Chakrav. in Fasc. Fl. India 11: 112. 1982; A. Kumar in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 600. 2016.

Climbers, annual, monoecious. Tendrils 2-3-fid. Leaves broadly ovate or orbicular-reniform, 8-14.5 x 10-17.5 cm, deeply cordate at base, denticulate, pubescent, angular or 5-7-lobed; lobes obtuse or acute. Male flowers in axillary racemes. Calyx 5-lobed; lobes triangular, ca 1.5 mm long, acute; tube cylindrical, 1-1.5 cm long. Petals 5, white, lanceolate-oblong, 7-9 mm long, fimbriate at apex. Filaments very short; anthers oblong, connate. Female flowers solitary. Calyx and corolla as in the male. Ovary oblong; style filiform; stigmas 3; ovules few on 3 parietal placentae. Fruits green with white stripes when young, red on ripening, ovoid, conical, 3-6 x 2-3.5 cm. Seeds 8-10, more or less ellipsoid, compressed, rugulose.

Flowering & Fruiting: August–October.

Common in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 217 m, 19.08.2015, A.N. Shukla & N. Srivastava 75035.

MOLLUGINACEAE

MOLLUGO L.

Mollugo pentaphylla L., Sp. Pl. 89. 1753; Duthie, Fl. Gangetic Plain 1: 387. 1903; A. Kumar & K.K. Khanna in Kr.P. Singh & al., Fl. Uttar Pradesh 1: 611. 2016. *M. stricta* L., Sp. Pl. ed. 2. 131. 1762; C.B. Clarke in Hook.f., Fl. Brit. India 2: 663. 1879.

Annual herbs, main branches erect or prostrate; stems 10–20 cm long with profusely branched. Leaves in false whorls of 3–9, lower ones rosulate, upper linear-lanceolate or obovate or elliptic, cuneate at base, acute at apex, entire along margins. Flowers white, in terminal, leaf opposed cymes. Sepals white or whitish, 5, elliptic, ovate-oblong, ca 2 mm long. Petals absent. Capsules oblong, ellipsoid, 3-lobed. Seeds brownish black, 15–20, reniform.

Flowering & Fruiting: Throughout the year.

Common weed in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75108.

RUBIACEAE

Key to genera

| | |
|--|-------------------------|
| 1a. Herbs | 2 |
| 1b. Shrubs or trees | 3 |
| 2a. Ovules solitary in each locule | 7. Spermacoce |
| 2b. Ovules few to many in each locule | 6. Oldenlandia |
| 3a. Flowers in globose heads | 4 |
| 3b. Flowers solitary or in fascicle, panicle or corymbose cyme | 5 |
| 4a. Stigma mitriform to elongate-clavate | 5. Mitragyna |
| 4b. Stigma ovoid to globose | 3. Haldinia |
| 5a. Fruit a capsule | 4. Hymenodictyon |
| 5b. Fruit a drupe or a berry | 6 |
| 6a. Plants armed; flowers unisexual | 1. Ceriscoides |
| 6b. Plants unarmed; flowers bisexual | 2. Gardenia |

1. CERISCOIDES (Hook.f.) Tirveng.

Ceriscoides turgida (Roxb.) Tirveng. in Bull. Mus. Natl. Hist. Nat., Ser. 3, Bot. 35: 15. 1978. *Gardenia turgida* Roxb., Fl. Ind. (Carey & Wall. ed.) 2: 557. 1824; Hook.f., Fl. Brit. India 3: 118. 1880; Duthie, Fl. Gangetic Plain 1: 388. 1903.

Small trees, up to 4 m high. Leaves ovate-oblong, attenuate at base, acute-apiculate at apex, 5–11 x 3–5 cm; stipules ovate, deciduous. Flowers axillary. Male flowers in 3–4-flowered fascicles. Female flower solitary, greenish white, turning yellow. Calyx campanulate; lobes 5, triangular. Corolla tubular, 5 cm across. Fruits brown, globose, 5 x 4 cm. Seeds red, triangular.

Flowering & Fruiting: March–November.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75075; Bichulia, 25.12.2016, A.N. Shukla 76364.

2. GARDENIA J.Ellis

Key to species

- 1a. Leaves broadly elliptic or obovate-orbicular, more than 15 cm long and 7 cm broad; lateral nerves not close **2. *G. latifolia***
- 1b. Leaves elliptic, obovate or elliptic-ovate, up to 15 cm long and 7 cm broad; lateral nerves close **1. *G. gummifera***

1. *Gardenia gummifera* L.f., Suppl. Pl. 164. 1782; Hook.f., Fl. Brit. India 3: 116. 1880; Duthie, Fl. Gangetic Plain 1: 387. 1903.

Small trees. Leaves obovate-oblong or elliptic-oblong, sessile, glabrous, 5–9 × 2–4 cm, rounded or obtuse at base, acute or acuminate at apex, main nerves 12–16 pairs; stipules ochrea like. Flowers white, scented, on short peduncle or sessile. Calyx-teeth triangular, pubescent. Corolla-tube, pubescent outside, to 5 cm long. Drupes oblong, purple when ripe, 1.3–2.2 cm long with 2 pyrenes.

Flowering & Fruiting: March–August.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 20.08.2015, A.N. Shukla & N. Srivastava 75067.

2. *Gardenia latifolia* Sol., Hort. Kew. 1: 294. 1789; Hook.f., Fl. Brit. India 3: 116. 1880; Duthie, Fl. Gangetic Plain 1: 388. 1903.

Yellow resiniferous, small, deciduous trees. Leaves obovate-orbicular, subacute, main nerves 10–20 pairs, 10–20 × 6–10 cm. Flowers white, solitary, subsessile, villous outside, ca 5 cm long. Calyx 2–2.4 cm long; lobes 5–8, lanceolate, deeply divided, densely pubescent. Corolla lobes obovate-oblong; tube 5–6 cm long. Stamens 9, epipetalous. Fruits globose or oblong, with persistent calyx, smooth, 4 × 3 cm.

Flowering & Fruiting: March–December.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75037; near Devdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75047; Patariya Nala, 22.12.2016, A.N. Shukla 76303.

3. HALDINA Ridsdale

Haldina cordifolia (Roxb.) Ridsdale in Blumea 24(2): 360. 1979. *Nauclea cordifolia* Roxb., Pl. Coromandel 1: 40. 1796. *Adina cordifolia* (Roxb.) Hook.f. ex Brandis, For. Fl. 263. T. 33. 1874; Hook.f., Fl. Brit. India 3: 24. 1880; Duthie, Fl. Gangetic Plain 1: 375. 1903.

Tall tree. Leaves cordate to orbicular, chartaceous, 9–16 × 10–18 cm, cordate at base, abruptly acuminate at apex, puberulous along nerves above, pubescent below; lateral nerves 8–10 pairs; stipules interpetiolar, foliaceous. Flowers white or yellowish green, in globose heads of 3 cm. Heads 1–3-fascicled, lateral; peduncles up to 5 cm

long. Calyx cupular, obscurely 5-angled, apically unequal, 5-lobed. Corolla creamish, funnel-shaped, glabrous within, 3–4 cm long. Capsules 0.3–0.4 mm. Seeds elongate, tailed above.

Flowering & Fruiting: June–October.

Not commonly in mixed forest of hilly tracts.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Chandra Prabha river, 21.12.2016, A.N. Shukla 76285.

4. HYMENODICTYON Wall.

Hymenodictyon orixense (Roxb.) Mabb. in Taxon 31(1): 66. 1982. *Cinchona orixensis* Roxb., Bot. Descr. Swietenia 21. 1793. *Hymenodictyon excelsum* (Roxb.) Wall. in Roxb., Fl. Ind. 2: 149. 1824; Hook.f., Fl. Brit. India 3: 35. 1880; Duthie, Fl. Gangetic Plain 1: 377. 1903.

Large, deciduous trees. Leaves ovate-elliptic, 19–12 × 6–9 cm, cuneate at base, abruptly acuminate at apex, pubescent on both surfaces. Panicles terminal, dense-flowered. Flowers greenish white, fragrant, small. Bract solitary, foliaceous. Calyx minute, pubescent. Corolla pubescent. Style very long. Capsules reddish brown, ellipsoid, ca 4 cm long. Seeds winged.

Flowering & Fruiting: July–February.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75049; Devdari, 20.12.2016, A.N. Shukla 76230.

5. MITRAGYNA Korth.

Mitragyna parvifolia (Roxb.) Korth., Observ. Naocl. Ind. 19. 1839; Duthie, Fl. Gangetic Plain 1: 376. 1903. *Nauclea parvifolia* Roxb., Pl. Coromandel. 1: 40. T. 52. 1796. *Stephegyne parvifolia* Korth., Verh. Nat. Gesch. Bot. Nederl. 161. 1840; Hook.f., Fl. Brit. India 3: 25. 1880.

Deciduous trees, 8–15 m tall. Leaves 6–14 × 4–8.5 cm, obovate-elliptic or suborbicular, rounded-acute at base, rounded to shortly acuminate at apex. Flowering heads up to 2 cm across, axillary and terminal. Calyx 2 mm long, obscurely 5-toothed. Corolla 1.5–2 cm long, funnel-shaped, 5-lobed, yellowish. Fruiting heads 1–1.7 cm across, consisting of many, 3–5 mm long. Seeds numerous, minute, rugose.

Flowering & Fruiting: August–January.

Common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75160; Along road side, 20.12.2016, A.N. Shukla 76236; Pindra Nala, 24.12.2016, A.N. Shukla 76349.

6. OLDENLANDIA L.

Oldenlandia corymbosa L., Sp. Pl. 119. 1753; Hook.f., Fl. Brit. India 3: 64. 1880; Duthie, Fl. Gangetic Plain 1: 380. 1903.

Decumbent annual herbs. Leaves sessile, linear-lanceolate to oblong, acute, glabrous, $1-3 \times 0.1-0.5$ cm, bristly on the revolute margins, somewhat pale or whitish beneath. Flowers white, small, in 3-5-flowered peduncled axillary cymes, rarely solitary, 0.3-1.5 cm long. Calyx-lobes ovate-triangular, acute, 0.1 cm long. Corolla 0.12-0.25 cm long, white or pale-purple. Capsules grayish white, globose, with persistent calyx, 0.2×0.2 cm. Seeds black, minute, angled, reticulate.

Flowering & Fruiting: September-April.

Common, in mixed forests, cultivated fields and grasslands.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76216; Bichuliya, 25.12.2016, A.N. Shukla 76369.

7. SPERMACOCE L.

Key to species

1a. Septum persistent in fruits

1. *S. hispida*

1b. Septum not persistent in fruits

2. *S. pusilla*

1. *Spermacoce hispida* L.f., Sp. Pl. 102. 1753; Hook.f., Fl. Brit. India 3: 200. 1881; Duthie, Fl. Gangetic Plain 1: 395. 1903.

Prostrate or procumbent herbs. Leaves obovate or lanceolate-oblong, sessile or subsessile, $0.5-3.0 \times 0.4-1.4$ cm, acute at apex, coriaceous, scabrid above; stipules copular, bristly. Flowers whitish purple, 4-6, clustered on reduced axillary branches. Calyx-tube small; teeth linear-lanceolate. Corolla lobes 4, valvate. Capsules ellipsoid, hirsute, septum persistent, ca 2 mm across. Seeds brown glossy.

Flowering & Fruiting: August-April.

Common in wastelands.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 21.08.2015, A.N. Shukla & N. Srivastava 75118; Jalebiya Mode, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75126; Baliyari, 267 m, 19.08.2015, A.N. Shukla & N. Srivastava 75011; Patariya Nala, 22.12.2016, A.N. Shukla 76298.

2. *Spermacoce pusilla* Wall. in Roxb., Fl. Ind. 1. 379. 1820. *Spermacoce stricta* auct. non L.f.; Hook.f., Fl. Brit. India 3: 200. 1881; Duthie, Fl. Gangetic Plain 1: 394. 1903.

Annual herbs. Leaves whorled, linear-lanceolate or rarely oblong, glabrous or scabrid, $2-4 \times 0.3-0.7$ cm; stipules membranous, bristly. Flowers white, in dense axillary or terminal clusters, subtended by 2 pairs of leaves; bracts filiform. Calyx linear, pubescent. Corolla campanulate, ca 4 mm long. Stamens 3-4, epipetalous. Capsules obovoid, pubescent, septum not persistent. Seeds black.

Flowering & Fruiting: September–November.

Common, in wastelands.

Specimens examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla 75058; near Jamsoti, 23.08.2015, A.N. Shukla & N. Srivastava 75164.

ASTERACEAE

Key to genera

- | | |
|---|-------------------------|
| 1a. Capitula homogamous; florets all ligulate or tubular or tubuliform | 2 |
| 1b. Capitula heterogamous; florets both ray and disc | 7. Cyathocline |
| 2a. Anther cells tailed or auricled or mucronate at the base | 10. Emilia |
| 2b. Anther cells cleft at base or subentire | 3 |
| 3a. Florets all tubular; style branches subulate, hairy | 4 |
| 3b. Florets all tubuliform; style branches linear, obtuse, truncate or appendiculate | 5 |
| 4a. Heads in glomerules; florets 1-5 | 9. Elephantopus |
| 4b. Heads distinct; florets 1-many | 6. Cyanthillium |
| 5a. Anther cells tailed or auricled | 6 |
| 5b. Anther cells not tailed | 10 |
| 6a. Heads homogamous | 7 |
| 6b. Heads heterogamous | 8 |
| 7a. Achenes winged | 4. Caesulia |
| 7b. Achenes not winged | 11. Gnaphalium |
| 8a. Heads radiate | 13. Pentanema |
| 8b. Heads discoid or disciform | 9 |
| 9a. Heads compound | 14. Sphaeranthus |
| 9b. Heads solitary | 3. Blumea |
| 10a. Involucral bracts 2-many-seriate, dry or with scarios tips | 5. Cotula |
| 10b. Involucral bracts uniseriate, herbaceous or foliaceous | 11 |
| 11a. Leaves divided to the base or deeply pinnatifid | 12 |
| 11b. Leaves simple or pinnately compound | 13 |
| 12a. Achenes linear, with retrorsely barbed pappus awns | 1. Bidens |
| 12b. Achenes somewhat rounded, without retrorsely barbed pappus awns | 12. Parthenium |
| 13a. Disc achenes rounded or laterally compressed; pappus absent or of 2 short, weak scales | 14 |
| 13b. Disc achenes dorsally compressed or angular; pappus present or absent | 16. Tridax |
| 14a. Receptacle flat, never conical | 15 |
| 14b. Receptacle convex or conical | 15. Spilanthes |
| 15a. Pales bristle like | 8. Eclipta |
| 15b. Pales linear or oblanceolate, concave or folded | 2. Blainvillea |

1. BIDENS L.

Key to species

- | | |
|---|-------------------------|
| 1a. Outer involucral bracts leafy, 10-40 mm long; achenes cuneate with retrorse setae along the margins | 2. B. tripartita |
|---|-------------------------|

1b. Outer involucre bracts linear or narrowly spatulate, 3-8 mm long; achenes linear, glabrous or more or less hispid in the upper part **I. B. biternata**

1. Bidens biternata (Lour.) Merr. & Sherff in Bot. Gaz. 88(3): 293. 1929; H.J.Chowdhery in Hajra & al., Fl. India 12: 367. 1995. *Coreopsis biternata* Lour., Fl. Cochinch. 2: 508. 1790. *Bidens pilosa auct. non L.*, 1753; Hook.f., Fl. Brit. India 3: 309. 1881; Duthie, Fl. Gangetic Plain 1: 430. 1903.

Herbs, erect, up to 90 cm high. Leaves bipinnatifid, compound 1-2 cm long, lateral leaves, ovate, 1.4-3 × 0.4-2 cm, acute at apex, dentate or pinnatifid along margins; terminal leaves elliptic, with 3-5 pinnatifid lobes on each side, 1.5-5 × 1-2 cm. Heads on dichotomously branched peduncles, ca 5 mm. Involucre bracts 2-seriate; outer bracts linear-oblong, ciliate at the margins, ca 5 mm long; inner bracts ovate-lanceolate, glabrous, ca 5 mm long. Ray-florets ligule yellow, ca 3 mm long; disc-florets 5-lobed, ca 3.4 mm long. Achenes black, linear, tetragonal, 7-14 mm long.

Flowering & Fruiting: January-February.

Common along roadside.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 24.08.2015, A.N. Shukla & N. Srivastava 75174.

2. Bidens tripartita L., Sp. Pl.: 831. 1753; Hook.f., Fl. Brit. India 3: 309. 1881. p.p.; H.J.Chowdhery in Hajra & al., Fl. India 12: 375. 1995.

Herbs, annual, upto 1 m high, glabrous to hirsute. Leaves opposite, 3-lobed, tripartite or simple; segments lanceolate, acuminate, serrate, 3-6 x 0.7- 1.5 cm; undivided leaves elliptic-lanceolate, acuminate, serrate, gradually attenuate at the base, 2-3 x 0.4-1 cm, petioled or sessile. Heads discoid, solitary, terminal or in the axils of upper leaves 1-2.5 cm across; peduncles 1-6 cm long. Involucre in 2-series; outer 5-9 foliaceous, lanceolate-spatulate, 1-3 cm long, spreading, entire or dentate, ciliate along the margins, inner ovate or elliptic-lanceolate, 8-10 mm long, acute, acuminate or obtuse, membranous, glabrous. Pales oblong-lanceolate, as long as the achenes, scarious with dark lines. Ray florets absent. Disc florets many; corolla tubular-campanulate, 5-toothed. Style arms lanceolate, acute. Achenes dark brown, cuneate-linear, 5-8 mm long, compressed, with sparsely retrorsely hispid margins. Pappus awns 2-3.

Flowering & Fruiting: March-September.

Common in waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75091.

2. BLAINVILLEA Cass.

Blainvillea acmella (L.) Philipson in Blumea 6(2): 350. 1950; H.J.Chowdhery in Hajra & al., Fl. India 12: 377. 1995. *Verbesina acmella* L., Sp. Pl. 901. 1753. *Blainvillea latifolia* (L.f.) DC. ex Wight. Contrib., Bot. Ind. 17. 1834; Hook.f., Fl.

Brit. India 3: 305. 1881. *B. rhomboidea* Cass., Dict. Sci. Nat. (ed. 2). 2, 29: 493. 1823; Duthie, Fl. Gangetic Plain 1: 428. 1903.

Rigid, scabrous, annual herbs, 30–60 cm high. Leaves opposite or distally alternate, petioled, ovate–lanceolate or rhomboid–ovate, 5–8 × 4–5 cm, cuneate at base, acute–acuminate at apex, crenate–serrate along margins. Heads peduncled, axillary and terminal, up to 1 cm across. Involucral bracts 2–seriate; outer bracts ovate, oblong, hairy outside, 4–5 mm long; inner bracts paleaceous, small. Ray–florets 2–dentate, white, 4–5 mm long; disc–florets ca 3 mm long, with 5–dentate corolla. Achenes cuneate–truncate, dorsally compressed, 3–4–angled. Pappus of 2–5, unequal bristles, 0.6–1.0 cm long.

Flowering & Fruiting: August–November.

Common, in shady waste places, around fields and gardens.

Specimens examined: Chandra Prabha Wildlife Sanctuary, before Jamsoti on Jalebiya mode, 24.08.2015, A.N. Shukla & N. Srivastava 75183; near Jamsoti, 235m, 23.08.2015, A.N. Shukla & N. Srivastava 75158.

3. BLUMEA DC.

Key to species

- 1a. Achenes terete or sub-angulate
1b. Achenes distinctly ribbed

1. **B. axillaris**

2. **B. virens**

1. **Blumea axillaris** (Lam.) DC., Prodr. 5: 434. 1836. *Blumea mollis* (D. Don) Merr. in Philip. J. Sci. (Bot.) 5: 395. 1910; S. Kumar in Hajra & al., Fl. India 13: 135. 1995. *Blumea wightiana* DC. in Wight, Contrib. Bot. Ind. 14. 1834; Duthie, Fl. Gangetic Plain 1: 413. 1903. *B. neilgherrensis* Hook.f., Fl. Brit. India 3: 261. 1881.

Annual herbs, 30–90 cm high. Leaves ovate or oblanceolate, 2–8 × 0.75–3.0 cm. Heads in terminal or axillary panicles, 2–3 mm across. Involucral bracts 3–seriate. Ray–florets tubular, glabrous; disc–florets 5–lobed, papillate. Achenes linear, ca 0.5 mm long; pappus white.

Flowering & Fruiting: January–November.

Common along roadsides.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gidhmarwa, 24.12.2016, A.N. Shukla 76355.

2. **Blumea virens** DC., Cont. Bot. India 14. 1834; Hook.f., Fl. Brit. India 3: 264. 1881; Kumar in Hajra & al., Fl. India 13: 143. 1995.

Herbs, erect, glabrous, with fibrous root stocks, 30–70 cm high. Leaves 3–4 × 1–2 cm; lower leaves lyrate-lobed with 1–2 pairs of lobes, lateral lobes triangular–oblong, terminal lobes elliptic–ovate; upper leaves oblanceolate, with acute or acuminate apex, and irregularly serrate–dentate along margins, glabrate or sparingly pilose on both surfaces. Heads in lax terminal panicles, 5–7 mm across. Involucral bracts 4–5–seriate; outer bracts linear, acute, glabrous or sparsely pubescent outside,

ca 2 mm long; inner bracts lanceolate, with scarious margins, ca 7 mm long. Ray-florets filiform, 2–3-lobed, ca 4.5 mm long. Achenes oblong–columnar, 8–10-ribbed, sparsely hairy. Pappus white, to 4 mm long.

Flowering & Fruiting: February–March.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, 22.12.2016, A.N. Shukla 76251.

4. CAESULIA Roxb.

Caesulia axillaris Roxb., Pl. Coromandel 1: 64. t. 93. 1798; Hook.f., Fl. Brit. India 3: 291. 1881; Duthie, Fl. Gangetic Plain 1: 422. 1903; P.C.Pant in Hajra & al., Fl. India 13: 2. 1995.

Herbs, prostrate or suberect, succulent, up to 60 cm high. Leaves semi–amplexicaul, linear–lanceolate, 4–9 × 0.4–1 cm, dilated and sheathing at base, serrulate along margins. Heads 2–3 united to form a compound head. Involucral bracts 2–3; outer bracts broadly ovate–orbicular, crenulate or denticulate at apex, ca 5 mm long; inner bracts linear–lanceolate, ca 4 mm long. Corolla tubular, campanulate, 5-fid, ca 1.5 mm long. Achenes obovoid, flat, winged and sparsely hairy, ca 1.4 × 1 mm. Pappus of 2, ovate scales, ribbed on the back.

Flowering & Fruiting: September–November.

Common weed in cultivated fields, also found in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Tilra village, 21.12.2016, A.N. Shukla 76249.

5. COTULA L.

Cotula anthemoides L., Sp. Pl. 891. 1753; Hook.f., Fl. Brit. India 3: 316. 1881; Duthie, Fl. Gangetic Plain 1: 434. 1903.

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

Flowering & Fruiting: December–April.

Not common in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 22.08.2015, A.N. Shukla & N. Srivastava 75139.

6. CYANTHILLIUM Blume

Key to species

1a. Achenes glabrous

2. **C. patulum**

1b. Achenes silky pubescent or puberulous

1. **C. cinereum**

1. Cyanthillium cinereum (L.) H. Rob., Proc. Biol. Soc. Wash. 103: 252. 1990. *Conyza cinerea* L., Sp. Pl. 2: 862. 1753. *Vernonia cinerea* (L.) Less. In Linnaea 4: 291. 1829; Hook.f., Fl. Brit. India 3: 233. 1881; Duthie, Fl. Gangetic Plain 1: 404. 1903; Hajra in Hajra & al., Fl. India 13: 367. 1995.

Herbs, annual or perennial, erect, up to 80 cm high; stems terete, ribbed greyish pubescent; branches occasionally fulvous pubescent, glandular. Leaves various, obtuse or acute, repand-serrate undulate or almost entire, tip up to 8.5 x 3.5 cm, glabrous, fulvously pubescent villous, or glandular beneath, petioled or sessile. Heads in terminal corymbose panicles, 4–5 mm across, 18–20-flowered. Involucral bracts 4-seriate, lanceolate, pointed at the tip or recurved, with few glands; outer ca 1.5 mm long; inner ca 4.5 mm long. Achenes terete, ca 1.5 mm long, appressedly silky, faintly ribbed, sometimes dimorphic. Pappus hairs white or fulvous, biseriate; of the outer row short.

Flowering & Fruiting: Throughout the year.

Common in forest area.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Jalebiya mode, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75136; Pindra Nala, 24.12.2016, A.N. Shukla 76340.

2. Cyanthillium patulum (Aiton) H. Rob. in Proc. Biol. Soc. Washington 103(1): 252. 1990. *Conyza patula* Aiton, Hort. Kew. 3: 184. 1789. *Vernonia patula* (Dryand.) Merr. in Philip. J. Sci. 3: 439. 1908; Hajra in Hajra & al., Fl. India 13: 376. 1995.

Herbs, up to 70 cm high; stems terete, ribbed, appressedly pubescent; young branches greyish villous. Leaves broadly ovate, ovate-elliptic, acute, acuminate or obtuse, subentire, up to 10.5 x 4.5 cm, silky villous, glandular beneath. Heads at the top of dichotomous branches, terminal or in the upper axils. Bracts linear. Involucral bracts 4-seriate, sparsely greyish villous, more or less glandular, spine tipped; outer subulate; inner oblong-lanceolate, mucronate. Corolla glandular. Achenes ca 1.5 mm long, 5-angled, glabrous, glandular. Pappus hairs white, uniseriate.

Flowering & Fruiting: Throughout the year.

Common in waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jalebia mode, 22.08.2015, A.N. Shukla & N. Srivastava 75133, 75146.

7. CYATHOCLINE Cass.

Cyathocline purpurea (Buch.-Ham. ex D. Don) Kuntze, Revis. Gen. Pl. 1: 333. 1891; Hajra in Hajra & al., Fl. India 12: 111. 1995. *Tanacetum purpureum* Buch.-

Ham. ex D. Don, Prodr. Fl. Nepal. 181. 1825. *Cyathocline lyrata* Cass. in Ann. Sci. Nat. ser. 1, 17: 420. 1829; Hook. f., Fl. Brit. India 3: 246. 1881; Duthie, Fl. Gangetic Plain 1: 407. 1903.

Erect or procumbent, aromatic, annual herbs, up to 60 cm high. Leaves alternate, sessile; lower obovate-lanceolate; upper lyrate-pinnatisect, 2–14 cm long; lobes oblong, 0.5–2.4 × 0.2–1.4 cm, serrate-dentate or lobed along margins, surface viscidly glandular-pubescent. Heads yellow, 4–5 mm across, long peduncled, in terminal corymbose panicles. Involucral bracts 2-seriate; outer bracts linear-lanceolate, acute, pilose outside, ca 2.5 mm long; inner bracts lanceolate with scarious margins, ca 2 mm long. Ray-florets 2-toothed, ca 4 mm long; disc-florets tubular, 5-lobed, with ciliate teeth, bisexual or sterile, ca 3.5 mm long. Achenes brownish, minute, oblong, smooth. Pappus absent.

Flowering & Fruiting: Throughout the year.

Common in moist places, usually along stream and river banks.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, Gardi Nala, 23.12.2016, A.N. Shukla 76314, 76260.

8. ECLIPTA L., nom. cons.

Eclipta prostrata (L.) L., Mant. Pl. 2: 286. 1771; H.J. Chowdhery in Hajra & al., Fl. India 12: 381. 1995. *Verbesina prostrata* L., Sp. Pl. 902. 1753. *Eclipta alba* (L.) Hassk., Pl. Jav. Rar. 528. 1848; Hook. f., Fl. Brit. India 3: 304. 1881. *E. erecta* L., Mant. Pl. 2: 286. 1771; Duthie, Fl. Gangetic Plain 1: 427. 1903.

Strigosely hirsute annual herbs, 15–60 cm high. Leaves opposite, short-petioled, linear, elliptic, or oblong-lanceolate, 2–5 × 1–1.5 cm, cuneate at base, appressed pilose on both surfaces. Heads subglobose 0.5–2 cm across, solitary or in pairs, axillary and terminal. Involucral bracts 2-seriate; outer bracts ovate-lanceolate, appressed pubescent, ca 5 mm long; inner bracts oblong-ovate, c. 4 mm long. Ray-florets white, ligulate, bidentate, ca 2 mm long; disc-florets tubular, 4–5-lobed, ca 1.75 mm long. Achenes narrow, triquetrous more or less laterally compressed, verrucose. Pappus obsolete or 2, aristate.

Flowering & Fruiting: August–December.

Common in moist waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gardi Nala, 23.12.2016, A.N. Shukla 76315.

9. ELEPHANTOPUS L.

Elephantopus scaber L., Sp. Pl. 814. 1753; Hook. f., Fl. Brit. India 3: 242. 1881; Duthie, Fl. Gangetic Plain 1: 404. 1903; Uniyal in Hajra & al., Fl. India 13: 333. 1995.

Rigid, scabrous, perennial, rosetted herbs, 20–40 cm high. Radical leaves rosetted as base, sessile, obovate-lanceolate, or obovate-oblong, oblanceolate, 3.5–16 × 0.8–4 cm, cuneate-attenuate at base, acuminate at apex, serrate along margins; cauline leaves alternate, few undersurface pale-brown tomentose. Heads solitary, glomerate,

to 2 cm across, terminal on 2.5–8 cm long peduncles, each subtended by 3–8 cordate, foliaceous, conduplicate, bracts. Involucral bracts 2-seriate; outer bracts broadly ovate-cordate, leaf-like, 1-nerved, 1–2 cm long; inner bracts 3-nerved, twice in length to outer ones. Achenes truncate, 10-ribbed, pilose, ca 5 mm long. Pappus white, 1-seriate, comprising 4–5-bristles, 0.5 cm long.

Flowering & Fruiting: January–March.

Not common in mixed forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 22.12.2016, A.N. Shukla 76250.

10. EMILIA Cass.

Emilia sonchifolia (L.) DC., Contrib. Bot. India 24. 1834; Hook.f., Fl. Brit. India 3: 336. 1881; Duthie, Fl. Gangetic Plain 1: 436. 1903; Mathur in Hajra & al., Fl. India 13: 333. 1995. *Cacalia sonchifolia* L., Sp. Pl. 1835. 1753.

Slender, puberulous or scabrid, spreading annual herbs, up to 1 m high. Leaves radical and alternate, slightly petioled, obovate, dentate or lyrate pinnatifid, upper leaves oblong-lanceolate, 3–8.5 × 1–6 cm, sparsely dentate, amplexicaul or auricled at base. Heads 7–9 mm long, on 3.5–5 cm long peduncles, combined in to corymbs. Involucral bracts lanceolate, acute, 7–9 mm long. Corolla purple, ca 1 cm long. Achenes small, 5-angled. Pappus white, conspicuous, soft.

Flowering & Fruiting: February–March.

Common in waste places, along streams and river banks.

Specimen examined: Chandra Prabha Wildlife Sanctuary, before Jamsoti on Jalebiya mode, 175 m, 24.08.2015, A.N. Shukla & N. Srivastava 75169.

11. GNAPHALIUM L.

Gnaphalium polycaulon Pers., Syn. Pl. 2: 421. 1807; P.C.Pant in Hajra & al., Fl. India 13: 91. 1995. *G. indicum* auct. non L., 1753; Hook.f., Fl. Brit. India 3: 289. 1881; Duthie, Fl. Gangetic Plain 1: 421. 1903.

Herbs, slender, erect-decumbent, 50 cm high. Leaves semi-amplexicaul, linear-obovate or linear, spatulate, 1.5–3.0 × 0.4–0.6 cm, semiamplexicaul at base, woolly on both surfaces. Heads in dense, terminal and axillary, leaf spikes or crowded into ovoid clusters, ca 2 mm across. Involucral bracts pale brown-glistening white; linear-oblong, acute, membranous, outermost woolly outwards. Ray-florets female, fertile, with filiform corolla, obscurely toothed, ca 1 mm long; disc-florets female, with corolla ca 1 mm long, 5-toothed. Achenes oblong, minute, minutely papillose. Pappus hairs white, not coherent.

Flowering & Fruiting: March–April.

Common in waste places, along streams.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, 21.12.2016, A.N. Shukla 76255.

12. PARTHENIUM L.

Parthenium hysterophorus L., Sp. Pl. 988. 1753; Chowdhary in Hajra & al., Fl. India 12: 403. 1995.

Herbs, annual, erect diffusely branches, up to 1 m high. Leaves usually lanceolate above to pinnately dissected downwards, 5–15 × 0.4–5.0 cm; pinnules oblong–lanceolate, entire to deeply lobed, puberulous, acute with decurrent base. Heads ca 5 mm across. Involucral bracts 2–seriate; outer bracts herbaceous, ca 3.5 mm long; inner bracts thinner, subtending, ca 3 mm long. Ray–florets urceolate with indistinct lobes, membranous, ca 4 mm long; disc–florets infundibuliform, 5–lobed, ca 3.5 mm long. Achens flattened, 2 mm long. Pappus of 2 broad, strongly reflected awns, 0.3–0.5 mm long.

Flowering & Fruiting: September–October.

Common on waste and moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 21.08.2015, A.N. Shukla & N. Srivastava 75093.

13. PENTANEMA Cass.

Pentanema indicum (L.) Ling in Acta Phytotax. Sin. 10(2): 179. 1965; Kumar in Hajra & al., Fl. India 13: 28. 1995. *Inula indica* L., Sp. Pl. ed. 2. 1236. 1763; Duthie, Fl. Gangetic Plain 1: 423. 1903. *Vicoa auriculata* Cass., Ann. Sci. Nat. Ser. 1, 17; 418. 1929; Hook.f., Fl. Brit. India 3: 297. 1881.

Herbs, erect, viscid pubescent with a woody rootstock, 30–60 cm high. Leaves oblong–lanceolate, 2–8 × 0.1–0.5 cm, cordate–hastate at base, acute at apex, scabrid on margins, pubescent on both surfaces. Heads yellow, heterogamous, radiate, solitary, axillary or terminal, 0.5–1 cm across. Involucral bracts 3–4–seriate, linear–lanceolate, acute, pubescent outside, 2–4 mm long. Ray–florets, 3–dentate, 4–5 mm long; disc–florets with infundibuliform 5–dentate corollas. Achenes brown, obovate, obtuse, narrowed at base, thinly hairy, 1 mm long. Pappus white, hairs filiform, few, up to 0.3 cm long.

Flowering & Fruiting: September–June.

Common in open grassland and moist shaded places.

Specimen examined: Chandra Prabha Wildlife, Sanctuary, along Chandra Prabha Dam, 21.12.2016, A.N. Shukla 76276.

14. SPHAERANTHUS L.

Sphaeranthus indicus L., Sp. Pl. 927. 1753; Hook.f., Fl. Brit. India 3: 275. 1881, p.p.; Duthie, Fl. Gangetic Plain 1: 419. 1903; Kumar in Hajra & al., Fl. India 13: 160. 1995; S.K. Maurya & al., Intl. J. Biod. 8. 2015.

Herbs, with several ascending branches, 30–60 cm high. Leaves sessile, obovate–oblong, 1.0–1.5 × 0.5–1.0 cm, narrowed at base, acute to rounded at tip, dentate along

margins, glandular–villous on both surfaces. Heads purplish, globose or ellipsoid, ca 12 mm across. Involucral bracts 2–seriate; outer bracts linear, apiculate, ciliate and glandular, ca 3 mm long; inner bracts linear–oblanceolate, acuminate, ca 3 mm long. Ray–florets 2–toothed, ca 1.5 mm long; disc–florets 5–lobed, 2–2.5 mm long. Achenes glandular hairy, ca 1 mm long. Pappus absent.

Flowering & Fruiting: November–March.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 8. 2015).

15. SPILANTHES Jacq.

Spilanthes paniculata Wall. ex DC., Prodr. 5: 625. 1836; Chowdhery in Hajra & al., Fl. India 12: 410. 1995. *Spilanthes acmella* var. *paniculata* (DC.) C.B. Clarke, Comp. Ind. 139. 1876; Hook.f., Fl. Brit. India 3: 307. 1881.

Small, annual herbs, up to 60 cm high. Leaves opposite, ovate or ovate–elliptic, 1.4–5.0 × 0.3–2.5 cm, narrowed at base, acute at apex, crenate–serrate along margins, pubescent on lower surface. Heads 6–8 mm across, in axillary and terminal panicles. Involucral bracts 2–seriate, oblong–elliptic, obtuse or subacute, 3–5 mm long. Ray–florets few, inconspicuous, 2–3–dentate, 4–5 mm long; disc–florets campanulate, 5–lobed, ca 3 mm long. Achenes black, dorsally compressed, ciliate along the margins, ca 2 mm long. Pappus of 2–3 weak strigose awns.

Flowering & Fruiting: March–April.

Common in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 21.12.2016, A.N. Shukla 76271.

16. TRIDAX L.

Tridax procumbens L., Sp. Pl. 900. 1753; Hook.f., Fl. Brit. India 3: 311. 1881; Duthie, Fl. Gangetic Plain 1: 433. 1903; Chowdhery in Hajra & al., Fl. India 12: 418. 1995.

Perennial, straggling, hirsute herbs, up to 60 cm high. Leaves ovate–lanceolate, 1–3 × 0.5–1.0 cm, cuneate at base, acute at apex, serrate–dentate along margins. Heads 7–10 mm across, solitary, terminal. Involucral bracts 2–3–seriate; outer bracts lanceolate–acuminate, hairy, 3.5–6 mm long; inner bracts oblong, membranous, 5–6 mm long. Ray–florets yellow; corolla 2–4 mm long; disc–florets bright yellow, 5–lobed, 3.5–6.5 mm long. Achenes narrowly obconical, densely pilose, 1.5–2.5 mm long. Pappus of 15–20 unequal, plumose bristles, 2.0–6.0 mm long.

Flowering & Fruiting: Throughout the year.

Common in waste moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 21.08.2015, A.N. Shukla & N. Srivasatava 75113.

PRIMULACEAE**ANAGALLIS L.**

Anagallis arvensis L., Sp. Pl. 148. 1753; Hook.f., Fl. Brit. India 3: 506. 1882; Duthie, Fl. Gangetic Plain 1: 461. 1903.

Annual herbs, up to 55 cm high; branches 4-angled, glabrous. Leaves opposite, ovate-lanceolate, 1–2.5 × 0.7–1.2 cm, rounded at base, subacute at apex, glabrous. Flowers blue, in solitary axillary, pedicels long. Calyx 5-partite, lobes lanceolate, acuminate. Corolla blue, rotate, 5-partite, 5–9 mm across. Capsules globose, 4–5 mm across. Seeds 3-angled, flattened.

Flowering & Fruiting: December–March.

Common, in cultivated fields and along water courses.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Talra village, 21.12.2016, A.N. Shukla 76269.

EBENACEAE**DIOSPYROS L.**

Diospyros melanoxylon Roxb., Pl. Coromandel 1: 36. T. 46. 1795; C.B. Clarke in Hook.f., Fl. Brit. India 3: 564. 1882. – *Tendu*.

Deciduous trees, up to 10 m tall; bark black, fissured. Leaves alternate or sub opposite, elliptic-oblong, up to 16 × 7 cm, cuneate at base, acute at apex, pubescent beneath. Male flowers 4–6-merous in drooping cymes. Calyx-lobes 5, acute in males, cordate in females, 2-winged. Corolla-lobes 5, 0.7–1.2 cm long. Female flowers solitary axillary, 4–5-merous. Calyx-lobes 5, 5–8 mm long. Corolla white, tubular, 0.9–1.5 cm long. Berries globose with persistent, reflex-margined sepal, up to 3 cm across. Seeds oval-wedge-shaped, shining.

Flowering & Fruiting: March–August.

Commonly found in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Near Jamsoti, 22.12.2016, A.N. Shukla 76304; Pindra Nala, 194 m, 24.12.2016, A.N. Shukla 76337.

OLEACEAE**Key to genera**

- | | |
|--|----------------------|
| 1a. Plants usually scandent shrubs; fruit a berry | 1. Jasminum |
| 1b. Plants always erect shrubs or trees; fruit a capsule | 2. Nyctanthes |

1. JASMINUM L.

Jasminum officinale L., Sp. Pl. 7. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 3: 603. 1882; Duthie, Fl. Gangetic Plain 1: 477. 1903; S.K. Maurya & al., Intl. J. Biod. 6. 2015.

Twinning shrubs; branches long, striate hairy. Leaves opposite, imparipinnate, 5–7-foliolate, up to 10 cm long; terminal leaflets ovate or lanceolate, acuminate at

apex; lateral ones ovate or elliptic, up to 4.5 cm long, rounded at base, acute or apiculate at apex. Flowers in dichotomous, terminal, lax cymes. Calyx 1–2 cm long, lobes 5, linear, subulate, 5–9 mm long. Corolla white, lobes 5, ovate or elliptic. Berries black when ripe, ellipsoid or globose up to 7×6 mm.

Flowering & Fruiting: June–October.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 8. 2015).

2. NYCTANTHES L.

Nyctanthes arbor-tristis L., Sp. Pl. 6. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 3: 603. 1882; Duthie, Fl. Gangetic Plain 1: 477. 1903.

Trees, up to 8 m tall; branches 4–angled. Leaves opposite, ovate, $2.5\text{--}6.5 \times 1.8\text{--}4.5$ cm, rounded or slightly cuneate at base, acute or acuminate at apex, entire or distantly toothed along margins, scabrous above, pubescent beneath. Flowers in axillary or terminal 3–chotomous cymes. Calyx–tube infundibuliform, 3–4 mm long, obscurely 5–toothed. Corolla–tube orange–coloured, 0.8–1.2 cm long, lobes white, 5–7, unequal. Capsules orbicular, 1–2 cm across. Seeds flat.

Flowering & Fruiting: September–January.

Common, in mixed forests and along road sides.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Chandra Prabha River, 21.12.2016, A.N. Shukla 76274.

APOCYNACEAE

Key to genera

- | | |
|--|----------------------|
| 1a. Seeds not comose | 1. Carissa |
| 1b. Seeds comose | 2 |
| 2a. Follicles not connate | 2. Holarrhena |
| 2b. Follicles connate throughout or at the tip | 3. Wrightia |

1. CARISSA L., nom. cons.

Carissa spinarum L., Mant. Pl. 559. 1771; Hook.f., Fl. Brit. India 3: 631. 1882, *p.p.*; Duthie, Fl. Gangetic Plain 1: 483. 1903.

Bushy, evergreen shrubs. Leaves broadly ovate or elliptic, $1.5\text{--}4 \times 1.2\text{--}2.5$ cm, acute or rounded at base, acute or apiculate at apex. Flowers in terminal or axillary, often branched, pubescent. Calyx divided almost to base; segments 2.5–3 mm long. Corolla–lobes oblong or oblong–lanceolate, 0.7–1 cm long. Berries dark purple on ripening, subglobose, 0.6–1 cm across.

Flowering & Fruiting: January–April.

Common, in open forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76217.

2. HOLARRHENA R.Br.

Holarrhena pubescens Wall. ex G. Don, Gen. Hist. 4: 78. 1837. *H. antidysenterica* Wall., Numer. List No. 1672. 1829, non (L.) Wall., 1829; Hook.f., Fl. Brit. India 3: 644. 1882; Duthie, Fl. Gangetic Plain 1: 487. 1903. – *Dudhi*.

Small trees or large shrubs, up to 6 m tall; bark grey smooth. Leaves broadly ovate to elliptic-oblong, $4.5-15.5 \times 1.8-7$ cm, rounded or tapering at base, acuminate at apex, glabrous or more or less tomentose especially beneath. Flowers, fragrant, in terminal corymbose cymes. Calyx-lobes lanceolate, acuminate, ciliate, 2.5–3 mm long. Corolla white, lobes oblong, 12–14 mm long. Follicles up to 25 cm long, cylindrical with lenticels. Seeds linear oblong; coma brown, about twice as long as the seeds.

Flowering & Fruiting: February–June.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 20.08.2015, A.N. Shukla & N. Srivastava 75053.

3. WRIGHTIA R.Br.

Wrightia tinctoria R.Br. subsp. **rothii** (G. Don) Ngan in Ann. Missouri Bot. Gard. 52: 144. 1965. *W. Rothii* G. Don, Gen. Hist. 4: 86. 1838 ex char. *W. tinctoria* R.Br. var. *rothii* (G. Don) Hook.f., Fl. Brit. India 3: 653. 1882.

Trees, up to 7 m tall; bark smooth, ash colored. Leaves subsessile, elliptic or elliptic-obanceolate, more or less puberulous, $3.5-11.5 \times 1-4$ cm, acute at base, subacuminate or acuminate at apex. Flowers in terminal, lax cymes. Calyx glandular inside, 5-partite, lobes oblong with membranous margins, 2–3 mm long. Corolla white, 1.5–2.2 cm across, hypocrateriform. Follicles curved, united at apex, up to 38 cm long. Seeds linear, 1–1.7 cm long, acute at apex.

Flowering & Fruiting: March–September.

Not common in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Jalebia mode, 22.08.2015, A.N. Shukla & N. Srivastava 75150; near Chandra Prabha Dam, 22.12.2016, A.N. Shukla 76311.

ASCLEPIADACEAE

Key to genera

- | | |
|---|----------------------|
| 1a. Plants erect | 1. Calotropis |
| 1b. Plants twining or climbing | 2 |
| 2a. Filament usually free; pollinia granular | 3. Hemidesmus |
| 2b. Filament connate into a tube; pollinia waxy | 2. Gymnema |

1. CALOTROPIS R.Br.

Key to species

- | | |
|--|-----------------------|
| 1a. Corolla-lobes revolute; corona with auricles | 1. C. gigantea |
|--|-----------------------|

1b. Corolla-lobes erect; corona without auricles

2. *C. procera*

1. *Calotropis gigantea* (L.) R.Br. in W.T.Aiton, Hort. Kew. Ed. 2. 2: 78. 1811; Hook.f., Fl. Brit. India 4: 17. 1883; Duthie, Fl. Gangetic Plain 1: 497. 1903. *Asclepias gigantea* L., Sp. Pl. 214. 1753.

Shrubs, up to 2.8 m tall. Leaves ovate–obovate, sessile, up to 14 × 8 cm, cordate at base, acute at apex. Flowers in umbellate cymes, not fragrant. Calyx–segments acute, ca 4 mm long. Corolla purple to white, lobes deltoid, spreading. Follicles ventricose, paired, recurved, up to 12 × 3.5 cm. Seeds ovate marginated, comose.

Flowering & Fruiting: March–May.

Common in wastelands and along road side.

Specimen examined: Chandra Prabha Wildlife Sanctuary, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75121.

2. *Calotropis procera* (Aiton) W.T. Aiton, Hort.. Kew. ed. 2. 2: 78. 1811; Hook.f., Fl. Brit. India 4: 18. 1883; Duthie, Fl. Gangetic Plain 1: 498. 1903; S.K. Maurya & al., Intl. J. Biod. 5. 2015. *Asclepias procera* Aiton, Hort. Kew. 1: 3. 1789. – *Madar*.

Undershrubs, up to 2 m high. Leaves ovate–oblong, 12 × 8 cm, cordate at base, acute to mucronate at apex, cottony beneath. Flowers in umbellate cymes, fragrant; peduncles often paired. Calyx–segments spreading. Corolla pink with purple spots, lobes ca 9 mm long. Follicles ellipsoid or ovoid. Seeds obovate, ca 6 mm long.

Flowering & Fruiting: Throughout the year.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 5. 2015).

2. GYMNEMA R.Br.

***Gymnema sylvestre* (Retz.) R.Br. ex Schult.,** Syst. Veg. 6: 57. 1820; Hook.f., Fl. Brit. India 4: 29. 1883; Duthie, Fl. Gangetic Plain 1: 502. 1903. *Periploca sylvestris* Retz., Observ. Bot. 2: 15. 1781. – *Gurmar*.

Perennial climbers; stems and branches pubescent. Leaves elliptic–obovate, up to 3.5 × 7 cm, cordate at base, acuminate at apex. Flowers in umbellate cymes; peduncles tomentose. Calyx pubescent, deeply lobed, lobes obtuse, ciliolate. Corolla pale yellow, lobes obtuse, thick glabrous. Follicles lanceolate, up to 7 cm long. Seeds pale brown, ovoid or oblong, flat.

Flowering & Fruiting: October–February.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75037; before Jamsoti on Jalebiya Mode, 175 m, 24.08.2015, A.N. Shukla & N. Srivastava 75184.

3. HEMIDESMUS R.Br.

***Hemidesmus indicus* (L.) R.Br. ex Schult.** in Syst. Veg. 6: 126. 1820; Hook.f., Fl. Brit. India 4: 5. 1883; Duthie, Fl. Gangetic Plain 1: 495. 1903. *Periploca indica* L., Sp. Pl. 211. 1753.

Twiners. Leaves opposite or in whorls of 4, elliptic-oblong or linear, up to 8×2.5 cm, obtuse at base, mostly apiculate at apex, dark green with white streaks above, pale or silvery white beneath. Flowers in 5–15-flowered, fasciculate cymes. Calyx-lobes herbaceous, thick. Corolla-lobes yellow to nearly brown or purple inside, 4–5 mm long. Follicles 10–12 cm long. Seeds black, flattened, 0.6–1.2 cm long.

Flowering & Fruiting: August–January.

Not common, in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Gardi Nala, 23.12.2016, A.N. Shukla 76325; near guest house, 24.12.2016, A.N. Shukla 76335.

LOGANIACEAE

MITRASACME Labill.

Mitrasacme pygmaea R.Br., Prodr. 453. 1810. *M. polymorpha* auct. non R.Br., 1810; C.B. Clarke in Hook.f., Fl. Brit. India 4: 80. 1883, *p.p.*

Herbs, hispid. Leaves ovate, 5-9 x 2-3 mm, serrulate, 1-nerved. Flowers in terminal or axillary umbels. Calyx ca 0.6 mm long; lobes acute. Corolla-lobes white, rounded; tube ca 3.5 mm long. Capsules globose, ca 1.5 mm across, truncate above, crowned by styles. Seeds ellipsoid, punctuate.

Flowering & Fruiting: September–October.

Not common, in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 22.08.2015, A.N. Shukla & N. Srivastava 75142.

GENTIANACEAE

CANSCORA Lam.

Canscora diffusa (Vahl) R.Br. ex Roem. & Schult., Syst. Veg. 3: 301. 1818; C.B. Clarke in Hook.f., Fl. Brit. India 4: 103. 1883; Duthie, Fl. Gangetic Plain 1: 522. 1903. *Gentiana diffusa* Vahl, Symb. Bot. 3: 47. 1794.

Branched herbs; stem not winged. Leaves opposite, broadly ovate, sessile, cordate at base, acuminate or apiculate at apex, narrowed at both the ends, glabrous on both surfaces, lower shortly petioled, up to 12×8 mm, upper becoming smaller, passing in to linear, bracts, 2–3 mm long. Flowers violet with brown throat in leafy paniculate cymes. Pedicel quadrangular; bracts linear-subulate. Sepals lobes linear-acute. Petals tube as long as the sepals; stamens 4, one larger than others. Capsule oblong. Seeds dark-brown, many.

Flowering & Fruiting: October–December.

Not common, in moist shady places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Gardi Nala, 23.12.2016, A.N. Shukla 76324; Baliyari Nala, 20.12.2016, A.N. Shukla 76233.

BORAGINACEAE
HELIOTROPIUM L.

Key to species

- 1a. Leaves usually revolute; inflorescence bracteate throughout **2. *H. zeylanicum***
 1b. Leaves not revolute; lower flowers of inflorescence bracteate, upper flowers
 ebracteate or with reduced bracts **1. *H. strigosum***

1. *Heliotropium strigosum* Willd., Sp. Pl. 192: 743. 1798; C.B. Clarke in Hook.f., Fl. Brit. India 4: 151. 1883; Duthie, Fl. Gangetic Plain 1: 537. 1903

Herbs, erect or procumbent, much branched, 10-20 cm high; stems covered with appressed white hairs. Leaves linear-lanceolate or narrowly oblong-lanceolate, 0.5-2.5 x 0.1-0.4 cm, acute at apex, entire, densely appressed hairy, sessile. Flowers in lax, bracteates spikes; lower flowers pedicellate; upper ones sessile. Calyx deeply divided; segments strigose outside. Corolla white, tubular or infundibuliform, strigose outside. Drupes unlobed or 4-lobed, ovoid, dark brown to black; nutlets 4, conical, glabrous or appressed hairy.

Flowering & Fruiting: April-December.

Common in waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 21.08.2015, A.N. Shukla & N. Srivastava 75110.

2. *Heliotropium zeylanicum* (Burm.f.) Lam., Encycl. 3: 94. 1789; Duthie, Fl. Gangetic Plain 1: 537. 1903. *H. curassavicum* L. var. *zeylanicum* Burm.f., Fl. Ind. 41. t. 16. f. 2. 1768. *H. paniculatum* R.Br. Prodr. 494. 1810; C.B. Clarke in Hook.f., Fl. Brit. India 4: 151. 1883.

Annual herbs, ca 30 cm high. Leaves linear-lanceolate, cuneate at base, acute at apex, 1.2-2.6 x 0.1-0.2 cm. Flowers in terminal or axillary, simple or forked, bracteate, uniseriate spikes. Calyx lobes 5, ovate, 1.5 mm across. Corolla white with yellow throat, sparsely hairy outside. Drupes lobed, covered with loose trichomes.

Flowering & Fruiting: August-September.

Common, in open places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 21.08.2015, A.N. Shukla & N. Srivastava 75115.

CONVOLVULACEAE

Key to genera

- 1a. Prostrate herbs 2
 1b. Erect or climbing herbs or shrubs **3. *Ipomoea***
 2a. Styles 2 **1. *Evolvulus***
 2b. Style 1 **2. *Merremia***

1. EVOLVULUS L.

Key to species

1a. Stems with erect, silky pubescent; corolla shallowly lobed; capsules 2-celled

1. E. alsinoides

1b. Stems glabrous or with appressed tomentum; corolla deeply lobed; capsules 1-celled

2. E. nummularius

1. *Evolvulus alsinoides* (L.) L., Sp. Pl. ed. 2. 392. 1762; C.B. Clarke in Hook. f., Fl. Brit. India 4: 220. 1883; Duthie, Fl. Gangetic Plain 1: 546. 1903. *Convolvulus alsinoides* L., Sp. Pl. 157. 1753.

Prostrate or ascending, slender herbs, clothed with adpressed or spreading hairs. Leaves elliptic to linear-oblong, subsessile, 7–20 × 4–7 mm, acute to rounded at both ends, silky pilose. Flowers 1–5 on a peduncle; peduncles 6–40 mm long. Sepals ovate-lanceolate, acute, 4–5 mm long. Corolla white or blue, campanulate to subrotate or sometimes broadly infundibuliform, 1 cm across. Capsules globular, glabrous, 2-celled, usually 4-seeded, 5 mm across. Seeds black, smooth.

Flowering & Fruiting: August–March.

Common in wastelands, mostly in rocky and dry places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75026; near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75034; Rajdari block, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75070; Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75148; near Jamsoti, 23.08.2015, A.N. Shukla & N. Srivastava 75157.

2. *Evolvulus nummularius* (L.) L., Sp. Pl. ed. 2. 391. 1762. *Convolvulus nummularius* L., Sp. Pl. 157. 1753.

Creeping, perennial herbs. Leaves broadly ovate to orbicular, 4–12 × 4–10 mm, cordate at base, rounded to emarginate at apex, glabrous or slightly pubescent beneath. Flowers in leaf axils, solitary or paired; pedicels 2–6 mm long. Sepals elliptic-ovate to ovate-oblong, pubescent. Corolla white, broadly campanulate, 5–7 mm wide. Capsules globose, 1-celled, 4 mm across. Seeds brown to black, subglobose, slightly muricate.

Flowering & Fruiting: August–February.

In wastelands and mixed forests

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75052; Patariya Nala, 22.12.2016, A.N. Shukla 76306.

2. IPOMOEA L.

***Ipomoea carnea* Jacq.**, Enum. Syst. Pl. 13. 1760.

Twining shrubs. Leaves ovate or lanceolate, 6–9 × 3–7 cm, shallowly cordate or truncate at base, acuminate at apex. Flowers in cymose, paniculate clusters; pedicels 6–8 mm long. Sepals suborbicular, broadly ovate, 4–6 × 4 mm. Corolla deep pink to

purple, rarely white, 5–9 cm long. Capsules ovoid, glabrous, ca 2 cm across. Seeds brown, densely villous.

Flowering & Fruiting: Throughout the year.

Common, in wastelands and along borders of cultivated fields.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Chandra Prabha Dam, 267, 21.08.2015, A.N. Shukla & N. Srivastava 75101.

3. MERREMIA Dennst. ex Endl.

Merremia hederacea (Burm.f.) Hallier f., Bot. Jahrb. Syst. 18(1–2): 118. 1893. *Evolvulus hederaceus* Burm.f., Bot. Jahrb. Syst. 18(1–2): 118. 1893. *Ipomoea chryseides* Ker Gawl., Bot. Reg. t. 270. 1818; C.B. Clarke in Hook.f., Fl. Brit. India 4: 206. 1883.

Twiners; stems smooth, glabrous. Leaves broadly ovate, 1–4 x 1–3.5 cm, obtuse at apex, broadly cordate at base, 3-lobed. Flowers solitary or in cymes. Sepals broadly obovate, ca 3 x 2 mm, notched at apex. Corolla yellow, campanulate, 7–11 mm long. Capsules broadly conical to depressed globose, 4-angled. Seeds blackish, glabrescent, 2–5 mm long.

Flowering & Fruiting: September–November.

Common, in mixed forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 21.12.2016, A.N. Shukla 76280.

SOLANACEAE

Key to genera

- | | |
|---|--------------------|
| 1a. Fruit a capsule | 1. Datura |
| 1b. Fruit a berry | 2 |
| 2a. Anthers dehiscing by apical pores | 3. Solanum |
| 2b. Anthers dehiscing by longitudinal slits | 2. Physalis |

1. DATURA L.

Datura innoxia Mill., Gard. Dict. ed. 8. n. 5. 1768. *D. metel auct. non L.*, 1753: C.B. Clarke in Hook.f., Fl. Brit. India 4: 243. 1883; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 9. 1960. – *Dhatura*.

Stout shrubs, up to 1 m high. Leaves ovate or ovate–elliptic, 5.0–14.5 × 2.0–7.5 cm, unequally truncate or rounded at base, acute at apex, entire or sinuate–dentate along margins, pubescent and glandular on both surfaces. Flowers axillary, solitary; pedicels 2–3 cm long, recurved in fruits. Calyx reflexed in fruits. Corolla white, ca 7 cm long; teeth 10, linear. Capsules 3.5–5.5 cm across, globose, densely pubescent and armed with weak, 1.0–1.8 cm long spines. Seeds rugose.

Flowering & Fruiting: July–January.

Common, in wastelands, usually along drains.

Specimen examined: Chandra Prabha Wildlife Sanctuary, on the way to Chandra Prabha Gate, 22.12.2016, A.N. Shukla 76286.

2. *PHYSALIS* L.

Physalis angulata L., Sp. Pl. 183. 1753.

Erect, simple or branched herbs. Leaves ovate, 2–3 × 1–2 cm, rounded at base, acute or obtuse at apex, dentate along margins, sinuate or lobulate, puberulous or pubescent. Flowers nodding; pedicels 0.4–1 cm long. Calyx–lobes equalling the tube. Corolla yellow, often with small purple spots at the base. Berries globose, 6–10 mm across. Seeds rugose.

Flowering & Fruiting: August–January.

Common, in wastelands.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75001; Dhusariya, 24.08.2015, A.N. Shukla & N. Srivastava 75175.

3. *SOLANUM* L.

Key to species

| | |
|----------------------------|--------------------------|
| 1a. Plants armed | 2 |
| 1b. Plants unarmed | 1. <i>S. americanum</i> |
| 2a. Corolla violet or blue | 3. <i>S. virginianum</i> |
| 2b. Corolla white | 2. <i>S. torvum</i> |

1. *Solanum americanum* Mill., Gard. Dict. (ed. 8): 5. 1768. *Solanum nigrum* L., Sp. Pl. 186. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 229. 1883; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 2. 1960.

Erect or rambling, much branched, annual–perennial herbs. Leaves ovate or ovate–lanceolate, 2–7.5 × 1.5–3.5 cm, decurrent along the petioles at base, subacute or acuminate at apex, subentire or sinuately toothed along margins; petioles 2–3 cm long. Flowers in extra–axillary, umbelliform cymes, small, nodding; peduncles appressed hairy, 1–4 cm long; pedicels 5 mm long. Calyx c. 3 mm long; lobes ovate–rounded, subobtusate. Corolla white, rarely purple; lobes oblong. Berries blackish purple or red, globose, 4–6 mm across. Seeds discoid, pitted.

Flowering & Fruiting: September–February.

Common, in wastelands and cultivated fields.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Talra village, 21.12.2016, A.N. Shukla 76246.

2. *Solanum torvum* Sw., Prodr. 47. 1788; C.B. Clarke in Hook.f., Fl. Brit. India 4: 234. 1883.

Much–branched, tomentose shrubs. Leaves ovate–elliptic to oblong, 3–8 × 2–4 cm, rounded or cordate at base, acute or obtuse at apex, sinuate or pinnatifid, pubescent, sparsely prickly on midrib. Flowers in many–flowered, sessile or shortly pedunculate, corymbose cymes. Calyx copular, glandular pubescent, ca 5 mm long; lobes oblong,

acuminate. Corolla white, 7–8 mm long; lobes lanceolate, subacute. Berries globose, ca 2 cm across. Seeds globose, smooth.

Flowering & Fruiting: Throughout the year.

Common in waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari, 267 m, 19.08.2015, A.N. Shukla & N. Srivastava 75031.

3. *Solanum virginianum* L., Sp. Pl. 187. 1753. *S. xanthocarpum* Schrad. & Wendl. in Schrad., Sert. Hannov. 1: 8. t. 2. 1795; C.B. Clarke in Hook.f., Fl. Brit. India 4: 236. 1883; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 3. 1960.

Diffuse or prostrate, perennial herbs. Leaves ovate or elliptic, sinuate or subpinnatifid, 5–8 × 3–5 cm, rounded or oblique at base, obtuse or subacute at apex, stellate hairy, with prickles on midrib and veins. Flowers in extra-axillary, few-flowered cymes. Calyx-lobes linear or lanceolate, 5–8 mm long. Corolla bluish purple to violet, 2–3 cm across; lobes deltoid, pubescent outside. Berries yellow–orange, globose, 1.5–2.5 cm across. Seeds compressed, smooth.

Flowering & Fruiting: December–June.

Common, in wastelands and fallow fields.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary road, 21.08.2015, A.N. Shukla & N. Srivastava 75094.

SCROPHULARIACEAE

Key to genera

- | | |
|--|-----------------------------|
| 1a. Fertile stamens 2 | 3. <i>Lindernia</i> |
| 1b. Fertile stamens 4 | 2 |
| 2a. Corolla 4-lobed | 5. <i>Scoparia</i> |
| 2b. Corolla 5-lobed | 3 |
| 3a. Corolla campanulate, obscurely bilabiate | 1. <i>Bacopa</i> |
| 3b. Corolla tubular distinctly bilabiate | 4 |
| 4a. Anther cells separate | 2. <i>Limnophila</i> |
| 4b. Anther cells contiguous | 4. <i>Mazus</i> |

1. *BACOPA* Aubl.

Bacopa monnieri (L.) Wettst. in Engl. & Prantl, Nat. Pflanzenfam. 4(3b): 77. 1891. *Lysimachia monnieri* L., Cent. Pl. II: 9. 1756. *Herpestis monnieri* (L.) Kunth in Humb., Bonpl. & Kunth, Nov. Gen. Sp. 2: 366. 1818, nom. illeg.; Hook.f., Fl. Brit. India 4: 272. 1884. – *monniera*.

Suberect, creeping or prostrate, herbs, up to 25 cm long. Leaves sessile, obovate or oblanceolate, 0.8–2 × 0.3–0.6 cm, narrowed at base, obtuse or rounded at apex, entire or crenulate along margins. Flowers axillary, solitary; pedicels 3–9 mm long in flowers and up to 20 mm long in fruits; bracteoles 2, linear, acute, entire, ca 4 mm long. Calyx-segments unequal; 3 larger segments broadly ovate-oblong; 2 inner ones lanceolate, narrow, acute, entire. Corolla purplish or pink with purplish veins, campanulate, ca 1 cm long. Capsules ovoid, acute, glabrous, ca 5 mm long.

Flowering & Fruiting: July–April.

In marshy and swampy areas.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari water fall, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75080; Jamsoti, 22.12.2016, A.N. Shukla 76294.

2. LIMNOPHILA R.Br., nom. cons.

Key to species

1a. Flowers distinctly pedicellate.

1. *L. indica*

1b. Flowers sessile or subsessile.

2. *L. sessiliflora*

1. *Limnophila indica* (L.) Druce in Bot. Exch. Club Soc. Brit. Isles 3: 420. 1914. *Hottonia indica* L., Syst. Nat. ed. 10, 919. 1759. *Limnophila gratiolooides* R.Br., Prodr. 442. 1810; Hook.f., Fl. Brit. India 4: 271. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 21. 1960.

Aquatic, aromatic herbs, 2–12 cm long. Aerial leaves opposite or whorled, the lower whorled, pinnatifid or multifid; the upper opposite, linear–oblong, 2.5–4.5 × 0.5–0.8 cm, amplexicaul at base, acute at apex, crenate along margins. Flowers axillary, solitary or in terminal racemes; pedicels glandular; bracteoles 2, linear subulate, 2–4 mm long. Calyx 3–6 mm long; lobes linear, acute or acuminate, glabrous or pubescent, 2–3 mm long. Corolla white, purple or bluish, 8–10 mm long. Capsules ellipsoid–subglobose, compressed. Seeds minute, truncate or rounded at ends.

Flowering & Fruiting: Throughout the year.

Common in marshy and aquatic habitat.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 20.08.2015, A.N. Shukla & N. Srivastava 75081; Gardi Nala, 23.12.2016, A.N. Shukla 76322.

2. *Limnophila sessiliflora* Blume, Bijdr. Fl. Ned. Ind. 14: 749. 1826; Hook.f., Fl. Brit. India 4: 270. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 20. 1960.

Herbs, annual or perennial, floating or partly submerged, simple or branched, hirsute to subglobose. Leaves whorled, submerged ones divided into capillary, glabrous segments, 5–30 mm long; those on aerial stems elliptic–lanceolate, 4–12 × 3 mm, crenate–serrate to lacerate and pinnatisect, punctuate. Flowers axillary, solitary, sessile or subsessile; bracts linear; bracteoles absent. Calyx 4–7 mm long, sparingly hirsute; lobes 2–3.5 mm long, acuminate, glandular. Corolla light purple or pink, 7–12 mm long; tube cylindrical, often with yellow tinge. Capsules 3.5–5.5 mm long. Seeds truncate at both ends.

Flowering & Fruiting: October–November.

Common in ponds.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76207; Girda nala, 23.12.2016, A.N. Shukla 76316.

3. LINDERNIA All.**Key to species**

- 1a. Fertile stamens 2
1b. Fertile stamens 4

- 1. *L. ciliata***
2. *L. crustacea*

1. *Lindernia ciliata* (Colsm.) Pennell, Brittonia2: 182. 1936. *Gratiola ciliata* Colsm., Prodr. Descr. Gratiol. 14. 1793. *Bonnaya brachiata* Link & Otto, Icon. Pl. Select. 2: 25. t. 11. 1820; Hook.f., Fl. Brit. India 4: 284. 1884.

Small annual herbs, stem quadrangular. Leaves sessile, oblong, 1–3.2 × 0.5–1.2 cm, rounded or narrowed at base, obtuse or subacute at apex, serrate along margins. Flowers in terminal, lax racemes; pedicels slender, 2–4 mm long; bracts linear, subulate, 4–5 mm long. Calyx divided almost up to base, ca 4 mm long; segments linear, subulate, ciliate, aristate. Corolla white, pink or red, ca 7 mm long. Stamens 2. Capsules more than twice the length of calyx, cylindrical, linear. Seeds truncate at both ends.

Flowering & Fruiting: August–February.

Not common, in moist shady places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari, 19.08.2015, A.N. Shukla & N. Srivastava 75028.

2. *Lindernia crustacea* (L.) F.Muell., Syst. Census Austral. Pl. 1: 97. 1882. Pl. 97. 1882. *Capraria crustacea* L., Mant. Pl. 1: 87. 1767. *Vandellia crustacea* (L.) Benth., Scroph. Ind. 35. 1835; Hook.f., Fl. Brit. India 4: 279. 1884.

Diffusely branched, annual herbs. Leaves ovate, 8–15 × 5–10 mm, rounded or cordate at base, obtuse at apex, entire or serrate along margins; petioles 2–6 mm long. Flowers axillary, solitary and in subracemes; pedicels 6–18 mm long. Calyx 3.5–4 mm long, lobed only to 1/4th of its length; teeth deltoid or lanceolate, acute. Corolla purple or blue–violet, yellow–red in throat, 8–14 mm long. Capsules obovate or ovoid to elliptic–oblong, apiculate, 2–8 mm long. Seeds pale yellow, ovoid.

Flowering & Fruiting: July–November.

Common in moist shady places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 20.08.2015, A.N. Shukla & N. Srivastava 75059; Baliyari, 267 m, 19.08.2015, A.N. Shukla & N. Srivastava 75041.

4. MAZUS Lour.

Mazus pumilus (Burm.f.) Steenis in Nova Guinea. N.s., 9(1): 31. 1958. *Lovelina pumila* Burm.f., Fl. Indica 186, t. 60, f. 3. 1768. *Mazus rugosus* Lour., Fl. Cochinch. 385. 1790; Hook.f., Fl. Brit. India 4: 259. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 19. 1960.

Herbs, annual, tufted or trailing, non stoloniferous, 10–40 cm high. Basal leaves rosulate, obovate–elliptic, narrowed at the base into a petiole, obtuse at apex, distantly

crenate along margins. Flowers in 2.4–20 cm long, leafless or leafy, pubescent, racemes. Calyx–lobes ovate–lanceolate, subulate, ca 5 mm long. Corolla white or light blue, 5–11 mm long; ridges of lower lip brown spotted and bearded with club-shaped hairs. Capsules subglobose, included in the calyx. Seeds pale yellow, minute.

Flowering & Fruiting: November–April.

Common, in moist shady places particularly along drains and water channels.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 22.12.2016, A.N. Shukla 76296.

5. SCOPARIA L.

Scoparia dulcis L., Sp. Pl. 116. 1753; Hook.f., Fl. Brit. India 4: 289. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 27. 1960.

Herbs or undershrubs, 30–90 cm high; stems and branches 4–6–angled, glabrous or occasionally minutely pubescent at nodes. Leaves ternate or opposite, ovate–elliptic, elliptic or rhomboid, 0.7–3.5 × 0.4–1.8 cm, narrowed at the base, acute or obtuse at apex, coarsely serrate along margins. Flowers 3–6 in axillary whorls; pedicels 9–10 mm long. Calyx–segments 4, oblong, acute or subacute, entire, 3–5–nerved. Corolla white, pilose, ca 5 mm across. Capsules subglobose, 2–4 mm across. Seeds ovoid or obovoid.

Flowering & Fruiting: Throughout the year.

Common, in open wastelands and as weed of cultivated fields.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75006; Gardi Nala, 23.12.2016, A.N. Shukla 76331.

BIGNONIACEAE

Key to genera

- | | |
|---|---------------------|
| 1a. Perfect stamens 5; capsule large, flat | 2. Oroxylum |
| 1b. Perfect stamens 4; capsule cylindric, ribbed, mostly curved | 1. Fernandoa |

1. FERNANDOA Welw. ex Seem.

Fernandoa adenophylla (Wall. ex G.Don) Steenis, Blumea 23: 135. 1976. *Bignonia adenophylla* Wall. ex G.Don, Gen. Hist. 4: 221. 1838.

A deciduous trees, 10–15 m tall. Leaves opposite, 20–30 cm long; pinnae rusty tomentose; leaflets 5–7, lateral, elliptic–oblong, 6–15 × 5–12 cm, entire, acute; rusty tomentose–brown. Calyx 3–5–lobed, 20–25 mm long. Corolla tomentose on the outside, lobes subequal, obtuse. Style 3–5 cm long. Stigma elliptic, 5 mm long. Fruits long, twisted.

Flowering & Fruiting: August–November.

Cultivated in forest areas.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along the road side, 20.12.2016, A.N. Shukla 76203.

2. OROXYLUM Vent.

Oroxylum indicum (L.) Kurz, Forest Fl. Burma 2: 237. 1877; C.B. Clarke in Hook.f., Fl. Brit. India 4: 378. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 42. 1960; S.K. Maurya & al., Intl. J. Biod. 7. 2015. *Bignonia indica* L., Sp. Pl. 625. 1753.

Trees, irregularly branched with open crown, 4–6 m high. Leaves usually tufted towards twig end; leaflets ovate–elliptic, 7–10 × 4–8 cm, oblique at base, acuminate at apex, entire or coarsely serrate–dentate along margins, shining, dark green above, pubescent beneath. Flowers solitary on a tubercle, arranged in erect racemes; peduncles ca 40 cm long. Calyx dirty violet, campanulate, turning woody in fruit, 3–6 cm long. Corolla deep maroon, glandular inside, 5–6 cm long; lobes ovate, sparsely toothed. Capsules elongate, brown, 30–100 cm long. Seeds discoid, winged all round except at the base.

Flowering & Fruiting: June–March.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

PEDALIACEAE

SESAMUM L.

Sesamum indicum L., Sp. Pl. 634. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 387. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 47. 1960.

Herbs, annual, erect, up to 1 m high. Leaves elliptic–lanceolate; lower ones opposite, 3–foliolate or palmatisect, serrate; upper ones oblong or ovate–lanceolate, 5–10 × 0.5–4.5 cm, rounded or acute at base, subacute at apex, subentire or coarsely serrate along margins, puberulous beneath. Flowers axillary, solitary, with 2, yellow glands at the base of pedicels. Calyx–lobes oblong, pubescent. Corolla pink or white, bilabiate; lobes pubescent outside. Capsules 4–angled, apiculate, deeply 4–grooved, 1–3 cm long. Seeds white, brown or black, smooth or rugose.

Flowering & Fruiting: September–October.

Common, in cultivation.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along Rajdari water fall, 20.08.2015, A.N. Shukla & N. Srivastava 75068; before Jamsoti, 175 m, 24.08.2015, A.N. Shukla & N. Srivastava 75177.

ACANTHACEAE

Key to genera

- | | |
|---|--------------------|
| 1a. Calyx 4-partite or lobed | 2 |
| 1b. Calyx 5-partite or lobed | 6 |
| 2a. Stamens 2; Staminodes 1-2 or absent | 3 |
| 2b. Stamens 4; Staminodes absent | 4 |
| 3a. Flowers more than 2 cm long | 2. Barleria |

- 3b. Flowers up to 1 cm long **7. Justicia**
 4a. Corolla with subobsolete or obsolete upper lip, tube cartilaginous; anthers 1-celled **3. Blepharis**
 4b. Corolla with well developed upper lip, tube thin-fleshy or membranous; anthers 2-celled 5
 5a. Stamens exerted; stigma linear **6. Hygrophila**
 5b. Stamens included; stigma capitates **8. Lepidagathis**
 6a. Stamens 2 7
 6b. Stamens 4 8
 7a. Ovules 3 to many in each locule; capsules 6 or more-seeded **1. Andrographis**
 7b. Ovules 1 to 2 in each locule; capsules 2-4-seeded **10. Rungia**
 8a. Bracts present; bracteoles small, not exceeding the calyx **5. Hemigraphis**
 8b. Bracts absent; bracteoles large, exceeding the calyx 9
 9a. Bracteoles foliaceous, broad; capsules clavate, with a solid base, bearing seeds only in the upper part **4. Dipteracanthus**
 9b. Bracteoles not foliaceous, narrow; capsules linear, without a solid base, bearing seeds throughout **9. Ruellia**

1. ANDROGRAPHIS Wall. ex Nees

Key to species

- 1a. Capsules ovoid, seeded 4 **1. A. echioides**
 1b. Capsules oblong-ellipsoid, seeded 8-12 **2. A. paniculata**

1. Andrographis echioides (L.) Nees in Wall., Pl. Asiat. Rar. 3: 117. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 505. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 66. 1960. *Justicia echioides* L., Sp. Pl. 16. 1753.

Erect, annual herbs, up to 50 cm high. Leaves oblong-elliptic or oblanceolate, sessile, 3–8 × 1.5–3 cm, rounded or cuneate at base, obtuse at apex, subentire along margins, glabrous above, lineolate beneath. Flowers in simple or branched, subsecund racemes; bracts linear, ca 2 mm long; bracteoles subulate, pubescent. Calyx-segments linear, 4–5 mm long. Corolla white with purple streaks; upper lip with a purple blotch; lower lip dark purple; lobes glandular pubescent. Capsules ellipsoid, 8–10 mm long. Seeds brown, ovoid, rugose, 2.5 mm across.

Flowering & Fruiting: August–February.

Not common, in mixed forest.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near forest rest house, 20.08.2015, A.N. Shukla & N. Srivastava 75069; Gidhmarwa, 24.12.2016, A.N. Shukla 76343.

2. Andrographis paniculata (Burm.f.) Nees, Pl. Asiat. Rar. 3: 116. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 501. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 66. 1960; S.K. Maurya & al., Intl. J. Biod. 4. 2015. *Justicia paniculata* Burm.f., Fl. Ind. 9. 1768. *Andrographis subspathulata* C.B. Clarke in Hook.f., Fl. Brit. India 4: 502. 1884.

Erect, stout, glabrous herbs or undershrubs. Leaves linear–obovate or lanceolate, 4–7 × 1–2.5 cm, tapering at base, acute at apex. Flowers in terminal and axillary, paniculate racemes, rarely axillary, solitary; bracts opposite, lanceolate; bracteoles 2, small or absent. Calyx 5–partite, glandular pubescent. Corolla white or purplish, glandular pubescent; lower lip with deep pink or purple markings inside at base. Capsules linear–oblong, sparsely pubescent, 6–12–seeded, 1–1.5 cm long. Seeds brown, subquadrate, rugose.

Flowering & Fruiting: September–April.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

2. BARLERIAL.

Key to species

- | | |
|--|-------------------------------|
| 1a. Plants armed; corolla yellow; capsules 2-seeded | 2. <i>B. prionitis</i> |
| 1b. Plants unarmed; corolla white or purple; capsules 4-seeded | 1. <i>B. cristata</i> |

1. *Barleria cristata* L., Sp. Pl. 636. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 488. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 70. 1960.

Erect herbs or undershrubs, ca 1 m high. Leaves elliptic or oblong–lanceolate, 8–13 × 1.5–3.0 cm, narrowed at base, acute or acute–acuminate at apex, entire along margins. Flowers in axillary and terminal capituliform spikes. Calyx 4–partite nearly to base; two outer segments white, large, ovate–oblong, bristle–tipped on margin; two inner lanceolate ciliate. Corolla pinkish purple, purple or white, pubescent outside; lobes 5, ovate, ca 7 mm long. Capsules ellipsoid, 1.5–2 cm long. Seeds brown, ca 4 mm across.

Flowering & Fruiting: Throughout the year.

Not common, in scrub forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, 21.12.2016, A.N. Shukla 76281.

2. *Barleria prionitis* L., Sp. Pl. 636. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 482. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 69. 1960; S.K. Maurya & al., Intl. J. Biod. 4. 2015.

Glabrous, armed undershrubs, ca 1 m high. Leaves opposite, obovate or elliptic–obovate, 4–11 × 1.5–4 cm, tapering at base, obtuse or acute at apex, entire along margins, sparsely pubescent beneath. Flowers solitary or in terminal, spicate clusters; bracts lanceolate, 2 cm long, spine–tipped; bracteoles bristle–tipped. Calyx–segments broadly lanceolate, acuminate; outer pair spine–tipped. Corolla yellow, slightly bilabiate, glabrous or puberulous. Capsules ovoid, beaked, 1–1.5 cm long. Seeds sub–orbicular, appressedly hairy, ca 5 mm across.

Flowering & Fruiting: September–April.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

3. BLEPHARIS Juss.

Blepharis maderaspatensis (L.) Heyne ex Roth, Nov. Pl. Sp. 320. 1821. *Acanthus maderaspatensis* L., Sp. Pl. 639. 1753. *Blepharis boerhaviaefolia* Pers., Syn. Pl. 2: 180. 1806, non Roth, 1821; C.B. Clarke in Hook.f., Fl. Brit. India 4: 478. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 53. 1960.

Perennial, prostrate herbs. Leaves in whorls of 4, 2 smaller and 2 larger at each node, elliptic, ovate-lanceolate, cuneate at base, acute at apex, 3–8 x 1.4–3.4 cm. Flowers axillary, in 2–3-flowered clusters, often combined into leafy spikes. Calyx-segments oblong, ciliate. Corolla pale blue or pink with a yellow spot inside the lower lip. Capsules ellipsoid, brown, 2-seeded. Seeds densely papillose.

Flowering & Fruiting: September–April.

Common, in wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 21.12.2016, A.N. Shukla 76256.

4. DIPTERACANTHUS Nees

Dipteracanthus prostratus (Poir.) Nees in Wall., Pl. Asiat. Rar. 3: 81. 1832. *Ruellia prostrata* Poir. in Lam., Encycl. 6: 349. 1804; C.B. Clarke in Hook.f., Fl. Brit. India 4: 411. 1884, incl. var. *dejecta* C.B. Clarke in Hook.f., Fl. Brit. India 4: 412. 1884.

Perennial, prostrate or decumbent herbs, up to 50 cm high. Leaves ovate-elliptic, acute to acuminate at apex, 2–7 x 0.4–3.0 cm. Flowers axillary, usually solitary, sessile. Calyx-lobes linear, puberulous, ciliate, 8–18 mm long. Corolla pale mauve-violet, caducous, pubescent outside. Capsules clavate, brown, pubescent, ca 2 cm long.

Flowering & Fruiting: April–June.

Common, in wastelands and sandy riverbeds.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76356.

5. HEMIGRAPHIS Nees

Hemigraphis hirta T. Anderson in J. Linn. Soc., Bot. 9: 462. 1867; C.B. Clarke in Hook.f., Fl. Brit. India 4: 422. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 60. 1960.

Hirsute-villous, prostrate herbs. Leaves opposite, elliptic or broadly elliptic, 1–2 x 0.5–0.8 cm, cuneate at base, obtuse or acute at apex, crenate along margins. Flowers in condensed, 2–6-flowered heads; bracts elliptic, woolly, 8–12 mm long; bracteoles absent. Calyx-segments linear, c. 7 mm long. Corolla violet with deep violet throat, glabrous, fugacious, 10–12 mm long. Capsules linear-cylindric, glabrous, 0.5–1 cm long. Seeds 12, compressed, discoid, brownish.

Flowering & Fruiting: April–July.

Common in wastelands.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Batwa khoh, 21.12.2016, A.N. Shukla 76258; along Chandra Prabha river, 21.12.2016, A.N. Shukla 76284.

6. HYGROPHILA R.Br.

Key to species

- | | |
|-------------------------------------|--------------------------------|
| 1a. Plants armed; calyx 4-partite | 1. <i>H. auriculata</i> |
| 1b. Plants unarmed; calyx 5-partite | 2. <i>H. polysperma</i> |

1. *Hygrophila auriculata* Heine, Kew Bull. 16: 172. 1962. *Hygrophila spinosa* Anderson in Thwaites, Enum. Pl. Zeyl. 225. 1860; C.B. Clarke in Hook.f., Fl. Brit. India 4: 408. 1884.

Spiny herbs, up to 1 m high. Leaves in whorl of 6 at a node, subsessile, oblong or linear-lanceolate, 5–18 × 1.5–4.5 cm, cuneate at base, acute-acuminate at apex, dentate along margins. Flowers in dense clusters at leaf axils, usually 8 in each whorl, showy; bracts 2-seriate, to 4 cm long; bracteoles narrow, smaller. Calyx 4-partite; segments linear-lanceolate, hairy. Corolla blue-purple, glabrous; tube ca 1.2 cm long, abruptly widening. Capsules linear-oblong, 4–8-seeded.

Flowering & Fruiting: September–June.

Common along ponds and ditches.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 22.12.2016, A.N. Shukla 76287.

2. *Hygrophila polysperma* (Roxb.) T. Anderson in J. Linn. Soc. Bot. 9: 456. 1867; C.B. Clarke in Hook.f., Fl. Brit. India 4: 406. 1884; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 56. 1960. *Justicia polysperma* Roxb., Fl. Ind. 1: 119. 1832.

Erect or procumbent herbs. Leaves ovate or elliptic-oblong, subsessile, 0.5–2.5 × 0.3–1.5 cm, tapering at base, obtuse or acute at apex, entire along margins. Flowers in terminal, dense spikes; bracts foliaceous; bracteoles linear, ciliate on margin. Calyx 5-partite; segments linear-lanceolate. Corolla white, pink or bluish purple, hairy, ca 6 mm long. Capsules linear-oblong, brown, pubescent, ca 8 mm long. Seeds pale brown, ca 0.5 mm across.

Flowering & Fruiting: October–April.

Common in moist places along drains.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 22.12.2016, A.N. Shukla 76297.

7. JUSTICIA L.

Key to species

- | | |
|--|------------------------------|
| 1a. Shrubs | 1. <i>J. adhatoda</i> |
| 1b. Herbs | 2 |
| 2a. Bracts and bracteoles as long as or longer than calyx-segments | 3. <i>J. japonica</i> |
| 2b. Bracts and bracteoles shorter than calyx-segments | 3 |

- 3a. Bracts and bracteoles ca 2.5 mm long
 3b. Bracts and bracteoles up to 1.25 mm long

4. J. Prostrata
2. J. diffusa

1. Justicia adhatoda L., Sp. Pl. 15. 1753; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 76. 1960. *Adhatoda zeylanica* Medik. in Hist. & Commentat. Acad. Elect. Sci. Theod.-Palat. 6: 393. 1790. *A. vasica* Nees in Wall., Pl. Asiat. Rar. 3: 103. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 540. 1885; S.K. Maurya & al., Intl. J. Biod. 4. 2015.

Erect, glabrous shrubs, up to 1 m high. Leaves elliptic-lanceolate or ovate-lanceolate, cuneate or decurrent at base, acuminate or acute at apex, 5–20 x 3–6 cm. Flowers in leafy spikes. Calyx 5-lobed; lobes lanceolate. Corolla white or cream-coloured. Capsules dark brown clavate, 2–3 cm long. Seeds suborbicular, rugose.

Flowering & Fruiting: December–March.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

2. Justicia diffusa Willd., Sp. Pl. 1: 87. 1797; C.B. Clarke in Hook.f., Fl. Brit. India 4: 538. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 78. 1960.

Procumbent, strigose herbs. Leaves ovate-orbicular or elliptic-lanceolate, 2–7 x 0.3–3 cm, rounded or cuneate at base, acute or acuminate at apex, pubescent beneath. Flowers in axillary or terminal, 3–7 cm long, erect spikes; bracts linear-lanceolate; bracteoles similar to bracts. Calyx 4-partite; segments lanceolate, ca 4 mm long. Corolla pink or pale purple, infundibuliform, ca 5 mm long; upper lip broadly ovate, notched; tube as long as the limb. Capsules ellipsoid, glabrous. Seeds ovate, minutely papillose when wet.

Flowering & Fruiting: September–March.

Common in wastelands.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 20.08.2015, A.N. Shukla & N. Srivastava 75061; Bichuliya, 25.12.2016, A.N. Shukla 76372.

3. Justicia japonica Thunb., Syst. Veg. Ed. 14. 63. 1784. *Justicia simplex* D. Don, Prodr. Fl. Nepal. 118. 1825; C.B. Clarke in Hook.f., Fl. Brit. India 4: 539. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 78. 1960.

Herbs, erect or prostrate, up to 30 cm high; branches 4-angled, grooved, pubescent, swollen above the nodes. Leaves variable in shape, ovate, ovate-lanceolate or elliptic-oblong, 2–5 x 0.5–2 cm, acute or obtuse at apex, subentire, glabrous or pubescent. Flowers in terminal or axillary, dense, cylindrical spikes; bracts and bracteoles elliptic-ovate, slightly longer than calyx, membranous-margined. Calyx 4-partite, 3–5 mm long; segments unequal, ciliate. Corolla pale purple or whitish, 5–6 mm long; throat mottled inside. Capsules ellipsoid, pubescent at tip. Seeds rugose.

Flowering & Fruiting: August–April.

Common, in open places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015,

A.N. Shukla & N. Srivastava 75040; Rajdari, 20.08.2015, A.N. Shukla & N. Srivastava 75060.

4. *Justicia prostrata* (Roxb. ex C.B. Clarke) Gamble in Fl. Madras 1081. 1924. *Justicia diffusa* var. *prostrata* Roxb. ex C.B. Clarke in Hook.f., Fl. Brit. India 4: 538. 1885.

Herbs, annual, prostrate, slender, branches spreading. Leaves ovate-elliptic or suborbicular, 1–2 × 0.5–1 cm, obtuse at apex, rounded at base, entire, sparsely pubescent. Flowers in axillary and terminal, up to 6 cm long spikes; bracts and bracteoles lanceolate, shorter than calyx, pubescent. Calyx 4-partite; segments lanceolate, scarious, ciliate along midrib and margin. Corolla white or pink with purple spots, ca 7 mm long. Capsules oblong-ellipsoid, ca 3 mm long, beaked, grooved. Seeds black, tuberculate.

Flowering & Fruiting: July-April.

Common in wasteland.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76372.

8. LEPIDAGATHIS Willd.

Lepidagathis trinervis Nees, Pl. Asiat. Rar. 3: 96. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 517. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 72. 1960.

Herbs, perennial, pubescent, up to 25 cm high. Leaves linear or linear-lanceolate, sessile, tapering at base, acute at apex, 2.4–6.0 × 0.4–1.0 cm. Flowers in axillary spikes. Calyx-segments spinous-tipped. Corolla pink, violet or pale purple, 6–9 mm long. Capsules compressed, beaked, 2-seeded. Seeds covered with long, silky white hairs.

Flowering & Fruiting: November–April.

Common in scrub forest usually in rock crevices.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76359.

9. RUELLIA L.

Ruellia tuberosa L., Sp. Pl. 635. 1753; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 59. 1960.

Erect, annual herbs. Leaves elliptic or elliptic-obovate, 5–10 × 2.5–4.0 cm, cuneate to attenuate at base, obtuse or rounded at apex. Flowers in axillary and terminal, pedunculate cymes; bracteoles linear-subulate, 3–5 mm long. Calyx-segments linear, glandular, ciliate, 1–2 cm long. Corolla blue-violet, occasionally white, hairy outside, 5 cm long; lobes irregularly sinuate-dentate. Capsules linear-fusiform, grooved dorsiventrally, ca 2.5 cm long. Seeds many, ovate-oblong, 2 mm across.

Flowering & Fruiting: July–September.

Not common in wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75071.

10. RUNGIA Nees

Rungia pectinata (L.) Nees in DC., Prodr. 11: 470. 1847. *Justicia pectinata* L., Cent. Pl.: 3. 1756 & Amoen. Acad. 4: 299. 1759. *Rungia parviflora* Nees in Wall., Pl. Asiat. Rar. 3(12): 110. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 550. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 80. 1960. *R. parviflora* Nees var. *pectinata* (L.) C.B. Clarke in Hook.f., Fl. Brit. India 4: 550. 1885.

Much-branched, procumbent annual herbs. Leaves elliptic or lanceolate, sessile or petiolate, 3–6 × 1–3 cm, tapering at base, acuminate at apex, serrulate along margins. Flowers in terminal and axillary, distinctly unilateral spikes; sterile and fertile bracts dissimilar; sterile bracts oblong-lanceolate; fertile ones obovate-orbicular; bracteoles oblong, scarious-margined. Calyx-segments linear-lanceolate, ciliate on margin. Corolla light blue with two rows of darker patches in the lowerlip. Capsules ovoid, 4-seeded. Seeds yellow, compressed, orbicular.

Flowering & Fruiting: January–April.

Common in wastelands and in mixed forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76229; Batwa Khoh, 21.12.2016, A.N. Shukla 76261; Bichuliya, 25.12.2016, A.N. Shukla 76370.

VERBENACEAE

Key to genera

- | | |
|--|------------------------|
| 1a. Inflorescence of cylindric or capitate spikes | 2 |
| 1b. Inflorescence raceme | 3 |
| 2a. Erect shrubs; calyx truncate, entire; drupes fleshy | 3. Lantana |
| 2b. Prostrate herbs; calyx 2-lobed; drupes dry | 4. Phyla |
| 3a. Stamens much exserted; drupes separatory 4-lobed | 1. Clerodendrum |
| 3b. Stamens not much exserted; drupes not separatory 4-lobed | 2. Gmelina |

1. CLERODENDRUM L.

Clerodendrum phlomidis L.f., Suppl. Pl. 292. 1782; C.B. Clarke in Hook.f., Fl. Brit. India: 4: 590. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 92. 1960. *Clerodendrum multiflorum* (Burm.f.) Kuntze, Revis. Gen. Pl. 3: 526. 1891.

Small trees or Shrubs. Leaves ovate-rhomboid, 3–6 × 2–4 cm, acute or subcordate at base, acute or shortly acuminate at apex, subentire or crenate-serrate along margins, glabrescent to thinly pubescent above and below. Flowers in axillary and terminal cymes; bracts foliaceous. Calyx 9 mm long; lobes ovate, subacuminate. Corolla white or yellowish white, hypocrateriform, puberulent outside, ca 4 cm long; lobes subequal. Drupes obovoid, depressed at apex, black when mature, 6–12 × 4–6 mm. Seeds oblong, dirty white, 5–7 mm long.

Flowering & Fruiting: October–February.

Common, in hilly tracks and on river banks.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Talra village, 21.12.2016, A.N. Shukla 76247.

2. GMELINA L.

Gmelina arborea Roxb., Hort. Bengal. 46. 1814 & Fl. Ind. 3: 84. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 581. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 88. 1960; S.K. Maurya & al., Intl. J. Biod. 6. 2015.

Trees, up to 20 m high. Leaves broadly ovate, cordate or deltoid-ovate, 10–18 × 8–11 cm, cordate or truncate and often cuneate into petiole at base, acuminate or caudate at apex, entire along margins, glabrous above, fulvous-tomentose beneath. Flowers in axillary or terminal panicles. Calyx broadly campanulate, 5-toothed, ca 6 mm long. Corolla yellow, tubular below, obliquely infundibuliform at the throat, ca 4 cm long; upper lip 2-lobed; lower lip 3-lobed; middle lobe much longer and broader. Drupes obovoid or ellipsoid-obovoid, yellow-orange when mature with a bony endocarp, succulent, aromatic, ca 3.5 × 2.4 cm. Seeds 1–3, oblong.

Flowering & Fruiting: March–June.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

3. LANTANA L.

Lantana camara L., Sp. Pl. 627. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 562. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 84. 1960. *L. camara* L. Var. *aculeata* (L.) Moldenke in Torreya 34: 9. 1934.

Prickly rambling or climbing shrubs, up to 2.5 m high. Leaves ovate, 2–8 × 2–4 cm, cuneate, rounded or cordate at base, acute or shortly acuminate at apex, crenate-serrate along margins, scabrid-rugose on the upper surface and densely to sparsely pubescent beneath. Flowers in pedunculate, upright spikes; bracts inconspicuous. Calyx small, inconspicuous, ca 5 mm long. Corolla pink, orange; mouth turning yellow or orange after fertilization; limb 6–8 mm wide; tube ca 12 mm long. Drupes obovoid, greenish or purple, fleshy, 2-seeded, ca 4 × 3 mm.

Flowering & Fruiting: April–June.

Common along roadsides and forest margins.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Devdari, 19.08.2015, A.N. Shukla & N. Srivastava 75046; Patariya Nala, 22.12.2016, A.N. Shukla 76293.

4. PHYLA Lour.

Phyla nodiflora (L.) E. Greene, Pittonia 4(20E): 46. 1899. *Verbena nodiflora* L., Sp. Pl. 20. 1753. *Lippia nodiflora* (L.) Rich. in Michx., Fl. Bor.-Amer. 2: 15. 1803; C.B. Clarke in Hook.f., Fl. Brit. India 4: 563. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 84. 1960.

Perennial, prostrate herbs. Leaves obovate–spathulate or oblanceolate, 1–2 × 0.4–1.0 cm, cuneate at base, obtuse at apex, decurrent into petiole, serrate above the middle, entire towards base, glabrescent. Flowers in condensed or elongated, pedunculate spikes; bracts broadly ovate, concave, apiculate, sparsely ciliate; bracteoles absent. Calyx copular; lobes 2, lanceolate, acute. Corolla purplish white, 2 mm across; tube ca 2 mm long. Drupes oblong or subglobose, 1–2 mm long, compressed, separating into 2 or 1–seeded pyrenes, enclosed by persistent calyx.

Flowering & Fruiting: Throughout the year.

Common in moist wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Chandra Prabha Dam, 229 m, 21.08.2017, A.N. Shukla & N. Srivastava 75117.

LAMIACEAE

Key to genera

- | | |
|--|-----------------------|
| 1a. Calyx equally dentate or lobed | 2. Hyptis |
| 1b. Calyx unequally dentate or 2-lipped | 2 |
| 2a. Calyx-lobes more than 5, usually 6-10 | 3. Leucas |
| 2b. Calyx-lobes less than 5 or 5 | 3 |
| 3a. Fertile stamens 2 | 25. Salvia |
| 3b. Fertile stamens 4 | 44 |
| 4a. Calyx deflexed in fruit; upper lobe widest large | 4. Ocimum |
| 4b. Calyx suberect or declinate in fruit; upper lobe broader than others | 1. Anisochilus |

1. ANISOCHILUS Wall. ex Benth.

Anisochilus carnosus (L.f.) Wall. ex Benth. in Wall., Pl. Asiat. Rar. 2: 18. 1830; Hook.f., Fl. Brit. India 4: 627. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 104. 1960. *Lavandula carnosa* L.f., Suppl. Pl. 273. 1782.

Annual erect herbs, ca 60 cm high. Leaves broadly ovate, 2–4 × 1–4 cm, rounded or subcordate at base, subacute at apex, serrate along margins, verrucose above, pubescent below. Panicles diffusely branched; spikes subglobose to oblong–ovoid, 1.4–5 cm long; bracts broadly ovate, truncate at base. Calyx tubular; upper lip deltoid–lanceolate, up to 2.4 × 2 mm; lower lip slightly truncate. Corolla pinkish purple, up to 1.4 cm long; upper lip up to 5 mm long; lower lip broadly ovate, up to 5 mm long. Nutlets dark brown, shining, ovoid to suborbicular, compressed.

Flowering & Fruiting: January–December.

Common, in moist soil near drains and on hill slopes.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Pindra Nala, 24.12.2016, A.N. Shukla 76354.

2. HYPTIS Jacq.

Hyptis suaveolens (L.) Poit. in Ann. Mus. Natl. Hist. Nat. 7: 472, pl. 29, f. 2, 1806; Hook.f., Fl. Brit. India 4: 630. 1885. *Ballota suaveolens* L., Syst. Nat. ed. 10. 1100. 1759.

Annual, herbs, 0.5–1.0 m high. Leaves broadly ovate or suborbicular, 3–6 × 2–4 cm, rounded cordate at base, obtusely acute at apex, irregularly serrate along margins, sparsely pilose above, hirsute beneath; petioles shallowly crenate–serrulate, 1.5–4 cm long. Flowers axillary or terminal, secund in short umbels; bracts minute, setaceous. Calyx glandular and hispid outside, villous at the mouth, striate; teeth erect, subulate. Corolla blue, small. Nutlets blackish brown, usually 2, ovoid, flat, notched at the apex and with a white mark on either side of the pointed base.

Flowering & Fruiting: Throughout the year.

Common as weed in wastelands.

Specimens examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75072; along Chandra Prabha River, 21.12.2016, A.N. Shukla 76268.

3. LEUCAS R.Br.

Leucas aspera (Willd.) Link, Enum. Hort. Berol. Alt. 2: 113. 1822; Hook.f., Fl. Brit. India 4: 690. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 113. 1960. *Phlomis aspera* Willd., Enum. Hort. Berol. 2: 621. 1809.

Annual herbs, up to 55 cm high. Leaves linear or narrowly oblong–lanceolate, 3–6 × 0.4–1.0 cm, narrowed at base, obtuse at apex, entire or crenate along margins. Verticillasters terminal or axillary, very dense, many-flowered; bracts linear, almost equaling the calyx. Calyx tubular, curved, usually smooth and glabrous below, ribbed and scabrid or hispid above, 8–10 mm long; teeth short, deltoid, spinulose, ciliate; mouth small, very oblique, produced on the upper side. Corolla white, ca 9 mm long. Nutlets smooth brown, ca 2.6 mm long.

Flowering & Fruiting: August–April.

Common, in fallow lands and wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75107.

4. OCIMUM L.

Ocimum americanum L., Cent. Pl. 1: 15. 1755. *O. canum* Sims., Bot. Mag. 51: t. 2452. 1823; Hook. f., Fl. Brit. India 4: 607. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 99. 1960.

Annual, branched herbs. Leaves elliptic–lanceolate, 5–7 × 2.3–3.5 cm, narrowed at both ends, entire or faintly dentate along margins. Verticillasters densely flowered, in 7–14 cm long, spiciform racemes. Flowers subsessile; pedicels short, erect, often closely appressed to the rachis; bracts awned, ciliate with long, white hairs. Calyx villous inside, slightly pubescent outside, ca 3 mm long; upper calyx–tooth broad and rounded, awned, ciliate; other 4 teeth lanceolate, subulate. Corolla white, 5–6 mm long. Nutlets black, narrowly ellipsoid, punctulate.

Flowering & Fruiting: August–March.

Common, in wastelands, forest floor and nearby habitations.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Chandra Prabha Dam, 229 m, 21.08.2015, A.N. Shukla & N. Srivastava 75119; Tilra village, 21.12.2016, A.N. Shukla 76248.

5. SALVIA L.

Salviaplebeia R.Br., Prodr. 501. 1810; Hook.f., Fl. Brit. India 4: 655. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 118. 1960.

Annual, branched herbs. Leaves oblong–lanceolate, 4–10 × 1.5–4 cm, narrowed at base, subacute at apex, irregularly crenate along margins. Verticillasters in panicles of 6–25 cm long, slender, spicate racemes; bracts small, narrow. Calyx 2.5–3 mm long, glandular hairy; upper lip obtuse, entire; lower lip 2-lobed, larger than the upper. Corolla white or lilac, ca 6 mm long; upper lip oblong–obtuse; lower lip 3-lobed; middle lobe much larger; tube exserted, annulate, inside. Nutlets brown, minute, ovoid, mucilaginous when wet.

Flowering & Fruiting: September–April.

Common, along roadsides, river banks and sides of channels.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76373.

NYCTAGINACEAE

BOERHAVIA L.

Boerhavia diffusa L., Sp. Pl. 3. 1753. *B. repens* L. var. *diffusa* (L.) Hook.f., Fl. Brit. India 4: 709. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 127. 1960.

Herbs, perennial, diffuse, straggling, with somewhat woody base; stems terete, usually pinkish, gland hairy. Leaves ovate–oblong, 1–3 × 0.3–3.4 cm, rounded–subcordate at base, obtuse at apex, subentire along margins, whitish beneath. Flowers in terminal, diffuse panicles, much exceeding the foliage, pinkish mauve, sessile, ca 4 mm long; bracts and bracteoles ovate, acuminate, puberulous, 1.6–2 mm long. Perianth 2.5–3 mm long, funnel shaped, constricted below the middle, deep pink, glandular–hairy in lower part. Anthocarps fusiform, ca 4 mm long.

Flowering & Fruiting: October–April.

Common along roadsides, river banks and in wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla 75098.

AMARANTHACEAE

Key to genera

1a. Flowers in heads

1b. Flowers in terminal clusters, spikes or panicles

2. **Alternanthera**

2

- 2a. Flowers with soft woolly hairs
2b. Flowers without woolly hairs

1. Aerva
3. Amaranthus

1. AERVA Forssk.

Aerva sanguinolenta (L.) Blume, Bijdr. Fl. Ned. Ind. 547. 1825. *Achyranthes sanguinolenta* L., Sp. Pl. ed. 2. 294. 1762. *Aerva scandens* (Roxb.) Wall. ex Maq. in DC., Prodr. 13(2): 302. 1849; Hook.f., Fl. Brit. India 4: 727. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 138. 1960.

Erect or rambling undershrubs, ca 1 m high. Leaves mostly alternate, rarely opposite, elliptic–lanceolate, 2–8 × 0.8–4.0 cm, cuneate at base, acute–mucronate at apex, appressed hairy. Flowers in axillary and terminal, often panicle spikes; panicles 1–6 cm long or terminal ones up to 8 cm long. Tepals densely white–villous, ca 3 mm long; outer tepals white; inner ones with green centre. Utricles rotund, compressed. Seeds reniform, black, reticulate.

Flowering & Fruiting: July–April.

Common, on forest–floors and along roadsides.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Batwa Khoh, 21.12.2016, A.N. Shukla 76263.

2. ALTERNANTHERA Forssk.

Alternanthera sessilis (L.) R.Br. ex DC., Cat. Pl. Horti. Monsp. 4: 77. 1813; Hook.f., Fl. Brit. India 4: 731. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 142. 1960. *Gomphrena sessilis* L., Sp. pl. 225. 1753. *Alternanthera nodiflora* R.Br., Prodr. 417. 1810; Hook.f., Fl. Brit. India 4: 732. 1885.

Erect, ascending or prostrate herbs rooting at the lower nodes. Leaves variable, linear–lanceolate to oblong, 1–5 × 0.2–2 cm, cuneate to attenuate at base, obtuse to shortly acuminate at apex; petioles obsolete to ca 6 mm long. Flowers in axillary, solitary or 2–5 together, subglobose, ca 4 mm across, sessile heads; bracts deltoid–ovate, 0.71–1 mm long; bracteoles persistent, 1–1.5 mm long. Tepals white, ovate–elliptic, equal, 1.4–2.4 mm long. Utricles brown, equalling the tepals. Seeds discoid, brown.

Flowering & Fruiting: Throughout the year.

Common in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Sanctuary road, 21.08.2015, A.N. Shukla & N. Srivastava 75102.

3. AMARANTHUS L.

Amaranthus spinosus L., Sp. Pl. 991. 1753; Hook.f., Fl. Brit. India 4: 718. 1885; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 133. 1960; S.K. Maurya & al., Intl. J. Biod. 4. 2015.

Annual, spiny herbs, up to 1 m high. Leaves ovate to rhomboid–ovate, elliptic, lanceolate–oblong, 2.5–20 × 0.7–6 cm, cuneate or attenuate at base, mucronate at

apex; petioles up to 9 cm long, sometimes longer than lamina. Flowers in axillary clusters or in terminal, up to 20 × 1 cm spikes, green; lower clusters and lower part of spikes bearing only female flowers; upper part of spikes with male flowers; bracts and bracteoles deltoid-ovate, awned; bracteoles shorter than bracts. Tepals 5. Capsules ovoid-urceolate, ca 1.5 mm long. Seeds black, compressed, 0.75–1 mm across.

Flowering & Fruiting: Throughout the year.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

CHENOPODIACEAE

CHENOPODIUM L.

Chenopodium album L., Sp. Pl. 219. 1753; Hook.f., Fl. Brit. India 5: 3. 1886; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 143. 1960.

Erect, branched, glabrous, annual herbs. Lower leaves ovate-rhomboid, irregularly and rather coarsely dentate-serrate-laciniate along margins; upper ones elliptic-oblong-lanceolate, 1.5–15 × 0.4–12 cm, acute or rounded at base, acute or obtuse at apex. Flowers in terminal, leafy, paniculate clusters, 5–merous. Tepals ovate, obtuse, 1.5–2.23 mm long. Utricles depressed, papillose, 1.5 mm long. Seeds blackish brown, 1–1.5 mm across.

Flowering & Fruiting: September–March.

Common, in cultivated fields and wastelands.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gidhmarwa, 24.12.2016, A.N. Shukla 76342.

POLYGONACEAE

PERSICARIA (L.) Mill., nom. cons.

Persicaria glabra (Willd.) Gomez in Ann. Inst. Segunda Ensef. Habana 2: 278. 1896. *Polygonum glabrum* Willd., Sp. Pl. 2: 447. 1799; Hook.f., Fl. Brit. India 5: 34. 1886; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 153. 1960.

Erect, glabrous, branched annual herbs. Leaves elliptic-ovate or lanceolate, tapering at base, acuminate at apex, 10–25 × 1.5–4.0 cm; acaesae membranous, eciliate, closely sheathing the stems. Flowers in terminal, 5–8 cm long, slender, paniculate racemes. Perianth pink-red or white; tepals oblong, obtuse. Nuts rounded, flattened, black, glabrous, 2.5–3.0 mm long.

Flowering & Fruiting: October–April.

Common, along edges of ponds, streams and in riverbeds.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Chandra Prabha Dam, 21.12.2016, A.N. Shukla 76259.

LAURACEAE**LITSEA** Lam.

Litsea glutinosa (Lour.) C.B.Rob. in Philipp. J. Sci. 6(5): 321. 1911. *Sebifera glutinosa* Lour., Fl. Cochinch. 2: 638. 1790. *Litsea sebifera* Pers., Syn. Pl. 2: 4. 1806; Hook.f., Fl. Brit. India 5: 157. 1886. *Litsea chinensis* Lam., Encycl. 3: 574. 1792; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 167. 1960.

Small or medium-sized trees with light grey bark. Leaves ovate-lanceolate or ovate, 12–15 × 4–6 cm, rounded or cuneate at base, acute at apex, glabrous or pubescent beneath; lateral veins 7–9 pairs, not very prominent beneath; petioles slender, 2–3 cm long. Flowers in large, compound umbels, usually in subumbellate clusters at the apex of slender stalks, white pubescent; peduncles 8–16 mm long; pedicels 3–6 mm long. Fruits black, globose, shining, on slightly enlarged perianth tube.

Flowering & Fruiting: June–November.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Chandra Prabha river, 21.12.2016, A.N. Shukla 76277.

LORANTHACEAE**DENDROPHTHOE** Mart.

Dendrophthoe falcata (L.f.) Blume in Schult.f., Syst. Veg. 7: 1730. 1830; N.P. Balakr. & al. in K. Rajasekaran, Fl. India 23: 3. 2012. *Loranthus falcatus* L.f., Suppl. Pl. 211. 1782. *L. longiflorus* Desr. in Lam., Encyl. 3: 598. 1789; Hook.f., Fl. Brit. India 5: 214. 1886; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 175. 1960.

Epiphytic, semi-parasitic bushy herbs. Leaves opposite, elliptic-oblong, obovate or ovate-lanceolate, 5–10 × 2.4–6.0 cm, cordate to cuneate at base, obtuse or acute at apex. Flowers in 6–9 cm long racemes, often clustered in leafy axils; pedicels 2.4–4 cm long; bracts small. Calyx entire or obscurely toothed, ca 0.5 cm long. Corolla bright red; lobes reflexed; tube 3–6 cm long. Drupes ovoid-oblong, bright red, crowned by persistent calyx-base, 5–6 mm long.

Flowering & Fruiting: November–May.

Not common parasite in mixed dry deciduous forests and on roadside trees.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Chandra Prabha Dam, 22.12.2016, A.N. Shukla 76310.

EUPHORBIACEAE**Key to genera**

- | | |
|-------------------------------------|---------------------|
| 1a. Flowers arranged in cyathia | 4. Euphorbia |
| 1b. Flowers not arranged in cyathia | 2 |
| 2a. Leaves lobed | 3 |
| 2b. Leaves neither lobed | 4 |

- | | |
|---|-----------------------|
| 3a. Male perianth 2-seriate; tepals 10 | 5. Jatropha |
| 3b. Male perianth 1-seriate; tepals 4-5 | 8. Ricinus |
| 4a. Male flowers solitary or in axillary fascicles | 5 |
| 4b. Male flowers in axillary spikes, racemes corymbose cymes or panicles | 6 |
| 5a. Male inner tepals 5 or 6 | 1. Bridelia |
| 5b. Male inner tepals absent, if present then only 3 | 7. Phyllanthus |
| 6a. Male perianth 1-seriate; inner tepals absent | 6. Mallotus |
| 6b. Male perianth 2-seriate; inner tepals 5 | 7 |
| 7a. Inflorescence terminal or in bifurcations of the stems; stamens incurved in bud | 3. Croton |
| 7b. Inflorescence axillary; stamens erect in bud | 2. Chrozophora |

1. BRIDELIA Willd.

Key to species

- | | |
|------------------------------------|-------------------------|
| 1a. Flowers 6-12 mm in diam. | 2. B. stipularis |
| 1b. Flowers up to 5.5. mm in diam. | 1. B. retusa |

1. Bridelia retusa (L.) A.Juss., Euphorb. Gen. 109, t. 7, f. 22. 1824; Hook.f., Fl. Brit. India 5: 268. 1887; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 191. 1960; N.P. Balakr. & al. in T. Chakrabarty & al., Fl. India 23: 380. 2012. *Clutia retusa* L., Sp. Pl. 1042. 1753. *B. retusa* var. *squamosa* (Lam.) Müell.Arg., l. c. 493. 1866; Hook.f., Fl. Brit. India 5: 268. 1887.

Tall trees, with blackish-brown, irregularly fissured bark. Leaves elliptic-oblong, 8.0-13.5 × 3.5-6.0 cm, usually rounded at base, obtuse at apex, entire or slightly crenulate along margins, glabrous and bright green above, glaucous and finely tomentose beneath. Flowers in axillary clusters or long, axillary or terminal spikes with male and female flowers intermixed, greenish yellow, sessile or shortly pedicellate. Male outer tepals deltoid-ovate, fleshy, 2-3 mm long; inner tepals greenish white, obovate, short. Female tepals spatulate. Drupes purple black, supported by persistent calyx, ca 8 mm across.

Flowering & Fruiting: July-February.

Not common in mixed forests and along roadsides.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75076.

2. Bridelia stipularis (L.) Blume, Bijdr. 597. 1826; Hook.f., Fl. Brit. India 5: 270. 1887, *p.p.*; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 192. 1960; N.P. Balakr. & al. in T. Chakrabarty & al., Fl. India 23: 382. 2012. *Clutia stipularis* L., Mant. Pl. 1: 127. 1767.

Stragglers, scandent shrubs. Leaves oblong to elliptic or broadly so to obovate-elliptic, obovate-oblong or obovate-orbicular, rounded, acute or occasionally subcordate at base, 5-20 × 2.5-10 cm. Inflorescences glomerulate, arising on lateral leafy or small-leaved branchlets. Male flowers: pedicels up to 1 mm long, puberulous; calyx 6 - 9 mm in diam.; sepals triangular, 3-4.5 × 1.5-2.5 mm; petals spatulate or deltoid-orbicular, 1-2 × 1-2 mm; disc flat, ca 4.5 mm in diam.; staminal column ca 2

mm long; filaments ca 1 mm long; anthers ellipsoid, ca 1 mm long; pistillode ovoid, ca 1 mm long. Female flowers: sessile or pedicellate; calyx 6-12 mm in diam.; sepals triangular, 3-6 x 2-3 mm; petals spathulate, orbicular-spathulate; ovary conic, 1.5-2 x 1.5-2 mm; styles 1.5-2 mm long. Fruits ellipsoid, oblong-ellipsoid, black, blackish brown or dark reddish brown when dry.

Flowering & Fruiting: September-November.

Common in mixed forest.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 22.12.2016, A.N. Shukla 76288; Baliyari Nala, 20.12.2016, A.N. Shukla 76235.

2. *CHROZOPHORA* Neck. ex A.Juss.

1a. Prostrate–procumbent herbs; leaf base subcordate; racemes short

1. *C. prostrata*

1b. Erect herbs; leaf base truncate or cuneate; racemes elongate

2. *C. rottleri*

1. *Chrozophora prostrata* Dalzell in Dalzell & A.Gibson, Bombay Fl. 233. 1861; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 207. 1960; N.P. Balakr. & al. in N.P. Balakr., Fl. India 23: 180. 2012. *C. plicata* A.Juss. in Euphorb. Gen. 28. 1824; Hook.f., Fl. Brit. India 5: 410. 1887.

Prostrate herbs with spreading branches, up to 25 cm long. Leaves broadly ovate–suborbicular, truncate–cordate at base, obtuse at apex, 1.2–3.4 x 1.8 cm. Flowers in axillary, short, few–flowered racemes. Male outer tepals ovate; inner tepals reddish. Female outer tepals linear; inner tepals smaller than outer. Capsules greyish black, subglobose. Seeds dark grey, globose.

Flowering & Fruiting: March–June.

Common, in fallow fields and along edges of ponds.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75116.

2. *Chrozophora rottleri* (Geiseler) A.Juss. ex Spreng, Syst. Veg. 3: 850. 1826; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 206. 1960; N.P. Balakr. & al. in N.P. Balakr., Fl. India 23: 181. 2012. *Croton rottleri* Geiseler in Croton. Monogr. 54. 1807. *Chrozophora tinctoria* auct. non A.Juss. 1824: Hook.f., Fl. Brit. India 5: 408. 1887, p.p.

Annual or perennial, erect, greyish herbs, 40–60 cm high. Leaves alternate, broadly ovate to suborbicular, acute–subcordate at base, obtuse at apex, 4–8 x 3–7 cm. Flowers in axillary or terminal racemes. Male outer tepals ovate; inner tepals yellow. Female outer tepals deltoid, hairy; inner tepals yellow. Capsules purplish, subglobose, ca 8 mm across. Seeds ash–coloured, globose.

Flowering & Fruiting: March–May.

Common in wastelands and riverbeds.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75112.

3. CROTON L.

Croton bonplandianus Baill. in *Adansonia* 4: 339. 1864; N.P. Balakr. & al. in T. Chakrabarty & N.P. Balakr., *Fl. India* 23: 231. 2012.

Herbs, perennial, erect, up to 60 cm high. Leaves ovate–lanceolate, obtuse–subtruncate at base, acute at apex, 2.5–7.0 x 1–3 cm. Flowers greenish, in 5–8 cm long racemes; male flowers above, female flowers fascicled in the axil of minute bracts. Male outer tepals obovate; inner tepals linear–oblong. Female tepals lanceolate. Capsules 5–6 mm long, 3–angled. Seeds oblong, shining.

Flowering & Fruiting: January–December.

Common weed in wastelands and cultivated fields.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75092; Chandra Prabha Dam, 22.12.2016, A.N. Shukla 76308.

4. EUPHORBIA L.

Key to species

- | | |
|---|--------------------------------|
| 1a. Shrubs or small trees; stems fleshy | 2. <i>E. neriifolia</i> |
| 1b. Herbs; stems not fleshy | 2 |
| 2a. Leaves more than 1 cm long | 1. <i>E. hirta</i> |
| 2b. Leaves less than 1 cm long | 3 |
| 3a. Capsules pubescent at the angles of the cocci, glabrous elsewhere | 3. <i>E. prostrata</i> |
| 3b. Capsules pubescent all over. | 4. <i>E. thymifolia</i> |

1. *Euphorbia hirta* L., *Sp. Pl.* 454. 1753; Duthie, *Fl. Gangetic Plain* (repr. ed.) 2: 187. 1960; N.P. Balakr. & al. in M.S. Binoj Kumar & N.P. Balakr., *Fl. India* 23: 287. 2012. *E. pilulifera* L., *Sp. Pl.* 454. 1753, p.p.; Hook.f., *Fl. Brit. India* 5: 250. 1887.

Procumbent, ascending or erect, annual, hairy herbs. Leaves ovate–oblong to elliptic, 1.4–2.4 x 0.4–1.5 cm, rounded or cuneate at base, subobtuse at apex, serrate along margins. Cyathia in axillary, capituliform cymes. Involucres campanulate; lobes acute, hairy; glands orbicular, truncate at apex, with an obsolete appendage. Capsules globose–trigonous, appressedly hairy, 2 mm across. Seeds reddish, ovoid, with 3 sharp one blunt angles.

Flowering & Fruiting: August–October.

Common along roadsides and waste moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75024.

2. *Euphorbia neriifolia* L., *Sp. Pl.* 451. 1753; Hook.f., *Fl. Brit. India* 5: 255. 1887; Duthie, *Fl. Gangetic Plain* (repr. ed.) 2: 184. 1960; N.P. Balakr. & al. in M.S. Binoj Kumar & N.P. Balakr., *Fl. India* 23: 323. 2012.

Erect, deciduous shrubs or small trees, branched, 2–3 m high. Leaves alternate, 15–25 x 5–8 cm, crowded towards the apex of branches, obovate–oblong. Involucres

yellowish; lateral ones shortly pedicellate, bisexual; central ones male, sessile; lobes large, erect, cordate, fimbriate; glands transversely oblong, yellow. Capsules deep red or pale-brown, obovoid-trigonous, smooth, glabrous. Seeds smooth.

Flowering & Fruiting: November–December.

Usually in drier or rocky regions and wastelands.

Specimens examined: Chandra Prabha wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75077; Pendra nala, 24.12.2016, A.N. Shukla 76350.

3. *Euphorbia prostrata* Aiton, Hort. Kew. Ed. 1, 2: 139. 1789; N.P. Balakr. & al. in M.S. Binoj Kumar & N.P. balakr., Fl. India 23: 295. 2012; Hook.f., Fl. Brit. India 5: 266. 1887, in adnot. *E. chamaesyce* auct. non L. 1753.

Prostrate or ascending, slender, annual herb, with hispidly hairy branches; stems several, spreading, slightly flattened from base, puberulous with minute curved hairs on upper side, glabrous below, 20–30 cm long. Leaves ovate-oblong, slightly oblique, 2–6 × 1.5–4.0 cm, cordate-rounded at base, obtuse or rounded at apex, crenulate along margins. Involucres axillary, solitary; lobes lanceolate, ciliate; glands red, suborbicular. Capsules usually deflexed, subglobosely trigonous. Seeds reddish, 4-angled, transversely furrowed.

Flowering & Fruiting: August–September.

Usually on hill slopes and in rock crevices.

Specimen examined: Chandra Prabha Wild Life Sanctuary, compartment no. 15, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75042; Bichuliya, 25.12.2016, A.N. Shukla 76371; Bichuliya, 25.12.2016, A.N. Shukla 76366.

4. *Euphorbia thymifolia* L., Sp. Pl. 454. 1753; Hook.f., Fl. Brit. India 5: 252. 1887; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 188. 1960; N.P. Balakr. & al. in M.S. Binoj Kumar & N.P. balakr., Fl. India 23: 299. 2012.

Small, annual, more or less pubescent, prostrate herbs; stems divaricately branched, hispid pubescent. Leaves obliquely oblong or elliptic-oblong, 3–5 × 2.5–4.0 mm, oblique at base, rounded at apex, glabrous above, pubescent beneath. Involucres axillary, solitary or 2–3 together in an axil; lobes short, ciliate; glands minute or absent. Capsules obtusely keeled, pubescent. Seeds quadrangular, bluntly pointed, transversely 5 to 6-furrowed.

Flowering & Fruiting: Throughout the year.

Common in moist places and along the roads and ridges.

Specimen examined: Chandra Prabha wildlife Sanctuary, near Devdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75042.

5. *JATROPHA* L.

Jatropha curcas L., Sp. Pl. 1006. 1753; Hook.f., Fl. Brit. India 5: 383. 1887; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 215. 1960; N.P. Balakr. & al. in T. Chakrabarty & N.P. balakr., Fl. India 23: 203. 2012; S.K. Maurya & al., Intl. J. Biod. 6. 2015.

Soft-wooded, deciduous shrubs or small trees. Leaves broadly ovate, 5-lobed, cordiform, 5–15 × 5–13 cm, acute at apex, entire or shallowly 5-lobed at margin; stipules caducous. Flowers yellowish, in terminal, cymose panicles, small. Perianth campanulate, 5–10-lobed; outer tepals equal ovate-obovate, sericeous at base inside, ca 4 mm long. Ovary c. 2 mm across; styles c. 5 mm long. Capsules yellow, globose or broadly ovoid, smooth, 2.0–2.5 × 1.5–2.0 cm. Seeds oblong, 1.5 × 1.25 cm.

Flowering & Fruiting: August–January.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

6. MALLOTUS Lour.

Mallotus philippensis (Lam.) Müll.Arg. in *Linnaea* 34(1): 196. 1865; Hook.f., *Fl. Brit. India* 5: 442. 1887; Duthie, *Fl. Gangetic Plain* (repr. ed.) 2: 210. 1960; N.P. Balakr. & al. in S.R.M. Susila Rani & N.P. balakr., *Fl. India* 23: 159. 2012. *Croton philippensis* Lam., *Encycl.* 2: 206. 1786.

Small, much-branched, dioecious, evergreen trees. Leaves ovate-lanceolate, 8–16 × 3.0–7.5 cm, rounded or cuneate at base, acute-acuminate at apex, entire or closely dentate along margins, glaucous and glandular beneath. Flowers whitish yellow. Male flowers clustered in 10–20 cm long, erect, terminal spikes. Tepals 4, lanceolate, ca 3 mm long. Female flowers distant, in 4–6 cm long spikes. Tepals 3–4, ovate-lanceolate, thick. Ovary reddish glandular; styles free, papillose. Capsules 3-lobed, 3-valved. Seeds black, globose, smooth.

Flowering & Fruiting: October–May.

Common in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along Chandra Prabha River, 21.12.2016, A.N. Shukla 76266.

7. PHYLLANTHUS L.

Key to the species

- | | |
|---|--------------------------|
| 1a. Tepals 4 or 5; disk glands in male flowers 4 or 5 | 2 |
| 1b. Tepals 6; disk glands in male flowers 6 | 3. P. simplex |
| 2a. Stamens 3, all connate; ovary 3-locular; fruit dry, dehiscent capsule | 1. P. amarus |
| 2b. Stamens 5, only inner ones connate; ovary 5-12-locular; fruit a fleshy, indehiscent berry | 2. P. reticulatus |

1. Phyllanthus amarus Schumach. & Thonn. in C.F. Schumacher, *Beskr. Guin. Pl.* 421. 1827; N.P. Balakr. & al. in T. Chakrabarty & al., *Fl. India* 23: 482. 2012. *P. nanus* Hook.f., *Fl. Brit. India* 5: 298. 1887. *P. niruri* auct. Non L., 1753; Hook.f., *Fl. Brit. India* 5: 298. 1887, p.p.; Duthie, *Fl. Gangetic Plain* (repr. ed.) 2: 201. 1960.

Erect or ascending, annual herbs, with terete, smooth stem. Leaves oblong-elliptic, 5–14 × 2–5 mm, obtuse at both ends; stipules lanceolate-subulate, ca 1 mm long. Flowers yellowish. Male tepals, 5, ovate-rounded, ca 0.6 mm long. Stamens 3, connate. Female flowers solitary. Tepals 5, oblong-spathulate, 1–1.4 mm long. Styles free, 2-lobed. Capsules depressed globose, smooth, ca 2 mm across. Seeds 3-angled, light brown with longitudinal ribs on the back.

Flowering & Fruiting: August–December.

Common as weed in gardens, fields and open sandy places, near villages.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75023.

2. *Phyllanthus reticulatus* Poir. in *Encycl.* 5: 298. 1804; Hook.f., *Fl. Brit. India* 5: 288. 1887; Duthie, *Fl. Gangetic Plain* (repr. ed.) 2: 199. 1960; N.P. Balakr. & al. in T. Chakrabarty & al., *Fl. India* 23: 479. 2012.

Shrubs, straggling, 1.5–2.5 m high; branches pinkish. Leaves elliptic oblong, 15–27 × 6–15 mm, obtuse at apex, rounded or cuneate at base; stipules lanceolate, 1–1.5 mm long. Male tepals 5, unequal, 1.8–2.3 mm long, imbricate; outer smaller, oblong-ovate; inner suborbicular. Female flowers solitary. Tepals as in male flowers. Styles 3, shortly 2-fid. Berries globose, purple-black, smooth. Seeds ca 1.7 mm long, 3-angled, finely granulate.

Flowering & Fruiting: September–June.

Not common, in wasteland.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Latifsah, 24.12.2016, A.N. Shukla 76333.

3. *Phyllanthus simplex* Retz., *Observ. Bot.* 5: 29. 1789; Hook.f., *Fl. Brit. India* 5: 295. 1887; Duthie, *Fl. Gangetic Plain* (repr. ed.) 2: 200. 1960; N.P. Balakr. & al. in T. Chakrabarty & al., *Fl. India* 23: 477. 2012. *P. virgatus* auct. non G.Forst., *Fl. Ins. Austr.* 65. 1786.

Perennial, erect or decumbent–ascending, herbs, 25–40 cm high. Leaves linear–oblong, 1–3 × 0.3–0.6 cm, rounded at base, obtuse–apiculate at apex, entire along margins; stipules peltate, subsagittate, acute, 1–1.2 mm long. Flowers greenish yellow, usually solitary. Male tepals 6, oblong, obtuse, c. 0.8 mm long. Female tepals 6, ovate–oblong, ca 10 mm long. Styles shortly 2-fid. Capsules globose, slightly 3-lobed, 2–2.5 mm across. Seeds dark brown, 3-angled, ca 1.2 mm long.

Flowering & Fruiting: August–November.

Common in wastelands, forest clearings, forest edges and grassy fields.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75019; compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75079; Bivhuliya, 25.12.2016, A.N. Shukla 76363.

8. RICINUS L.

Ricinus communis L., *Sp. Pl.* 1007. 1753; Hook.f., *Fl. Brit. India* 5: 457. 1887; Duthie, *Fl. Gangetic Plain* (repr. ed.) 2: 212. 1960; N.P. Balakr. & al. in S.R.M. Susila Rani & N.P. Balakr., *Fl. India* 23: 166. 2012; S.K. Maurya & al., *Intl. J. Biod.* 7. 2015.

Erect, glabrous, pruinose, small trees, up to 4 m high. Leaves alternate, palmatifid, 6–10-lobed; lobes ovate–lanceolate, 10–18 × 3–7 cm, acuminate at apex, serrate along

margins, pubescent below; petioles with 1–2 glands at apex. Flowers in terminal, pyramidal, leaf-opposed panicles. Male tepals ovate–lanceolate, unequal, ca 5 mm long. Stamens many. Female tepals caduceus, 8–10 mm long; styles 3, 2-fid. Capsules subglobose, muricate, pruinose, 1.5–2 cm long. Seeds oblong, mottled, caruncled.

Flowering & Fruiting: September–May.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

MORACEAE

FICUS L.

Key to species

- | | |
|---|---------------------------|
| 1a. Receptacles sessile or subsessile | 2 |
| 1b. Receptacles distinctly pedunculate | 5. F. racemosa |
| 2a. Leaves caudate–acuminate at apex | 1. F. arnottiana |
| 2b. Leaves otherwise at apex | 3 |
| 3a. Leaves densely whitish brown tomentose beneath | 4. F. mollis |
| 3b. Leaves glabrous or puberulous | 4 |
| 4a. Receptacles 15–25 mm across, yellow, orange or red on ripening | 2. F. benghalensis |
| 4b. Receptacles 7–12 mm across, pink, purple, black or cream–coloured on ripening | 3. F. microcarpa |

1. Ficus arnottiana Miq., Ann. Mus. Bot. Lugduno–Batavi 3: 287. 1867; King in Hook.f., Fl. Brit. India 5: 513. 1888; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 242. 1960.

Glabrous, deciduous trees, up to 20 m high. Leaves alternate, broadly ovate, 6–17 × 5–15 cm, cordate at base, caudate–acuminate at apex, entire along margins, subcoriaceous, glabrous, stipulate, long petiolate. Receptacles in axillary pairs or clustered on tubercles, sessile or subsessile, globose, red to purple, glabrous; basal bracts 3. Male flowers sessile, few near the ostiole of receptacle. Female and gall flowers sessile or pedicellate. Achenes smooth.

Flowering & Fruiting: February–April.

Not common in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76360.

2. Ficus benghalensis L., Sp. Pl. 1059. 1753; King in Hook.f., Fl. Brit. India 5: 499. 1888; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 238. 1960.

Large, evergreen trees; young branches pubescent, 10–20 m high, aerial roots from the branches forming prop roots. Leaves alternate, elliptic to ovate, 10–20 × 6–12 cm, rounded at base, obtuse at apex, glabrous above, puberulous beneath, with abundant cystolith. Receptacles axillary, paired, sessile, globose, red on ripening, 1.5–2 cm across; basal bracts 3. Male flowers numerous, near the ostiole of receptacle. Tepals 3. Female flowers sessile. Gall flowers pedicellate. Achenes yellowish brown, angled, 2.0 × 1.5 mm.

Flowering & Fruiting: Throughout the year.

Common, along roadsides, near habitations and on outskirts of mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, along roadside, 20.12.2016, A.N. Shukla 76201.

3. *Ficus microcarpa* L.f., Suppl. Pl. 442. 1782. *F. retusa auct. non* L., 1767; King in Hook.f., Fl. Brit. India 5: 511. 1888; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 239. 1960.

Large or medium-sized, evergreen trees, all parts glabrous. Leaves alternate, spirally arranged, elliptic-ovate or rhomboid, 4–8 × 3–5.5 cm, cuneate at base, acute or obtuse at apex, entire or undulate along margins, glabrous or puberulous, petiolate, stipulate. Receptacles pink to mauve-purple, black on ripening, axillary, paired, sessile, globose, ca 1 cm across. Male flowers numerous. Tepals 3. Female flowers sessile. Gall flowers similar to female ones, pedicellate. Achenes smooth.

Flowering & Fruiting: March–October.

Common in mixed forests, on hill slopes and in rock crevices.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, 21.12.2016, A.N. Shukla 76270.

4. *Ficus mollis* Vahl, Symb. Bot. 1: 82. 1790. *Ficus tomentosa* Roxb. ex Willd., Sp. Pl. 4: 1136. 1806; King in Hook.f., Fl. Brit. India: 5: 501. 1888; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 239. 1960.

Large shady trees. Leaves alternate, spirally arranged, ovate-elliptic or oblong, 8–18 × 4.5–12 cm, cordate or rounded at base, acute at apex, entire along margins, glabrous above, whitish brown tomentose beneath. Receptacles axillary paired or clustered, rarely solitary, sessile, brown, tomentose. Male flowers dispersed, subsessile. Female flowers sessile. Gall flowers sessile or pedicellate. Achenes smooth.

Flowering & Fruiting: April–June.

Common, in rocky crevices, on hill slopes.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75043; near Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75159; along road side, 20.12.2016, A.N. Shukla 76240; Patariya Nala, 22.12.2016, A.N. Shukla 76290; Gidhmarwa, 24.12.2016, A.N. Shukla 76352.

5. *Ficus racemosa* L., Sp. Pl. 1060. 1753; S.K. Maurya & al., Intl. J. Biod. 6. 2015. *F. glomerata* Roxb., Pl. Coromandel 2: 13. t. 123. 1799; King in Hook.f., Fl. Brit. India 5: 535. 1888; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 248. 1960.

Tall, evergreen trees; young parts puberulous, up to 10 m high, young branches hairy, trunk buttressed at base. Leaves alternate, ovate-oblong, 6–15 × 3–6 cm, rounded or acute at base, obtuse or acute at apex, entire along margins. Receptacles

green to red, in clusters on main branches of trunk or on leafless branches, pedunculate, subglobose or pyriform, 2–3 cm across. Male flowers sessile, in 2–3 rings near the ostiole. Female flowers sessile or shortly pedicellate. Gall flowers long pedicellate. Achenes reddish–brown, obovoid.

Flowering & Fruiting: February–September.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

SALICACEAE

FLACOURTIA Comm. ex L'Hér.

Flacourtia indica (Burm.f.) Merr., Interpr. Herb. Amboin. 377. 1917; R.L.Mitra in B.D.Sharma & al., Fl. India 2: 402. 1993. *Gmelina indica* Burm.f., Fl. Ind. 132. t. 39. f. 5. 1768. *Flacourtia ramontchii* L'Hér., Strip. Nov. 3: 59. t. 30 & 30B. 1786; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 193. 1872; Duthie, Fl. Gangetic Plain 1: 57. 1903. *F. sepiaria* Roxb., Pl. Coromandel 1: 48. t. 68. 1795; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 194. 1872.

Small trees, ca 14 m tall; bark grayish–black. Leaves alternate in young branches, fascicled in older ones, ovate, obovate, oblong–elliptic or suborbicular, 2.5–10 × 1.5–6.5 cm, cuneate, rounded or rarely subcordate at base, obtuse or bluntly acute at apex, crenate or serrate along margins. Flowers white or greenish yellow, male flowers in short clusters and female ones solitary or in pairs. Sepals 4–6, connate at base, ovate, obtuse, ca 1.5 mm long. Berries green, changing to red on ripening globular, fleshy, 5–10 mm across. Seeds 3–gonous, pale yellow to brown.

Flowering & Fruiting: March–May.

Common in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gidhmarwa, 24.12.2016, A.N. Shukla 76338.

CERATOPHYLLACEAE

CERATOPHYLLUM L.

Ceratophyllum submersum L., Sp. Pl. ed. 2. 1409. 1763.

Herbs, up to 1 m long, rough, collapsing in a tassel when taken out of water; internodes 0.5–2.8 cm long. Leaves 6–10 in a whorl, 1.7–2.5 cm long, dichotomously forked, with 7–12, filiform, minutely dentate segments. Flowers axillary, solitary, sessile. Male tepals 6–10, linear, greenish white, ciliate at apex. Female tepals as in male flowers. Nutlets ellipsoid or ovoid, compressed, ca 4 mm long, purple–black. when ripe; apical spine soft, ca 0.5 mm long.

Flowering & Fruiting: October–November.

Common in ponds, rivers.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75124.

HYDROCHARITACEAE**Key to genera**

- | | |
|--|-----------------------|
| 1a. Stems present; leaves cauline | 1. Hydrilla |
| 1b. Stems absent or plants with only stolons; leaves radical | 2 |
| 2a. Leaves petiolate; flowers solitary | 2. Ottelia |
| 2b. Leaves sessile; male peduncles many-flowered | 3. Vallisneria |

1. HYDRILLA Rich.

Hydrilla verticillata (L.f.) Royle, Ill. Bot. Himal. Mts. 1: pl. 376. 1839; Hook.f., Fl. Brit. India 5: 659. 1888; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 262. 1960. *Serpicula verticillata* L.f., Suppl. Pl. 416. 1782.

A branched, submerged, aquatic, leafy herbs. Leaves 3–8 in a whorl, sessile, linear-oblong, 5–10 × 1.5–3.0 mm, entire or serrulate along margins. Flowers minute, unisexual. Male flowers shortly pedicellate. Sepals ovate, green. Petals oblong. Female flowers sessile. Sepals and petals as in male, narrow. Fruits shortly apiculate at both ends, ca 6 mm long. Seeds 2–6, dark brown, ca 2 mm long.

Flowering & Fruiting: November–April.

Common in fresh water ponds, tanks, ditches and rivers.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, 21.12.2016, A.N. Shukla 76245.

2. OTTELIA Pers.

Ottelia alismoides (L.) Pers., Syn. Pl. 1: 400. 1805; Hook.f., Fl. Brit. India 5: 662. 1888; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 265. 1960. *Stratiotes alismoides* L., Sp. Pl. 535. 1753.

Annual, submerged to partly floating herbs. Floating leaves broadly ovate or suborbicular, cordate–truncate at base, acute or acuminate at apex, 5–15 × 3–12 cm; submerged leaves linear–lanceolate. Spathe 2.4–3.4 cm long. Sepals linear-oblong. Petals white with yellow base. Fruits ellipsoid, 6–valved, 2.4–4.0 cm long. Seeds oblong, minute.

Flowering & Fruiting: October–March.

Common in ponds, lakes and roadside ditches.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari nala, 20.12.2016, A.N. Shukla 76209.

3. VALLISNERIA L.

Vallisneria natans (Lour.) H.Hara in J. Jap. Bot. 49(5): 136. 1974. *Physkium natans* Lour., Fl. Cochinch. 2: 662. 1790. *Vallisneria spiralis auct. non L.*, 1753; Hook.f., Fl. Brit. India 5: 660. 1880, p.p.; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 263. 1960.

Submerged, tufted, acaulescent, dioecious herbs. Leaves radical, linear, obtuse, 3–9–nerved, 5–35 × 0.3–0.7 cm, sheathing at base, obtuse at apex, softly denticulate along margins. Male flowers many in 5–6 mm long spathe. Sepals 3, ovate-oblong.

Petals absent. Female flowers solitary in a tubular, 3-toothed spathe; peduncles ca 1 cm long, filiform. Fruits 6–7 cm long.

Flowering & Fruiting: December–February.

Common in muddy bottom of ponds and ditches.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, 21.12.2016, A.N. Shukla 76244.

AMRYLLIDACEAE

PYROLIRION Herb.

Pyrolirion flavum Herb. in Bot. Reg. 37. 1821.

Herbs, perennial, slender. Bulbs covered with old leaf bases. Leaves linear, 30–40 x 0.5–0.8 cm, plicate. Flowers yellow, solitary; scape up to 20 cm long.

Flowering & Fruiting: May–October.

Common in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75156.

HYPOXIDACEAE

CURCULIGO Gaertn.

Curculigo orchioides Gaertn., Fruct. Sem. Pl. 1: 63. Pl. 16. 1788; Hook.f., Fl. Brit. India 6: 279. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 319. 1960. – *Kalimusli*.

Acaulescent, tuberous, perennial herbs. Leaves basal, sessile or subsessile, linear-lanceolate to elliptic, 10–40 × 1.5–5.0 cm, narrowed at base, acuminate at apex, entire along margins; sheaths persistent, fibrous. Scape short, hidden by leaf sheaths. Flowers appear almost at the ground level, bisexual, 1–3 opening at a time, yellow, on a beak-like hypanthium. Perianth 6-lobed; lobes oblong-elliptic, outer ones hairy outside, inner ones sparsely hairy along nerves. Capsules sessile, 1.5–2.0 cm long, 1–4-seeded. Seeds glossy, beaked.

Flowering & Fruiting: May–September.

Not common, in forests–undergrowth.

Specimens examined: Chandra Prabha Wildlife Sanctuary, compartment no. 8, 232 m, 20.08.2015, A.N. Shukla & N. Srivastava 75074; near Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75167.

DIOSCOREACEAE

DIOSCOREA L.

Dioscorea bulbifera L., Sp. Pl. 1033. 1753; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 324. 1960. *D. sativa* Thunb., Fl. Jap. 151. 1784, non L., 1753; Hook.f., Fl. Brit. India 6: 295. 1892.

A twining, glabrous, perennial herbs. Leaves simple, alternate, broadly ovate-cordate, 9–25 × 8–20 cm, cordate at base, subcaudate at apex, entire along margins. Male flowering axes 1–4, on up to 1 m long leafless branches, pendulous. Flowers white, pink or brownish white, fragrant. Female flowering axes 1 or 2 from a leaf axil, directed downwards. Capsules oblong, 3-valved, winged, 2.0–2.5 × 0.8–1.25 cm. Seeds oblong, flattened, brownish, ca 1 cm long.

Flowering & Fruiting: July–November.

Not common, in mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Semaria, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75030.

ASPARAGACEAE

Key to genera

- | | |
|---|-------------------------------|
| 1a. Leaves reduced to spinescent scales; cladodes present | 1. <i>Asparagus</i> |
| 1b. Leaves well developed; cladodes absent | 2. <i>Chlorophytum</i> |

1. ASPARAGUS L.

Asparagus racemosus Willd., Sp. Pl. 2: 152. 1799; Hook.f., Fl. Brit. India 6: 316. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 327. 1960. – *Satawar*.

Scandent undershrubs with cladodes. Roots tuberous, fasciculate. Cladodes in clusters of 2–6, oblong-linear, triquetrous, falcate, 1–3 cm long. Flowers small, white, in solitary or fascicled, simple or branched racemes; pedicels jointed in the middle; bracts ovate or triangular. Perianth-segments linear-oblong, spreading. Berries scarlet when ripe, globose.

Flowering & Fruiting: August–January.

Not common, along cultivated fields.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76368; Jamsoti, 21.08.2015, A.N. Shukla & N. Srivastava 75109.

2. CHLOROPHYTUM Ker Gawl.

Chlorophytum tuberosum (Roxb.) Baker in J. Linn. Soc. London (Bot.) 15: 332. 1876; Hook.f., Fl. Brit. India 6: 334. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 334. 1960. *Anthericum tuberosum* Roxb., Pl. Coromandel 2: 20. 1800. – *Safed Musli*.

Perennial, acaulescent herbs. Roots tuberous, cylindrical, fleshy. Leaves radical, 20–50 × 2–4 cm, crowded at the base, falcately recurved, wavy or crisped on margins, sessile. Flowers in simple or shortly branched racemes; scape 15–90 cm long, with a small sheath; pedicels jointed at or below the middle. Perianth white; segments elliptic, 12–15 mm long. Capsules oblong, 2-lobed at apex, ca 1 cm, long. Seeds irregularly orbicular, flat, opaque.

Flowering & Fruiting: May–August.

Not common, in sandy moist places, amidst rock boulders and in open places among grasses.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Devdari water fall, 207 m, 19.08.2015, A.N. Shukla & N. Srivastava 75025.

COLCHICACEAE

IPHIGENIA Kunth

Iphegenia indica (L.) A. Gray ex Kunth in Enum. Pl. 1: 213. 1833. Hook.f., Fl. Brit. India 6: 357. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 331. 1960. *Melanthium indicum* L., Mant. Alt. 2: 226. 1771.

Herbs, perennial, grass like, 5-20 cm high. Corms globose; sheaths brown. Stems flexuous. Leaves few, alternate, 10-20 x 0.3-0.7 cm, upper much smaller. Flowers solitary or in corymbs; pedicels 1-2 cm long; bracts linear, foliaceous. Perianth purplish; segments linear-subulate, 5-7 cm long, spreading and reflexed. Capsules obovoid or oblong, ribbed.

Flowering & Fruiting: June-October.

Not common, in mixed forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Rajdari, 24.08.2015, A.N. Shukla & N. Srivastava 75171.

PONTEDERIACEAE

MONOCHORIA C.Presl

Monochoria vaginalis (Burm.f.) C.Presl, Reliq. Haenk. 1: 128. 1827; Hook.f., Fl. Brit. India 6: 363. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 336. 1960. *Pontederia vaginalis* Burm.f., Fl. Ind. 80. 1768.

Annual or perennial, amphibious herbs, 20-70 cm tall. Leaves broadly ovate or ovate-oblong, 5-12 x 3-9 cm, rounded or subcordate-truncate at base, acute or acuminate at apex, entire along margins. Racemes erect, subtended by leaf-sheath when young, finally deflexed. Tepals 6, blue-violet; outer oblong, 8-10 mm long; inner obovate, 10-12 mm long. Ovary ellipsoid, glandular; stigma 3-lobed. Capsules pale with brown ribs, ovoid, 8-10 mm long. Seeds many, ovoid, with many brown ribs.

Flowering & Fruiting: August-April.

Common, along edges of ponds, tanks and in marshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jalebiya mode, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75127.

COMMELINACEAE

Key to genera

- | | |
|---|---------------------|
| 1a. Perfect stamens 2-3; staminodes 3-4 | 2 |
| 1b. Perfect stamens 6; staminodes absent | 2. Cyanotis |
| 2a. Bracts spathaceous, flowers sky-blue, filaments glabrous | 1. Commelina |
| 2b. Bracts not spathaceous, flowers reddish-blue, filaments hairy | 3. Murdannia |

1. COMMELINA L.

Commelina diffusa Burm.f., Fl. Ind. 18. t. 7. f.2. 1768. *C. nudiflora* auct. Pl. non L., 1753; Hook.f., Fl. Brit. India 6: 369. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 338. 1960.

Glabrous, straggling, annual herbs, up to 1 m long. Leaves lanceolate or ovate-lanceolate, narrowed at base, abruptly acuminate at apex, 3.5–8 × 1–2 cm; sheaths often ciliate, ca 1 cm long. Spathes solitary in almost all axils, ovate-cordate, 1.7–4 cm long. Cymes branched, 1–3-flowered, usually all male; outer cymes with 3–4 bisexual flowers. Petals white or blue. Capsules broadly oblong, acuminate, 5-seeded. Seeds brown, oblong-cylindric, tubercled and reticulate.

Flowering & Fruiting: August–November.

Common in marshy places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, on the way to Rajdari water fall, 24.08.2015, A.N. Shukla & N. Srivastava 75180; along Chandra Prabha river, 21.12.2016, A.N. Shukla 76272.

2. CYANOTIS D. Don, nom. Cons.

Cyanotis axillaris (L.) D. Don ex Sweet, Hort. Brit. 430. 1826 ; Hook.f., Fl. Brit. India 6: 388. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 344. 1960. *Commelina axillaris* L., Sp. Pl. 1: 42. 1753.

Perennial, suberect or prostrate, somewhat succulent herbs. Ascending branches 10–75 cm long. Leaves linear-lanceolate or ensiform, sessile, acute to acuminate at apex, 4–15 × 0.3–1.2 cm; sheaths scarious, ciliate on margins, 5–10 mm long. Flowers in axillary fascicles. Corolla pink or blue; lobes ovate, ca 5 mm long; tube ca 1 cm long. Capsules oblong, glabrous. Seeds conical, pitted, truncate at base.

Flowering & Fruiting: August–January.

Common in moist shady places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, along sanctuary road, 176 m, 21.08.2015, A.N. Shukla & N. Srivastava 75111 ; Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75022 ; Bichulia, 25.12.2016, A.N. Shukla 76367.

3. MURDANNIA Royle

Murdannia nudiflora (L.) Brenan, Kew Bull. 7(2): 189. 1952. *Commelina nudiflora* L., Sp. Pl. 41. 1753, p.p. *Aneilema nudiflorum* Wall. ex Hook.f., Fl. Brit. India 6: 378. 1892; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 342. 1960.

A decumbent or ascending, glabrous, annual herbs. Leaves linear-lanceolate, rarely ovate-lanceolate, sessile, 4–10 × 0.4–0.8 cm, rounded or subcordate at base, subacute at apex, scabrid along margins, hairy beneath; sheaths sparsely hairy, ciliate at mouth. Flowers in terminal and axillary, lax, cymose panicles, bracteate. Sepals ovate. Petals purple, blue or whitish, orbicular. Fertile stamens 2, included; filaments

hairy. Capsules subglobose, mucronate, purple–streaked, 6–seeded. Seeds trigonous, tuberculate, reddish to dark–brown.

Flowering & Fruiting: August–November.

Common, in marshy habitats.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 217 m, 19.08.2015, A.N. Shukla & N. Srivastava 75017; along sanctuary road, 21.08.2015, A.N. Shukla & N. Srivastava 75097; near Rajdari water fall, 20.08.2015, A.N. Shukla & N. Srivastava 75073; Jalebiya mode. 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75152; Dhusariya, 22.08.2015, A.N. Shukla & N. Srivastava 75154.

ARACEAE

Key to genera

- 1a. Leaves and spadices present during the same period **2. Colocasia**
 1b. Leaves and spadices appearing separately during different periods **1. Amorphophallus**

1. AMORPHOPHALLUS Blume ex Decne.

Amorphophallus paeoniifolius (Dennst.) Nicolson in Taxon 26: 338. 1997. *Dracontium paeoniifolius* Dennst., Schlüssel Hortus Malab. 13, 21, 38. 1818. *Amorphophallus campanulatus* (Roxb.) Blume ex Decne. in Ann. Mus. Hist. Nat. Paris 3: 366. 1834; Hook.f., Fl. Brit. India 6: 513. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 363. 1960; S.K. Maurya & al., Intl. J. Biod. 4. 2015.

Cormous herbs, to 1 m tall. Tubers dark brown, depressed globose. Leaves large, radical, twice 2–fid; leaflets obovate or oblong, acute, many veined; petiole dark green, warty. Spathes light red to pink, campanulate. Spadix as long as spathe, stout; appendage globose, amorphous. Male inflorescence turbinate. Anthers pale yellow. Female inflorescence sessile on the ground. Ovaries dark red, crowded.

Flowering & Fruiting: July–October.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 4. 2015).

2. COLOCASIA Schott, nom. cons.

Colocasia esculenta (L.) Schott in Schott & Endl., Melet. Bot. 18. 1832. *Arum esculentum* L., Sp. Pl. 965. 1753.

Tall herbs with tuberous stoloniferous rhizomes. Leaves radical, peltate or broadly ovate, pale or glaucous beneath, long petiolate, 30–100 × 1.2–1.5 cm. Spath–tube green, 3–5 cm long; limb yellow, lanceolate, convolute, deciduous, 12–15 cm long. Spadix to 10 cm long including 1.5 cm long appendage, female and male parts separated by a zone of neuters. Fruits a fleshy berry, consisting of connate 2–valved carpels. Seeds many, oblong.

Flowering & Fruiting: August–September.

Common, in moist shady places of the forests.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliari, 267 m, 19.10.2015, A.N. Shukla & N. Srivastava 75051; Devdari kund, 21.12.2016, A.N. Shukla 76253.

ALISMATACEAE

SAGITTARIA L.

1a. Leaves obtuse; achenes elliptic with distinctly blunt toothed dorsal wing

1. *S. guayanensis* subsp. *lappula*

1b. Leaves sharply acute; achenes triangularly obovate with subcrenate or entire wing

2. *S. trifolia*

1. *Sagittaria guayanensis* Humb., Bonpl. & Kunth subsp. ***lappula*** (D.Don.) Bogin in Mem. N.Y. Bot. Gard. 9: 192. F. 5. 1955. *S. lappula* D.Don, Prodr. Fl. Nepal. 22. 1825. *S. guayanensis auct. non* Humb., Bonpl. & Kunth, 1816: Hook.f., Fl. Brit. India 6: 561. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 372. 1960.

Annual, aquatic herbs. Leaves broadly ovate, floating, deeply cordate at base, obtuse, 3–9 x 2–4 cm. Racemes ca 8 cm long. Flowers greenish white; lower whorls bisexual, upper ones male. Sepals ca 10 mm long. Petals obovate–suborbicular. Achenes ellipsoid, surrounded by broad, blunt, spiny wing. Seeds brown.

Flowering & Fruiting: April–October.

Common, in marshy places along edges of ponds.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75123.

2. *Sagittaria trifolia* L., Sp. Pl. 993. 1753. *S. sagittifolia auct. non* L., 1753: Hook.f., Fl. Brit. India 6: 561. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 371. 1960.

Aquatic, rhizomatous herbs. Mature leaves hastate or sagittate, sharply acute at apex, 5–15 cm long; young and floating leaves often strap-shaped or cordate–oblong. Flowers white; lower female, nearly sessile; upper male, with longer pedicels. Petals white. Achenes obliquely, winged.

Flowering & Fruiting: December–May.

Common, in ponds and streams.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari kund, 21.12.2016, A.N. Shukla 76252.

ERIOCAULACEAE

ERIOCAULON L.

Eriocaulon cinereum R.Br., Prodr. 254. 1810. *E. sieboldianum* Siebold & Zucc. ex Steud., Syn. Pl. Glumac. 2: 272. 1855; Hook.f., Fl. Brit. India 6: 577. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 378. 1960.

Stemless, monoecious, glabrous, tufted annual herbs. Leaves acicular, glabrous, 2–5 × 0.15–0.2 cm, acuminate at apex. Heads black, hemispherical, 2.5–4 mm across; peduncles 3–9 cm long; sheaths 1–2 cm long; involucre bracts straw-coloured, obovate-oblong, obtuse, glabrous, 1.5–1.8 × 0.8–1 mm; floral bracts black, linear-elliptic, 1.5–1.8 × 0.3–0.4 mm. Male flowers: Sepals connate into a 3-lobed spath, black. Petals 3, minute, glabrous or sparsely hairy. Female flowers: Sepals 1 or 2 black, linear. Petals absent. Seeds ovoid-ellipsoid, 0.3–0.35 × 0.2–0.3 mm.

Flowering & Fruiting: August–November.

Not common, in moist places along rivers and ponds.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76205.

CYPERACEAE

Key to genera

- | | |
|---|-----------------------------|
| 1a. Fruit an achene not bony, enclosed in a flask-shaped utricle | 2 |
| 1b. Fruit a bony nut, not enclosed in a flask shaped utricle | 8. <i>Scleria</i> |
| 2a. Flowering glumes all distichous | 3 |
| 2b. Flowering glumes spirally arranged, rarely the basal one distichous | 6 |
| 3a. Rachilla deciduous | 4 |
| 3b. Rachilla persistent | 5 |
| 4a. Rhizome short; inflorescence spike | 6. <i>Kyllinga</i> |
| 4b. Rhizome long; inflorescence a single head | 2. <i>Courtoisina</i> |
| 5a. Style base persistent, dilated at base | 4. <i>Fimbristylis</i> |
| 5b. Style base not persistent, neither dilated nor constricted | 3. <i>Cyperus</i> |
| 6a. Style base dilated and constricted | 1. <i>Bulbostylis</i> |
| 6b. Style base neither dilated nor constricted | 7 |
| 7a. Glumes awned | 5. <i>Fuirena</i> |
| 7b. Glumes not awned | 7. <i>Schoenoplectiella</i> |

1. *BULBOSTYLIS* Kunth

Bulbostylis barbata (Rottb.) C.B. Clarke in Hook. f., Fl. Brit. India 6: 651. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 408. 1960. *Scirpus barbatus* Rottb., Descr. Pl. Rar. 27. 1772 & Descr. Icon. Rar. Pl. 52. t. 17. f. 4. 1773.

Annual, tufted herbs, 4–20 cm tall. Leaves shorter to subequalling the stem, ca 0.3 mm broad. Inflorescence ugilosa, 4–16 mm across. Spikelets linear, polygonal, rhachilla zig-zag, 2–8 × 1.0–1.2 mm. Glumes brown, laxly imbricating, acute or mucronate, glabrous or hispidulous. Nuts stramineous to pale brown, smooth, 0.4–0.7 × 0.2–0.6 mm.

Common in ditches and stream beds.

Flowering & Fruiting: September–December.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Dhusariya, 242 m, 22.08.2015, A.N. Shukla & Nitisha Srivastava 75143.

2. COURTOISINA Soják

Courtoisina cyperoides (Roxb.) Soják in Čas. Nár. Mus., Odd. Pyír. 148(3–4): 193. 1980; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 398. 1960. *Kyllinga cyperoides* Roxb., Fl. Ind. 1: 187. 1820. *Courtoisia cyperoides* (Roxb.) Nees in Linnaea 9: 286. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 6: 625. 1893.

Tufted annuals with fibrous roots, 15–75 cm high. Roots purplish. Stem slender, trigonous. Leaves 1.5–4 mm broad. Anthela compound or subcompound; bracts 3–7, foliaceous, rather distantly placed, up to 40 cm long; rays sometimes curved. Spikelets many together, congested in subglobose, 5–8 mm broad, spikes elliptic–oblong, strongly compressed, 1–2-flowered, 3–4 × 1.2–1.5 mm; rhachilla winged. Glumes brown, elliptic, cellular reticulate, grooved, with a short stout mucro, 2.5–3 mm long; keel yellow, broadly winged. Nuts trigonous, linear–oblong, narrowed to both ends, ca 3 × 0.7 mm.

Flowering & Fruiting: September–March.

Common along streams and waterlogged areas.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari, 20.12.2016, A.N. Shukla 76231.

3. CYPERUS L.

Key to species

- | | |
|--|-------------------------|
| 1a. Rhachilla of the spikelets caduceus | 2. C. cyperoides |
| 1b. Rhachilla of the spikelets persistent | 2 |
| 2a. Inflorescence capitate | 3. C. difformis |
| 2b. Inflorescence anthelate with distinct rays | 3 |
| 3a. Spikelets in well elongated spikes; the rhachis several times longer than the spikelets | 4. C. iria |
| 3b. Spikelets digitate or in very short spikes, the rhachis obscure or much shorter than to about as long as the spikelets | 4 |
| 4a. Spikelets digitate, 3–20 mm long | 3. C. tenuispica |
| 4b. Spikelets shortly spicate, 5–60 mm long | 1. C. corymbosus |

1. Cyperus corymbosus Rottb., Descr. Icon. Rar. Pl. 42. t. 7. f. 4. 1773; C.B. Clarke in Hook.f., Fl. Brit. India 6: 612. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 391. 1960.

Perennials, 0.5–1 m high. Rhizomes creeping. Stems spongy, faintly septate 5–8 mm thick, terete below, trigonous above. Leaves absent or solitary. Anthela compound, 15–20 cm across; bracts with spinulose revolute margins, lowest 2–10 cm long. Spikelets clustered, 4–8 together, linear; rhachilla wings linear, hyaline. Glumes stramineous, reddish brown striolate along the nerves, ovate–oblong, 2.5–3 mm long. Stamens 3. Stigma 3. Nuts blackish, narrowly obovoid–ellipsoid, trigonous, ca 1.5 mm long, apiculate.

Flowering & Fruiting: December–January

Not common in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Girda Nala, 23.12.2016, A.N. Shukla 76317.

2. *Cyperus cyperoides* (L.) Kuntze, Revis. Gen. Pl. 3(2): 333. 1898. *Scirpus cyperoides* L., Mant. Pl. 181. 1771. *Mariscus sieberianus* Nees ex C.B. Clarke in Hook.f., Fl. Brit. India 6: 622. 1893.

Perennial herbs, up to 1 m high. Leaves 2.4–9.0 mm broad. Spikes cylindrical, 6–35 × 6–12 mm. Spikelets linear–lanceolate, flowering obliquely spreading, fruiting divaricate or the lower even deflexed, usually maturing 2 nuts, 3.5 mm long. Glumes greenish, sometimes red striolate, ovate–oblong. Nuts yellowish when young, mature deep brown, linear–oblong, trigonous, slightly curved, apiculate, ca 2.2 × 0.4 mm.

Flowering & Fruiting: September–December.

Common in waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, before Jamsoti, 175 m, 24.08.2015, A.N. Shukla & N. Srivastava 75176.

3. *Cyperus difformis* L. in Torner. Cent. Pl. 2: 6. 1756; C.B. Clarke in Hook.f., Fl. Brit. India 6: 599. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 382. 1960.

Annuals with reddish, fibrous roots, 8–60 cm high. Stems compressed–triquetrous, smooth, 1.5–4 mm thick. Leaves many slightly shorter than the culm, 5–30 × 0.2–0.6 cm. Anthela simple, evolute or almost capitate contracted; bracts 2–3, foliaceous, to 25 cm long. Spikelets numerous together forming 5–15 mm broad, subglobose heads, linear–lanceolate, 3–8 × 1 mm. Glumes hyaline with a reddish brown band on each side of the midrib, somewhat discolouring, broadly obovate–suborbicular with rotundate tips, muticous or mucronulate, membranous, 0.5–0.8 mm long. Stamens 1–2. Stigmas 3. Nuts yellowish, triquetrous, elliptic–obovoid, minutely apiculate, shortly stipitate, nearly equaling the glume, 0.5–0.6 × 0.3 mm.

Flowering & Fruiting: July–April.

Common, growing on marshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76215.

4. *Cyperus iria* L., Sp. Pl. 45. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 606. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 385. 1960.

Annual herbs, up to 40 cm high. Leaves 0.5–1.0 mm broad. Anthela simple or compound, lax, 5–15 cm across. Spikes narrow, 1–3 cm long, bearing 5–20 spikelets. Spikelets approximate or remote, linear–oblong. Glumes loosely imbricating, broadly obovate to suborbicular, muticous or mucronulate, 1.2–1.4 mm long. Nuts deep brown, glossy, obovoid–ellipsoid, triquetrous, apiculate, broadly stipitate, 1.0–1.4 mm long.

Flowering & Fruiting: August–February.

Common, growing on marshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75033.

5. *Cyperus tenuispica* Steud., Syn. Pl. Cyp. 2: 11. 1854. *C. flavidus* C.B. Clarke in J. Linn. Soc. London (Bot.) 21: 122. t. 3. f. 25. 1884 & in Hook.f., Fl. Brit. India 6: 600. 1893, non Retz., 1789; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 382. 1960.

Annuals, usually short lived, 4-20 cm high. Leaves 1.4-3.4 mm broad. Anthela compound or decomposed, 1.4-6.0 cm across. Spikelets digitate, 3-9 together, 3-7 x 1.0-1.4 mm. Glumes laxly imbricating, yellowish green to ferruginous, 0.6-1.0 mm long. Nuts marble white, broadly obovoid to subglobose, obscurely trigonous, 0.2-0.3 mm long.

Flowering & Fruiting: November-February.

Common, on moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76212.

4. FIMBRISTYLIS Vahl

Key to species

- | | |
|--|--------------------------|
| 1a. Stigmas 2; nuts lenticular | 2 |
| 1b. Stigmas 3; nuts trigonal | 4. F. littoralis |
| 2a. Stem bearing 1-3 spikelets | 2. F. argentea |
| 2b. Stem bearing 4-numerous spikelets | 3 |
| 3a. Glumes 1.2-1.5 mm long; nuts 0.5-0.7 mm long | 1. F. aestivalvis |
| 3b. Glumes 2-5 mm long; nuts 0.7-1.5 mm long | 3. F. dichotoma |

1. *Fimbristylis aestivalis* Vahl, Enum. Pl. Obs. 2: 288 1805; C.B. Clarke in Hook.f., Fl. Brit. India 6: 637. 1893, p.p.; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 403. 1960.

Annuals, 5-18 cm high. Stems ribbed. Leaves subequalling the stem, hairy or glabrous; sheaths usually densely hairy, sometimes glabrous. Anthela compound or decomposed, 1-4.5 cm across; bracts filiform. Spikelets oblong-lanceolate, polygonal, 2.5-5 x 1-2 mm, acute. Glumes pale brown, ca 1.5 mm long, keeled, lower 2-4 aristate, hairy, upper mucronulate, glabrous. Stamens 1-2. Style glabrous or fimbriate upwards; stigmas 2. Nuts stramineous, obovoid, biconvex, shortly stipitate, smooth.

Flowering & Fruiting: September-January.

Common, growing on moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76213.

2. *Fimbristylis argentea* (Rottb.) Vahl, Enum. Pl. Obs. 2: 294 1805; C.B. Clarke in Hook.f., Fl. Brit. India 6: 640. 1893. *Scirpus argenteus* Rottb., Descr. Icon. Rar. Pl. 51. 1773.

Annuals. Stems caespitose, trigonous. Leaves usually many in a basal cluster, setaceous, with prominent surface cells, glabrous except for some points on the margins. Spikelets 4-20 clustered in a solitary head, linear-cylindrical, 5-10 mm long, densely flowered; bracts 2-4, overtopping the head. Glumes silvery grey or whitish, ovate-lanceolate, 1-1.3 mm long, acute, with a 3-nerved, green keel. Stamens 1. Stigmas 2. Nuts pale, obovoid, biconvex, slightly margined, smooth or obscurely transversely wavy-lined.

Flowering & Fruiting: December-January.

Common along streams and waterlogged areas.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 21.08.2015, A.N. Shukla & Nitisha Srivastava 75114.

3. *Fimbristylis dichotoma* (L.) Vahl, Enum. Pl. 2: 287. 1805, excl. var.; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 403. 1960. *Scirpus dichotomus* L., Sp. Pl. 50. 1753. *Fimbristylis diphylla* Vahl, Enum. Pl. 2: 289. 1805; C.B. Clarke in Hook.f., Fl. Brit. India 6: 636. 1893.

Perennials, often with short woody rhizome, 15-70 cm high. Stems slender to stout, glabrous, angular, striate, 1-2 mm thick. Leaves mostly from the base, flat, linear, acute to obtuse at apex, glabrous or pubescent beneath, sometimes glaucescent, 10-30 × 0.15-0.5 mm; ligule a fringe of hairs. Anthela simple to supradecomposed, 3-8 cm across; bracts 2-4, foliaceous. Spikelets ovoid-globose, terete, 4-11(-20) × 2-3 (-5) mm; rachilla narrowly winged. Glumes spiral, glossy chestnut, ovate-oblong, 3-nerved, 1.8-3 × 1.5-2 mm. Stamens 1-3. Stigmas 2. Nuts whitish or cream-coloured, biconvex, obovate, shortly stipitate, verruculose, trabeculate, 1-1.2 × 0.8-1 mm.

Flowering & Fruiting: April-November.

Common, on moist places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75009; before Jamsoti on Jalebiya mode, 24.08.2015, A.N. Shukla & N. Srivastava 75178; Gardi Nala, 23.12.2016, A.N. Shukla 76329.

4. *Fimbristylis littoralis* Gaudich., Voy. Uranie 413. 1829. *F. miliacea* Vahl, Enum. Pl. 2: 287. 1805; C.B. Clarke in Hook.f., Fl. Brit. India 6: 644. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 406. 1960.

Annuals or perennials, 10-50 cm high. Stems 4-5-angled. Leaves several, equitant, more or less distichous, frequently yellowish green, laterally flattened, as long as the stem, 1-3 mm broad; upper leaves reduced to bladeless sheaths. Anthela compound to supradecomposed; bracts short, foliaceous. Spikelets solitary, subglobose, 2-5 × 1.5-2 mm, obtuse. Glumes spiral, ovate-oblong, 1-1.5 mm long, muticous. Stamens 1-2. Styles sparsely fimbriate; stigmas 3. Nuts stramineous, narrowly obovoid, trigonous, shortly stipitate, verruculose, transversely lineolate.

Flowering & Fruiting: September-April.

Common, on marshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76211.

5. *FUIRENA* Rottb.

Fuirena ciliaris (L.) Roxb., Hort. Bengal. 81. 1814. *Scirpus ciliaris* L., Mant. Pl. 2: 182. 1771. *Fuirena glomerata* Lam., Tabl. Encycl. 1: 150. 1791; C.B. Clarke in Hook.f., Fl. Brit. India 6: 666. 1893.

Annuals, 10-35 cm high, densely hairy on stem, leaves and glumes. Leaves linear-lanceolate, 5-15 cm long. Partial panicles usually more or less congested at the tip. Spikelets in clusters of 3-10, greyish green, ovoid-oblong, 5-15 mm long. Glumes 1.5-1.7 mm long, awned; awns hairy, usually recurved. Perianth bristly, of variable length; perianth scales brown, subquadrate, as long as the nut, clawed, 3-dentate at apex, cordate or hastate at base; claw ca 0.7 mm long; blade ca 1 mm long. Nuts brownish, broadly obovoid, triquetrous, 0.7-1 mm long, apiculate, smooth or faintly transversely lineolate.

Flowering & Fruiting: October–May.

Not common, growing on marshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, growing on marshy places, 20.12.2016, A.N. Shukla 76223.

6. *KYLLINGA* Rottb.

Kyllinga brevifolia Rottb., Descr. Ic. Rar. Nov. Pl. 13, t. 4, f. 3. 1773; C.B. Clarke in Hook.f., Fl. Brit. India 6: 588. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 396. 1960.

Perennials, 10–70 cm high. Rhizomes pinkish or purplish, creeping, simple or sometimes branched, 3–40 cm long, 1.5–2 mm thick. Stems distantly or closely arranged in a row, triquetrous, smooth, 0.5–1.5 mm thick. Leaves much shorter than to equaling the stem, 1.5–3.5 mm broad. Inflorescence capitate; bracts 3–4, foliaceous, spreading or deflexed; capitula 3–10 mm broad. Spikelets numerous, congested, elliptic–lanceolate, 1-flowered, 2.5–3.5 × 1 mm. Glumes keeled, mucronate; keel with spinules up to two third way up; sides sometimes with brownish dots and streaks. Nuts brownish, biconvex, laterally compressed, obovate or elliptic, apiculate at apex, 1–1.5 × 0.4–0.7 mm.

Flowering & Fruiting: Throughout the year.

Common, in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jalebiya mode, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75147.

7. *SCHOENOPLECTIELLA* Lye

1. *Schoenoplectiella articulata* (L.) Lye, *Lidia* 6(1): 21, f. 1. 2003. *Scirpus articulatus* L., Sp. Pl. 47. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 656. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 410. 1960.

Annuals or short-lived perennials with fibrous roots, 15–80 cm high. Rhizome in conspicuous. Stems highly tufted, terete, smooth, glabrous, 2–10 mm thick. Leaves reduced to 2–3 basal sheaths; lower 1 or 2 very small or scaly like, brownish; upper sheath obliquely truncate at apex, 4–15 cm long. Inflorescence capitate, pseudolateral, 1–3 cm across, bearing 15–60 spikelets; bracts solitary, erect, stem like, transversely septate, 20–50 cm long. Spikelets ovoid-oblong, terete, subacute, 8–17 × 4–6 mm. Glumes rufous, broadly ovate or suborbicular, 3–5 mm long. Perianth absent. Stamens 3. Stigmas 3. Nuts triquetrous, obovate, apiculate at apex, creamish and faintly transversely wavy-ridged in early tige, blakish-brown and smooth later, 1.7–2.2 × 1.4 mm.

Flowering & Fruiting: October–December.

Common on marshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76219.

2. *Schoenoplectiella lateriflora* (J.F. Gmel.) Lye, *Lidia* 6: 25. 2003. *Scirpus lateriflorus* J.F. Gmel., Syst. Nat. 1: 127. 1791. *S. supinus* L. var. *uninodis* C.B. Clarke in Hook.f., Fl. Brit. India 6: 656. 1893; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 410. 1960.

Annuals, 10–20 cm high. Stems slender, subterete, with a node above the base. Leaves absent; sheaths 2–3, uppermost sometimes bearing a short lamina. Inflorescence pseudolateral, capitates, bearing 2–3 spikelets or sometimes reduced to a solitary spikelets; bracts solitary, erect, stem like, 4–15 cm long. Spikelets ovoid-oblong, subterete, 5–8 × 2.5–3 mm. Glumes with brown-purplish dots, ovate, 2–2.5 mm long. Perianth absent. Stamens 3. Nuts yellowish or ultimately blackish, broadly obovoid, trigonous, 1.2–1.5 mm long, sessile, transversely wavy-wrinkled, rugulosa.

Flowering & Fruiting: Throughout the year.

Common, growing on marshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Chandra Prabha Dam, 22.12.2017, A.N. Shukla 76307.

8. *SCLERIA* P.J.Bergius

***Scleria levis* Retz.**, Observ. Bot. 4: 13. 1786, non C.B. Clarke, 1894. *S. hebecarpa* Nees in Wight, Contr. Bot. India 117. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 6: 689. 1894, incl. var. *pubescens* (Steud.) C.B. Clarke; Duthie, Fl. Gangetic Plain (repr. ed.) 2: 416. 1960.

Perennials, up to 1 m tall. Stems somewhat slender, trigonous, glabrous or minutely puberulous on concave faces, at times retrorsely scabrous on angles, 2–3 mm thick. Leaves glabrous or hairy, 4–8 mm broad; sheaths triquetrous or broadly winged. Inflorescence paniculate; lateral partial panicles 1–2 only. Spikelets unisexual, 3–6 mm long. Glumes stramineous brown, acute or mucronulate. Stamens 3. Disk deeply 3-lobed; lobes brown, thin, lanceolate, acute or notched, 1–1.5 mm long. Nuts glossy white, ovoid-globose, subterete, apiculate, smooth or faintly transversely ugilosa, hairy or glabrescent, 2–2.5 mm long.

Flowering & Fruiting: October–February.

Not common, in open moist shady places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75008; on the way to Rajdari water fall, 24.08.2015, A.N. Shukla & N. Srivastava 75170.

POACEAE

Key to genera

- | | |
|---|-------------------------|
| 1a. Plants tall, perennial; culms woody; leaf blades flat, lanceolate to ovate | |
| | 7. Dendrocalamus |
| 1b. Plants small, annual or perennial; culms herbaceous; leaf blades flat or filiform, usually linear to lanceolate | 2 |
| 2a. Spikelets in pair, one sessile, other pedicellate; first glume large and firm, clasping or enclosing the florets | 3 |
| 2b. Spikelets solitary or paired, if paired then first glume not larger and firmer than lemma of fertile floret, not clasping or enclosing second glume | 10 |
| 3a. Joints of the rhachis and pedicel narrow | 4 |
| 3b. Joints of the rhachis and pedicel swollen | 7 |
| 4a. Pairs of spikelets alike and with perfect florets | 23. Saccharum |
| 4b. Pairs of spikelets dissimilar; sessile bisexual | 5 |
| 5a. Racemes paired, digitate, scattered or in panicle | 6 |
| 5b. Racemes solitary | 15. Heteropogon |
| 6a. Racemes arranged in panicle or in whorls on main axis | 3. Chrysopogon |
| 6b. Racemes digitate, subdigitate or scattered | 9. Dichanthium |
| 7a. Inflorescence a spike like raceme; spikelets solitary, almost sessile | 11. Dimeria |
| 7b. Inflorescence otherwise; spikelets paired, one sessile, other icellate | 8 |
| 8a. Sessile spikelet with a male and bisexual floret; upper lemma usually awned | 9 |
| 8b. Sessile spikelet with a bisexual floret only or occasionally with a male floret below; upper lemma usually awnless | 18. Mnesithea |
| 9a. Racemes many-noded, not enclosed in a apth like sheath | 16. Ischaemum |
| 9b. Racemes 1-noded, reduced to 3 heteromorphous spikelets, enclosed in a cymbiform spath | 1. Apluda |
| 10a. Reduced floret always below the perfect one | 11 |
| 10b. Reduced florets absent, if present always above perfect one | 19 |
| 11a. Reduced floret 1, its lemma similar to second glume | 12 |
| 11b. Reduced floret 1-2, its lemma dissimilar to second glume | 16 |

- 12a. Spikelets in involucre of bristles or subtended by solitary bristle. **21. Setaria**
 12b. Spikelets not in involucre or subtended by bristles 13
- 13a. Inflorescence an open or contracted panicle, sometimes spike like panicle **24. Sacciolepis**
 13b. Inflorescence one-sided spikes or spike like racemes, digitate or scattered, rarely solitary
 14
- 14a. Lemma of the upper florets thinly cartilaginous, usually with flat margins **10. Digitaria**
 14b. Lemma of the upper floret crustaceous or coriaceous, with inrolled margins 15
- 15a. Leaf blades linear; ligules absent; racemes dense **12. Echinochloa**
 15b. Leaf blades lanceolate to ovate; ligules present; racemes loose **19. Oplismenus**
- 16a. Glumes absent or rudimentary **21. Oryza**
 16b. Glumes present 17
- 17a. Spikelets 2-flowered, lower male or barren, upper bisexual **4. Coelachne**
 17b. Spikelets with one perfect floret, usually reduced floret absent 18
- 18a. Spikelets 3-awned; lemmas indurated, rigid at maturity **2. Aristida**
 18b. Spikelets not as above; lemmas hyaline or membranous **26. Sporobolus**
- 19a. Inflorescence a panicle or open raceme 20
 19b. Inflorescence a spike or spicate raceme 21
- 20a. Plants 1.5-3 m tall with stout rhizomes forming colonies **22. Phragmites**
 20b. Plants less than 1.5 m long, not rhizomatous **13. Eragrostis**
- 21a. Inflorescence of 1 to several, unilateral, spicate primary branches 22
 21b. Inflorescence a terminal, bilateral spike or spicate raceme. 24
- 22a. Spikelets with 2 or more perfect florets 23
 22b. Spikelets with 1 perfect floret **5. Cynodon**
- 23a. Inflorescence branches paired, verticillate or clustered at culm apex **6. Dactyloctenium**
 23b. Inflorescence branches distributed along the culm axis **8. Desmostachya**
- 24a. Spikelets solitary at each node of the inflorescence axis **13. Eragrostiella**
 25a. Inflorescence flexuous and interrupted; spikelets 2-3-flowered, ciliate **17. Melanocenchris**
 25b. Inflorescence compact; spikelets 1-flowered, glabrous **20. Oropetium**

1. APLUDA L.

Apluda mutica L., Sp. Pl. 82. 1753; Bor, Grass. Burma Ceylon India Pakistan 93. 1960. *A. varia* Hack. subsp. *mutica* Hack. in A.DC., Monogr. Phan. 6: 196. 1889; Hook.f., Fl. Brit. India 7: 150. 1896.

Tufted perennials. Culms erect or at times geniculate from rhizomatous base, 0.5–1 m high. Leaves linear–lanceolate, 4.5–40.0 × 0.4–1.0 cm, narrowed at base, acuminate at apex; ligules membranous. Inflorescence of several racemes each enclosed in spathe together forming a leafy panicle. Spikelets in groups of 3, one sessile, bisexual, second imperfect, sessile spikelets 4–5 mm long. Lower glume 11–13–nerved; upper glume cymbiform, 7–nerved. Lower lemma folded, hyaline, awned or awnless, 4–5 mm long. Upper lemma 3–nerved, notched, awned, bent. Second spikelet male. Terminal spikelet pedicellate, similar to sessile but upper lemma not notched, neuter or male; pedicels ca 3 mm long. Caryopsis oblong, with large embryo.

Flowering & Fruiting: September–November.

Common in waste land.

Specimen examined: Chandra Prabha Wildlife Sanctuary, 24.12.2016, A.N. Shukla 76344.

2. ARISTIDA L.

Aristidaadscensionis L., Sp. Pl. 82. 1753; Hook.f., Fl. Brit. India 7: 224. 1896; Bor, Grass. Burma Ceylon India Pakistan 407. 1960.

Annual or perennial herbs. Culms 20–60 cm tall. Leaves linear to oblong–lanceolate, rounded at base, serrulate towards apex, 4.5–22.0 x ca 0.4 cm. Inflorescence a contracted panicle. Spikelets straw–coloured or with purple tinge. Lower glume acute, membranous; upper glume 2–dentate at apex. Lemma linear, laterally compressed; awn 3–fid, not articulated. Caryopsis cylindrical, equaling lemma.

Flowering & Fruiting: August–March.

In wastelands and on outskirts of forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75163.

3. CHRYSOPOGON Trin.

Chrysopogon zizanioides (L.) Roberty, Bull. Inst. Franç. Afrique Noire, A 22: 106. 1960. *Phalaris zizanioides* L., Mant Pl. 2: 183. 1771. *Vetiveria zizanioides* (L.) Nash in Small, Fl. S. E. U. S. 67. 1903; Bor, Grass. Burma Ceylon India Pakistan 258. 1960. *Phalaris zizanioides* L., Mant. Pl. 183. 1771. *Andropogon squarrosus* sensu Hook.f., Fl. Brit. India 7: 186. 1896, *non* L.f., 1781.

Tufted rhizomatous, perennials. Culms up to 1.5 m high. Leaves linear, 60–80 × 0.8 cm, flat towards apex and infolded towards base; sheaths glabrous; ligules minute. Inflorescence a contracted panicle. Spikelets in pairs. Sessile spikelets lanceolate, acute. Lower glume muriculate on back, 5–nerved, ca 3.8 mm long; upper glume concave, spinulose, awnless, ca 4.2 mm long. Lower lemma empty, ca 3.6 mm long; upper lemma 3–nerved, mucronate, ca 3 mm long. Anthers 3, orange–yellow. Caryopsis ca 2 mm long, broader at base.

Flowering & Fruiting: August–November.

Common, along water courses and in marshy places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Along Rajdari water fall, 20.08.2015, A.N. Shukla & N. Srivastava 75087; Along Chandra Prabha River, 21.12.2016, A.N. Shukla 76283.

4. COELACHNE R.Br.

Coelachne simpliciuscula (Wight & Arn. ex Steud.) Munro ex Benth., J. Linn. Soc., Bot. 19: 93. 1881; Bor, Grass. Burma Ceylon India Pakistan 576. t. 61 a. 1960. *Panicum simpliciusculum* Wight & Arn. ex Steud., Syn. Pl. Glumac. 1: 96. 1854. *Coelachne pulchella* auct. *non* R.Br., 1810: Hook.f., Fl. Brit. India 7: 270. 1896.

Stoloniferous annual or short lived perennials. Culms decumbent, slender, 15–25 cm high. Leaves linear to narrowly lanceolate, 1.3–3.4 × 0.3 cm, acuminate, serrulate along margins; sheaths loose, striate; ligules hairy. Inflorescence a variable panicle. Spikelets sessile or shortly pedicellate, globose or ovoid. Lower glume ca 1 mm long, with obscure nerves; upper glume herbaceous, with obscure nerves, ca 1.5 mm long. Lower lemma coriaceous, rounded on back, ca 2 mm long. Upper floret neuter; rhachilla stipitate. Anthers 2, yellow, 0.2–0.4 mm long. Caryopsis narrowly ellipsoid, ca 0.5 mm long.

Flowering & Fruiting: December–March.

Not common, growing in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Gardi Nala, A.N. Shukla 76313.

5. CYNODON Rich.

Cynodondactylon (L.) Pers., Syn. Pl. 1: 85. 1805; Hook.f., Fl. Brit. India 7: 288. 1896; Bor, Grass. Burma Ceylon India Pakistan 469. 1960. *Panicum dactylon* L., Sp. Pl. 58. 1753.

Stoloniferous perennials. Culms decumbent, more or less ribbed, purple to yellow, 10–50 cm high. Leaves linear–lanceolate to lanceolate, 1–10 × 0.3–0.6 cm, acuminate to attenuate, scabrid, margins inrolled to flat; sheaths compressed, glabrous; ligules ciliate. Inflorescence of 2–6 spikes, erect, spreading; rhachis slender. Spikelets sessile, compressed, 1-flowered, 1.5–2.5 mm long. Lower glume narrowly oblong, membranous, acute, keeled, 1–1.4 mm long; upper glume similar, 1.5–2 mm long. Lemma acute, membranous, 3-nerved, 2–3 mm long; keels and margins hispid with white hairs. Anthers 3, very small. Caryopsis greenish brown, oblong–elliptic, acute, raised at apex, 1–1.2 × 0.6 mm.

Flowering & Fruiting: Throughout the year.

Common, in wastelands and cultivated fields.

Specimen examined: Chandra Prabha Wildlife Sanctuary, near Jamsoti, 235 m, 23.08.2017, A.N. Shukla & N. Srivastava 75165.

6. DACTYLOCTENIUM Willd.

Dactyloctenium aegyptium (L.) Willd., Enum. Pl. 1029. 1809; Bor, Grass. Burma Ceylon India Pakistan 489. t. 54. 1960. *Cynosurus aegyptius* L., Sp. pl. 72. 1753. *Eleusine aegyptiaca* (L.) Desf., Fl. Atlant. 1: 85. 1798; Hook.f., Fl. Brit. India 7: 295. 1896.

Tufted annuals or perennials. Culms terete or compressed, erect or ascending, glabrous, 8–45 cm high. Leaves linear to ovate–lanceolate, 2–22 × 0.20 cm, acuminate, sparsely tuberculate hairy especially towards basal margins, margins cartilaginous; sheaths compressed; ligules membranous. Inflorescence of 2–6, digitate spikes. Spikelets closely placed, pectinate in two rows on one side of the rhachis, 3–5-flowered, ca 2 mm long. Lower glume ovate, 1-nerved, 3.5–4 mm long; keel

narrowly winged, scabrid; upper glume similar to lower one but cuspidate at apex. Lower lemma ovate, 1-nerved, 3–3.5 mm long; empty lemma one or absent. Palea keels hispid. Anthers 3, yellow, ca 0.5 mm long. Caryopsis brownish, ovate to elliptic, acute to obtuse at apex, wrinkled, margins wavy, pericarp free, 0.8–1 × 1.2 mm.

Flowering & Fruiting: August–November.

Common in cultivated fields and wastelands.

Specimen examined: Chandra Prabha wildlife Sanctuary, before Jamsoti on Jalebiya mode, 24.08.2015, A.N. Shukla & N. Srivastava 75179.

7. DENDROCALAMUS Nees

Dendrocalamus strictus (Roxb.) Nees in Linnaea 9: 476. 1834; Gamble in Hook.f., Fl. Brit. India 7: 404. 1896. *Bambos stricta* Roxb., Pl. Coromandel 1: 58. 1798. – *Bans*.

Perennials, deciduous. Culms robust, up to 15 m high; culms sheaths variable, rounded at the top, slightly auricled, ciliate on margins, covered on the back with golden-brown stiff hairs, sometimes glabrous striate, 10–35 cm long; ligules narrow. Leaves linear-lanceolate, terminating above in a sharp acuminate twisted point, rounded at the base into short petiole, 2.5–20 cm long; leaf sheaths striate, hairy, ending in a prominent callus and short auricle. Inflorescence a large, branched panicle with dense, glabrous, spaced heads. Spikelets fertile and sterile mixed, 8–10 mm long. Empty glumes 2 or more. Lemma ovate, ending in a sharp spine. Palea ovate or obovate; keels ciliate. Caryopsis brown, ovoid-subglobose, shining, beaked, with persistent style, 8 mm long.

Flowering & Fruiting: November–April.

Common, in mixed forests or as pure formation.

Specimens examined: Chandra Prabha wildlife Sanctuary, Sikarganj, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75005; along roadside, 20.12.2016, A.N. Shukla 76239; near Chandra Prabha Dam, 22.12.2016, A.N. Shukla 76310.

8. DESMOSTACHYA (Hook.f.) Stapf

Desmostachya bipinnata (L.) Stapf in Dyer, Fl. Cap. 7: 632. 1900; Bor, Grass. Burma Ceylon India Pakistan 491. 1960. *Briza bipinnata* L., Syst. Nat. ed. 10. 2: 875. 1759. *Eragrostis cynosuroides* (Retz.) P.Beauv., Ess. Agrostogr. 162. 1812; Hook.f., Fl. Brit. India 7: 324. 1896. – *Kush*.

Decumbent rhizomatous perennials. Culms more or less ribbed, 46–80 cm high. Leaves linear-lanceolate, convolute, ca 50 × 0.7 cm, acute at apex, serrulate along margins; sheaths coriaceous, glabrous; ligules a ring of hairs. Inflorescence a large panicle of many spikes. Spikelets 2-seriate, purple brown, petinate, 3–6-flowered. Lower glume mucronate, keeled, 1-nerved, 0.5–0.7 mm long; upper glume obtuse, ca 1 mm long. Lemma 1.5–1.7 mm long; keels scabrid. Anthers 3, purplish yellow, 0.8–1 mm long. Caryopsis obliquely ovoid, compressed, ca 0.5 mm long.

Flowering & Fruiting: August.

Common, in open dry places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Semaria, 19.08.2015, A.N. Shukla & N. Srivastava 75014.

9. *DICHANTHIUM* Willemet

Dichanthium annulatum (Forssk.) Stapf in Parin, Fl. Trop. Africa 9: 178. 1917; Bor, Grass. Burma Ceylon India Pakistan 133. 1960. *Andropogon annulatus* Forssk., Fl. Aegypt.–Arab. 173. 1775; Hook.f., Fl. Brit. India 7: 196. 1896.

Tufted annuals or perennials, rhizomatous or not. Culms erect to decumbent, erect or ascending, up to 60 cm high. Leaves linear–lanceolate, 3.3–10.0 × 0.4–0.5 cm, rounded to truncate at base, acuminate at apex; ligule 1–1.3 mm; leafy sheaths keeled towards apex. Inflorescence of 2–10, subdigitate racemes. Sessile spikelets oblong–lanceolate, dorsally compressed, bisexual, 2.8–4 × 1.2 mm. Anthers 3, yellow, ca 2 mm long. Pedicellate spikelets male or neuter. Caryopsis light brown, broadly ellipsoid, ca 2 mm long.

Flowering & Fruiting: May–February.

Common, along roadsides.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Jamsoti, A.N. Shukla & N. Srivastava 75155; Gidhmarwa, 24.12.2016. A.N. Shukla 76345.

10. *DIGITARIA* Haller

Digitaria ciliaris (Retz.) Koeler, Descr. Gram. 27. 1802. *Panicum ciliare* Retz., Observ. Bot. 4: 16. 1786. *Paspalum sanguinale* Lam. var. *ciliare* (Retz.) Hook.f., Fl. Brit. India 7: 15. 1896. *Digitaria adscendens* (Humb., Bonpl. & Kunth) Henr. in Blumea 1: 92. 1934; Bor, Grass. Burma Ceylon India Pakistan 298. 1960.

Annuals or perennials. Culms purplish yellow, geniculate, more or less ribbed, 20–75 cm high. Leaves linear to oblong–lanceolate, 3.5–13.0 × 0.5–0.8 cm, rounded to narrowly acute towards base, acuminate at apex; sheaths 5–9 cm long; ligules membranous, truncate. Inflorescence of 2–9, variable sized racemes; rachis 0.5–1 mm wide, flat with a sharp median keel on one side, 2.5–3 mm long. Lower glume triangular, ca 0.3 mm long; upper glume narrowly triangular, acute, hairy, 3–nerved, ca 2 mm long. Lower floret sterile. Upper floret bisexual. Lemma lanceolate, acute, glabrous, 3–nerved, ca 2.8 mm long. Anthers 3, purplish, ca 1.2 mm long. Caryopsis greenish, oblong, ca 1.5 × 0.6 mm.

Flowering & Fruiting: August–October.

Common, growing on moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Devdari, A.N. Shukla & N. Srivastava 75064.

11. DIMERIA R.Br.

Dimeria ornithopoda Trin., Fund. Agrost. 167, pl. 14. 1820; Hook.f., Fl. Brit. India 7: 104. 1896; Bor, Grass. Burma Ceylon India Pakistan 142. t. 3. f. 8. 1960.

Tufted annuals. Culms slender, 15–50 cm high. Leaves lanceolate, 2.5–7.0 × 0.4 cm, hairy mostly towards base, acuminate at apex, basal portion with tubercle-based hairs, tuberculate along margins; sheaths keeled, glabrous, hairy at throat; ligules ciliate. Inflorescence usually of 2 spikes; rhachis scabrid on margins. Spikelets solitary, linear, 1.5–2 mm long. Lower glume c. 1.5 mm long; upper glume lanceolate, equal to spikelet, papery, keeled, fimbriate. Lower lemma minute, linear, acute, nerveless, glabrous, ca 1 mm long; upper lemma fertile, oblong–acute, ca 1.5 mm long, 1–dentate with 9–10 mm long awn. Anthers 3, yellow, ca 0.6 mm long. Caryopsis greenish brown, narrowly oblong, 1.3–1.5 × 0.3 mm.

Flowering & Fruiting: September–February.

Not common, in forest area.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76224.

12. ECHINOCHLOA P.Beauv., nom. cons.

Echinochloa colona (L.) Link, Hort. Berol. 2: 209. 1833; Bor, Grass. Burma Ceylon India Pakistan 308. 1960. *Panicum colonum* L., Syst. Nat. ed. 10. 2: 870. 1759; Hook.f., Fl. Brit. India 7: 32. 1896.

Tufted annuals. Culms geniculate, erect or decumbent, 15–45 cm high. Leaves linear–lanceolate, 5–15 cm long, narrowly rounded at base, acuminate at apex; sheaths compressed, glabrous; ligules absent. Inflorescence of several racemes along the main axis. Spikelets paired, arranged in 2–4 rows, sessile to subsessile, ovate–elliptic to subglobose, acute to acuminate, 2.2–4 × 1.4–1.6 mm. Lower glume acute, 5–nerved, 1.5–1.7 mm long; upper glume acute, 7–nerved, 2.5–3 mm long. Lower lemma 2–2.5 mm long; upper lemma ca 1.8 mm long. Anthers 3, yellow, ca 0.6 mm long. Caryopsis brown, elliptic to oblong, 1.2–1.4 × 1 mm.

Flowering & Fruiting: August–April.

Common, in moist places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, near Rajdari water fall, 19.08.2015, A.N. Shukla & N. Srivastava 75020; Jalebiya road, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75129.

13. ERAGROSTIELLA Bor

Eragrostiella bifaria (Vahl) Bor, Indian Forester 66: 270. 1940 & Grass. Burma Ceylon India Pakistan 494. 1960. *Poa bifaria* Vahl, Symb. Bot. 2: 19. 1791. *Eragrostis bifaria* (Vahl) Wight ex Steud., Nomencl. Bot. ed. 2.1: 562. 1840; Stapf in Hook.f., Fl. Brit. India 7: 325. 1896. *E. coromandeliana* (J.Koenig ex Rottler) Trin., Mem. Acad.

Imp. Sci. St. Peteresbourg, Ser. 6, Sci. Math. 1: 415. 1831; Hook.f., Fl. Brit. India 7: 326. 1896.

Tufted annuals or perennials. Culms geniculate, with remains of old leaves at base, 30–60 cm tall. Leaves linear–lanceolate, filiform, 4–18 × 0.2 cm, rounded at base, attenuate at apex; sheaths glabrous, hard; ligules membranous, truncate. Inflorescence 8–20 cm long raceme. Spikelets overlapping by half of their length, linear–elliptic, 6–20 mm long. Lower glume lanceolate, ca 1.7 mm long; upper glume narrowly ovate, ca 1.8 mm long. Lemma ovate, acute, ca 2 mm long. Palea winged along the keels, ciliolate on margins. Anthers 3, yellow, ca 0.3 mm long. Caryopsis ovate to globose, slightly 3–angled, 0.3–0.6 × 0.2 mm.

Flowering & Fruiting: August–October.

Not common, on rocky slopes.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75166.

14. ERAGROSTIS Wolf

Key to species

- | | |
|--|-------------------------|
| 1a. Spikelets breaking up from above downwards; rachis fragile | 1. E. amabilis |
| 1b. Spikelets breaking up from below upwards; rachis tough | 2 |
| 2a. Spikelets ovate to oblong, 2–3.5 mm broad | 3. E. unioloides |
| 2b. Spikelets linear, to 2 mm broad | 2. E. gangetica |

1. Eragrostis amabilis (L.) Wight & Arn. in Hook. & Arn., Bot. Beechey Voy. 251. 1833. *Poa amabilis* L., Sp. Pl. 68. 1753. *Eragrostis tenella* (L.) P.Beauv. ex Roem. & Schult., Syst. Veg. ed. 15.2: 576. 1817, var. *tenella*; Stapf in Hook.f., Fl. Brit. India 7: 315. 1896 incl. var. *plumose*; Bor, Grass. Burma Ceylon India Pakistan 513. 1960.

Annuals. Culms slender, 10–40 cm tall. Leaves linear–lanceolate, 3.5–13.5 × 0.4 cm, rounded to truncate at base, acuminate at apex; sheaths glabrous but with long hairs at throat; ligules ciliate. Inflorescence a terminal panicle, pyramidal to elliptic, 3–15 cm long. Spikelets 1.5–2.5 mm long. Lemma 0.8–1.2 mm long, scaberulous on the keel. Palea hairy on the nerves; hairs shorter than the width of the floret. Anthers 3, light to dark pink. Caryopsis pale to light brown, ovoid, polished, 0.4–0.6 mm long.

Flowering & Fruiting: July–October.

Common, in waste places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76228; Patariya Nala, 22.12.2016, A.N. Shukla 76303.

2. Eragrostis gangetica (Roxb.) Steud., Syn. Pl. Glumac. 1: 266. 1854; Bor, Grass. Burma Ceylon India Pakistan 508. 1960. *Poa gangetica* Roxb., Fl. Ind. 1: 341. 1820. *Eragrostis stenophylla* Hochst. ex Miq., Verh. Kon. Net. Inst. Wetensch. 3 (4): 39. 1851; Stapf in Hook.f., Fl. Brit. India 7: 318. 1896 *p.p.*

Tufted annual or perennial. Culms geniculate, 50–70 cm high. Leaves linear-lanceolate, 6–14 × 0.5 cm, acute at apex, margins infolded and villous hairy at base; sheaths glabrous; ligules membranous, truncate. Inflorescence a terminal, branched panicle; lower branches not whorled, usually solitary. Spikelets linear, 4–10 × 1–1.5 mm. Glumes lanceolate, about half of lemma, 1-nerved, scabrid on back. Lemma acute to subobtusate, 1–1.5 mm long. Palea scabrid on keel. Anthers 2, dark pink appearing blackish, ca 0.3 mm long. Caryopsis brownish, elliptic to subglobose, ca 0.5 × 0.3–0.4 mm.

Flowering & Fruiting: September–November.

Common in open wet places among grasses.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76214; Gardi Nala, 23.12.2016, A.N. Shukla 76330; Baliarai, 19.08.2015, A.N. Shukla & N. Srivastava 75007.

3. *Eragrostis unioides* (Retz.) Nees ex Steud., Syn. Pl. Glumac. 1: 264. 1854; Bor, Grass. Burma Ceylon India Pakistan 515. 1960. *Poa unioides* Retz., Observ. Bot. 5: 19. 1789. *Eragrostis amabilis* auct. non (L.) Wight & Arn. ex Hook & Arn., 1838: Stapf in Hook.f., Fl. Brit. India 7: 317. 1896.

Tufted annuals. Culms 30–40 cm high. Leaves linear-lanceolate, 2–20 × 0.3 cm, acuminate, serrulate at apex, margins infolded; sheaths striate; ligules membranous. Inflorescence a panicle. Spikelets often pink or purplish, ovate-oblong, strongly compressed, obtuse, 4–10 × 2–4 mm. Florets closely imbricate. Lemma narrowly, ovate inside view, acute, membranous, strongly keeled, with pink or purple tinge, ca 2 mm long; lateral nerves prominent. Palea scabrid on nerves, falling with lemma. Anthers 2, deep pink. Caryopsis narrowly elliptic to obovate or rarely globose, stipitate, 0.5–0.6 × 0.2 mm.

Flowering & Fruiting: September–March.

Common, along stream and river banks.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari Nala, 20.12.2016, A.N. Shukla 76227.

15. HETEROPOGON Pers.

***Heteropogon contortus* (L.) P.Beauv. ex Roem. & Schult., Syst. Veg. ed. 15. 2: 836. 1817; Bor, Grass. Burma Ceylon India Pakistan 163. 1960. *Andropogon contortus* L., Sp. Pl. 1405. 1753; Hook.f., Fl. Brit. India 7: 199. 1896.**

Tufted decumbent perennials. Culms erect, yellowish, up to 1 m high. Leaves linear-lanceolate, 4–20 × 0.3–0.6 cm, ciliate at base, acute at apex; sheaths striate, glabrous; ligule a fringed membrane with short hairs. Inflorescence a terminal, up to 12 cm long raceme. Sessile spikelets lanceolate, terete, 6.5–7 mm long. Upper glume 3-nerved, ca 5 mm long. Lower lemma hyaline, empty, ca 3 mm long; upper lemma stout, epaleate; awn geniculate, 5–8 cm long. Anthers 3, yellow, 2–2.5 mm long. Pedicellate spikelets male or barren. Caryopsis cylindrical, hairy, 1–1.5 mm long.

Flowering & Fruiting: August–January.

Common in mixed forest.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Patiyari Nala, 22.12.2016, A.N. Shukla 76299.

16. ISCHAEMUM L.

Ischaemum rugosum Salisb., Icon. Strip. Rar. 1. t. 1. 1791; Hook.f., Fl. Brit. India 7: 127. 1896; Bor, Grass. Burma Ceylon India Pakistan 184. 1960.

Tufted annuals or short lived perennials. Culms geniculate, erect or ascending, 50–70 cm high. Leaves linear–lanceolate, 20–22 × 0.5 cm, rounded or subcordate or narrowly tapering towards base, acuminate to attenuate at apex; sheaths loose, rough; ligules membranous, 4–5 mm long. Inflorescence a paired raceme; joints and pedicels trigonous. Sessile spikelets ovate–oblong, to 6 mm long; callus bearded. Lower glume slightly oblique, ca 5.5 mm long; upper glume ca 5.5 mm long; keel winged, ciliate. Lower lemma lanceolate, acute, ca 4.5 mm long; upper lemma with 1.5–2 cm long awn. Anthers 3, yellow. Caryopsis brown, ovoid, ca 2 mm long.

Flowering & Fruiting: August – October.

Not common in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Pindra Nala, 24.12.2016, A.N. Shukla 76347.

17. MELANOCENCHRIS Nees

Melanocenchrus jacquemontii Jaub. & Spach, Ill. Pl. Orient. 4: 36. 1851; Bor, Grass. Burma Ceylon India Pakistan 473. 1960. *Gracilea royleana* (Nees ex Steud.) Hook.f., Fl. Brit. India 7: 284. 1896.

Annual, densely tufted herbs. Culms 7–25 cm tall. Leaves linear, acuminate and pointed at apex, ciliate on margins, 1.5–6.0 × 0.1–0.2 cm; sheaths glabrous. Inflorescence spicate, 1.4 cm long. Spikelets in clusters of threes, green or purple. Involucral glumes 4; outer glumes ca 7 mm long; inner glumes 6–7 mm long. Palea as long as the glume. Caryopsis greyish brown, oblong, polished, 1.4–2.0 mm long.

Flowering & Fruiting: September–November.

Common, in wastelands and mixed forests.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jalebiya mode, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75144.

18. MNESITHEA Kunth

Mnesithea laevis (Retz.) Kunth, Revis. Gramin. 1: 154. 1829; Bor, Grass. Burma Ceylon India Pakistan 197. 1960. *Rottboellia laevis* Retz., Observ. Bot. 3: 11. 1783. *R. perforata* Roxb., Pl. Coromandel 2: t. 182. 1805; Hook.f., Fl. Brit. India 7: 158. 1896.

Tufted annuals or perennials. Culms stoloniferous to rhizomatous, geniculate, 30–100 cm high. Leaves linear–lanceolate, 5–25 × 0.2–0.5 cm, narrowly truncate towards base, acute or obtuse to acuminate at apex; sheaths loose, glabrous; ligules membranous. Inflorescence a 8–20 cm long raceme. Sessile spikelets glabrous, 3.5–4 mm long. Lower glume faintly 4–5-nerved, ca 4 long; upper glume 3-nerved, ca 4 mm long. Lower lemma with faint marginal nerves. Palea absent. Upper lemma 3-nerved. Pedicellate spikelets reduced. Anthers 3, pinkish. Caryopsis 1.5–2 mm long.

Flowering & Fruiting: September–November.

Not common, in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jamsoti, 235 m, 23.08.2015, A.N. Shukla & N. Srivastava 75161.

19. OPLISMENUS P.Beauv.

Oplismenus burmannii (Retz.) P.Beauv., Ess. Agrostogr. 54, 168, 169. 1812; Hook.f., Fl. Brit. India 7: 68. 1896; Bor, Grass. Burma Ceylon India Pakistan 317. 1960. *Panicum burmannii* Retz., Observ. Bot. 3: 10. 1783.

Annuals or straggling stoloniferous perennials. Culms decumbent, 20–50 cm high. Leaves ovate to elliptic–lanceolate, 2–4 × 0.4–1.2 cm, rounded to oblique at base, acuminate at apex; sheaths compressed; ligules hyaline, membranous. Inflorescence a panicle of 3–7 racemes, ascending; rhachis slender, trigonous, pilose with bristles. Spikelets elliptic–lanceolate, c. 3 mm long. Lower glume dorsally pubescent, 1.5–2 mm long; awn pubescent, 2.5–8 mm long; upper glume similar to lower. Lower lemma empty; upper lemma whitish yellow, 2–2.5 mm long. Anthers 3, yellow. Caryopsis brownish, oblong, acute or obtuse on ends, 0.7–1 × 0.2 mm.

Flowering & Fruiting: July–December.

Common on sandy soil in shady places.

Specimens examined: Chandra Prabha Wildlife Sanctuary, Baliari Nala, 20.12.2016, A.N. Shukla 76220; Pindra Nala, 24.12.2016, A.N. Shukla 76348.

20. OROPETIUM Trin.

Oropetium villosulum Stapf ex Bor in Kew Bull. 4: 571. 1949; Bor, Grass. Burma Ceylon India Pakistan 474. 1960.

Annuals. Culms 5–10 cm tall, tufted, branched. Leaves setaceous, scabrid; sheaths compressed, spathaceous, glabrous; ligules short, membranous. Inflorescence of spikes enclosed in sheaths; rhachis 4-gonous. Spikelets 1–1.5 mm long, 1-flowered, sunken in the hollow rhachis. Lower glume 1–1.2 mm long, nerveless, truncate at apex; upper glume 2–2.5 mm long, 3-nerved, cuspidate. Lemma 1.5–1.7 mm long, 3-nerved, hirsute. Anthers 3, yellow, minute. Caryopsis oblong, ca 0.5 mm long.

Flowering & Fruiting: July–September.

Not common, in moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Jalebiya mode, 242 m, 22.08.2015, A.N. Shukla & N. Srivastava 75125.

21. *ORYZA* L.

Oryza rumfipogon Griff., Not. Pl. Asiat. 3: 5. 1851; Bor, Grass. Burma Ceylon India Pakistan 605. 1960.

Tufted annuals or perennials. Culms erect to geniculate, ca 90 cm high. Leaves narrowly elliptic–lanceolate, ca 40 × 2 cm, truncate to shallowly cordate at base, acuminate at apex; sheaths loose, glabrous, auricled; ligules splitting at tip, up to 1.7 cm long. Inflorescence an exserted, compound panicle; main branches angular and scabrid. Spikelets 8–10 mm long, falling with age. Lemma I 1–nerved, ca 2.5 mm long; lemma II ca 2.4 mm long; lemma III ca 0.7 mm long, strongly folded above the mid nerve; awn scabrid, ca 7 cm long. Palea similar; awn ca 6 mm long. Anthers 6, yellow to brown. Caryopsis up to 6 mm long.

Flowering & Fruiting: August–November.

Common as a weed.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Baliyari compartment, 19.08.2015, A.N. Shukla & N. Srivastava 75010.

22. *PHRAGMITES* Adans.

Phragmites karka (Retz.) Trin. ex Steud., Nomencl. Bot. ed. 2.2: 324. 1841; Hook.f., Fl. Brit. India 7: 304. 1896; Bor, Grass. Burma Ceylon India Pakistan 416. 1960.

Tufted reed like perennials. Culms smooth, ca 2 m high. Leaves oblong to linear–lanceolate, 30–60 × 1–1.3 cm, rounded to truncate at base, acuminate to attenuate at apex; sheaths loose, hairy; ligules membranous, 2–3 mm long. Inflorescence a large, open panicle; rachilla fragile, with white hairs on joints, 4–7 mm long. Spikelets 9–12 mm long; pedicels 1–6 mm long. Lower glume lanceolate, 1–nerved, 3–4 mm long; upper glume elliptic, acute, 4–5.5 mm long. Lower lemma empty; fertile lemma narrowly lanceolate, 8–10 mm long. Palea ciliate at apex, 2.5–3 mm long. Anthers 3, yellow. Caryopsis purplish, narrowly ellipsoid, ca 2 mm long.

Flowering & Fruiting: September–November.

Common, inmarshy places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Bichuliya, 25.12.2016, A.N. Shukla 76377.

23. *SACCHARUM* L.

Saccharum spontaneum L., Mant. Pl. 2: 183. 1771; Hook.f., Fl. Brit. India 7: 118. 1896; Bor, Grass. Burma Ceylon India Pakistan 214. 1960; S.K. Maurya & al., Intl. J. Biod. 7. 2015.

Tufted rhizomatous perennials. Culms erect, glabrous, up to 3 m high. Leaves linear–lanceolate to narrowly elliptic–lanceolate, 40–50 × 0.4 cm, narrowly truncate

at base, attenuate and tail like at apex; sheaths auriculate, glabrous, hairy at throat; ligules hairy. Inflorescence a lax, silvery white panicle. Spikelets lanceolate, sessile and pedicellate similar, 1-flowered, bisexual, 3–6 mm long. Sessile spikelets 3.5–4 mm long. Lower glume sharply acute, ciliate on margins, 2-nerved, ca 3.5 mm long; upper glume 1-keeled, ca 4 mm long. Lower lemma oblong, ciliate, epaleate, ca 3 mm long; upper lemma bisexual, linear or elliptic, ca 3 mm long. Anthers 3, purple. Caryopsis narrowly lanceolate, ca 3 mm long.

Flowering & Fruiting: September – November.

Reported on the basis of Maurya & al. (S.K. Maurya & al., Intl. J. Biod. 7. 2015).

24. SACCIOLEPIS Nash

Sacciolepis myosuroides (R.Br.) A.Camus in Lecomte, Fl. Indo-Chine 7: 460. 1922; Bor, Grass. Burma Ceylon India Pakistan 358. 1960. *Panicum myosuroides* R.Br., Prodr. Fl. Nov. Holland. 189. 1810; Hook.f., Fl. Brit. India 7: 42. 1896.

Annuals. Culms erect or decumbent, terete, simple or branched, up to 60 cm high. Leaves oblong-lanceolate to linear-lanceolate, 5–20 × 0.1–0.5 cm, rounded or narrowed near base, acuminate at apex; sheaths compressed, striate; ligules very short, membranous. Inflorescence a narrow, dense, cylindrical, 5–12 cm long panicle; rhachis scabrous; pedicels unequal. Spikelets often purple-tinged at tip, elliptic, 5–9-nerved, 2–3 mm long. Lower lemma empty, 9–11-nerved; upper lemma white, ovate-oblong, shining, 5-nerved, ca 1 mm long. Anthers 3, purple. Caryopsis elliptic, turgid, compressed, ca 1 mm.

Flowering & Fruiting: August–December.

Not common, growing along forest margins.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Near Baliari Nala, 20.12.2016, A.N. Shukla 76225.

25. SETARIA P.Beauv.

Setaria pumila (Poir.) Roem. & Schult., Syst. Veg. ed. 15, 2: 891. 1817. *Panicum pumilum* Poir. in Lam. & Poir., Encycl. Suppl. 4: 273. 1816. *Setaria allide-fusca* (Schumach.) Stapf & C.E.Hubb., Bull. Misc. Inform. Kew 1930: 259. 1930; Bor, Grass. Burma Ceylon India Pakistan 360. 1960. *Setaria glauca* Hook.f., Fl. Brit. India 7: 78. 1896, *non* P.Beauv. 1812.

Tufted annuals. Culms decumbent-ascending, glabrous, up to 60 cm high. Leaves linear to elliptic-lanceolate, 7–20 × 0.6–0.8 cm, narrowly rounded at base, acuminate at apex; sheaths glabrous; ligules hairy. Inflorescence a panicle; rhachis pubescent. Spikelets ovate, acute, 3-nerved, 2–2.5 mm long. Upper glume acute, 5-nerved, 1.3–1.5 mm long. Lower lemma empty, 5-nerved. Anthers 3, rarely barren. Upper lemma transversely rugose, not keeled. Palea glandular. Anthers 3, yellow. Caryopsis ovate-elliptic or rarely oblanceolate, ca 0.6 × 0.4 mm.

Flowering & Fruiting: August–November.

Common in cultivated fields.

Specimen examined: Chandra Prabha Wildlife Sanctuary, compartment no. 15, 225 m, 19.08.2015, A.N. Shukla & N. Srivastava 75027.

26. SPOROBOLUS R.Br.

Key to species

- 1a. Lemma to 1 mm long, raceme branches and pedicels capillary **2. *S. tenuissimus***
 1b. Lemma 1.2 mm long and above, raceme branches and pedicels not capillary

1. *S. indicus* var. *flaccidus*

1. *Sporobolus indicus* (L.) R.Br. var. *flaccidus* (Roem. & Schult) Veldkamp, Blumea 35: 433. 1991. *Agrostis elongata* (R.Br.) Roth ex Roem. & Schult. var. *flaccida* Roth ex Roem. & Schult., Syst. Veg. ed. 15.2: 368. 1817. *Sporobolus indicus* (L.) R.Br. var. *diandrus* (Retz.) Jovet & Guedes, Taxon 22: 163. 1973. *Sporobolus diandrus* (Retz.) P.Beauv., Ess. Agrostogr. 26, 147 & 178. 1812 '*diander*'; Hook.f., Fl. Brit. India 7: 247. 1896; Bor, Grass. Burma Ceylon India Pakistan 630 t. 76. 1960.

Tufted annuals or perennials. Culms 20–60 cm high. Leaves linear–lanceolate, 6.5–33.0 × 0.4 cm, attenuate and inrolled towards apex, basal margins ciliate; sheaths glabrous; ligules hairy. Inflorescence a purplish or grayish panicle. Spikelets acute, 1.2–1.6 mm long. Lower glume nerveless, 0.3–0.4 mm long; upper glume elliptic–ovate, 1–nerved, 0.6–0.8 mm long. Lemma lanceolate, 1–nerved, ca 1.5 mm long. Palea nerveless, ca 1.2 mm long. Anthers 2, purplish. Caryopsis brownish, oblanceolate, at times oblong, minutely raised and truncate at apex, narrowly acute at base, turgid, flat on dorsal and lateral sides, 0.6–1 × 0.3–0.5 mm.

Flowering & Fruiting: September–December.

Common, growing on moist places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015, A.N. Shukla & N. Srivastava 75021.

2. *Sporobolus tenuissimus* (Schrank) Kuntze, Revis. Gen. Pl. 3: 369. 1893; Bor, Grass. Burma Ceylon India Pakistan 633. 1960. *Panicum tenuissimum* Schrank, Denkschr. Koenigl.–Baier. Bot. Ges. Regensburg 2: 26. 1822. *Sporobolus minutiflorus* (Trin.) Link, Hort. Berol. 1: 88. 1827; Hook.f., Fl. Brit. India 7: 248. 1896.

Tufted annuals. Culms erect, slender, 30–90 cm high. Leaves linear–lanceolate, 12–24 × 0.4 cm, rounded at base, acuminate to attenuate at apex; sheaths glabrous; ligules minutely ciliate. Inflorescence a diffuse, delicate panicle. Spikelets 0.8–1 mm long. Lower glume truncate, 0.1–0.2 mm long; upper glume 0.3–0.5 mm long. Lemma ovate, ca 1 mm long. Anthers 3, dark brown. Caryopsis greenish, obovate to obcordate, more or less globose, truncate at apex with retuse depression, acute at base, granulate, ca 0.7 × 0.5 mm.

Flowering & Fruiting: August–September.

Along water courses and waste places.

Specimen examined: Chandra Prabha Wildlife Sanctuary, Rajdari, 19.08.2015,
A.N. Shukla & N. Srivastava 75021.

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ABOUT THE BOOK

The state of Uttar Pradesh has 25 wildlife sanctuaries that play a key role in biodiversity conservation in the state. Chandra Prabha Wildlife Sanctuary is the first declared sanctuary in Uttar Pradesh in year 1957. This sanctuary is an important picnic spot famous for Deodari and Rajdari waterfalls. Sanctuary has a luxuriantly growing forest area. The book entitled 'Flora of Chandra Prabha Wildlife Sanctuary, Uttar Pradesh' documents 270 species belonging to angiosperms and pteridophytes. The book contains detailed taxonomic treatment for each species. Simple and easy keys have been provided for delimitations of taxa. Colourful photoplates have been provided for easy identification of interesting plants. Along with flowering and fruiting of species, specimens examined have also been provided. Beautiful maps and graphs make the book attractive. Index to the plant names and references increase the utility of the book. Authors are in strong belief that the book will be helpful for students, scholars, scientists, policy makers, nature conservationists and tourists.

ABOUT THE AUTHORS



Dr. Achuta Nand Shukla, working as a Scientist E, in CS-III (Biodiversity) Division, Ministry of Environment, Forest and Climate Change, New Delhi. Dr. Shukla has published four Books and more than 75 research papers, 22 popular articles in the field of plant taxonomy, invasive alien species and conservation. Dr. Shukla has 20 years of research experience. He is the recipient of Swarn Jayanti Puraskar by NASI Allahabad.



Dr. Nitisha Srivastava is working as Botanist in Botanical Survey of India, Central Regional Centre, Prayagraj, Uttar Pradesh. She has published about 33 research papers, 03 book chapters and 12 popular Hindi articles. She has 15 years of research experience and has expertise in Plant taxonomy, medicinal plants, biodiversity conservation and cytotoxicity. She has presented 15 research papers and participated in about 30 National and International Conferences, symposia, workshop and nomenclature courses. She has also reviewed 14 research papers for various journals of repute.



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भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA

BOTANICAL SURVEY OF INDIA
CGO Complex, 3rd MSO Building
Block - F, 5th & 6th Floor, DF - Block
Sector - 1, Salt Lake City, Kolkata - 700064
Website : <http://bsi.gov.in>