



**FLORISTIC DIVERSITY OF PARVATI ARANGA WILDLIFE
SANCTUARY AND ADJACENT TIKRI FOREST AREA, TERAI
REGION, GONDA, UTTAR PRADESH**



भारतीय वनस्पति सर्वेक्षण
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**BOTANICAL SURVEY OF INDIA
MINISTRY OF ENVIRONMENT FOREST AND CLIMATE CHANGE
2023**



FLORISTIC DIVERSITY OF PARVATI ARANGA WILDLIFE SANCTUARY AND ADJACENT TIKRI FOREST AREA, TERAJ REGION, GONDA, UTTAR PRADESH

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**Cover photo: Above: Wetland plant community in the Parvati Aranga
Wildlife Sanctuary dominated by *Nelumbo nucifera*.
Below: Wetland in the Tikri Forest area.**

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भारतीय वनस्पति सर्वेक्षण

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.

Parvati Aranga Wildlife sanctuary is one of the twenty three Wildlife Sanctuaries of Uttar Pradesh covering an area of *c.* 80 km². It was named after two oxbow shaped rainfed lakes present inside the sanctuary *viz.* Parvati and Aranga. It was declared as a bird sanctuary in 23rd May, 1990. Being situated in the ecotone region between upper Gangetic plain and the Terai region, this sanctuary along with the adjacent Tikri Reserve Forest is endowed with a rich floral and faunal diversity. Located in the Central Asian Flyway this Important Bird Area serves as the wintering site of several migratory birds.

I congratulate the authors for their painstaking effort in documenting a total of 358 species spread over 274 genera and 100 families of flowering plants. This e-book is anticipated to be beneficial for the entire Botanical fraternity and other stakeholders in understanding the biodiversity and ecosystem of this Wildlife Sanctuary and towards taking effective management steps for sustainable use and conservation.

PREFACE

The Study of Parvati Aranga Wildlife Sanctuary (PAWS) and adjacent Tikri Forest area, Gonda, U.P., is of great significance as it is the ecotone zone between the Gangetic plains and the Terai region of the Uttar Pradesh which is endowed with rich floral and faunal diversity. PAWS and adjoining Tikri reserve forest in the north-eastern Terai region of Uttar Pradesh with its varied ecological habitats and occurrence of patchy wetlands in the form of 'Lakes' and 'Tals' sustains a variety of plant communities. The area also harbours a rich diversity of economical and medicinal plant species, mainly confined to the peripheral region of the forest. A large component of the forest is occupied by diverse forest stands and a number of special habitats portray remarkable vegetational diversity.

The Sanctuary and the reserve forest area are not very well explored by the botanists. Only a few sporadic publications have been done in a superficial manner. However, in the present work, an attempt has been made to include a detailed account of all the plants collected earlier (if any) and during the present investigation along with details based chiefly on macro-morphological characters for easy identification of families, genera and species. It is anticipated that it will be useful for foresters, researchers, environmentalists, stakeholders, etc.

Allahabad

Authors

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INTRODUCTION

Existence of diverse form of biota in a particular area is known as biodiversity. Rich biological diversity provides variations among organisms which make a stable community. The mapping of number of species with their genera and family is known as biodiversity assessment which includes both plant and animal diversity . This biodiversity assessment propounds a lot of ideas, concepts, and methods to understand the importance of biodiversity along with impact on their climate and also for their conservation.

Man has surveyed remote galaxies and has stood on the surface of moon but has not so far come anywhere near to completing a taxonomic catalogue of the fewer than half a million species of higher plants that grow on our planet. European botanists were exploring the floristic regions of the globe for several centuries and their efforts have succeeded only in preparing a more pragmatic taxonomic account of the plants of that region. The magnitude of the situation is so severe in the tropics due to variety of reasons, the first and foremost being habitat destruction at an alarming rate leading to loss of biodiversity, essential for the sustenance of life on earth. Thus, conservation of biodiversity has gained most important consideration all over the world since the earth summit held at Rio de Janerio in 1992.

The primary process in ascertaining the biodiversity is the taxonomic treatment of living organisms. This can be achieved only through the process involving extensive exploration, identification and documentation of the flora. Further studies on local and regional flora paid increased attention at ecological level in addition to taxonomic treatment, which proved to be more beneficial in the management practices.

The Article 8 of the convention of biodiversity (CBD) stresses the *in-situ* conservation of biota in a holistic manner. In this prospect, the Government of India has declared 671 Protected Areas including 102 National Parks, 515 Wildlife Sanctuaries, 48 Conservation Reserves and 4 Community Reserves, 39 Tiger Reserves, 19 Biosphere Reserves, 10 Elephant Reserves, 5 Natural World Heritage Sites and 26 Ramsar Wetland Sites (WII Report). The main objectives of the protected area network are rehabilitation and restoration of degraded ecosystems and conservation of threatened plants. Anthropogenic interference, tourism, grazing, developmental activities, illegal exploitation of forest products, etc. degradation of biotic structure, remnant deforestation, encroachment of alien species have affected the biodiversity in various ways.

The flora of India is both rich and diverse due to wide range of variations in climate, altitude, physical environment and ecological habitats. The Indian flora accounts for 11 percent of the total plant species of the world and has four biodiversity hotspots in the world (Eastern Himalaya, Western Ghats, Indo- Burma and Sunda- land) where in 28 percent of the plants are endemic to the country. Current estimation revealed that a total of 18,532 species of angiosperms, 81 species of Gymnosperms, 1293 species of Pteridophytes, 15223 species of Fungi, 7396 species of Algae, 2754 species of Bryophytes, 2528 species of Lichens in India and 1196 species of microbes representing roughly 11.5 percent of total recorded plant species of the world (Plant Discoveries, 2017).

Uttar Pradesh, the fifth largest and the most populated state in India comprising an area of 2, 40, 928 square km which is about 7.3 % of the total area of the country. It has a population of about 199,581,477 as per the 2011 census. It is situated between the coordinates 23° 52' N and 31° 28' N lat and 77° 3' and 84° 39' E long. The state shares its boundaries with Uttarakhand and Nepal in the North, Bihar in east, Jharkhand and Chhattisgarh in South-east and Madhya Pradesh in South, and Rajasthan and Delhi in west. The state is divided in to 75 districts and it is the highest populous state in the country. The state of Uttar Pradesh represented three distinct phytogeographical regions. The transitional belt running along the entire length of the state of Uttarakhand and country Nepal is called *Terai* and *Bhabhar* area. These areas have thick forest interspersed with tall elephant grass, marshes and swamps. The Gangetic plains which stretches across the entire state from east to west and it is the most fertile land and utilized from prehistoric time for cultivation. The Southern fringe of the Gangetic Plains is demarcated by the Vindhyan Hills and Plateau. The area exhibit a unique topography with strong ground and low hills.

The forest of the state is of typical northern dry deciduous type and can be broadly divided in to dry deciduous forest, mixed forest, saal forest, scrub forest, grass land and aquatic vegetation. Based on Champion and Seth classification the state has 27 forest types which belong to the following forest type groups: (1). Tropical Semi-evergreen -0.21%; (2). Tropical moist deciduous- 19.68%; (3). Littoral swamp- 2.35%; (4). Tropical dry deciduous- 59.66%; (5). Tropical swamp forest- 4.61%. Trees outside the forest area account for 22.50% of the green cover. The flowering plants are fairly well studied and so far ca. 1442 species are reported. The common tree species are, *Acacia nilotica* (L.) Delile, *A. Catechu* (L.f.) Willd., *Aegle marmelos*

(L.) Correa, *Albizia lebbek* (L.) Benth., *Barringtonia acutangula* (L.) Gaertn., *Bauhinia variegata* L., *Bombax ceiba* L., *Butea monosperma* (Lam.) Taub., *Cassia fistula* L., *Dalbergia sissoo* DC., *Diospyros cordifolia* Roxb., *Ficus benghalensis* L., *Ficus religiosa* L., *Mallotus philippensis* (Lam.) Muell. Arg., *Mangifera indica* L., *Phyllanthus emblica* L., *Shorea robusta* Gaertn. and *Tectona grandis* L.f., shrubs are represented by *Abutilon indicum* (L.) Sweet, *Barleria prionitis* L., *Clerodendrum indicum* (L.) Kuntze, *Sida cordifolia* L. etc., herbaceous flora are embodied with *Boerhavia diffusa* L., *Centella asiatica* (L.) Urb., *Commelina benghalensis* L., *Desmodium gangeticum* (L.) DC., *Eclipta prostrata* (L.) L., *Lindernia ciliata* (Colsm.) Pennell, *Lindernia crustacea* (L.) F. Muell., *Physalis minima* L., *Scoparia dulcis* L., *Sida acuta* Burm. f., *Solanum nigrum* L., and climber representatives are *Dioscorea bulbifera* L., *Gloriosa superba* L., *Mukia maderaspatana* (L.) M. Roem., *Oxystelma secamone* K. Schum., *Trichosanthes dioica* Roxb. etc. About 10 taxa of angiosperm are endemic to the state while more than 150 invasive alien species are reported which belong to 109 genera and 44 families. The state represented by the occurrence of 300 species of algae, 985 species of fungi, 135 species of lichens, 77 bryophytes, 44 pteridophytes and 1442 species of angiosperms .

Parvati Aranga Wildlife Sanctuary and adjacent Tikri forest area, Gonda, Uttar Pradesh is located in Tarabganj tehsil on way to Gonda district, between 27°10" to 27° 24" N latitude and 82° 15" to 82° 20" E longitude. It comprises an area of about 80 sq. km. and named after two important lakes- Parvati and Aranga situated in the Wildlife sanctuary. These are Rainfed Lake in a deep natural depression in the Gangetic plains of the terai region, established in year 1990. The whole area is very rich in biodiversity having dense Sal forest (*Shorea robusta*), Khair forest (*Acacia catechu*) and it has a vast natural wetland nearby with unique aquatic floral component, patches of grasslands which supports an incredible variety of plants and animal species. The chief representative elements of the flowering trees in this sanctuary are viz. *Acacia nilotica* (L.) Delile, *Cassia fistula* L., *Mallotus philippensis* (Lam.) Mull. Arg., *Shorea robusta* Gaertn., *Tectona grandis* L.f., *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn. etc. The vegetation also comprises of all categories of the aquatic and semi- aquatic plants viz., *Bacopa monnieri* (L.) Wettst., *Hydrilla verticillata* (L.f.) Royle, *Hygroryza aristata* (Retz.) Nees. Wight & Arn., *Ipomoea aquatica* Forssk., *Ludwigia adscendens* (L.) H. Hara, *Nymphaea nouchali*

Burm.f., *Nymphoides cristata* (Roxb.) Kuntze, *Polygonum barbatum* L. and *Typha*



Fig. 1. Map of the study area.

angustifolia L.. The aborigines in the sanctuary area are the *Bhars* and the people from other backward communities who dwell in the vicinity of this protected area.

Climate: The entire area experiences extremes hot and cold weather which is typical of plains of northern India. There are three distinct seasons in a year, viz., rainy, winter and summer. Rainy or monsoon season commences in the middle of June and continues up to the

end of September or beginning of October. During this season humidity is maximum. Mean rainfall of the area is between 100-120 cm.

The precipitation is mainly from easterly winds. Rainy season is followed by winter season from November to February. During this season days are cool and bright, whereas nights are very cold and foggy and temperature goes down to about 4° C. Spordic rainfall during winter also occurs. Frost occurs usually in January and dew falls until late in spring. Summer season commences in April and lasts up to middle of June until rain commences. During May and June maximum temperature rises up to 44°C, mainly due to hot winds blowing from west.

Geology and Soil: The whole area lies in between alluvium of the Gangetic Plain at an altitude of 100–115m. The Parvati Aranga Wildlife Sanctuary (PAWLS) and adjoining Tikri reserve forest in north-eastern Terai region of Uttar Pradesh with its varied ecological habitats and occurrence of patchy wetlands in form of ‘River’ and ‘Tals’ sustains a variety of plant communities.

VEGETATION AND DIFFERENT COMMUNITY STRUCTURE

The common vegetation of the study area is of moist deciduous type with some evergreen and semi-evergreen tree species. The flora under this category dominates the physiognomy of the forest area by forming different phytoassociations which ultimately leads to a healthy forest in this terai region. Some of the important plant associations are discussed below.

1. ***Shorea robusta*- *Mallotus philippensis* community**- Under this category the other associates are *Bridelia retusa* (L.) A. Juss., *Carrisa spinarum* L., *Rotheca serrata* (L.) Steane & Mabb., *Clerodendrum infortunatum* L., *Curculigo orchioides* Gaertn., *Ceriscoides turgida* (Roxb.) Tirveng. and *Glycosmis pentaphylla* (Retz.) DC.
2. ***Shorea robusta*- *Terminalia chebula* Community**- The other important associates are *Aegle marmelos* (L.) Correa, *Desmodium gangeticum* (L.) DC., *Phyllodium pulchellum* (L.) Desv., *Diospyros montana* Roxb., *Bauhinia vahlii* Wight & Arn., *Tiliacora racemosa* Colebr. and *Oplismenus compositus* (L.) P. Beauv.
3. ***Tectona grandis*- *Streblus asper* community**- The other important co-existing species are *Abrus precatorius* L., *Cissampelos pareira* L. var. *hirsuta* (Buch.- Ham. ex DC.) Forman, *Dioscorea bulbifera* L., *Cocculus hirsutus* (L.) W. Theob., *Clerodendrum infortunatum* L. and *Elephantopus scaber* L.
4. ***Shorea robusta*- *Terminalia alata* community**- The other phytoassociates are *Abutilon indicum* (L.) Sweet, *Oroxylum indicum* (L.) Kurz., *Ailanthus excelsa* Roxb., *Sida cordata* (Burm.f.) Borss. Waalk., *Madhuca longifolia* (J. Koenig. ex. L.) J.F.Macbr., *Chrysopogon zizanoides* (L.) Roberty.
5. ***Dalbergia sissoo*- *Acacia catechu* community**- The other phytoassociates are *Ailanthus excelsa* Roxb., *Albizia procera* (Roxb.) Benth., *Ampelocissus latifolia* (Roxb.) Planch., *Kydia calycina* Roxb., *Abrus precatorius* L. and *Cardiospermum halicacabum* L.
6. ***Barringtonia acutangula*- *Syzygium spp.* association**- In this type of association there may be individual stands of these species or mixed stands at some places. *Syzygium cumini* (L.) Skeels and *S. salicifolium* (Wight) J. Graham. are two important species of *syzygium* in the study area. The other associates are *Calamus tenuis* Roxb., *Saccharum*

spontaneum L., *Oxystelma secamone* K. Schum., *Tiliacora racemosa* Colebr., *Smilax zeylanica* L., *Helminthostachys zeylanica* (L.) Hook., and *Lygodium flexuosum* (L.) Sw.

7. **Syzygium spp.- Ficus spp. association-** Mainly consists of *Syzygium cumini* (L.) Skeels and *S. salicifolium* (Wight) J. Graham. of *Syzygium* and *Ficus racemosa* L., *F. heterophylla* L.f. and *F. virens* Aiton. Other phytoassociates are *Pongamia pinnata* (L.) Pierre, *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn. and *Vitex negundo* L.

Aquatic Vegetation

The sanctuary and forest area is rich in various seasonal and perennial water bodies like ponds, lakes, taals and other water reservoir with low-lying areas. Most of the 'taals' and the Parvati- aranga lakes in the area hold water throughout the year, only a few smaller and less deeper ones may dry up during summer season. During rainy season these get filled with water as a part of Saryu river flood area.

As the flood water recedes, these water bodies get roofed with a number of hydrophytes which have been in fall under following categories:

- **Floating Hydrophytes:** These plants float on the surface of water and in contact with air and water only viz., *Azolla pinnata*, *Pistia stratiotes* L., *Lemna perpusilla* Torr., and *Eicchornia crassipes* (Mart.) Solms.
- **Suspended Hydrophytes:** These are rootless, submerged hydrophytes that are in contact with water only. The main constituent of this category is *Ceratophyllum demersum* L.
- **Submerged anchored Hydrophytes:** These are entirely or the most part, in contact with water only. Plants represents this category are *Hydrilla verticillata* (L.f.) Royle, *Potamogeton crispus* L., *Ottelia alismoides* (L.) Pers., *Vallisneria spiralis* L. etc.
- **Floating leaved anchored hydrophytes:** These are in contact with soil, water and air as well. The common representatives are *Marsilea minuta*, *Nelumbo nucifera* Gaertn., *Nymphaea nouchali* Burm.f., *Nymphoides indica* (L.) Kuntze.
- **Floating shoots anchored Hydrophytes:** These are rooted in muddy substratum with their shoots floating on the water surface and are in contact with soil, water and air. The common plants are: *Ipomoea aquatica* Forssk., *Ipomoea fistulosa*, *Ludwigia adscendens* (L.) Hara, *L. perennis* etc.

- **Emergent Anchored hydrophytes:** The root, the lower part of the stem and often leaves of the species are usually submerged in water. Some of the characteristic species are *Ammania baccifera* L., *Ceratopteris thalictroides* (L.) Brongn. , *Coix lachryma -jobi* L., etc.
- **Wetland Hydrophytes:** In this category soil remain generally saturated with water at least in the early part of the monsoon season. The prominent species of this section are *Canscora diffusa* (Vahl) R.Br. ex Roem. & Schult., *Corchorus capsularis* L., *Gnaphalium* species, *Helminthostachys zeylanica* L., *Lygodium flexuosum* (L.) Swartz. , *Ranunculus sceleratus* L., *Rumex dentatus* L., *Veronica anagallis-aquatica* L. etc.

Vegetation of Special Habitats:

The study area is also harbours a rich population of flora with special habitats. There are almost 5 categories of special habitats have been observed along with aquatic flora under which the species from the unique and characteristic phytoassociation forms the habitat conditions.

1. **On marshy shady conditions:** Under this situation the following phytoassociates are growing together viz. *Bacopa monnieri* (L.) Wettst., *Centella asiatica* (L.) Urb., *Oldenlandia corymbosa* L., *Laphangium luteoalbum* (L.) Tzvelev, *Ceratopteris thalictroides* (L.) Brongn., *Pycreus pumilus* (L.) Nees, *Peperomia pellucida* (L.) Kunth, *Ranunculus muricatus* L. and *R. scleratus* L.
2. **On dry shady situations:** In these conditions scattered poulation of *Abutilon indicum* (L.) Sweet, *Desmodium gangeticum* (L.) DC., *Phyllodium pulchellum* (L.) Desv., *Leea alata* (Burm.f.) Merr., *Scoparia dulcis* L., *Aerva sanguinolenta* (L.) Blume and *Ageratum conyzoides* (L.) L. associations.
3. **On drying up beds:** In such areas plant species forming large clumps and patches under these associates viz. *Coldenia procumbens* L., *Glinus lotoides* L., *Grangea maderaspatana* (L.) Poir., *Heliotropium supinum* L., *Polycarpon prostratum* (Forssk.) Aschers & Schweinf., *Polygonum plebeium* R.Br., *Rumex dentatus* L. and *Sphaeranthus indicus* L.
4. **On the bank of water bodies:** The following important plants and their associates are observed under this situation viz. *Ammannia baccifera* L., *Lippia javanica* (Burm.f.) Spreng., *Chrysopogon zizaniodes* (L.) Roberty, *Arundo donax* L., *Typha domingensis*

Pers., *Persicaria lapathifolia* (L.) Delarbre species. There are also some woody species found along the water bodies in the forest area viz. *Barringtonia acutangula* (L.) Gaertn., *Syzygium cumini* (L.) Skeels, *S. salicifolium* (Wight) J. Graham and *Pongamia pinnata* (L.) Pierre along with other associates like *Oxystelma secamone* K. Schum., *Tiliacora racemosa* Colebr. and *Vitex negundo* L.

5. **On open situations:** These conditions support a rich wealth of grassland flora with some woody species viz. *Alysicarpus monilifer* (L.) DC., *Apluda mutica* L., *Biophytum sensitivum* (L.) DC., *Boerhavia diffusa* L., *Bothriochloa pertusa* (L.) A. Camus, *Carissa spinarum* L., *Chrozophora rottleri* A. Juss., *Clerodendrum infortunatum* L., *Cynodon dactylon* (L.) Pers., *Imperata cylindrica* (L.) Raeusch., *Indigofera linifolia* (L.f.) Retz., *Solanum virginianum* L., *Urena lobata* L., *Chrysopogon zizanioides* (L.) Nash, *Woodfordia fruticosa* (L.) Kurz and *Ziziphus nummularia* (Burm.f.) Wight & Arn.

Parasitic and Epiphytic associations

Along with general floral association some unique association in form of parasitic and epiphytic are also found in the area:

1. *Cuscuta reflexa* Roxb. found on a variety of host plants viz. *Streblus asper* Lour., *Glycosmis pentaphylla* (Retz.) DC., *Ipomoea fistulosa* Mart. ex Choisy, *Vitex negundo* L. and on *Ziziphus* spp.
2. *Dendrophthoe falcata* (L.f.) Ettingsh. on *Bombax ceiba* L., *Butea monosperma* (Lam.) Taub., *Mangifera indica* L., *Dalbergia sissoo* DC., *Syzygium cumini* (L.) Skeels at some places on *Tectona grandis* L.f.
3. *Vanda tessellata* (Roxb.) Hook. ex G. Don mainly growing as an epiphytes on *Madhuca longifolia* (J. Koenig ex L.) J.F. Macbr., *Tectona grandis* L.f. and on *Shorea robusta* Gaertn.

FAUNAL DIVERSITY

Along with affluent flora, the reserve forest is also endowed with many mammalian fauna viz. Wild boar (*Sus scrofa*), spotted deer (*Axis axis*), blue bull (*Boselaphus tragocamelus*), Indian porcupine (*Hystrix indica*), Rhesus macaque (*Macaca mulata*) and grey langur (*Semnopithecus ajax*) with many reptilian species viz. Bengal monitor (*Varanus benghalensis*), Indian Cobra (*Naja naja*), Krait (*Bungarus caeruleus*), Rat snake (*Ptyas mucosa*) and Indian python (*Python molurus*). The wildlife sanctuary consists of a large wetland in form of lake, rich in avifaunal diversity and different species of fishes.

The area also harbours many rare, threatened and common native and migratory bird viz. Black drongo (*Dicrurus macrocercus*), Green bee eater (*Merops orientalis*), Red-wattled Lapwing (*Vanellus indicus*), Purple swamphen (*Porphyrio porphyrio*), Sarus crane (*Grus antigone*), Pied kingfisher (*Ceryle rudis*), Grey headed fish eagle (*Ichthyophaga ichthyaetus*) and Red vented Bulbul (*Pycnonotus cafer*) along with many other species.

Few finding on the faunal diversity in the study area has been carried out by Singh, V. (2015) and Singh, V. & Srivastava, S. K. (2016) along with floristic investigation.

FLORISTIC DIVERSITY

The phytodiversity of Parvati Aranga Wildlife sanctuary and adjacent Tikri forest area comprised of a total of 358 species spread over 274 genera and 100 families of flowering plants. Out of these 64 species under 53 genera and 21 families belong to monocots and 294 species under 221 genera and 79 families belong to Dicots (Table-1) .

Table-1

	No. of Family	No. of Genera	No. of Species
1. Dicots	79	221	294
2. Monocots	21	53	64
Total =	100	274	358

The ten dominant families in the present flora have been listed below and a comparison has been made with the list given (Table-4) by Hooker (1904) for the Flora of British India and Gangetic Plain Province (Hooker, 1904). Leguminosae includes all species of these families Fabaceae, Caesalpiniaceae and Mimosaceae for flora comparison only.

Table- 2: A conspectus of families of Pteridophytes showing number of genera and species

Family	Genera	Species
Equisetaceae	1	1
Ophioglossaceae	1	1
Lygodiaceae	1	1
Pteridaceae	1	1
Adiantaceae	1	1
Parkeriaceae	1	1
Marseliaceae	1	1
Athyriaceae	1	1
Azollaceae	1	1
Salviniaceae	1	1

Table- 3: A conspectus of families of angiosperms showing number of genera and species

Family	Genera (Dicotyledons)	Species
Ranunculaceae	1	3
Annonaceae	2	2
Menispermaceae	4	4
Nymphaeaceae	1	1
Nelumbonaceae	1	1
Papaveraceae	1	1
Fumariaceae	1	1
Brassicaceae	2	2
Capparaceae	2	2
Flacourtiaceae	1	1
Polygalaceae	1	1
Caryophyllaceae	1	1
Portulacaceae	1	1
Dipterocarpaceae	1	1
Malvaceae	3	6
Bombacaceae	1	1
Sterculiaceae	2	2
Tiliaceae	2	4

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Zygophyllaceae	1	1
Oxalidaceae	2	2
Rutaceae	4	4
Meliaceae	2	2
Rhamnaceae	1	3
Vitaceae	2	2
Leeaceae	1	1
Sapindaceae	2	2
Ancardiaceae	2	2
Moringaceae	1	1
Fabaceae	19	28
Caesalpiniaceae	6	11
Mimosaceae	5	8
Combretaceae	2	5
Myrtaceae	2	2
Lecythidaceae	1	1
Lythraceae	3	3
Onagraceae	1	3
Passifloraceae	1	1
Cucurbitaceae	6	7

Molluginaceae	2	2
Aizoaceae	1	1
Apiaceae	2	2
Rubiaceae	6	6
Asteraceae	16	19
Campanulaceae	2	2
Plumbaginaceae	1	1
Primulaceae	1	1
Sapotaceae	1	1
Ebenaceae	1	2
Oleaceae	2	2
Apocynaceae	4	4
Asclepiadaceae	5	6
Gentianaceae	1	2
Menyanthaceae	1	2
Boraginaceae	5	6
Convolvulaceae	5	10
Cuscutaceae	1	1
Solanaceae	4	7
Scrophulariaceae	7	9

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Bignoniaceae	1	1
Pedaliaceae	1	1
Martyniaceae	1	1
Acanthaceae	9	9
Verbenaceae	7	8
Lamiaceae	7	8
Nyctaginaceae	1	1
Amaranthaceae	5	7
Chenopodiaceae	1	1
Basellaceae	1	1
Polygonaceae	2	4
Piperaceae	1	1
Loranthaceae	1	1
Euphorbiaceae	11	20
Urticaceae	2	2
Ulmaceae	1	1
Cannaceae	1	1
Moraceae	4	12
Casurainaceae	1	1
Ceratophyllaceae	1	1

Family	Genera (Monocotyledons)	Species
Hydrocharitaceae	3	3
Orchidaceae	2	2
Costaceae	1	1
Cannaceae	1	1
Amaryllidaceae	1	1
Hypoxidaceae	1	1
Dioscoreaceae	1	2
Liliaceae	2	2
Smilacaceae	1	1
Pontederiaceae	2	2
Commelinaceae	4	6
Arecaceae	1	1
Typhaceae	1	1
Araceae	2	2
Alismataceae	2	2
Najadaceae	1	1
Aponogetonaceae	1	1
Potamogetonaceae	1	1
Eriocaulaceae	1	1
Cyperaceae	5	11
Poaceae	19	21

Table-4

India (Hooker 1904)	Gangetic Plain Province (Hooker 1904)	Phytodiversity of Parvati Aranga Wildlife Sanctuary And Adjacent Tikri Forest Area, Terai Region, Gonda, Uttar Pradesh
Orchidaceae	Poaceae	Leguminosae (47 spp.)
Leguminosae	Leguminosae	Poaceae (21 spp.)
Poaceae	Cyperaceae	Euphorbiaceae (20 spp.)
Rubiaceae	Asteraceae	Asteraceae (19 spp.)
Euphorbiaceae	Scrophulariaceae	Moraceae (12 spp.)
Acanthaceae	Malvaceae	Cyperaceae (11 spp.)
Asteraceae	Acanthaceae	Convolvulaceae (10 spp.)
Cyperaceae	Euphorbiaceae	Scrophulariaceae (09 spp.)
Lamiaceae	Convolvulaceae	Acanthaceae (09 spp.)
Urticaceae	Lamiaceae	Verbenaceae (08 spp.)
		Lamiaceae (08 spp.)

A further analysis of the flora reveals (Table-5), that ten dominant genera of the area are *Ficus* represented by maximum number of 7 species; followed by *Cyperus* (6 spp.), *Ipomoea* and *Phyllanthus* (5 spp. each); *Sida*, *Senna*, *Terminalia* and *Euphorbia* (4 spp. each), and *Ranunculus* and *Ziziphus* (3 spp. each).

Table-5

Sl. No.	Name of genera	No. of species
1.	<i>Ficus</i>	7
2.	<i>Cyperus</i>	6
3.	<i>Ipomoea</i>	5
4.	<i>Phyllanthus</i>	5
5.	<i>Sida</i>	4
6.	<i>Senna</i>	4
7.	<i>Terminalia</i>	4
8.	<i>Euphorbia</i>	4
9.	<i>Ranunculus</i>	3
10.	<i>Ziziphus</i>	3

PATTERN OF RARENESS AND REGENERATION POTENTIAL IN THE STUDY AREA

Rarity and regeneration of plant species in any forest area plays a significant role in maintenance of a healthy forest. *Plumbago zeylanica* L., *Oroxylum indicum* (L.) Kurz., *Hymenodictyon orixense* (Roxb.) Mabb., *Clerodendrum indicum* (L.) Kuntze, *Gloriosa superba* L., *Terminalia chebula* Retz., *Helicteres isora* L., *Bauhinia vahlii* Wight & Arn., *Bacopa monnieri* (L.) Wettst., *Leea alata* Edgew., *Habenaria plantaginea* Lindl., *Tylophora indica* (Burm.f.) Merr., *Cheilocostus speciosus* (J. Koenig) C. D. Specht, *Holarrhena pubescens* Wall. ex G. Don, *Heminthostachys zeylanica* were considered most rare plant species found during collection and survey of the area (Table.1). There are also some common species occurs frequently in the entire area due to their capacity to produce seedling rapidly viz. *Bridelia retusa* (L.) A. Juss., *Mallotus philippensis* (Lam.) Mull. Arg., *Mitragyna parvifolia* (Roxb.) Korth., *Terminalia alata* Wall., *Rothea serrata* (L.) Steane & Mabb., *Clerodendrum infortunatum* L., *Cayratia trifolia* (L.) Domin, *Cissampelos pareira* L., *Ichnocarpus frutescens* (L.) W. T. Aiton, *Elephantopus scaber* L. and *Lygodium flexuosum* (L.) Sw (Table. 6). Certain rhizomatous species like *Curculigo orchioides* Gaertn., *Typhonium trilobatum* (L.) Schott, *Helminthostachys zeylanica* (L.) Hook. and *Gloriosa superba* L. growing even in highly stochastic environment. This type of rarity and regeneration among various species are indicative of their ability to reproduce and establish efficiently in frequently distributed environment.

An extensive ecological and floristic study has been conducted in the north-eastern terai region of the Uttar Pradesh with respect to the floral diversity and documentation of vegetational phytosociology. The present communication reveals that the plant community with special habitat specially in protected and reserve forest area may play a vital role in the future sustenance of the forest vegetation. The area also harbours a rich diversity of economical and medicinal plant species, mainly confined to the peripheral region of the forests. There is need of continued monitoring of various ecological parameters with the help of more accurate and sophisticated ecological tools for the betterment of the plant community of the study area.

Table-6 Rare species occurring in the study area:

Name of the species	Family	Habit	Phenology
<i>Bacopa monnieri</i> (L.) Wettst	Plantaginaceae	Herbs	July–March
<i>Bauhinia vahlii</i> Wight & Arn.	Leguminosae	Lianas	Sept.– Jan.
<i>Clerodendrum indicum</i> (L.) Kuntze	Verbenaceae	Shrubs	April– Dec.
<i>Cheilocostus speciosus</i> (J. Koenig) C. D. Specht	Costaceae	Shrubs	Aug.– Jan.
<i>Gloriosa superba</i> L.	Liliaceae	Climbers	July– Nov.
<i>Habenaria plantaginea</i> Lindl.	Orchidaceae	Herbs	Aug.– Nov.
<i>Helminthostachys zeylanica</i> (L.) Hook.	Ophioglossaceae	Herbs	July–Sept.
<i>Holarrhena pubescens</i> Wall. ex G. Don	Apocynaceae	Large Shrubs	May– Feb.
<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Rubiaceae	Trees	July– Feb.
<i>Leea alata</i> Edgew.	Vitaceae	Shrubs	June– Sept.
<i>Oroxylum indicum</i> (L.) Kurz.	Bignoniaceae	Trees	June–March
<i>Passiflora foetida</i> L.	Passifloraceae	Climbers	Nov.– Jan.
<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Shrubs	Aug.– Oct.
<i>Schleichera oleosa</i> (Lour.) Merr.	Sapindaceae	Trees	April– Aug.
<i>Strychnos nux-vomica</i> L.	Loganiaceae	Trees	March– Feb.
<i>Terminalia chebula</i> Retz.	Combretaceae	Trees	March– Oct.
<i>Tylophora indica</i> (Burm.f.) Merr.	Apocynaceae	Climbers	May– Sept.

ADVERSE FACTORS AFFECTING THE FLORISTIC RICHNESS OF THE STUDY AREA

Parvati Aranga Wildlife sanctuary and adjacent Tikri forest area are one of the most biodiversity rich area in Terai region of Gonda district. The area harbours a varied flora and fauna are under the threat due to many adverse factors. Some of the important among them are as follows:

Anthropogenic Activities: The populations residing nearby sanctuary and reserve forest area are mostly depend upon the natural resources for requirement of food, shelter, fuel, medicine, etc., resulting in diminishing of population of various economically valuable species. Forest trees or twigs are often lopped up by villagers for firewood and fodder causing ample damage to the forest flora.

Grazing: Grazing activities by cattle in forest and in wetland area banks causes a threat to the flora and fauna of the study area. Many cultivated fields present inside the sanctuary are often created by clearing forest patch.

Fire: Forest fire in the Tikri reserve forest area is one of the crucial factor affecting the ground flora and sapling of the trees in the forest. Fire is deliberately done by villagers who are often interesting in getting fresh clumps of grasses for their cattles. Some sense it is a good practice as controlled fire support some unique vegetation to grow like some medicinal flora like *Olax* sp., *Grewia* sp. etc. in addition to various species of grasses.

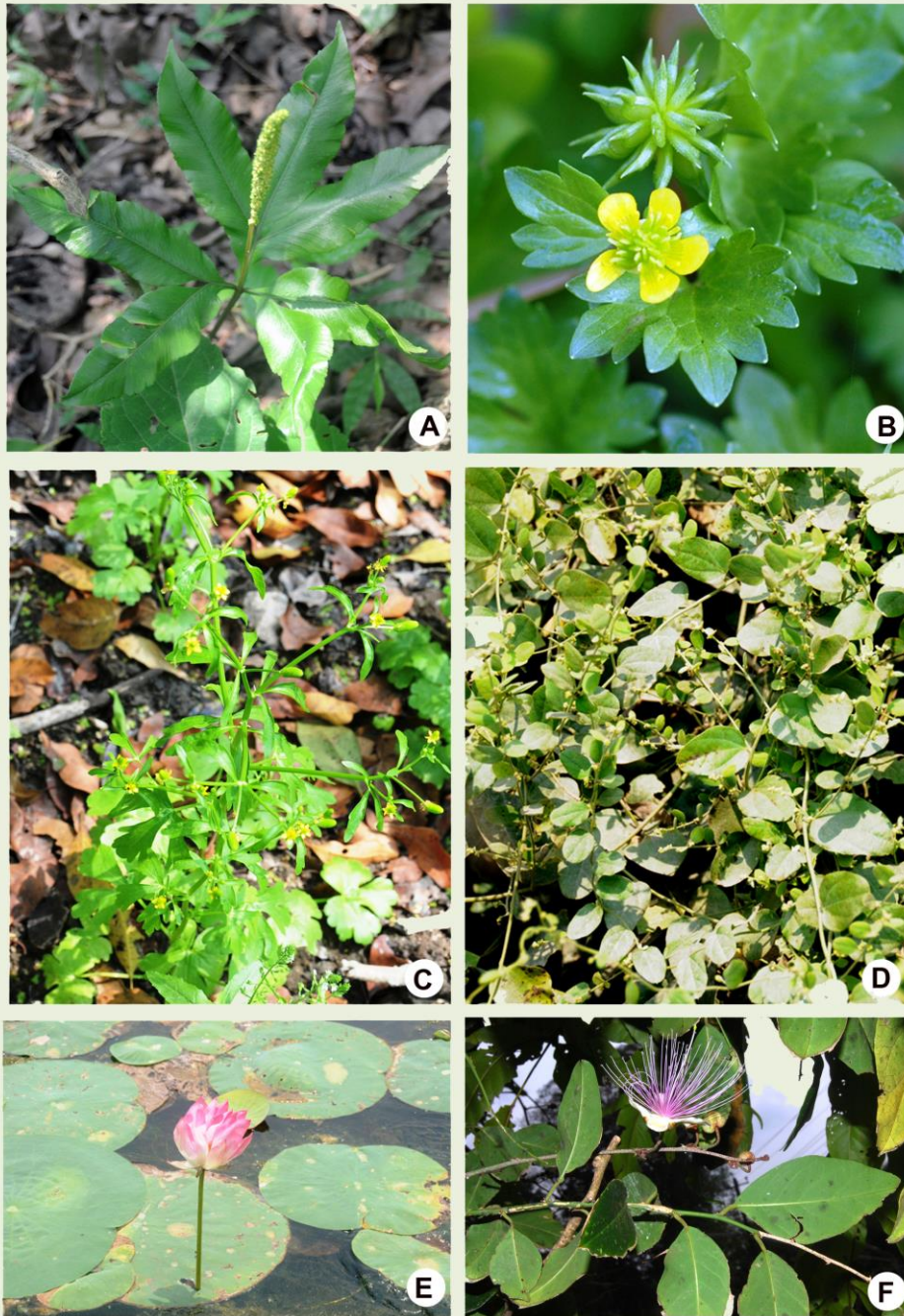
Weeds: Various exotic weeds like *Parthenium hysterophorus* L., *Ipomoea carnea* Jacq., *Lantana camara* L., *Pistia stratiotes*, *Eicchornia crassipes* (Mart.) Solms., *Sida acuta* etc. are fast spreading weeds in the sanctuary and reserve forest area, thus posing a great threat to the populations of indigenous flora. Such noxious weed need to be eradicated on priority basis with the help of different environmental agencies.

Plate - 1



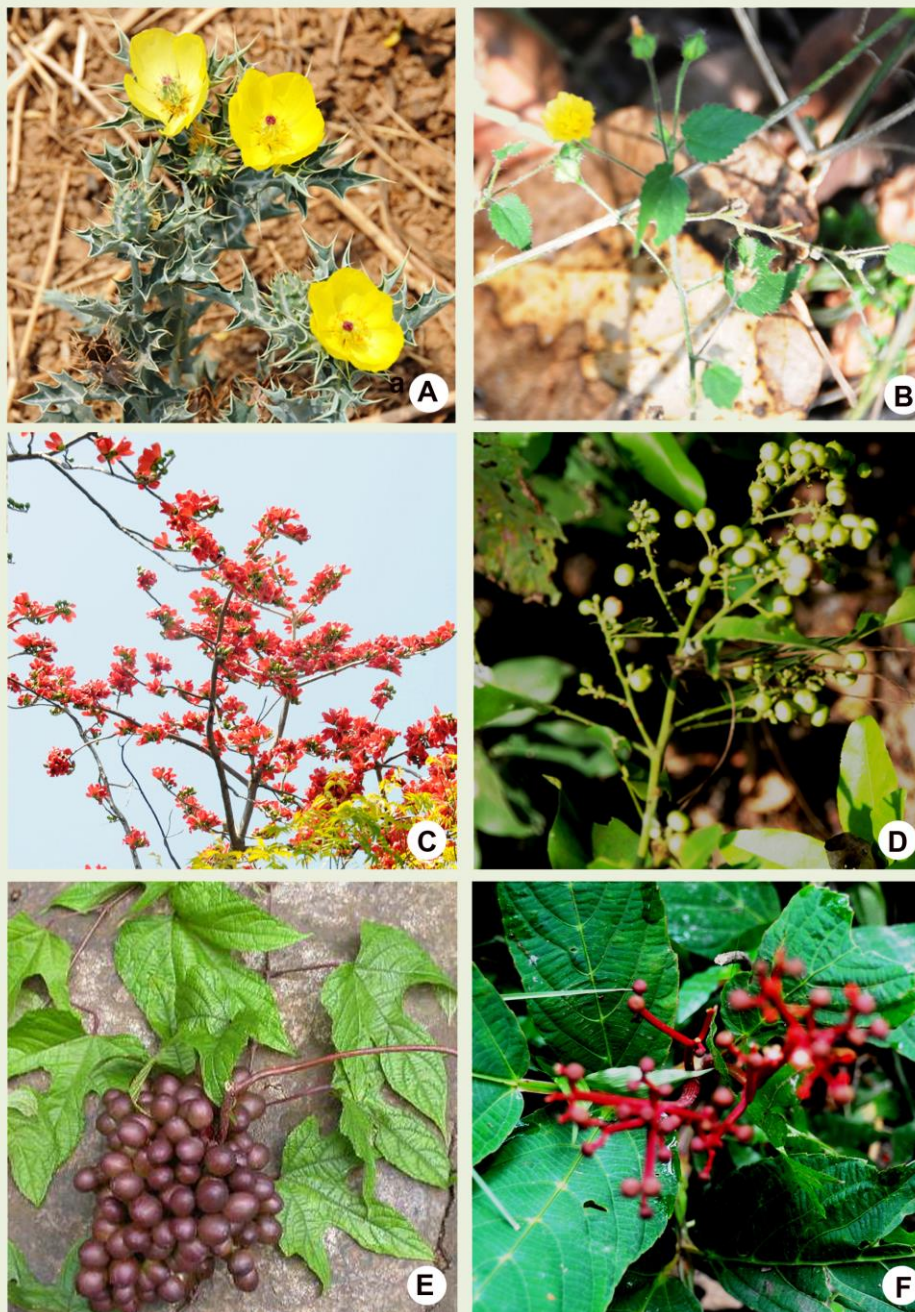
A. A landscape of Tikri reserve Forest; B. *Barringtonia* swamp forest in Tikri Reserve Forest; C. Dry deciduous mixed forest; D. Scrub and Grassland area; E. Wetland in the forest area; F. Wetland plant community in the Parvati Aranga Wildlife sanctuary dominated by *Nelumbo nucifera*

Plate-2



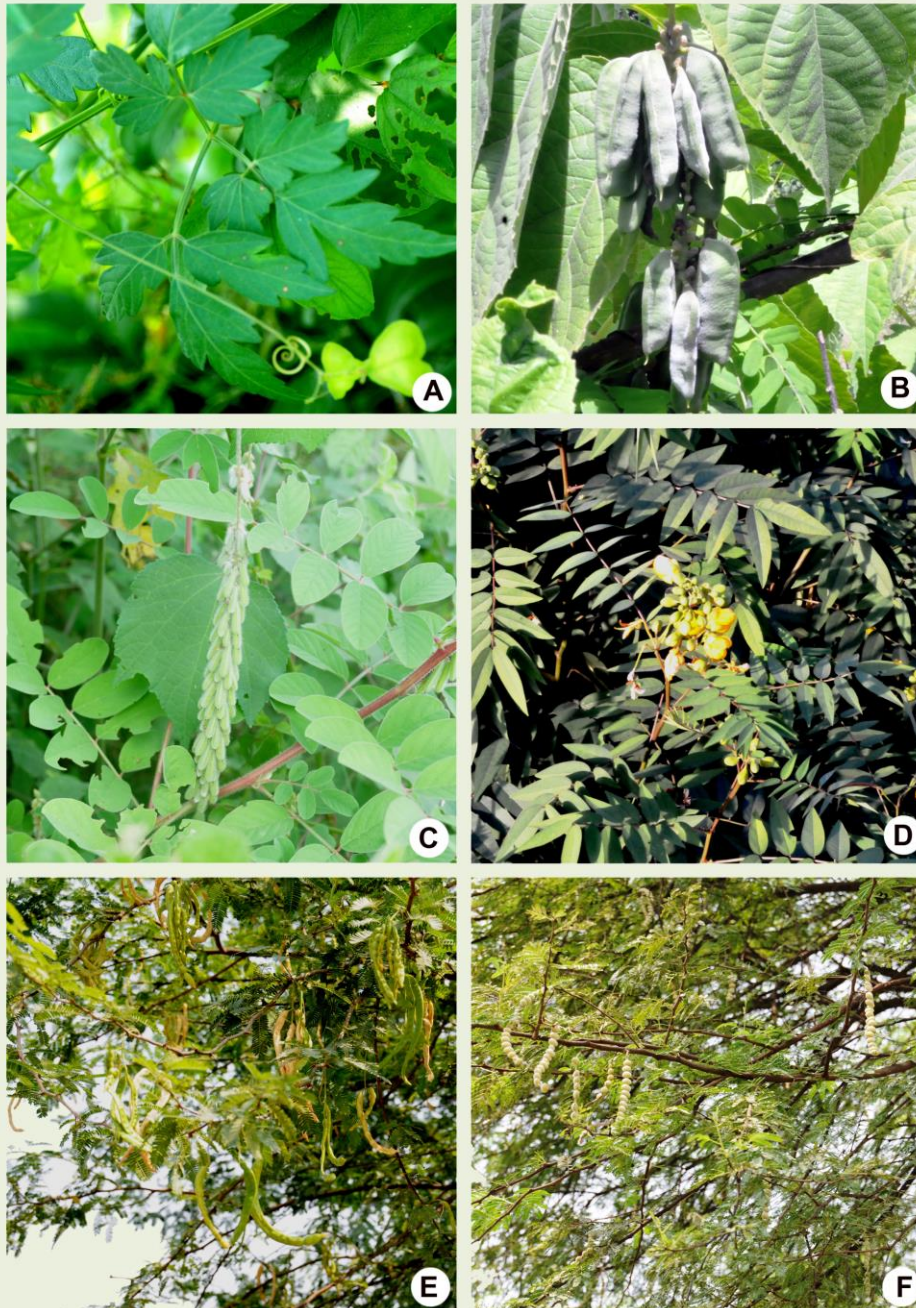
A. *Helminthostachys zeylanica* (L.) Hook.; B. *Ranunculus muricatus* L.; C. *Ranunculus scleratus* L.; D. *Cocculus hirsutus* (L.) W. Theob.; E. *Nelumbo nucifera* Gaertn.; F. *Capparis zeylanica* L.

Plate-3



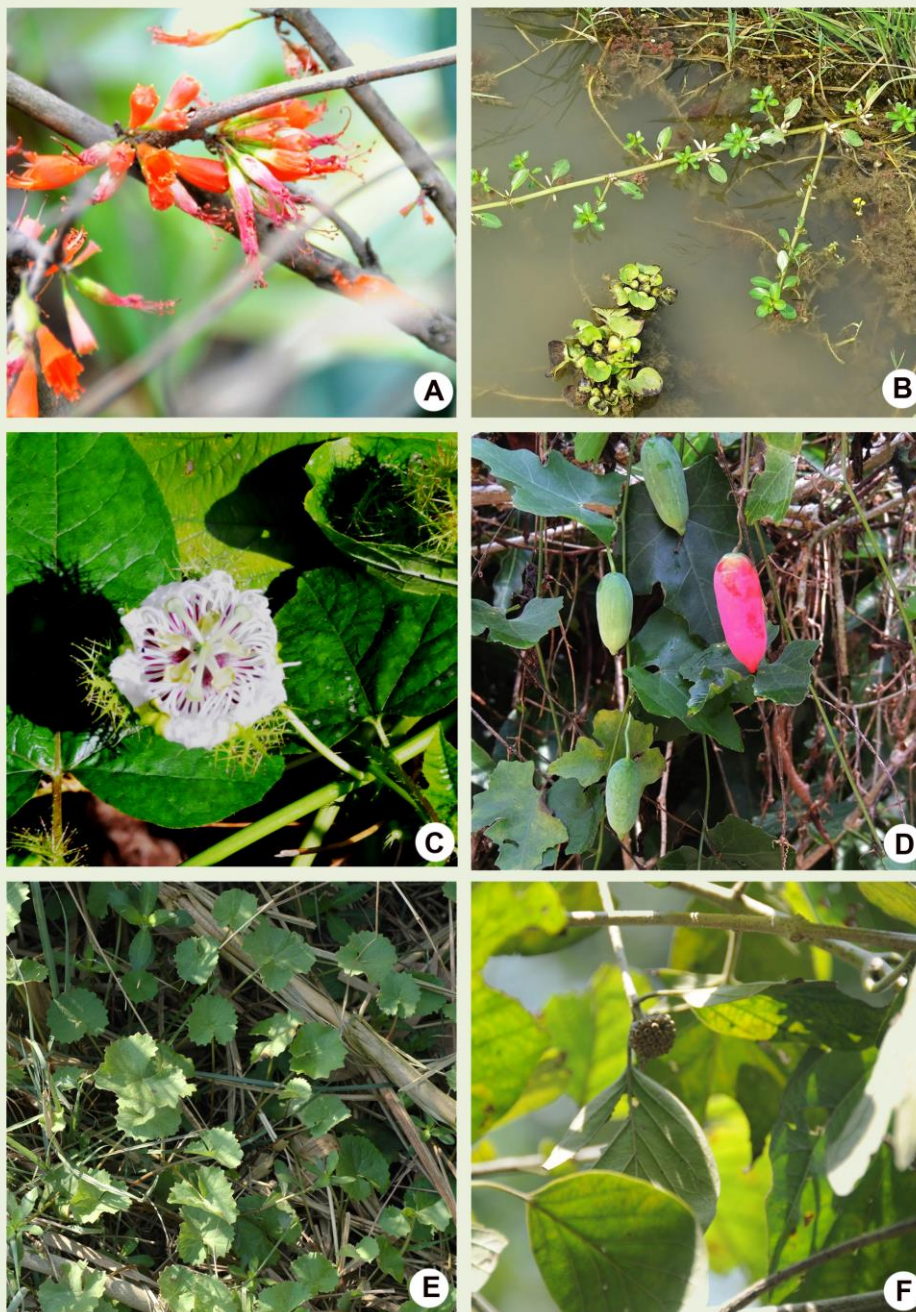
A. *Argemone mexicana* L.; **B.** *Sida cordata* (Burm.f.) Borss.Waalk.; **C.** *Bombax ceiba* L.; **D.** *Glycomis pentaphylla* (Retz.) DC.; **E.** *Ampelocissus latifolia* (Roxb.) Planch.; **F.** *Leea alata* Edgew.

Plate - 4



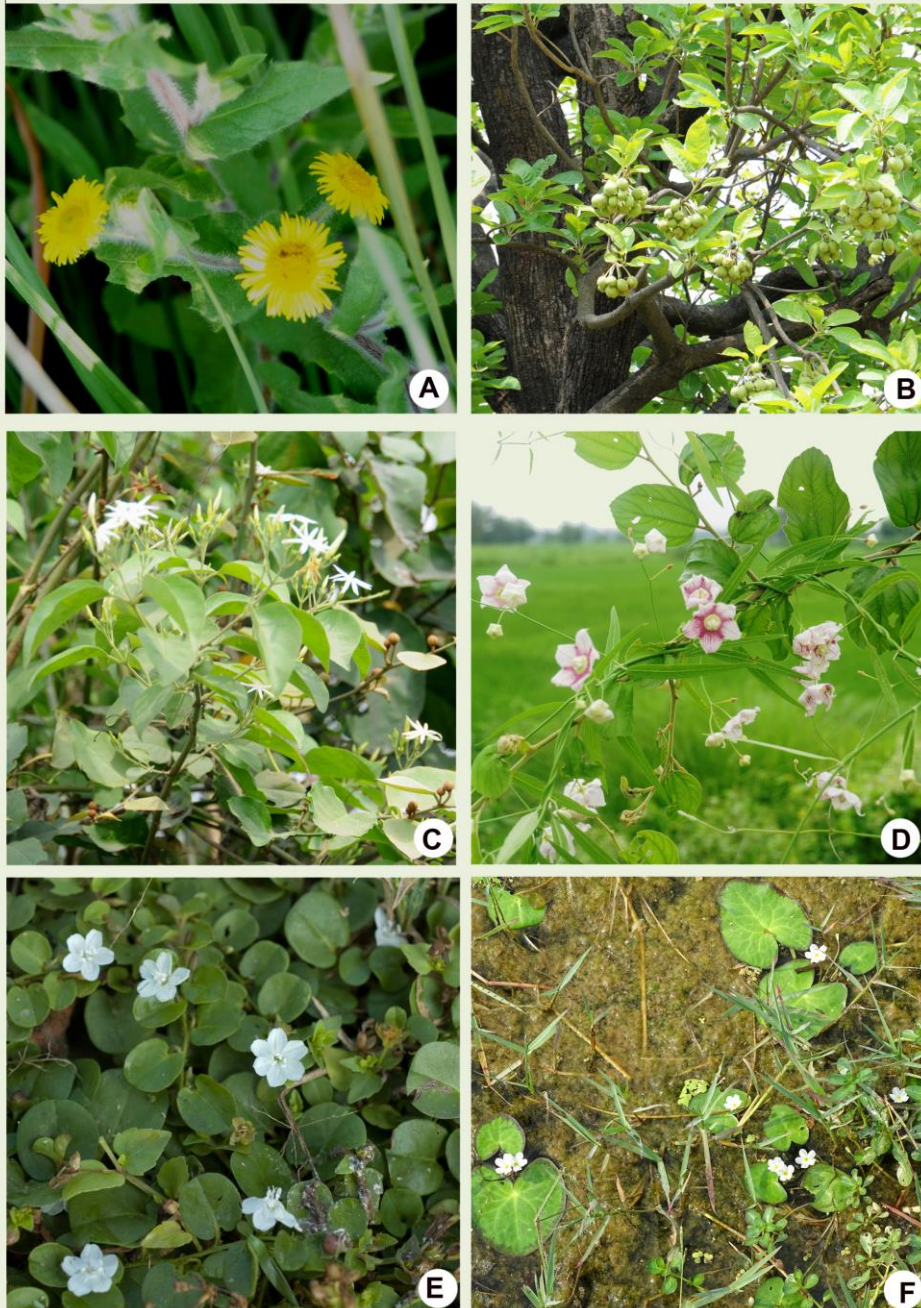
A. *Cardiospermum halicacabum* L.; B. *Abrus precatorius* L.; C. *Indigofera astragalina* DC.; D. *Senna sophera* (L.) Roxb.; E. *Acacia catechu* (L.f.) Willd.; F. *Acacia nilotica* (L.) Willd. ex Del.

Plate - 5



A. *Woodfordia fruticosa* (L.) Kurz.; B. *Ludwigia adscendens* (L.) H. Hara; C. *Passiflora foetida* L.; D. *Coccinia grandis* (L.) Voigt; E. *Centella asiatica* (L.) Urb.; F. *Mitragyna parviflora* (Roxb.) Korth.

Plate - 6



A. *Senecio vestitus* (Thunb.) P.J. Bergius; **B.** *Madhuca longifolia* (J. Koenig) Macbr. var. *latifolia* (Roxb.) Chevalier; **C.** *Holarrhena pubescens* Wall. ex G. Don; **D.** *Oxystelma secamone* K.Schum.; **E.** *Evolvulus nummularius* (L.) L.; **F.** *Nymphoides cristatum* (Roxb.) O. Kuntze.

PRESENTATION OF THE FLORA

A detailed account of taxonomic description have been provided in pteridophytes and angiosperms. Families of pteridophytes are arranged in alphabetical order, whereas arrangement of families in angiosperms is in accordance with the Bentham & Hooker's systems of classification (1862–1883) with few modifications as per new trends. The details include taxonomic citation of species along with reference to J.D. Hooker's Flora of British India (1872–1897), Duthie's Flora of Upper Gangetic Plain (1903–1929) and other relevant literature along with brief description of each taxa, flowering and fruiting period, habitat, collector name and voucher number have been given at the end.

Abbreviations of author's name as per Authors of Plant names (Brummitt & Powell, 1996). Abbreviations of titles of floras and periodicals are mainly based on the following publications: Taxonomic Literature ed. 2 (Stafleu & Cowan, 1976–1988) and its supplements (Stafleu & Mennega, 1992–2000) and Botanico-Periodicum- Huntianum (Lawrence & al., 1968) and its supplement (Bridson & Smith, 1991).

PTERIDOPHYTES

ADIANTACEAE

Adiantum L.

Adiantum capillus-veneris L., Sp. Pl. 2: 1096 (1753); Bedd., Ferns Southern India: t. 4. 1863, Handb. Fern. Brit. India: 84. 1883; C.B. Clarke, Trans. Linn. Soc. London Bot. 1: 453. 1880; Hope, J. Bombay Nat. Hist. Soc. 13: 239. 1900.

Rhizome long-creeping, stipes 5–10 cm, pendulous, sub-erect, wiry, shining, black, glabrous. Fronds 5–25 cm, bipinnate with terminal short leaflet and lateral pinnae; segments cuneate at the base, rounded at outer edge, deeply cleft; the lobes crenate, thin, pellucid-herbaceous. Sori roundish to obreniform, placed in roundish sinuses of the crenations.

Fertile: October – November.

Rare, found in swampy places under forest floor.

Specimen examined: Tikri forest, Vineet K. Singh 67618 (BSA).

ATHYRIACEAE

Diplazium Sw.

Diplazium esculentum (Retz.) Sw. in Schrad. J. Bot. 1801 (1): 312. 1803. *Hemionitis esculenta* Retz., Obs. Bot. 6: 38. 1791. *Asplenium esculentum* (Retz.) Presl, Rel. Haenk. 1: 45. 1925; Hooker, Sp. Fil. 3: 268. 1860; Hooker & Baker, Syn. Fil.: 244. 1867; Bedd., Ferns South. India 54. t. 164. 1865.

Rhizome erect or ascendent, covered with persistent stipe bases, young rhizomes bear pinnate, small fronds, old well-developed rhizomes have 2-pinnate, large (up to 1 m or more) fronds, intermediate types have pinnate to partially bipinnate fronds. Stipes rather long, up to 40.0–50.0 cm long, stramineous, base blackish, thick, grooved, scaly at base, scales brown, sparse, 1.0–15 × 0.1 cm, margin finely toothed, higher up stipe glabrous; rachis often sparsely minutely hairy (hairs pale-brown) or more commonly in the west, almost glabrous. Lamina 1–2-pinnate, size variable, ovate lanceolate, texture herbaceous to subcoriaceous, glabrous. In pinnate types, pinnae 9–12 pairs, 4.0 cm long, 1.0 cm broad, alternate, petiolate, lanceolate, margin serrate, the second and third pair of pinnae from lamina base the largest, lowest pinnae usually distant. Sori indusiate, on almost all veinlets in a lobe including the anastomosing ones, many basal acroscopic, diplazoid, indusia linear, membranaceous, margin wavy or fimbriate or almost entire. Spores light-brown, non-perinate, exine reticulate.

Fertile: February – March.

Commonly found on the bushes in the forest area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77280 (BSA).

AZOLLACEAE

Azolla Lam.

Azolla pinnata R.Br., Prodr. Fl. N. Holl. 167. 1810.

Plants aquatic, floating, triangular, *c.* 2 × 1 cm; roots hanging downwards, with numerous root hairs. Leaves arranged in alternate rows, 3–4 × 2–3 mm, 2-lobed; one lobe floating, the other one submerged, papillose on upper surface; older leaves dull red. Sori indusiate, on submerged leaf-lobes near the base of branches; microsporangia many; megasporangia few.

Common in stagnant water near lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75722 (BSA).

EQUISETACEAE

Equisetum L.

Equisetum diffusum D. Don, Prodr. Fl. Nepal 19. 1825.

Small plants, stems 30–50 cm long, erect, sterile and fertile stems alike, short firm, diffused; branchlets 5–6 at each node in whorl; internodes 2–3 cm, ridged, sheaths loose up to 1 cm long, linear-lanceolate, entire, 6–12 square grooved ribs. Strobilus stalked, 1–2 cm long, oblong-cylindrical.

Fertile: November – December.

Common in the edges of the forest in water logged sandy places.

Specimen examined: Tikri forest, Vineet K. Singh 77276 (BSA).

LYGODIACEAE

Lygodium Sw.

Lygodium flexuosum (L.) Swartz, in Schrad. J. Bot. 2: 106. 1801; Bedd. Ferns South. India: t. 64. 1863; Bedd. Handb. Ferns Brit. India: 452. 1883; C.B. Clarke, Trans. Linn. Soc. London Bot. 1: 584. 1880; Hope, J. Bombay Nat. Hist. Soc. 15: 105. 1903. *Ophioglossum flexuosum* L., Sp. Pl. 2: 1063. 1753.

Rhizome short-creeping, apex hairy, hairs dark-brown or blackish. Stipes arise close together on the rhizome length *c.* 15–20 cm, primary petiole 0.3–1.0 cm long; dormant apex hairy, hairs pale-brown. Fertile pinules slightly narrower than the sterile ones; fertile lobes marginal, 2–4 mm long.

Fertile: November – March.

Commonly found on the bushes in the forest area.

Specimens examined: Tikri forest, Vineet K. Singh 67606, 77228, 77286 (BSA).

MARSELIACEAE

Marsilea L.

Marsilea minuta L., Mant: 308. 1771. *M. quadrifolia sensu* Subr. & Henry in Bull. Bot. Surv. India 8: 209. 1966.

Herbs, *c.* 10–15 cm high. Rhizome long-creeping, thin, rooting in mud, glabrous but apex hairy; hairs lightbrown; pinnae 1–2 cm long, 1.0–1.5 cm broad, obtusely, margin entire or toothed or crenate; veins many, anastomosing obliquely, glabrous. Sporocarp usually borne in pairs, sometimes many, free from the stipe and from each other, basal, pedicelate, pedicels short, twice as long as the body of the sporocarp. Megaspores, ellipsoidal, microspores yellowish, oval to almost rounded.

Commonly found on the bushes in the forest area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77252 (BSA).

OPHIOGLOSSACEAE

Helminthostachys Kaulf.

Helminthostachys zeylanica (L.) Hooker, Gen. Fil.: 47: 1840; Bedd. Handb. Ferns Brit. India: 467. t. 292. 1883; C.B. Clarke, Trans. Linn. Soc. London Bot. 1: 587. 1880. *Osmunda zeylanica* L. Sp. Pl. 2: 1063. 1753.

Rhizome creeping, fleshy, thick, 0.4–0.6 cm diam., with numerous fleshy roots. The fronds consist of a long common stipe on which are present the sterile and fertile segments. Common stipes 10–40 cm long, green or purplish, glabrous. Lamina (sterile) palmately divided into 3 main parts, each part petiolate and further giving rise to two lateral pinnae and a terminal one. Pinnae 10–25 cm long, 2–4 cm broad, petiolate, bases cuneate, apex acuminate, margin

entire or slightly irregularly toothed, texture thin, membranaceous; veins free, forked, close together; main vein grooved on the upper side. Spike longer than the sterile lamina, 15–20 cm long, 5–6 cm broad; sporangia in clusters on short lateral branches. Spores yellowish-brown, tetrahedral trilete, reticulate.

Common under swampy forest floor.

Specimen examined: Tikri forest, Vineet K. Singh 67649 (BSA).

PARKERIACEAE

Ceratopteris Ad. Brongn.

Ceratopteris thalictroides (L.) Brongn., Bull. Sci. Soc. Philom. Paris Ser. 38: 186. 1821; Tiwari in J. Indian Bot. Soc. 43: 3. 435. 1964. *Acrostichum thalictroides* L. Sp. Pl. 2: 1070. 1753.

Rhizome short, erect. Fronds dimorphic; fertile fronds erect, the sterile ones short and spreading; 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.

Fertile: November.

Commonly found in marshy places.

Specimen examined: Tikri forest, Vineet K. Singh 75610 (BSA).

PTERIDACEAE

Pteris L.

Pteris vittata L., Sp. Pl. 2 : 1074. 1753; *Pteris longifolia auct. quoad*, plant. Asia; Bedd., Ferns. South. India: 33. 1863, Handb. Fern. Brit. India: 106, t. 55. 1883; C.B. Clarke. Trans. Linn. Soc. London Bot. 1: 461. 1880; Hope, J. Bombay Nat. Hist. Soc. 13: 448. 1904.

Rhizome creeping, thick, short, scaly; scales light-brown, concolorous, narrow, linear-lanceolate, margin entire, apex acuminate. Stipe length variable, generally much shorter than the lamina, stramineous or lightgreen, light-brown upon drying, thick, diam. 0.4–1.0 cm, scaly and fibrillose, scales abundant at stipe base, light-brown, narrowly linear-lanceolate, margin entire, scales becoming narrower higher up on stipe, fibrils of the same colour as the scales on stipe but narrower. Lamina pinnate, 6–100 cm long, 1–27 cm broad, oblong-obovate, texture herbaceous

to subcoriaceous, upper surface glabrous; pinnae many, 20–30 pairs, 0.5–8 cm long, 0.3–0.5 cm broad, alternate, sessile, linear, base truncate or cordate, or slightly auricled, margin of sterile pinnae and infertile apex of fertile pinnae finely dentate-serrate; lower 5–7 pairs of pinnae gradually reduced and distant, usually sterile, apical pinnae variable in size. Sori marginal, continuous from the base of pinnae, stopping a little short of the apex, indusiate, indusial whitish, membranaceous, margin irregularly serrulate. Spores light-brown, non-perinate, exine tuberculate to rugulose on the proximal side reticulate on distal side.

Fertile: November – December.

Commonly found near slope of the rest house.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Rest house Vineet K. Singh 77271 (BSA).

SALVINIACEAE

Salvinia Seg.

Salvinia natans (L.) All., Fl. Pedem 2: 289. 1785. *Marsilea natans* L., Sp. Pl. 1099. 1753.

Plants aquatic, floating. Rhizomes creeping, dichotomously branched, hairy. Leaves in whorls of three, 2 floating and 1 submerged; floating leaves simple, 1–1.4 cm long, oblong-ovate, entire, cordate at base, hairy on upper surface, hairs with a short stalk and 4 free spreading branches; submerged leaves 2–4 mm long, terminating in 2 or 3 sporocarp bunches. Sporocarps globose, clustered or tight knitted.

Commonly growing in the wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75727 (BSA).

ANGIOSPERMS**RANUNCULACEAE****Ranunculus L.**

Ranunculus cantoniensis DC., Prodrumus 1: 43. 1824; M.A. Rau in B.D. Sharma & al., Fl. India 1: 117. 1993. *R. napaulensis* DC., Prodrumus 1: 39. 1824. *R. trilobatus* D. Don., Prodr. Fl. Nepal. 194. 1825, non Desf., 1978. *R. fibrosus* Wall. ex Hook.f. & Thomson, Fl. Ind. 37. 1855. *R. pensylvanicus sensu* Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 19. 1872, non L. f., 1782; Duthie, Fl. Gangetic Plain 1: 20. 1903.

Annual herb, 40–65 cm tall; stem erect hairy, profusely branched, rooting at base. Radical leaves 3-foliolate or ternatisect, appressed pubescent; leaflets 4–5 × 5–6 cm, tripartite, deeply cut into narrow oblanceolate, coarsely toothed segments; petioles 15–20 cm long. Cauline leaves trifoliolate, progressively shorter, from stalked to sessile. Flowers 1–1.5 cm across, yellow. Sepals 5, elliptic-oblong, subobtuse, reflexed, hirsute. Petals 5, oblong-obovate, yellow to creamy white, many nerved. Receptacle subglobose, hairy. Achenes *c.* 1.5 mm across, broadly elliptic, cuneately suborbicular, compressed, numerous in oblong or globose heads.

Flowering & Fruiting: May – December.

Infrequent in swampy places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Forest Rest house, Vineet K. Singh 77252 (BSA).

Ranunculus muricatus L., Sp. Pl. 555. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 19. 1872; M.A. Rau in B.D. Sharma & al., Fl. India 1: 124. 1993. *Jaldhania*.

Herb, 10–25 cm high, diffusely branched. Radical leaves 6–8, trifid, suborbicular-ovate reniform, 1.5–4.0 cm across, lobes cordate at base, crenate-lobate along the margins; petioles long with decreasing in length towards apex. Cauline leaves 3-partite with crenate base, similar to radical leaves. Flowers solitary borne on upto 1.5 cm long peduncles, *c.* 1.4 cm across leaf opposed; pedicels upto 2.0 cm long. Petals 5, oblong-obovate, yellow. Achenes numerous in subglobose heads, obovoid, compressed, beaked, tuberculate on surface; beak *c.* 2 mm long, triangular.

Flowering & Fruiting: April – October.

Common in marshy places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari village, Vineet K. Singh 77256 (BSA).

Ranunculus sceleratus L., Sp. Pl. 551. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 19. 1872; Duthie, Fl. Gangetic Plain 1: 19. 1903; M.A. Rau in B.D. Sharma & al., Fl. India 1: 128. 1993. *Jaldhania*.

Herb, fleshy, 30–45 cm high. Radical leaves reniform, 2.5–4 cm across, 3-partite at base; cauline leaves obovate, unlobed or bluntly 3–5-toothed; petioles 3–8 cm long, progressively shortened. Flowers several, diffusely racemose. Sepals elliptic, pubescent, caducous. Petals yellow, as long as sepals or shorter. Achenes obovoid, compressed, pale on margins, numerous in a cylindrical or oblong head.

Flowering & Fruiting: January – April.

Common in marshy places along the lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari village Vineet K. Singh 67688 (BSA).

ANNONACEAE

Annona L.

Annona squamosa L., Sp. Pl. 537. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 78. 1872; Duthie, Fl. Gangetic Plain 1: 23. 1903; Deb Mitra in B.D. Sharma & al., Fl. India 1: 207. 1993. *Saripha*.

Small tree upto 3–4 m high, Leaves 4–8 × 2–4 cm, oblong-lanceolate, acute at apex, cuneate at base, entire. Flowers 1.5–2.5 cm long, greenish yellow. Sepals triangular, minute. Petals 2–2.5 cm long, pubescent, inner one's minute. Stamens indefinite. Carpels indefinite; style oblong. Fruits 5–10 cm across, ovoid or conical, separated by deep grooves. Seeds many, black, smooth, shiny, arillate.

Flowering & Fruiting: May – December.

Common along the forest margins, also planted for its edible fruits.

Specimen examined: Tikri forest, Vineet K. Singh 75673 (BSA).

Polyathia Blume

Polyathia suberosa (Roxb.) Thw., Enum. Pl. Zeyl. 398; 1864; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 65. 1872 ; Fl. Gangetic Plain 1: 23. 1903 ; Deb Mitra in B.D. Sharma & al., Fl. India 1: 278. 1993. For. Fl. U.P. 2: 9; FG: 34. *Uvaria suberosa* Roxb., Pl. Cor. t. 34. 1795.

Shrub or evergreen small tree, 3–4 m high. Young branches tomentose. Bark thick, corky, lenticellate and reticulately furrowed, dark-grey; blaze brown and red. Leaves shortly petioled, 3.5–10.0 × 2.0–3.0 cm, oblong-lanceolate, obtuse or acute, glabrous and shining above, pubescent beneath. Flowers c. 1 cm long, bracteates, small, greenish-yellow usually solitary and extra-axillary. Ripe carpels stalked, umbellate, puberulous, red when ripe, 1–2 seeded.

It looks elegant with dark green, glabrous, shining leaves and hence can be grown in gardens for ornamental purposes.

Flowering & Fruiting: June – December.

Rare in the forest.

Specimen examined: Tikri forest, Vineet K. Singh 67582 (BSA).

MENISPERMACEAE

Cissampelos L.

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

Climbing undershrub with striate stems. Leaves peltate, 4–7 × 3.7–5 cm, broadly ovate or suborbicular, at times broader than long, subcordate or truncate at base, obtuse and mucronate at apex, pubescent on the nerves below. Male flowers in axillary cymes; sepals, petals and stamens 4. Female flowers crowded in axils of orbicular, leafy bracts in axillary racemes; sepal and petal 1 each. Drupes 2–3 mm across, subglobose, in the axil of leafy bracts, red when ripe.

Flowering & Fruiting: July – December.

Common in deciduous forests.

Specimens examined: Tikri reserve forest 75611, 75717, 75796, 75725 Vineet K. Singh (BSA).

Cocculus DC., nom. cons.

Cocculus hirsutus (L.) W. Theob. in Mason, *Burmah* ed. 3, 2: 657. 1860; Mabb. in *Taxon* 34: 155. 1985; M. Gangop. in B.D. Sharma & al., *Fl. India* 1: 318. 1993. *Menispermum hirsutum* L., *Sp. Pl.* 341. 1753. *Cocculus villosus* (Lam.) DC., *Syst. Nat.* 525. 1817; Hook.f. & Thomson in Hook.f., *Fl. Brit. India* 1: 101. 1872; Duthie, *Fl. Gangetic Plain* 1: 20. 1903. *Menispermum villosus* Lam., *Encycl.* 4: 97. 1797. *Jaljamani*.

Woody twiner. Young parts covered with densely grey hairs. Leaves variable in size and shape, 2–6 × 1.0–6.0 cm, variable in size and shape usually ovate, densely villous, base cuneate to truncate or hastate, apex obtuse or mucronate. Male flowers in short axillary racemes or panicles; sepals *c.* 1.2 mm long, outer ones oblanceolate, inner broad, obovate, densely hirsute on back, glabrous or hirsute within; petals 6, membranous, deeply 2-lobed and embracing the filaments at base; stamens 6. Female flowers: 2–3, in axillary fascicles; sepals as in males; petals thick and fleshy; ovaries 3, smooth. Drupes purple, compressed globose, *c.* 3 mm across, transversely rugose.

Flowering & Fruiting: September – May.

Common twiner on shrubs and small trees in the forest and sanctuary area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Bahadura Vineet K. Singh 75799 (BSA).

Tiliacora Colebr., nom. cons.

Tiliacora acuminata (Lam.) Hook.f. & Thomson, *Fl. Ind.* 187. 1855; *Menispermum acuminatum* Lam., *Encycl.* 4: 101. 1797. *Tiliacora racemosa* Colebr. in *Trans. Linn. Soc. London* 13: 67, t. 6. 1822; Hook.f. & Thomson in Hook.f., *Fl. Brit. India* 1: 99. 1872; Duthie, *Fl. Gangetic Plain* 1: 27. 1903. *Karwat*.

Woody climbing shrub. Stem striate; branches sparsely puberulous or glabrous. Leaves 5–8 × 4–5 cm, ovate-cordate, acute to acuminate at apex, glabrous, entire; petioles 1–2 cm long. Male flowers 3–6 at apex of inflorescence, yellow; sepals 9, 3 in each whorl, elliptic, glabrous; petals 6, obovate, *c.* 1 mm long; stamens 6, *c.* 2 mm long, free. Female flowers solitary; sepals

and petals as in male; carpels 8–12, *c.* 1.0 mm long. Drupes oblong to obovoid, red when ripe, shiny glabrous.

Flowering & Fruiting: May – December.

Common on shrubs and small trees in the reserve forest area.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67616, 75612, 77254 (BSA).

Tinospora Miers, nom. cons.

Tinospora cordifolia (Willd.) Miers ex Hook.f. & Thomson, Fl. Ind. 1: 184. 1855 & in Hook.f., Fl. Brit. India 1: 97. 1872; Forman in Kew Bull. 36: 403, f. 4 C-E. 1981; A. Pramanik in B.D. Sharma & al., Fl. India 1: 347. 1993; Duthie, Fl. Gangetic Plain 1: 26. 1903; *Menispermum cordifolium* Willd., Sp. Pl. ed. 4, 4: 826. 1806. *Cocculus cordifolius* (Willd.) DC. Syst. Nat. 1: 518. 1824. *Gurach*.

Woody twiner with long pendulous aerial roots. Branches striate or lenticulate, glabrous. Leaves 4–6 × 3–6.0 cm, broadly ovate, base cordate, apex acuminate, glabrous on both surfaces; petiole base twisted, up to 4 cm long. Racemes often much longer than leaves, axillary, terminal or from old wood. Male flowers fascicled, yellow; sepals unequal, outer ones *c.* 1 mm long, ovate-oblong, suborbicular, concave; petals clawed; limb subtrilobed, shorter than the inner sepals. Female flowers solitary; sepals similar to those of males; petals cuneate-oblong, entire. Drupes oblong-obovoid on branched carpophores, subglobose, red when ripe. Seeds white, reniform, warty.

Flowering & Fruiting: August – April.

Common in outskirts of forests on shrubs and trees.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67587, 69788 (BSA).

NYMPHAEACEAE

Nymphaea L., nom. cons.

Nymphaea pubescens Willd., Sp. Pl. 2: 1154. 1799; D. Mitra in B.D. Sharma & al., Fl. India 1: 431. 1993. *N. lotus auct. non L.*, 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 114. 1872, *uterque p.p.*; Duthie, Fl. Gangetic Plain 1: 33. 1903. *N. lotus* var. *pubescens* (Willd.) Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 114. 1872; Duthie, Fl. Gangetic Plain 1: 34. 1903. *Kumuda*.

Aquatic rooted herb. Leaves floating, reniform to orbicular, 10–40 × 10–45 cm, repand to sinuately spinous-dentate, dark green and glabrous above, dull purplish green and velutinous pubescent beneath. Flowers slightly fragrant. Sepals usually ovate-lanceolate, puberulous and green outside, white inside. Petals 10–20; outer ones linear-oblongate. Stamens 25–60; outer ones yellow. Stigmatic appendages yellow, inflexed. Fruits 2–3 cm across. Seeds ellipsoid.

Flowering & Fruiting: August – January.

Common in pond.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Bahadura, Vineet K. Singh 67645 (BSA).

NELUMBONACEAE

Nelumbo Adans.

Nelumbo nucifera Gaertn., Fruct. Sem. Pl. 1: 73, t. 19, f. 2. 1788; D. Mitra in B.D. Sharma & al., Fl. India 1: 441. 1993. *Nelumbium speciosum* Willd., Sp. Pl. 2: 1258. 1799; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 116. 1872; Duthie, Fl. Gangetic Plain 1: 35. 1903. *Kamalgutta*.

Aquatic rooted herb. Leaves flat when floating, cupped when emersed, suborbicular, 25–70 cm across, shallowly notched and apiculate on one side, glabrous and glaucous, dark green above, paler beneath; petioles up to 1.5–2.0 m long, with scattered minute papillae. Flowers fragrant; peduncles up to 2 m long, with scattered minute papillae. Sepals green or pinkish green, concave. Petals 20–25, pink, elliptic, concave. Stamens numerous; outermost ones in double form, staminodial. Receptacles spongy, yellow during anthesis, turning green to dark brown. Seeds dark brown-black when ripe.

Flowering & Fruiting: March – December.

Common in pond.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari Vineet K. Singh 67519, 67665 (BSA).

PAPAVERACEAE

Argemone L.

Argemone mexicana L., Sp. Pl. 508. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 117. 1872; Duthie, Fl. Gangetic Plain 1: 36. 1903; Debnath & M.P. Nayar in B.D. Sharma & al., Fl. India 2: 2. 1993. *Bharbhanda*.

Annual herb, 20–70 cm high, spinescent, with yellow latex. Leaves elliptic-obovate, 5–15 × 2–8 cm, glaucous-green, semi-amplexicaul or cordate at base, pinnatifid, sinuate-lobulate; segments incisodentate, spiny along margins. Flowers sessile, subtended by 2–3 foliaceous bracts. Sepals with acute horn. Petals bright yellow. Capsules oblong, spinous. Seeds many, blackish brown to deep brown, reticulate.

Flowering & Fruiting: February – May.

In wastelands along the pond.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Bahadura, Vineet K. Singh 67616, 75755, 67627 (BSA).

FUMARIACEAE

Fumaria L.

Fumaria indica (Hausskn.) Pugsley in J. Linn. Soc., Bot. 44: 313. 1919; J.L. Ellis & N.P. Balakr. in B.D. Sharma & al., Fl. India 2: 84. 1993. *F. vaillantii* Loisel. var. *indica* Hausskn. in Flora 56: 443. 1873. *F. parviflora* Lam. subsp. *vaillantii* (Loisel.) Hook.f., Fl. Brit. India 1: 128. 1872, *p.p.*; Duthie, Fl. Gangetic Plain 1: 37. 1903.

Herb, 15–25 cm high. Stems grooved. Leaves multifid, decompound, glaucous; pinnae laciniate; ultimate lobules flat, narrowly linear-lanceolate, *c.* 4 × 1 mm, entire, acute. Flowers whitish or pinkish red, in racemes. Sepals lanceolate, caducous. Petals crested at back with ascending spur; upper petal emarginate. Nutlets pale brown, globose, slightly pointed or not, polished, verrucose or rugose.

Flowering & Fruiting: December – March.

Commonly found near cultivated fields of wetland as weeds.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Bahadura, Vineet K. Singh 69727 (BSA).

BRASSICACEAE

Brassica L.

Brassica rapa L. subsp. **campestris** (L.) A.R. Clapham in A.R. Clapham & al., Fl. Brit. Isles, ed. 2. 124. 1962; Hajra & al. in B.D. Sharma & al., Fl. India 2: 138. 1993. *B. campestris* L., Sp. Pl. 666. 1753; Hook.f. & T. Anderson in Hook.f., Fl. Brit. India 1: 156. 1872; Duthie, Fl. Gangetic Plain 1: 45. 1903. *B. rapa* L. var. *campestris* (L.) Peterm., Fl. Lips. 491. 1838. *Sarson*.

Herb, c. 1–1.5 m high. Basal leaves lyrate, bright green, shortly petiolate; upper cauline leaves amplexicaul, glaucous, sessile. Flowers in terminal racemes. Sepals patent. Petals yellow. Stamens 6, didynamous. Fruits linear-cylindric, 5–8 cm long, glabrous. Seeds small, smooth.

Flowering & Fruiting: January – March.

Cultivated as a crop, also found as an escape along the pond.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Bahadura, Vineet K. Singh 77207 (BSA).

Rorippa Scop.

Rorippa indica (L.) Hiern., Cat. Afr. Pl. Welw. 1: 26. 1896 (Addit. & Corr.). *Sisymbrium indicum* L., Mant. 1: 93. 1767. *Nasturtium indicum* DC., Prodr. 1: 139. 1824; Hook.f. & T. Anderson in Hook.f., Fl. Brit. India 1: 134; Duthie, Fl. Gangetic Plain 1:39.1903.

Annual small ascending herb, 10–50 cm high. Stem erect often branched basally and apically. Basal leaves withered by flowering. Radical leaves pinnatifid, lobes toothed, upper leaves lyrate. Raceme ebracteate. Sepals often green or pinkish, ascending, oblong-ovate. Flowers yellow. Pods narrow, cylindrical often curved upward. Seeds reddish brown, ovate-orbicular.

Flowering & Fruiting: February – August.

Rare in moist places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Bahadura, Vineet K. Singh 77211 (BSA).

CAPPARACEAE**Capparis L.**

Capparis zeylanica L., Sp. Pl. ed. 2. 720. 1762; Raghavan in B.D. Sharma & al., Fl. India 2: 298. 1993. *C. horrida* L.f., Suppl. Pl. 264. 1782; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 178. 1872; Duthie, Fl. Gangetic Plain 1: 53. 1903.

Scandent shrub, 2–3 m high, armed with recurved thorns; twigs densely covered with stellate hairs. Leaves ovate-elliptic or lanceolate, 2–4 × 1.5–2.5 cm, acute at apex, cuneate at base, coriaceous, glabrous; petioles pubescent. Flowers fragrant. Sepals subequal. Petals white with reddish spots. Stamens 30–40; filaments cream-coloured. Fruits reddish orange, globose or ellipsoid. Seeds embedded in scarlet pulp.

Flowering & Fruiting: February – October.

In adjoining areas near the pond climbing on bushes.

Specimens examined : Parvati Aranga Wildlife Sanctuary, Near Bhitari Vineet K. Singh 69714, 67668 (BSA).

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; Raghavan in B.D. Sharma & al., Fl. India 2: 317. 1993.

Annual herb, 30–40 cm high, viscid. Stems glandular pubescent. Leaves 3–5-foliolate; petioles c. 5 cm long; leaflets elliptic-oblong or obovate, c. 8 × 5 cm, entire, ciliate along margins. Flowers in corymbiform racemes; bracts foliaceous. Sepals glandular hairy outside. Petals yellow or white. Capsules erect or sometimes curved, terete, linear, 4–8 cm long. Seeds reddish brown to black, reniform.

Flowering & Fruiting: July – November.

Common in wastelands.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Tkri Village Vineet K. Singh 67568, 75615 (BSA).

FLACOURTIACEAE

Flacourtia Comm. ex L'Her.

Flacourtia indica (Burm.f.) Merr., Interpr. Herb. Amboin. 377. 1917; Mitra in B.D. Sharma & al., Fl. India 2: 402. 1993. *Gmelina indica* Burm.f., Fl. Ind. 132, t. 39, f.5. 1768. *Flacourtia sepiaria* Roxb., Fl. Coromandel 1: 48, t. 68. 1796; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 194. 1872. *F. ramontchii* L'Hér., Stirp. Nov. 3: 59, t. 30 & 30 B, 1786; Duthie, Fl. Gangetic Plain 1: 59. 1903. *Katahi*.

Deciduous shrub or small tree, up to 08–10 m high, polymorphous, thorny (simple or branched) at trunk bases in older trees. Leaves variable in shape, size, texture in indumentum, 1.2–4 × 1–3 cm, alternate in young branches, clustered towards apices on older branches, ovate, obovate, broadly elliptic, oblong-elliptic or suborbicular, cuneate, rounded or sometimes subcordate at base, acute, acuminate, obtuse, emarginate or retuse at apex, crenate, serrate or subentire at margins, membranous, chartaceous or subcoriaceous; petioles 2–7 mm long. Flowers in axillary or terminal, bracteate, short, puberulous or pubescent or glabrous racemes or terminating in short, thorny twigs, greenish-yellow or white; pedicels 2–4 mm long, glabrous or pubescent. Sepals 3–4, 0.5–1.0 mm long, ovate or suborbicular, obtuse, hairy inside. Male flowers in short clusters. Female flowers solitary or in pairs; ovary globular or urceolate, c. 1 mm long; styles 3–5, each with faintly 2-lobed stigma or sometimes indistinct with 3–4 sessile stigma at top, radiating, free or slightly connate at base. Berries 5–6 mm across, ellipsoid to subglobose, ribbed, dark purple.

Flowering & Fruiting: February – March.

Frequent in the outskirts of moist and dry deciduous forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77236 (BSA).

POLYGALACEAE

Polygala L.

Polygala arvensis Willd., Sp. Pl. 3(2): 876. 1802; Roxb., Fl. Ind. 3: 218. 1832; R.N. Banerjee in B.D. Sharma & al., Fl. India 2: 460. f. 87. 1993; *P. chinensis sensu* A.W. Benn. in Hook.f., Fl. Brit. India 1: 204. 1872, *p.p. non* L., 1753; *P. chinensis* L. var. *linarifolia sensu* Mukerjee in Bull. Bot. Soc. Bengal 12: 40. 1958, *non* (Willd.) Chodat, 1893. *Maradu*.

Annual erect or diffuse herb, 5–20 cm high. Leaves 1–3 × 0.5–2 cm, suborbicular, obovate or elliptic-oblong, obtuse or mucronate at apex, cuneate at base, margins entire; petioles *c.* 3 mm long. Flowers *c.* 4 mm long, solitary or in axillary or lateral few flowered racemes. Outer sepals 2.0–2.5 mm long, ovate; wing sepals 4–6 mm long, ovate or falcate. Petals yellow; laterals *c.* 3 mm, broadly obovate; keels equal to the laterals, appendages up to 1 mm long. Staminal sheath *c.* 2 mm long; filaments *c.* 2 mm long. Ovary *c.* 1 mm across, obovoid; style curved at apex. Capsules 3–5 × 3–4 mm, ovoid, orbicular or obliquely obcordate, compressed, emarginate at apex, narrowly winged along margins.

Flowering & Fruiting: July – December.

Common in wastelands, grasslands and along forest paths.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75714 (BSA).

CARYOPHYLLACEAE

Spargula L.

Spargula arvensis L., Sp. Pl. 440. 1753; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 243. 1874; Duthie, Fl. Gangetic Plain 1: 67. 1903; Majumdar in B.D. Sharma & al., Fl. India 2: 578.1993.

Annual herb, 10–20 cm high, sparsely glandular-pubescent. Leaves linear, 1–2 × 0.4–0.6 mm, glandular hairy above. Flowers in cymose panicles; bracts scarious. Sepals 5. Petals 5, white. Stamens 5–10. Capsules ovoid, *c.* 6 mm long, 5-valved. Seeds grey-black, sub-globose, *c.* 1.5 mm across, compressed, covered with whitish papillae or not.

Flowering & Fruiting: Throughout the year.

In moist places as a weed.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Tikri Village, Vineet K. Singh 69705 (BSA).

PORTULACACEAE

Portulaca L.

Portulaca oleracea L., Sp. Pl. 445. 1753; Dyer in Hook.f., Fl. Brit. India 1: 246. 1874; Duthie, Fl. Gangetic Plain 1: 69. 1903; M.K.V. Rao in B.D. Sharma & al., Fl. India 3: 4. 1993. *Lonia*.

Herb; stem erect or decumbent. Leaves fleshy, spirally arranged or subopposite, obovate-spathulate 2–5 mm long, with axillary hairs. Flowers 4–15 in capituli, surrounded by bracteoles. Sepals carinate. Petals yellow. Stamens 7–8. Capsules straw-yellow, ovoid, shining. Seeds shining black, reniform, 5–6 mm across.

Flowering & Fruiting: Throughout the year.

Common in moist places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Tikri Village, Vineet K. Singh 67622, 75729 (BSA).

DIPTEROCARPACEAE

Shorea Roxb. ex C.F. Gaertn.

Shorea robusta C.F. Gaertn., Suppl. Carp. 1(1): 48. t. 186. 1805; Dyer in Hook. f., Fl. Brit. India 1: 306. 1874; K. P. Janardh. in B.D. Sharma & al., Fl. India 3: 237. f. 62. 1993. *Sal, Sakhu*.

Tall deciduous trees, 20–40 m high. Leaves 9–25 × 5–10, ovate-oblong, rounded or cordate at base, cuspidate at apex, glabrous, shining; stipules falcate, caducous, pubescent. Flowers yellowish or creamy, in lax, terminal or axillary racemose panicles. Sepals 5, c. 2 mm long, ovate or triangular, pubescent, persistent, enlarging in fruits. Petals 5, 9–12 × 3–4 mm, lanceolate, acuminate, pubescent. Stamens many, much shorter than petals. Ovary globose, pubescent; style persistent in fruits and forming a beak. Fruits 1–1.5 cm long, ovoid, pubescent, with 3 larger and 2 smaller wings.

Flowering & Fruiting: February – June.

Major element of deciduous forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75760 (BSA).

MALVACEAE

Abutilon Mill.

Abutilon indicum (L.) Sweet, Hort. Brit. ed. 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. *Sida indica* L., Cent. Pl. 2: 26. 1756. *Kanghi*.

Herb or undershrub, tomentose, 0.5–1.5 m tall. Leaves ovate, 8–10 × 4–6 cm, acuminate at apex, cordate at base, crenate-dentate, pubescent. Flowers axillary, solitary. Calyx campanulate; lobes apiculate. Corolla yellow-orange. Schizocarps globose, c. 2 cm across; mericarps dorsally and ventrally stellate-hairy, 2–3-seeded. Seeds brownish black, reniform, 1.5–3 mm across, minutely stellate-hairy.

Flowering & Fruiting: August – March.

Common in wastelands near the pond.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67609, 69706 (BSA).

Malvastrum A. Gray, nom. cons.

Malvastrum coromandelianum (L.) Garcke in Bonplandia 5: 295. 1857; T.K. Paul in B.D. Sharma & al., Fl. India 3: 277. 1993. *Malva coromandeliana* L., Sp. Pl. 687. 1753. *Malvastrum tricuspdatum* (R.Br.) A. Gray, Pl. Wright. 1: 16. 1852; Mast. in Hook.f., Fl. Brit. India 1: 321. 1874; Duthie, Fl. Gangetic Plain 1: 79. 1903. *Kharenti*.

Perennial herb, 40–50 cm high. Stems, petioles and pedicels stellate-hairy. Leaves ovate-lanceolate, 3–5 × 1–2 cm, dentate-serrate, pilose above, stellate-hairy beneath; petioles 0.5–2 cm long. Flowers axillary, solitary; epicalyx-segments 4–6 mm long. Calyx-lobes pilose outside. Corolla yellow. Schizocarps globose; mericarps 8–10, reniform, strongly curved, dorsally sharp-edged, 1-seeded. Seeds black, reniform.

Flowering & Fruiting: September – January.

Common in shady habitats and wastelands near the pond.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari Village Vineet K. Singh 67630 (BSA).

Sida L.

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. carpinifolia auct. non* L.f., 1782; Mast. in Hook.f., Fl. Brit. India 1: 323. 1874.

Perennial herb, up to 0.5–1 m tall. Stems pubescent with minute stellate hairs mixed with some simple hairs. Leaves lanceolate or ovate-oblong, 2–4 × 1.2–2.5 cm, subacute at apex,

rounded at base, serrate; petioles 2–5 mm long, pubescent; stipules in pairs, dissimilar. Flowers axillary, solitary. Calyx campanulate, 5-fid; lobes ciliate. Corolla yellow; lobes ciliate at base, sparsely glandular hairy outside. Mericarps 6–10, 2-awned, reticulately rugose. Seeds dark brown, trigonous.

Flowering & Fruiting: August – November.

Common in fields and wastelands near the pond.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67570 (BSA).

Sida cordata (Burm.f.) Borss. in Blumea 14: 182. 1966; T.K. Paul in B.D. Sharma & al., Fl. India 3: 283. 1993. *Melochia cordata* Burm.f., Fl. Indica 143. 1768. *Sida veronicifolia* Lam., Encyl. 1: 5. 1783; Duthie, Fl. Gangetic Plain 1: 80. 1903. *S. humilis* Cav., Diss. 5: t. 134, f. 2. 1788; Mast. in Hook.f., Fl. Brit. India 1: 322. 1874. *S. humilis* var. *veronicifolia* (Lam.) Mast. in Hook.f., Fl. Brit. India 1: 322. 1874. *Bismar.*

Perennial herb, trailing, 20–65 cm tall. Stems, petioles and pedicels pubescent. Leaves ovate to orbicular, 1–4 × 1–3 cm, acuminate at apex, cordate at base, crenate-serrate, hairy; petioles 5–15 mm long; stipules filiform, hairy. Flowers axillary, solitary or in pairs. Calyx campanulate. Corolla yellow. Schizocarps globose, c. 4 mm across; mericarps 5, somewhat tetrahedral, glabrous, 1-seeded. Seeds black, trigonous.

Flowering & Fruiting: August – December.

Rare in fields and wastelands near the pond.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67700, 69755 (BSA).

Sida cordifolia L., Sp. Pl. 684. 1753; Mast. in Hook.f., Fl. Brit. India 1: 324. 1874; Duthie, Fl. Gangetic Plain 1: 82. 1903; K. Paul in B.D. Sharma & al., Fl. India 3: 285. 1993. Fl. Uttar Pradesh 1: 239. 2016. *Bala.*

Undershrub, up to 1–1.5 m high; stem erect, branched, grey-tomentose all over and with long spreading hairs on the branches and petioles. Leaves 2–6 × 1.5–5.5 cm, ovate, ovate-oblong or ovate-orbicular, crenate-serrate, acute or obtuse, base cordate, lateral nerves 4–5 pairs. Flowers yellow; peduncles, axillary solitary or few, jointed near the apex, rarely longer than the petioles and crowded towards the ends of branches. Ripe carpels 7–10, strongly reticulate; awns 2 longer than the calyx.

Flowering & Fruiting: September – December.

Frequently found during rainy season along road-sides in wasteland.

Specimens examined: Tikri reserve forest, Vineet K. Singh 69715, 69784 (BSA).

Sida rhombifolia L., Sp. Pl. 684. 1753 emend. 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.

Perennial herb, 30–50 cm high. Stems, petioles and pedicels covered with minute stellate hairs, ultimately glabrescent. Leaves ovate to oblong, often rhomboid, 2–4 × 1–3 cm, serrate; stipules filiform. Flowers axillary or clustered at the ends of branches. Calyx campanulate. Corolla yellowish. Mericarps 6–12, pubescent with 2 short awns. Seeds black, trigonous.

Flowering & Fruiting: September – December.

Common in fields and wastelands near the pond.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Rest house Vineet K. Singh 69773, 75613 (BSA).

BOMBACACEAE

Bombax L., nom. cons.

Bombax ceiba L., Sp. Pl. 511. 1753; M.P. Nayar & M.C. Biswas in B.D. Sharma & al., Fl. India 3: 398. f. 111. 1993; *B. malabaricum* DC., Prodr. 1: 479. 1824; Mast. in Hook.f., Fl. Brit. India 1: 349. 1874; *Salmalia malabarica* (DC.) Schott & Endl., Melet. Bot. 35. 1832. *Semal*.

Tall deciduous tree, 15–30 m high. Bark greyish-brown, covered with hard, sharp conical prickles. Leaves digitately 5–7-foliolate; petioles 10–15 cm long; leaflets 5–15 × 2–8 cm, ovate or elliptic-lanceolate, glabrous, base acute, apex acuminate; petiolules 1–2 cm long. Flowers red, crowded at ends of defoliated branches; pedicels 1–2 cm long, thick, fleshy. Calyx campanulate, 3–5-lobed; lobes 2–3 cm long, broadly ovate, glabrous outside, silky within. Petals 5, 6–7 cm long, elliptic-obovate. Capsules 10–12 cm long, oblong-ellipsoid, 5-valved. Seeds 4–5 mm across, ovoid, embedded in white silky fibres.

Flowering & Fruiting: February – May.

Common in deciduous forests and along roadsides.

Specimen examined: Tikri reserve forest, Near Forest Rest house Vineet K. Singh 69717 (BSA).

STERCULIACEAE

Helicteres L.

Helicteres isora L., Sp. Pl. 963. 1753; Mast. in Hook.f., Fl. Brit. India 1: 365. 1874, incl. vars.; Duthie, Fl. Gangetic Plain 1: 102. 1903; Malick in B.D. Sharma & al., Fl. India 3: 426. 1993. *Aithan*.

Shrubs or small trees, 3–4 m high; young branches with stellate hairs. Leaves variable, ovate, obovate or suborbicular, 8–12 × 5–8 cm, acuminate at apex, slightly obliquely cordate at base, irregularly dentate, scabrous with thinly scattered stellate hairs above, densely covered with stellate hairs beneath; petioles 1–2 cm long. Flowers axillary, solitary or fascicled. Calyx campanulate, gibbous. Petals red, reflexed. Fruits cylindrical, 5–8 cm long, spirally twisted. Seeds wrinkled.

Flowering & Fruiting: August – February.

In open places near the wetland.

Specimen examined: Tikri reserve forest, Near Forest Rest house Vineet K. Singh 67603 (BSA).

Pentapetes L.

Pentapetes phoenicea L., Sp. Pl. 698. 1753; Mast. in Hook.f., Fl. Brit. India 1: 371. 1874; Duthie, Fl. Gangetic Plain 1: 105. 1903; Malick in B.D. Sharma & al., Fl. India 3: 443. 1993. *Dopahariya*.

Annual herb, c. 1–1.5 m high; stem sparsely stellate-pubescent. Leaves deltoid or hastate-linear, 6–12 cm long, acute at apex, deltoid at base, strongly serrate, glabrous above, stellate-hairy on the veins beneath; petioles 1–2 cm long. Flowers in axillary, 1–2-flowered fascicles; bracteoles filiform. Sepals connate at base. Petals red. Capsules subglobose, c. 1 cm long, stellate-hairy with scattered bristles. Seeds obovate, angular.

Flowering & Fruiting: August – January.

Usually cultivated as ornamental found as an escape near lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75670 (BSA).

TILIACEAE**Corchorus L.**

Corchorus aestuans L., Syst. Nat. ed. 10. 2: 1079. 1759; P. Daniel & Chandrab. in B.D. Sharma & al., Fl. India 3: 485. 1993. *C. acutangulus auct. non* Forssk., 1775: Mast. in Hook.f., Fl. Brit. India 1: 398. 1874; Duthie, Fl. Gangetic Plain 1: 121. 1903. *C. fuscus* Roxb., Fl. Ind. 2: 582. 1832. *Conch.*

Annual herb, c. 40–45 cm high. Stems suberect, often purple. Leaves ovate-lanceolate, 2–5 × 1–4 cm, acute or acuminate at apex, rounded or subcordate at base, serrate, glabrous above, pilose beneath; basal filiform processes present or absent; petioles up to 1.5 cm long; stipules subulate. Flowers 2–3 in leaf-opposed, shortly pedunculate cymes; bracts filiform. Sepals purple-dotted outside, green inside. Petals yellow. Capsules cylindrical, 1–2 cm long, 6-angled, 3 of the angles winged; beaks 3, 2-fid. Seeds dark brown.

Flowering & Fruiting: August – February.

In moist places along the pond.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67662, 75606 (BSA).

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. *Kharenti.*

Annual herb, 40–50 cm high; stem erect. Leaves ovate-lanceolate or linear-lanceolate, 4–8 × 1–2 cm, acuminate at apex, rounded at base, serrate; basal serrations prolonged into filiform processes; petioles 1–3 cm long; stipules up to 1 cm long. Flowers 1–3 in axillary cymes; bracts linear. Sepals purple-dotted outside, green inside. Capsules globose to subglobose, 6–8 mm across, depressed at apex, longitudinally grooved, tuberculate or muricate. Seeds brown.

Flowering & Fruiting: August – December.

In moist places of wastelands.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77299 (BSA).

Triumfetta L.

Triumfetta pentandra A. Rich. in Guill., Perr. & A. Rich., Fl. Seneg. Tent. 93, t. 19. 1831; P. Daniel & Chandrab. in B.D. Sharma & al., Fl. India 3: 519. 1993. *T. neglecta* Wight & Arn., Prodr. Fl. Ind. Orient. 75. 1834; Mast. in Hook.f., Fl. Brit. India 1: 396. 1874; Duthie, Fl. Gangetic Plain 1: 119. 1903; Fl. Uttar Pradesh 1: 281. 2016.

Annual herb or undershrub, 30–60 cm tall. Stems stellate-hairy. Leaves elliptic, rhomboid or rhomboid-ovate, 2–6 × 1.0–5.5 cm, acuminate at apex, cuneate to subcordate at base, irregularly serrate, often shallowly 3-lobed, simple hairy above, stellate-hairy beneath; petioles up to 4 cm long; stipules subulate. Flowers in leaf-opposed, shortly pedunculate cymose clusters arranged in interrupted racemes; bracts linear. Sepals lorate, c. 2 mm long, cucullate, awned, stellate-hairy outside. Petals yellow, spatulate, c. 2 mm long, obtuse. Stamens usually 5. Ovary 2-locular. Capsules ovoid-oblong, tomentose; spines uncinata, with a line of hairs. Seeds obtusely trigonous, smooth, pale brown.

Flowering & Fruiting: September – April.

Common, grows in wastelands and in scrub forest.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67662, 75606 (BSA).

Triumfetta rhomboidea Jacq., Enum. Syst. Pl. 22. 1760; Mast. in Hook.f., Fl. Brit. India 1: 395. 1874; Duthie, Fl. Gangetic Plain 1: 118. 1903; P. Daniel & Chandrab. in B.D. Sharma & al., Fl. India 3: 520. 1993; Fl. Uttar Pradesh 1: 283. 2016. *Lapetua*.

Annual herb, up to 40 cm high; stem erect, pubescent. Leaves variable, rhomboid or ovate-elliptic, 3–6 × 2–4 cm, acute-acuminate at apex, rounded at base, 3-lobed, irregularly serrate, stellate-pubescent; petioles ca 4 cm long, pubescent; stipules subulate. Flowers in axillary or terminal, few-flowered cymes. Sepals apiculate. Petals yellow. Capsules subglobose, c. 4 mm across, white tomentose; spines uncinata, glabrous.

Flowering & Fruiting: August – December.

In wastelands near the pond.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67557, 69796 (BSA)

ZYGOPHYLLACEAE**Tribulus L.**

Tribulus terrestris L., Sp. Pl. 387. 1753; Edgew. & 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; Fl. Uttar Pradesh 1: 291. 2016. *Chota-Gokhru*.

Annual herb; stem prostrate to procumbent or suberect, stem and branches pilose hairy. Leaves opposite, 2–4 cm long, abruptly pinnate; leaflets 8–10 pairs, ovate to elliptic, 2–8 × 2–4 mm, acute or obtuse at apex, oblique at base; stipules subulate to falcate, 2–3 × 1–1.5 mm. Flowers yellow, solitary, axillary or leaf-opposed, c. 1 cm across; pedicels c. 8 mm long. Sepals ovate-lanceolate, 2–3 mm long, acute, hairy. Petals oblong or obovate, 2–4 mm long, with a short hairy claw. Stamens 10; anthers oblong. Ovary 5-locular, hirsute. Schizocarps 8–10 mm across excluding spines; mericarps 4–6 × 3–5 mm, dorsally tuberculate; spines 4 or 2.

Flowering & Fruiting: Throughout the year.

Common, grows on waste places, along roadsides and sandy and gravelly habitats.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67600 (BSA).

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. *Oxalis sensitiva* L., Sp. Pl. 434. 1753. *Chui mui*.

Annual herb, 10–20 cm tall. Stems branched, pubescent. Leaves crowded on the top of stem; leaflets opposite, 6–14 pairs, oblong, 0.4–1.1 × 0.1–0.3 cm, more or less glabrous; rachis c. 12 cm long; petioles short. Peduncles c. 15 cm long, appressed-strigose and patently glandular hairy. Flowers in terminal umbels; bracts lanceolate, small, crowded beneath short pedicels. Sepals ovate-lanceolate, c. 7 mm long, acute, glandular hairy. Petals yellow, lanceolate, c. 7 mm long. Stamens 10. Capsules ellipsoid, 2–3 mm long, covered with persistent calyx. Seeds brown, ovoid.

Flowering & Fruiting: February – September.

Common, grows in moist wet places.

Specimen examined: Tikri reserve forest, Near Railway track, Vineet K. Singh 67602 (BSA).

Oxalis L.

Oxalis corniculata L., Sp. Pl. 435. 1753; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 436. 1874; Duthie, Fl. Gangetic Plain 1: 130. 1903; Manna in Hajra & al., Fl. India 4: 242. 1997. *O. corniculata* L. var. *hispida* Blatt. in J. Bombay Nat. Hist. Soc. 34: 898. 1931. *Tin-patiya*

Perennial herb, caulescent; rhizomes woody. Leaves 3-foliolate, scattered, distant; leaflets broadly elliptic-obcordate, 4–15 × 3–12 mm, glabrous to sericeous above, glaucous beneath; petioles slender, c. 9 cm long, pubescent. Inflorescence pseudo-cymose to pseudo-umbellate; peduncles c. 12 cm long. Flowers 2 or more. Sepals 5. Petals 5, yellow. Capsules linear, 9–11 mm long. Seeds ovoid.

Flowering & Fruiting: November – June.

Common, in large patches along the moist places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67623 (BSA).

RUTACEAE

Aegle Corrêa, nom. cons.

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. *Crateva marmelos* L., Sp. Pl. 444. 1753. *Bel*.

Large tree, deciduous, armed, 10–12 m tall; branchlets armed with sharp, solitary or paired, axillary spines. Bark bluish-grey. Leaves pinnately 3–5-foliolate; leaflets ovate-elliptic, terminal ones c. 11–6 cm; lateral ones c. 6 × 4 cm, acuminate at apex, oblique at base, crenulate-serrulate, membranous to chartaceous, pale green, glandular-punctate; petioles c. 5 cm long, glabrous or puberulous. Inflorescences axillary and terminal, few-flowered, c. 5 cm long racemose or cymose. Petals 4–5, greenish white, ovate-oblong, c. 10 mm long, obtuse, glandular, glabrous. Stamens numerous, 30–35 in irregular 2 or 3 series, free, coherent at base; filaments subulate. Fruits subglobose, 4–10 cm across; pericarp hard, woody, many-seeded. Seeds oblong, flattened, embedded in a sweet, thick, mucilaginous pulp.

Flowering & Fruiting: March – December.

Common, grows along the road side and under forest.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67602, 67614, 77267 (BSA).

Glycosmis Corrêa, nom. cons.

Glycosmis pentaphylla (Retz.) DC., Prodr. 1: 538. 1824, *quoad basionym*; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 343. 1997. *Limonia pentaphylla* Retz., Observ. Bot. 5: 24. 1788. *L. arborea* Roxb., Pl. Coromandel 1: 60, t. 85. 1798. *Glycosmis arborea* (Roxb.) DC., Prodr. 1: 538. 1824. *G. pentaphylla auct. non* (Retz.) DC., 1824: Hook.f., Fl. Brit. India 1: 499. 1875, *p.p.*; Duthie, Fl. Gangetic Plain 1: 136. 1903.

Shrub, 1–2 m high. Leaves pinnate; leaflets 3–5, oblong-elliptic or oblong-lanceolate, 4–12 × 2–4 cm, acuminate at apex, cuneate at base, minutely serrate, coriaceous. Panicles axillary or terminal; peduncles *c.* 10 cm long, rusty pubescent. Flowers in dense clusters; bracteoles 2. Sepals 5, glandular. Petals 5, creamy white. Berries cream to crimson-red when ripe, sub-globose. Seeds green, planoconvex.

Flowering & Fruiting: Throughout the year.

Common under the forest floor.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67619, 69702, 69711 (BSA).

Limonia L.

Limonia acidissima L., Sp. Pl. ed. 2, 1: 554. 1762; Stone & Nicolson in Taxon 27: 551. 1978; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 294. 1997. *Feronia elephantum* Correa in Trans. Linn. Soc. London 5: 224. 1800; Hook.f., Fl. Brit. India 1: 516. 1875; Duthie, Fl. Gangetic Pl. 1: 143. 1903. *F. limonia* (L.) Swingle in J. Wash. Acad. Sci. 4: 328. 1914. *Kaitha*.

Tree, deciduous, 8–13 m tall, bark blackish, deep fissured. Leaflets 2–5 × 1.5–2.0 cm elliptic-obovate. Flowers polygamous in axillary and terminal racemes. Sepals 5, *c.* 1 mm long, triangular. Petals 5, *c.* 4 mm long, oblong, creamy-white. Berrie 5–6 cm across, globose, rind grayish, woody; pulp white, sour.

Flowering & Fruiting: April – February.

Rare, inside the forest area.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75655 (BSA).

Murraya J. Koenig ex L., nom. & orth. cons.

Murraya koenigii (L.) Spreng., Syst. Veg. (ed. 16) 2: 315. 1817; Hook.f., Fl. Brit. India 1: 503. 1875; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 351. 1997; *Bergera koenigii* L., Mant. Pl. 563. 1771. *Chalcas koenigii* (L.) Kurz in J. Asiat. Soc. Bengal 44(2): 132. 1875. *Kadhi patta*.

Shrub or small deciduous tree, 4–5 m high. Leaves 10–20 cm long, pinnate; leaflets 9–18, alternate, 2–4 × 1–2 cm, ovate-lanceolate, oblique at base, shortly acuminate or tapering at apex, margins entire or minutely crenate. Flowers in terminal corymbose panicles, greenish white, fragrant. Calyx cupular, deeply lobed; lobes 5, deltoid, puberulent outside, caducous. Petals 5–8 mm long, linear-oblong, glandular, glabrous. Stamens 10; filaments 5–6 mm long, filiform, dilated at base. Ovary oblong-ovoid, 2-locular. Berries ovoid or ellipsoid, 0.8–1 cm across, purplish-black, 2-seeded.

Flowering & Fruiting: February – July.

Grows near forest rest house.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77272 (BSA).

MELIACEAE

Azadirachta A. Juss.

Azadirachta indica A. Juss. in Mém. Mus. Hist. Nat. 19: 221. t. 13. f. 5. 1830; S.S. Jain & S.S.R. Bennet in Hajra & al., Fl. India 4: 478. 1997. *Melia azadirachta* L., Sp. Pl. 385. 1753; Hiern in Hook.f., Fl. Brit. India 1: 544. 1875; Duthie, Fl. Gangetic Plain 1: 150. 1903. *Melia indica* Brandis, Forest Fl. N. W. India 67. 1874. *Neem*.

Large tree, 10–20 m tall. Leaves pari- or impari-pinnate, 10–40 cm long; leaflets 9–15, opposite or alternate, ovate-lanceolate, 4–5 × 1–1.5 cm, acuminate at apex, prominently oblique at base, coarsely crenate-serrate, glabrous; terminal leaflet often aborted; petiolules 2–3 mm long. Panicles lax. Flowers white, fragrant. Calyx-lobes 5, broad, rounded, united at base. Petals 5, free, oblong-spathulate, c. 5 mm long, spreading, ciliate. Staminal tube mouth pubescent inside. Ovary globose; style terete. Drupes yellow, 1–2 cm long, smooth. Seeds surrounded by a sweet pulp when ripe.

Flowering & Fruiting: February – September.

Common on roadsides and in villages.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69799 (BSA).

Melia L.

Melia azedarach L., Sp. Pl. 384. 1753; Hiern in Hook. f., Fl. Brit. India 1: 544. 1875; Duthie, Fl. Gangetic Plain 1: 151. 1903; S.S. Jain & Bennet in Hajra & al., Fl. India 4: 494. 1997. *Bakain*.

Medium sized tree, upto 5–6 m high; young parts scurfy tomentose, glabrous at maturity. Leaves bipinnate, rarely tripinnate, 30–50 cm long; pinnae 5–8; leaflets 3–7 in each pinna, 2–5 cm long, oblanceolate or ovate-lanceolate or elliptic, oblique at base, acuminate at apex, toothed or lobed at margins. Flowers in lax panicles, 5-merous, lilac, scented. Calyx pubescent outside. Petals 4–5 mm long, linear-oblong or oblanceolate, pubescent outside when young. Drupes ellipsoid or globose, yellow when ripe.

Flowering & Fruiting: March – June.

Planted along roadsides, near houses and found as escape along paths.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69758 (BSA).

CELASTRACEAE**Celastrus L., nom. cons.**

Celastrus paniculatus Willd., Sp. Pl. ed. 4, 1(2): 1125. 1798; 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. f. 18. 2000; *C. dependens* Wall. in Roxb., Fl. India (Carey & Wallich ed.) 2: 389. 1824. *C. multiflorus* Roxb., Fl. India (Carey & Wallich ed.) 2: 389. 1824. *Kankun*.

Scandent shrub; branchlets lenticellate, brown. Leaves 3–6 × 2–4 cm, ovate-oblong or obovate-orbicular, base cuneate, apex shortly acuminate, margins crenate-serrate. Flowers in terminal panicles of 5–8 cm long, often unisexual, 2–3 mm across, 5-merous. Calyx lobes semi-orbicular, ciliate. Petals 3–4 mm long, obovate-oblong, creamy white or greenish white. Stamens *c.* 2.5 mm long. Ovary in female flowers globose; style columnar; stigma 3-lobed. Capsules 0.5–1 cm across, ovoid or globose, yellow, 3-valved, 3–6-seeded. Seeds ellipsoid, brownish, smooth, with fleshy scarlet aril.

Flowering & Fruiting: April – January.

Rare in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75786 (BSA).

RHMNACEAE

Ziziphus Mill.

Ziziphus mauritiana Lam., Encycl. 3(1): 319. 1789; Bhandari & Bhansali in N.P. Singh & al., Fl. India 5: 233. 2000; *Rhamnus jujuba* L., Sp. Pl. 194. 1753. *Ziziphus jujuba* (L.) Gaertn., Fruct. Sem. Pl. 1: 203. 1788, *non* Mill., 1768; M.A. Lawson in Hook. f., Fl. Brit. India 1: 632. 1875. *Baer*.

Large erect shrub or small tree, 3–10 m high; spines solitary or paired, straight or curved. Leaves 3–8 × 2–4 cm, elliptic-ovate, slightly oblique at base, mucronate at apex, entire to serrulate along margins, 3-nerved at base; petioles 0.5–1 cm long. Flowers in axillary cymes or fascicles of 10–15 flowers, greenish yellow, 4–5 mm across; peduncles 1–4 mm long; pedicels 2–4 mm long. Calyx lobes 2–3 mm long, triangular. Petals 1–2 mm long, spatulate. Drupes 1.2–2 cm across, globose or ovoid, glabrous, yellow or orange when ripe.

Flowering & Fruiting: August – March.

Occasional in outskirts of dry deciduous forests and cultivated for fruits.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75659, 77249, 77251 (BSA).

Ziziphus nummularia (Burm.f.) DC., Prodr. 2: 21. 1825; Wight & Arn., Cat. Ind. Pl. 31. 1833 & Prodr. Fl. Ind. Orient. 162. 1834; M.A. Lawson in Hook.f., Fl. Brit. India 1: 633. 1875; Bhandari & Bhansali in N.P. Singh & al., Fl. India 5: 235. 2000; *Rhamnus nummularia* Burm.f., Fl. Indica 61. 1768. *Ziziphus rotundifolia* Lam., Encycl. 3(1): 319. 1789; Duthie, Fl. Gangetic Plain 1: 164. 1903. *Jharberi*.

Straggling shrub, 3–4 m high; branches divaricate, flexuous, pubescent or tomentose when young; spines paired, longer one straight and shorter one hooked. Leaves 1–2 × 0.5–1.5 cm, broadly ovate-orbicular, oblique or rounded at base, acute or obtuse at apex, sharply serrate along margins, tomentose on both surfaces or glabrous above tomentose beneath, 3-nerved at base. Flowers in axillary 10–15 flowered cymes, sessile or shortly peduncled, 2–3 mm across, pale yellow. Drupes 5–7 mm across, globose, glabrous, hard, dark red when ripe, 2-seeded.

Flowering & Fruiting: August – January.

Common in outskirts of forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67558, 69795 (BSA).

Ziziphus oenopolia (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. f. 53. 2000; *Rhamnus oenopolia* L., Sp. Pl. 194. 1753. *Jharberi*.

Straggling armed shrub; young branches rusty tomentose. Leaves 2–6 × 1.5–3 cm, obliquely ovate or elliptic-lanceolate, 3–4-nerved from the oblique base, apex acute, margins entire or sometimes obscurely toothed, glabrous or pubescent above, rusty tomentose on nerves beneath. Flowers in axillary fascicles or paniculate cymes, greenish yellow, 2–3 mm across, pubescent. Drupes 5–7 mm across, globose, shining black when ripe, pulp scanty.

Flowering & Fruiting: May – November.

Common in scrub forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67660, 69782, 75614, 77217 (BSA).

VITACEAE

Ampelocissus Planch., nom. cons.

Ampelocissus latifolia (Roxb.) Planch. in Vigne Amer. Vitic. Eur. 8: 374. 1884 & in A. DC. & C. DC. Monogr. Phan. 5: 370. 1887; B.V. Shetty & P. Singh in N.P. Singh & al., Fl. India 5: 256. f. 58. 2000; *Vitis latifolia* Roxb., Fl. Ind. (Carey & Wallich ed.) 2: 474. 1824; M. A. Lawson in Hook. f., Fl. Brit. India 1: 652. 1875; Duthie, Fl. Gangetic Plain 1: 171. 1903. *Panibel*.

Climbing shrub; branches striate, hollow, glabrous. Leaves 10–15 cm long, orbicular, base deep cordate, apex acute-acuminate, margins serrate, 5–8 nerved, prominent beneath; petioles 5–8 cm long. Flowers in compact 4–5 cm long cymes, reddish-brown, c. 2 mm long; peduncles 4–6 cm long; tendrils 8–10 cm long, branched; pedicels c. 1 mm long. Calyx saucer shaped, small. Petals c. 1.5 mm long, oblong. Berries 5–10 mm across, globose, glabrous, black when ripe.

Flowering & Fruiting: May – November.

Common in outskirts as climber on large bushes.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67661 (BSA).

Cayratia Juss., nom. cons.

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. *Vitis trifolia* L., Sp. Pl. 203. 1753; *Cayratia carnosa* (Lam.) Gagnep. in Notul. Syst. (Paris) 1: 347. 1911. *C. trifolia* var. *cinerea* (Lam.) Gagnep. in Notul. Syst. (Paris) 1: 348. 1911. *C. trifolia* var. *cinerea* (Lam.) Raizada, Duthie's Fl. Upper Gangetic Plain, Suppl. 5: 43. 1976; Duthie, Fl. Gangetic Plain 1: 174. 1903; M.A. Lawson in Hook. f., Fl. Brit. India 1: 654. 1875. *Jangali angoor*.

Climbing herbaceous shrub; branches slender, puberulous or glabrous; tendrils wiry, branched. Leaves 3-foliolate, puberulous-glabrous on both surfaces; petioles 3–4 cm long; terminal leaflets 3–6 × 2–4 cm, obovate-elliptic, cuneate or rounded at base, acute at apex, crenate-serrate along margins; petiolules 0.5–2.0 cm long; lateral leaflets oblique at base. Inflorescences in axillary, 6–10 cm long divaricate cymes, greenish white, 1.5–2.0 mm long; peduncles 4–6 cm long, pedicels 2–3 mm long. Calyx cupular, subentire. Petals *c.* 2 mm long, ovate. Berries 1–1.5 cm across, globose.

Flowering & Fruiting: July – December.

Common in outskirts of the forests and wastelands.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67559 (BSA).

LEEACEAE

Leea Royen ex. *nom cons.*

Leea alata Edgew. in Trans. Linn. Soc. London 20: 36. 1846; M.A. Lawson in Hook.f., Fl. Brit. India 1: 665. 1875; Duthie, Fl. Gangetic Plain 1: 175. 1903; B.D. Naithani in N.P. Singh & al., Fl. India 5: 328. 2000.

Woody shrub, upto 1–2 m high with striate branches. Leaves 1-pinnate; leaflets 10–15 × 3–4 cm, elliptic-oblong or oblong-lanceolate, coarsely and irregularly serrate, acuminate or caudate, base usually rounded, glabrous, lateral nerves 8–12 pairs; stipules caducous. Inflorescence reddish, a dense corymb. Flowers bright red. Calyx *c.* 1.5 mm long, glabrous. Corolla-lobes *c.* 2.0 mm long; staminodial-lobes emarginate. Ovary 6-locular; style *c.* 1 mm long. Berries red, bluish purple when ripe.

Flowering & Fruiting: June – September.

Rare in mixed forest floor.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67659 (BSA).

SAPINDACEAE**Cardiospermum L.**

Cardiospermum halicacabum L., Sp. Pl. 366. 1753; Hiern in Hook.f., Fl. Brit. India 1: 670. 1875; Duthie, Fl. Gangetic Plain 1: 178. 1903; P.C. Pant in N.P. Singh & al., Fl. India 5: 356. 2000.

Annual climbing herb, 2–4 m long. Stem and branches furrowed. Leaves biternate, deltoid or ovate, 3–6 cm long; leaflets ovate or ovate-lanceolate, 3–4.0 × 1–1.5 cm, acute at apex, rounded at base. Flowers white, in axillary cymes. Sepals 4; outer two orbicular, *c.* 2 mm long; inner two oblong-ovate, *c.* 3 mm long, glabrous. Petals rounded, with inflexed appendage. Stamens 8; filaments hairy. Style 3-fid. Capsules pyriform, 1–2 cm across, trigonous, truncate at top, with winged angles. Seeds black, globose, 2–3 mm across, with white aril.

Flowering & Fruiting: February – July.

Climbing on bushes and hedges along the road side.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67666 (BSA).

Schleichera Willd., nom. cons.

Schleichera oleosa (Lour.) Oken in Allg. Naturgesch. 3(2): 1341. 1841; Merr. in J. Arnold Arbor. 31: 284. 1950; P.C. Pant in N.P. Singh & al., Fl. India 5: 384. 2000; *Pistacia oleosa* Lour., Fl. Cochinch. 2: 615. 1790. *Schleichera trijuga* Willd., Sp. Pl. ed. 4, 2: 1096. 1805; Bedd., Fl. Sylv. S. India t. 119. 1871; Hiern in Hook.f., Fl. Brit. India 1: 681. 1875; Talbot, For. Fl. Bombay 1: 335. f. 198. 1909; Duthie, Fl. Gangetic Plain 1: 179. 1903. *Kusum*.

Large deciduous tree, 12–15 m high, densely leafy. Leaves paripinnate, 10–15 cm long; leaflets 3–6, opposite, 5–20 × 3–10 cm, elliptic-oblong or obovate-oblong, base cuneate-subcordate, apex acute or apiculate or obtuse, margins entire; nerves prominent beneath; petioles 3–7 cm long. Flowers in slender pendulous interrupted 8–12 cm long paniced racemes, yellowish green, 2–3 mm across, polygamodioecious. Calyx 4–6-lobed. Petals absent. Disc undulate, flat. Stamens 5–8, inserted within disc. Ovary ovoid, pointed. Drupes 2–3 cm long, ovoid-globose, pointed, smooth or echinate, Seeds 1 or 2, enclosed in pulpy aril.

Flowering & Fruiting: March – September

Common in dry deciduous forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69704 (BSA).

ANACARDIACEAE

Mangifera L.

Mangifera indica L., Sp. Pl. 200. 1753; Hook. f., Fl. Brit. India 2: 13. 1876; Duthie, Fl. Gangetic Plain 1: 189. 1903; D. Chandra & Mukh. in N. P. Singh & al., Fl. India 5: 466. f. 100. 2000. *Aam*.

Large evergreen tree, with dense crown, 10–15 m high. Leaves 8–18 × 4–6 cm, oblong-lanceolate, base narrow, apex acute or acuminate, margins entire, glabrous on both surfaces. Flowers in large terminal panicles, greenish yellow or white, 3–4 mm long, 5-merous. Sepals ovate-oblong, pubescent outside. Petals ovate-oblong, reflexed, with 3 strong orange ridges inside. Disc fleshy, 5-lobed. Ovary glabrous. Drupes of variable size, usually 6–12 cm long, obliquely pyriform or sub-ovoid, fleshy.

Flowering & Fruiting: February – July.

Common in dry deciduous forests and planted for its edible fruits.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69743 (BSA).

Spondias L.

Spondias pinnata (L.f.) Kurz, Prelim. Rep. Forest Pegu App. A. 44 & B. 42. 1875; D. Chandra & Mukh. in N.P. Singh & al., Fl. India 5: 507. f. 113. 2000; *Mangifera pinnata* L.f., Suppl. Pl. 156. 1782. *Spondias mangifera* Willd., Sp. Pl. ed. 4, 2: 751. 1799; Hook. f., Fl. Brit. India 2: 42. 1876; *S. acuminata* Roxb., Fl. Ind. 2: 453. 1832; Hook, f., Fl. Brit. India 2: 42. 1876; Duthie, Fl. Gangetic Plain 1: 190. 1903. *Amra*.

Small tree, 8–15 m high. Leaves pinnate, 20–40 cm long; petioles 5–10 cm long; leaflets 5–15 × 3–7 cm, elliptic-oblong, opposite, base cuneate, slightly oblique, apex acuminate, margins entire or serrate; petiolules 0.5–1 cm long. Flowers in sparingly branched panicles, pinkish green, c. 4 mm across. Calyx lobes triangular. Petals ovate-oblong, acute. Ovary 4–5-locular, globose. Drupes 2–3 cm long, ovoid or ellipsoid, fleshy, yellowish green.

Flowering & Fruiting: April – December.

Occasional in dry deciduous forests also planted and self-sown.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67673 (BSA).

MORINGACEAE**Moringa** Adans.

Moringa oleifera Lam., Encycl. 1(2): 398. 1785; Uniyal in N.P. Singh & al., Fl. India 5: 516. f. 115. 2000; *M. pterygosperma* Gaertn., Fruct. Sem. Pl. 2: 314. t. 147. f. 2. 1791; Hook. f., Fl. Brit. India 2: 45. 1876; Duthie, Fl. Gangetic Plain 1: 192. 1903. *Sehjan*.

Small or medium sized tree, 6–10 m high; young branchlets pubescent. Leaves usually 3-pinnate, 30–45 cm long; leaflets 1–2.0 × 1.0–2 cm, opposite, elliptic-ovate or obovate. Flowers in panicles, 2.5–3 cm across, white, 5-merous. Calyx lobes linear-lanceolate, petaloid, reflexed. Petals narrowly spatulate. Stamens inserted at rim of disc; 5 fertile ones alternating with staminodes, villous at base. Ovary stipitate, hairy. Capsules 30–50 cm long, ribbed, beaked. Seeds trigonous, winged, white.

Flowering & Fruiting: January – May.

Commonly planted near habitations for its edible fruits used as a vegetable.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 75751 (BSA).

FABACEAE**Abrus** Adans.

Abrus precatorius L., Syst. Nat. ed. 12. 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. *Ghumchi, Ratti*.

Perennial, climbing, woody shrub; branches slender, glabrous or finely silky. Leaves paripinnate, 5–8 cm long; leaflets 10–20 pairs, opposite, linear or oblong, 0.8–1.5 × 0.4–0.5 cm, entire, glabrous or sparsely silky beneath. Flowers 1–1.2 cm long, in dense, pedunculate, 2–8 cm long, axillary racemes. Calyx campanulate, c. 3 mm long, truncate, finely silky. Corolla pink or pinkish white, c. 1 cm long. Stamens 9, monadelphous. Pods oblong, 2.5–4 × 1.1–1.4 cm, turgid, with a sharp deflexed beak, 3–6-seeded. Seeds scarlet with a black spot at the hilum, ovoid.

Flowering & Fruiting: August – March.

Common on bushes in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75720 (BSA).

Alysicarpus Desv., nom. cons.

Alysicarpus longifolius (Rottler ex Spreng.) Wight & Arn., Prodr. Fl. Ind. Orient. 233. 1834; Baker in Hook.f., Fl. Brit. India 2: 159. 1876; Duthie, Fl. Gangetic Plain 1: 278. 1903; Sanjappa, Legum. India 79. 1992. *Hedysarum longifolium* Rottler ex Spreng., Syst. Veg. 3: 319. 1826.

Herb, 1–1.5 m high; stem erect, stout, glabrous. Leaves 1-foliolate, oblong or lanceolate, 2–4 × 1–2 cm, obtuse or subacute at apex, sparsely pubescent on both the surfaces. Racemes terminal or axillary, 15–25 cm long; bracts 10–12 mm long. Calyx 6–8 mm long, pubescent; teeth ciliate. Corolla pink or purple. Pods 8–12 × 2–3 mm, moniliform, apiculate, 4–6-jointed, minutely pubescent, reticulately veined. Seeds chocolate-coloured, globose, *c.* 1 mm across.

Flowering & Fruiting: August – December.

Common in grasslands and near cultivated fields.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 75719 (BSA).

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. *Hedysarum vaginale* L., Sp. Pl. 746. 1753. *H. nummularifolium auct. non L.*, 1753: Willd., Sp. Pl. 3: 1173. 1802.

Annual or biennial herb, 20–60 cm high; stem prostrate to procumbent, dwarf or robust. Leaves 1-foliolate, rounded, ovate-oblong or suborbicular, 0.6–3.5 × 0.5–2.0 cm, rounded or apiculate at apex, slightly cordate at base. Racemes 3–6 cm long, 6–12-flowered. Calyx 3–4 mm long; teeth linear, acute, striate. Corolla pinkish, 3–4 mm long. Pods linear, 1.5–2.5 cm long, covered with minute hooked hairs, tetragonous, reticulately veined, pubescent; joints 5–8, turgid. Seeds brown, ellipsoid, *c.* 1.5 mm long, smooth.

Flowering & Fruiting: August – November.

Common on slopes, in rock crevices and waste places.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75721 (BSA).

Butea Roxb. ex Willd., nom. cons.

Butea monosperma (Lam.) Taub. in Engl. & Prantl, Nat. Pflanzenfam. 3(3): 365. 1894; Sanjappa, Legum. India 99. 1992. *Erythrina monosperma* Lam., Encycl. 2: 391. 1786. *Butea frondosa* Roxb. in Asiat. Res. 3: 469. 1792; Baker in Hook.f., Fl. Brit. India 2: 194. 1876; Duthie, Fl. Gangetic Plain 1: 240. 1903. *Palas, Paras*.

Tree, deciduous, 10–12 m high, with crooked trunk. Bark light brown. Leaves pinnately 3-foliolate; leaflets broadly obovate, grey tomentose beneath; terminal one ovate-rhomboid, 10–15 cm long, equally broad, rounded at apex; lateral ones oblique and smaller; petioles 7–10 cm long. Flowers c. 5 cm long, in fascicles on 8–10 cm long racemes, borne on leafless branches. Calyx black velvety; teeth 5, upper 2 connate, lower 3 deltoid. Corolla flame-coloured or scarlet to orange, silky outside; standard 2.5–5 cm long; keels semicircular, beaked. Pods 10–15 × 2–4 cm, stalked, rounded at base, 1-seeded at apex, silky white.

Flowering & Fruiting: February – June.

Common in open waste lands and along the road sides.

Specimens examined: Tikri reserve forest, Vineet K. Singh 69778, 75738 (BSA).

Butea superba Roxb. ex Willd., Sp. Pl. 3: 917. 1802; Baker in Hook.f., Fl. Brit. India 2: 195. 1876; Duthie, Fl. Gangetic Plain 1: 240. 1903; Sanjappa, Legum. India 99. 1992.

Large woody climber, 10–15 m high, with 40–60 cm thick trunk but sometimes branches spreading and partly lying on the ground. Leaves pinnately 3-foliolate; leaflets obovate-rhomboid, 20–50 cm long, retuse at apex; petioles 15–20 cm long. Flowers 4–6.5 cm long, in 20–30 cm long racemes. Calyx campanulate; teeth lanceolate, deltoid, velvety tomentose. Corolla orange-scarlet; standard acute, recurved; wings adnate to recurved, acute keel. Pods 10–15 cm long, narrowed at base, 1-seeded.

Flowering & Fruiting: April – June.

Rare in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75731 (BSA).

Cajanus Adans., nom. et orth. Cons.

Cajanus scarabaeoides (L.) A.Thouars, Dict. Sci. Nat. 6: 617. 1817, '*Cajan scarabaeoide*'; Maesen in Agric. Univ. Wageningen Pap. 85–4: 183, 189. 1985; Sanjappa, Legum. India 103. 1992. *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.

Perennial, climbing or twining herb; Stems slender, much branched, striate, tomentose. Leaves 3-foliolate, c. 5 cm long; rachis 1–2 mm long; leaflets lanceolate, elliptic, ovate or obovate, obtuse and mucronate at apex, pubescent, yellow glandular beneath, lateral ones unequally truncate at base, excurved on margins; stipules ca 1 mm long, acute. Flowers c. 6 mm long, in 2–6-flowered, pedunculate, c. 2 cm long, axillary racemes, bracteate. Calyx campanulate, 6–7 mm long, silky tomentose, lobed; upper lobes connate or bifid, the lowest longest. Petals yellow with maroon venations, glabrous; standard clawed; wings and keels adnate; keels beaked. Pods brown, linear-oblong, beaked, 5-seeded. Seeds reddish brown.

Flowering & Fruiting: September – February.

Common on hedges and bushes in wastelands and scrub forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75680 (BSA).

Crotalaria L., nom. cons.

Crotalaria prostrata Rottler ex Willd., Enum. Hort. Berol. 744. 1809; Baker in Hook.f., Fl. Brit. India 2: 67. 1876; Duthie, Fl. Gangetic Plain 1: 202. 1903; Sanjappa, Legum. India 127. 1992.

Perennial herb, 15–40 cm high; stem diffuse, prostrate or decumbent-ascending, with yellowish brown pubescence. Leaves lanceolate, obliquely-obovate or oblong, 10–30 mm long, obtuse, rounded or mucronate at apex, pubescent, subsessile. Racemes 3–8 cm long, 2–5-flowered; bracts subulate. Calyx 2–4 mm long, silky hairy; teeth linear. Corolla yellow, scarcely exerted. Pods oblong, 10–12 mm long, glabrous, 15–20-seeded. Seeds subreniform.

Flowering & Fruiting: October – January.

Rare in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77248 (BSA).

Crotalaria spectabilis Roth, Nov. Pl. Sp. 341. 1821; Sanjappa, Legum. India 130. 1992. *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.

Annual herb or undershrub; stem erect, glabrous, 1–2.5 m high; branches striate. Leaves obovate-cuneate or oblong-lanceolate, 5–15 cm long, mucronate at apex, glabrous above, silky beneath; stipules foliaceous, ovate, acuminate at apex, cordate at base. Racemes terminal, 15–50 cm long, 25–35-flowered; pedicels 10–20 mm long; bracts ovate-cordate, 10–15 mm long, deflexed. Calyx 8–10 mm long, glabrous; teeth lanceolate, longer than tube. Corolla yellow, streaked with purple at base, 15–20 mm long. Pods oblong, 2.5–5 cm long, glabrous, sessile, 20–30-seeded. Seeds blackish, reniform, 4–5 mm long.

Flowering & Fruiting: October – February.

Common along the road sides and in waste places.

Specimens examined: Tikri reserve forest, Vineet K. Singh 77221, 75696 (BSA).

Dalbergia L.f., nom. cons.

Dalbergia sissoo Roxb., Fl. Ind. 3: 223. 1832; Baker in Hook.f., Fl. Brit. India 2: 231. 1876; Duthie, Fl. Gangetic Plain 1: 264. 1903; Sanjappa, Legum. India 140. 1992. *Sheesham*.

Large, deciduous tree. Bark grey or light brown, longitudinally furrowed, exfoliating in narrow strips; blaze light brown, turning to dark brown on exposure. Leaves imparipinnate; petioles 5–10 cm long, zig-zag. Leaflets 3–5, alternate, distant, 2–5 × 1.5–4 cm, terminal largest, sub-orbicular or rhomboid, entire, abruptly acuminate, base narrowed or cuneate, glabrescent, secondary nerves very fine; petioles 0.5–1.0 cm, long, glandular at the base. Flowers pale-white in short axillary panicles. Stamen 9, monadelphous. Pods 3–4 × 0.5–1 cm, strap-shaped, pale-brown, long stalked, apiculate, cuneate at the base, glabrous. Seeds 1–3 dark brown.

Flowering & Fruiting: February – July.

Frequent in forest.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67612 (BSA).

Desmodium Desv., nom. cons.

Desmodium gangeticum (L.) DC., Prodr. 2: 327. 1825; Baker in Hook.f., Fl. Brit. India 2: 168. 1876 incl. var. *maculatum* (L.) Baker; Duthie, Fl. Gangetic Plain 1: 286. 1903; Sanjappa, Legum. India 153. 1992. *Hedysarum gangeticum* L., Sp. Pl. 746. 1753. *H. maculatum* L., Sp. Pl. 746. 1753. *Desmodium maculatum* (L.) DC., Prodr. 2: 327. 1825.

Perennial herb or undershrub, 60–120 cm high; stem erect, ascending or prostrate, slightly angular; branches appressed hairy. Leaves 1-foliolate; leaflets ovate-oblong to lanceolate, 4–15 × 2–8 cm, acute or acuminate at apex, rounded or subcordate at base, glabrous above, appressed pubescent beneath; petioles 0.8–2.0 cm long; stipules subulate. Flowers in axillary and terminal, paniculate, 10–35 cm long racemes; bracts setaceous. Calyx 4–5 mm long, pubescent; teeth lanceolate. Corolla white, pink or purplish, 5–6 mm long. Pods 10–20 mm long, curved, 6–8-jointed, deeply incised along lower suture, covered with minute hooked hairs. Seeds c. 1.5 mm across.

Flowering & Fruiting: August – December.

Common in mixed forests, grassy fields and waste lands.

Specimens examined: Tikri reserve forest & Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67503, 67617, 69767 (BSA).

Desmodium pulchellum (L.) Benth., Fl. Hongk. 83. 1861; Baker in Hook.f., Fl. Brit. India 2: 162. 1876; Duthie, Fl. Gangetic Plain 1: 283. 1903; Sanjappa, Legum. India 160. 1992. *Hedysarum pulchellum* L., Sp. Pl. 747. 1753. *Dicerma pulchellum* (L.) DC. in Ann. Sci. Nat. (Paris) 4: 236. 1825. *Phyllodium pulchellum* (L.) Desv. in J. Bot. 2, 1: 124, t. 5, f. 24. 1813.

Undershrub or shrub, 1–2 m high; stem erect, much branched; branches 3-gonous, appressed hairy. Leaves 3-foliolate; leaflets ovate or elliptic-lanceolate, obtuse or mucronate at apex, rounded at base, glabrous above, appressed hairy beneath; terminal leaflets 6–12 × 2–4 cm; lateral leaflets smaller than terminal; petioles 5–10 mm long; stipules 4–5 mm long, deltoid, acuminate. Flowers in terminal or axillary, 10–40 cm long racemes, composed of 2–6-flowered umbellules, each umbellule subtended and enclosed by a persistent leaf-like bract; bracts appressed pubescent. Calyx c. 3 mm long, hairy; teeth lanceolate. Corolla white or pale yellow, c. 4 mm long. Pods, 1–2-jointed, constricted on both sutures.

Flowering & Fruiting: September – February.

Common along the forest road sides and in forest clearings.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75602, 75642, 77223 (BSA).

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. *Hedysarum triflorum* L., Sp. Pl. 749. 1753. *Desmodium triflorum* var. *minus* and var. *villosum* Wight & Arn., Prodr. Fl. Ind. Orient. 229. 1834.

Perennial, caespitose, trailing, creeping or prostrate herb; stems patently hairy, often rooting at nodes. Leaves small, 3-foliolate, 1.2–1.5 cm long; leaflets obcordate or obovate, 4–6 × 3–5 mm, retuse or mucronate at apex, cuneate at base, glabrous above, appressed hairy beneath; stipules ovate-lanceolate, 2–3 mm long, acuminate. Flowers 1–5 together in axillary fascicles. Calyx 3.5–4 mm long, pubescent; teeth longer than tube. Corolla pink or white, 4–5 mm long, scarcely exerted; standard retuse; wings and keels shorter than standard. Pods c. 1.5 cm long, curved, on filiform pedicels; joints 2–5, reticulate-veined, indented on lower sutures, glabrous or hairy. Seeds pale brown, c. 2 mm long.

Flowering & Fruiting: September – December.

Common in grassy fields and scrub forests.

Specimens examined: Tikri reserve forest & Parvati Aranga Wildlife Sanctuary Vineet K. Singh 69764, 75773 (BSA).

Flemingia Roxb. ex W.T. Aiton, nom. cons.

Flemingia chappar Buch.-Ham. ex Benth. in Miq., Pl. Jungh. 244. 1852; Baker in Hook.f., Fl. Brit. India 2: 227. 1876; Duthie, Fl. Gangetic Plain 1: 217. 1903; Sanjappa, Legum. India 175. 1992. *Moghania chappar* (Buch.-Ham. ex Benth.) Kuntze, Revis. Gen. Pl. 1: 199. 1891.

Shrub, 1.5–2.5 m high, erect; young parts and petioles rusty pubescent. Leaves simple, suborbicular, 5–10 cm across, acuminate or cuspidate at apex, cordate at base, glabrous above, rusty pubescent along the nerves beneath. Flowers in axillary racemes or panicles; bracts reddish brown when mature, 2–3 × 3–3.5 cm, secund, membranous, strongly veined. Calyx 3–4 mm long; teeth lanceolate, hairy, gland-dotted. Corolla white, 8–10 mm long, exerted. Pods 6–10 mm long, covered with bright red glands.

Flowering & Fruiting: February – May.

Common as ground flora in Sal Forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 77261, 75688, 75758 (BSA).

Flemingia paniculata Wall. ex Benth. in Miq., Pl. Jungh. 245. 1852; Baker in Hook.f., Fl. Brit. India 2: 227. 1876; Duthie, Fl. Gangetic Plain 1: 217. 1903; Sanjappa, Legum. India 177. 1992. *Moghania paniculata* (Wall. ex Benth.) H.Li. in Amer. J. Bot. 31: 277. 1944.

Shrub, 1–1.5 m high, erect; branches slender, pubescent. Leaves simple, ovate or ovate-lanceolate, 7–12 × 3–5 cm, acute, acuminate or cuspidate at apex, cordate at base, glabrous except on nerves beneath; glands inconspicuous; stipules linear-lanceolate, 5–8 mm long, scarious. Racemes axillary or terminal, paniculate or fascicled, up to 10 cm long, tomentose; bracts cymbiform, pilose. Calyx 3–4 mm long, tomentose; teeth lanceolate, acuminate. Corolla purple or pink, exserted. Pods oblong, 10–12 mm long, pubescent, 2-seeded.

Flowering & Fruiting: February – March.

Common in damp and shady places of sal forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69747 (BSA).

Flemingia strobilifera (L.) Aiton & W.T.Aiton, Hortus Kew. ed. 2, 4: 350. 1812; Baker in Hook.f., Fl. Brit. India 2: 227. 1876; Duthie, Fl. Gangetic Plain 1: 216. 1903; Sanjappa, Legum. India 178. 1992. *Hedysarum strobiliferum* L., Sp. Pl. 764. 1753. *Zornia strobilifera* Pers., Syn. Pl. 2: 319. 1806. *Hedysarum bracteatum* Roxb., Fl. Ind. 3: 351. 1832. *Flemingia bracteata* (Roxb.) Wight, Icon. Pl. Ind. Orient. 1: 14, t. 268. 1840.

Shrub, much branched, 1–2 m high, erect; young branches pubescent. Leaves simple, oblong to ovate-lanceolate, 8–10 × 3–6 cm, acute at apex, rounded at base, thinly pubescent above, silky pubescent and gland-dotted below; stipules 4–8 mm long. Flowers in axillary and terminal, 7–10 cm long racemes or panicles; bracts ovate, 1.5–2.5 cm long, cordate, pubescent, enclosing 2 or more flowers. Calyx c. 5 mm long; teeth longer than tube. Corolla pale yellow with red streaks. Pods oblong, 5–10 mm long, densely pubescent, 2-seeded.

Flowering & Fruiting: September – March.

Common in Sal Forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75705, 77262 (BSA).

Indigofera L.

Indigofera astragalina DC., Prodr. 2: 228. 1825; Sanjappa, Legum. India 185. 1992. *I. hirsuta auct. non L.*, 1753; Baker in Hook.f., Fl. Brit. India 2: 98. 1876, *p.p.*; Duthie, Fl. Gangetic Plain 1: 254. 1903, *p.p.*

Annual herb, 50–120 cm high; stems erect, branched, stem and branches covered with brown stiff hairs. Leaves 7–9-foliolate, 8–12 cm long; leaflets opposite, oblong to obovate, elliptic or elliptic-oblong, 1–4 × 1–2 cm, mucronate at apex, pubescent on both the surfaces; stipules linear to filiform. Racemes axillary, 8–12 cm long; rachis hirsute, densely many-flowered; pedicels 1–2 mm long; bracts pilose. Calyx 2–3 mm long, plumose; lobes linear, divided almost to the base. Corolla light pink to brick red, 3–4 mm long. Pods subquadrangular, 10–15 × 3–5 mm, reflexed, apiculate, hirsute, 3–6-seeded. Seeds brown, tetragonous, pitted.

Flowering & Fruiting: August – September.

Common in grassy fields and along the forest road sides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69779 (BSA).

Indigofera trifoliata L., Cent. Pl. 2: 29. 1756; Baker in Hook.f., Fl. Brit. India 2: 96. 1876, *p.p.*; Duthie, Fl. Gangetic Plain 1: 251. 1903; Sanjappa, Legum. India 196. 1992.

Perennial herb or undershrub, 30–50 cm long, erect or trailing, much branched; branches covered with appressed white hairs. Leaves digitately 3-foliolate; leaflets obovate to obovate-oblong, 10–25 × 8–10 mm, rounded to obtuse at apex, cuneate to obtuse at base, glabrous above, densely appressed hairy and brownish orange or black gland-dotted beneath; petioles 6–10 mm long; stipules narrowly triangular, hairy outside. Racemes globose, 5–8 mm across, densely 6–20-flowered, sessile. Calyx 1.8–3.0 mm long, pubescent; teeth longer than cup. Corolla pink or red, 4–5 mm long; standard densely brown hairy and gland-dotted on the back. Pods deflexed, linear, 10–15 mm long, tetragonous, apiculate, broadly winged along sutures, 5–7-seeded. Seeds reddish brown, ellipsoid, *c.* 1 mm long.

Flowering & Fruiting: July – November.

Common in open forests and along the road sides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75715 (BSA).

Lathyrus L.

Lathyrus odoratus L., Sp. Pl. 732. 1753; Sanjappa, Legum. India 201. 1992.

Annual climbing herb; stem glabrescent, winged. Leaves paripinnate; leaflets 2, ovate-oblong or elliptic, 2–4 × 1.5–2.5 cm, glabrous above, hairy along the veins beneath; petioles 1–2.5 cm long; stipules falcate, 1.5–2.0 cm long, auricled at base. Flowers 2–3 on short pedicels, 3–4 cm long. Calyx c.1 cm long, cleft halfway down. Corolla white, pink or purple, 2–3 cm long. Pods 4–6 cm, slightly curved, pubescent, 6–8-seeded.

Flowering & Fruiting: January – March.

Commonly found near cultivated field of wetland area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 69722 (BSA).

Lathyrus sativus L., Sp. Pl. 730. 1753; Baker in Hook.f., Fl. Brit. India 2: 179. 1876; Duthie, Fl. Gangetic Plain 1: 260. 1903; Sanjappa, Legum. India 202. 1992.

Annual trailing herb, 20–50 cm long; Stem branched, glabrous, winged. Leaves paripinnately compound, ending in 3-partite tendrils; leaflets 2, linear-lanceolate, 2–5 × 0.5–1 cm, acuminate at apex, entire; stipules lanceolate, semi-sagittate. Flowers solitary, axillary on a long peduncle. Calyx 3–8 mm long; teeth unequal. Corolla blue, 10–20 mm long. Pods 2–4 × 1–1.2 cm, compressed, winged on the back, 3–5-seeded. Seeds brownish, c. 5 mm across, compressed.

Flowering & Fruiting: January – March.

Common in cultivated fields and sometimes cultivated as fodder crop.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 69709 (BSA).

Medicago L., nom. cons.

Medicago polymorpha L., Sp. Pl. 779. 1753 emend. Shin. in Rhodora 58: 5. 1956; Sanjappa, Legum. India 210. 1992. *M. hispida* Gaertn., Fruct. Sem. Pl. 2: 349. 1791. *M. lappacea* Desr. in Lam., Encycl. 3: 637. 1792. *M. denticulata* Willd., Sp. Pl. 3: 1414. 1802; Baker in Hook.f., Fl. Brit. India 2: 90. 1876; Duthie, Fl. Gangetic Plain 1: 211. 1903.

Annual herb, 20–25 cm high; stems prostrate or decumbent-ascending, glabrous. Leaves 3-foliolate; leaflets obovate, 7–10 × 4–8 mm, slightly emarginate, mucronate at apex, cuneate at base; petioles 0.5–1.5 cm long; stipules lacinate, segments linear. Flowers yellow, 3–4 mm long, 1–3 on short pedunculate racemes. Calyx 1.5–2.5 mm long, divided half way down, hairy on the back in upper part. Corolla yellow, 3–5 mm long. Pods subglobose, *c.* 5 × 5 mm, coiled 2–3 times, armed with hooked projections, many-seeded. Seeds reddish brown, reniform, *c.* 3 mm long.

Flowering & Fruiting: January – March.

Common in cultivated fields and moist waste places along the wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 69723 (BSA).

Melilotus Mill.

Melilotus indica (L.) All., Fl. Pedem. 1: 308. 1785; Duthie, Fl. Gangetic Plain 1: 208. 1903; Sanjappa, Legum. India 211. 1992. *Trifolium melilotus-indica* L., Sp. Pl. 765. 1753. *Melilotus parviflora* Desf., Fl. Atlant. 2: 192. 1799; Baker in Hook.f., Fl. Brit. India 2: 89. 1876.

Annual herb, 25–40 cm high; stem erect, slender, much branched, stem and branches sparsely hairy. Leaves 3-foliolate; leaflets obovate-oblongate, 0.5–2.0 × 0.3–1.1 cm, dentate in the upper part, glabrous except on midrib beneath; petioles 2–3 cm long; stipules 3–6 mm long, oblique at base, acute. Flowers 2–4 mm long, in 2–5 cm long, dense racemes. Calyx *c.* 2 mm long, divided less than halfway down. Corolla yellow, 2–3 mm long. Pods ovoid-ellipsoid, 2–3 mm long, apiculate, 1-seeded, glabrous. Seeds brown, ovoid, *c.* 2 mm long, compressed, smooth.

Flowering & Fruiting: December – March.

Common as weed in cultivated fields near wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha, Vineet K. Singh 69724 (BSA).

Mucuna Adans., nom. cons.

Mucuna pruriens (L.) DC., Prodr. 2: 405. 1825; Baker in Hook.f., Fl. Brit. India 2: 187. 1876; Duthie, Fl. Gangetic Plain 1: 237. 1903; Sanjappa, Legum. India 217. 1992. *Dolichos pruriens* L. in Stickman, Diss. Herb. Amb. 23. 1754.

Slender wide spreading climbers, annual; young branches pubescent. Leaves 3-foliolate; leaflets obovate or rhomboid-ovate, 5–10 × 3–8 cm, entire, glabrescent above, densely grey silky beneath; lateral leaflets obliquely acute or acuminate; petioles 10–15 cm long; stipules subulate. Racemes axillary, 15–25 cm long. Flowers 25–45 mm long. Calyx 1.5–1.8 cm long, bristly, cleft halfway down. Corolla purple; standard 2–3 cm long; wings shorter than keel. Pods 5–6 cm long, densely covered with brown, stinging hairs, 5–6-seeded. Seeds dark brown, ellipsoid, c.1 cm long, compressed, smooth.

Flowering & Fruiting: September – January.

Common on hedges and in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77215 (BSA).

Pongamia Vent.

Pongamia pinnata (L.) Pierre, Fl. Forest. Cochinch. t. 385. 1899; Sanjappa, Legum. India 230. 1992. *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. *Karanja*.

Tree, 8–12 m high; branches glabrous, spreading and forming dense canopy. Bark smooth, striated. Leaves imparipinnate, 7–20 cm long; leaflets 5–7, ovate or oblong, 4–8 cm long, acute or acuminate at apex, obtuse at base. Flowers in pedunculate, axillary racemes. Calyx 3–4 mm long, brown pubescent, subtruncate, obscurely dentate. Corolla white with pink tinge, c.1.2 cm long; standard silky, appendiculate at base, shortly clawed; wings adnate to the keel. Stamens monadelphous. Pods obliquely oblong, 3–4 cm long, woody, glabrous, shortly beaked, 1–2-seeded. Seeds dirty white with brown streaks, reniform.

Flowering & Fruiting: April – February.

Commonly planted along the roadsides in the forest area and in wastelands.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75777 (BSA).

Sesbania Scop., nom. cons.

Sesbania bispinosa (Jacq.) W.Wight in U.S. Deptt. Agr. Bur. Pl. Indust. Bull. 137: 15. 1909; Sanjappa, Legum. India 242. 1992. *Aeschynomene bispinosa* Jacq., Icon. Pl. Rar. 3: 13, t. 564. 1792. *A. aculeata* Schreb. in Nov. Act. Cur. 4: 134. 1770. *Sesbania aculeata* (Willd.) Poir.

in Lam., Encycl. 7: 128. 1806 as *Sesbania aculeatus* nom. illeg.; Baker in Hook.f., Fl. Brit. India 2: 114. 1876; Duthie, Fl. Gangetic Plain 1: 242. 1903.

Annual or biennial, prickly herb up to 2–3 m high. Leaves paripinnate, 20–30 cm long; rachis muricate or prickly; leaflets 20–80 linear, 5–20 mm long, obtuse-apiculate, glabrous above, sparsely hairy along margins and nerves beneath; stipules linear-lanceolate, 6–8 mm long. Racemes 8–12 cm long, 3–10-flowered; peduncles and pedicels often aculeate. Calyx 3–5 mm long; teeth pubescent along margins. Petals yellow with black or red margins outside; standard wedge-shaped, truncate. Pods linear, slightly falcate, 15–20 cm long, septate, beaked, 30–40-seeded. Seeds brown.

Flowering & Fruiting: September – January.

Common in cultivated fields and along the road sides in water-logged areas.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha, Vineet K. Singh 75623 (BSA).

Tephrosia Pers., nom. cons.

Tephrosia purpurea (L.) Pers., Syn. Pl. 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. *Cracca purpurea* L., Sp. Pl. 751. 1753. *Panisirka*, *Sarpokha*.

Perennial herb, up to 0.5–1 m high. Stems erect or spreading, much branched, glabrous or puberulent. Leaves imparipinnate, 7–13 cm long; leaflets 9–20, elliptic to oblong or obovate, 18–20 × 5–10 mm, obtuse to emarginate, truncate or mucronate at apex, acute or cuneate at base, glabrous above, silky beneath; stipules linear to deltoid, subulate, c. 3 mm long. Flowers in leaf-opposed, 10–12 cm long racemes, sometimes also with a few flowers in the upper leaf axils; pedicels 3–4 mm long; bracts filiform, c. 2 mm long. Calyx c. 3 mm long, pubescent; teeth acuminate. Corolla pink-red to purple, 6–8 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 the year.

Common along the roadsides and in open waste places.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67625 (BSA).

Trifolium L.

Trifolium tomentosum L., Sp. Pl. 771. 1753; Raizada, Suppl. Fl. Gangetic Plain 60. 1976; Sanjappa, Legum. India 26. 1992.

Annual herb. Stem diffuse, glabrous subcylindrical, striate, decumbent below, ascending upwards. Leaves 3-foliolate; leaflets obovate, 1–2 × 1–1.5 cm, retuse at apex, rounded, subtruncate, cuneate or acute at base, denticulate-dentate, subsessile; petioles 2–6 mm long; stipules 10–15 mm long. Flowers subsessile, in axillary, pedunculate, globose heads, 4–6 mm across; peduncles 8–10 mm long, recurved in fruit. Calyx 2.5–3 mm long, 5-toothed; upper 2 calyx-teeth subulate, connate at base; lower 3 lanceolate, acute. Corolla purplish, 4–5 mm long, hairy at the back; standard obovate, slightly notched. Pods ovoid-ellipsoid, 2-seeded, enclosed in inflated calyx, with upper calyx-teeth incurved and hidden, hairy.

Flowering & Fruiting: November – March.

Common in waste places and as a weed in agricultural fields near wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha, Vineet K. Singh 69772 (BSA).

Uraria Desv.

Uraria picta (Jacq.) Desv. ex DC., Prodr. 2: 324. 1825; Baker in Hook.f., Fl. Brit. India 2: 155. 1876; Duthie, Fl. Gangetic Plain 1: 273. 1903; Sanjappa, Legum. India 268. 1992. *Hedysarum pictum* Jacq., Collectanea 2: 262. 1788.

Perennial, suffruticose herb or undershrub, 0.8–1.5 m high. Stems erect, cylindrical, finely downy. Lower leaves 1–3-foliolate, upper ones 4–9-foliolate; rachis 10–12 cm long; leaflets linear-lanceolate, 3–15 × 0.5–3 cm, rigidly coriaceous, excurved on margins, glabrous above, minutely pubescent beneath, with a median glaucous band on the upper surface; petioles 2–5 cm long; stipules lanceolate, 0.5–1.5 cm long. Flowers c. 15 mm long, in cylindrical, 20–30 cm long racemes; pedicels 5–15 mm long, bristly, abruptly recurved at tip; bracts brown, scarious. Calyx bilipped, c. 5 mm long; lobes cordate, acuminate, hirsute. Corolla violet or purple, 6–7 mm long, slightly exerted; standard with two yellow spots. Pods 6–8 mm long, glabrous, 3–6-jointed, folded in one another. Seeds shining white.

Flowering & Fruiting: August – January.

Common as ground flora in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69800 (BSA).

Zornia J.F. Gmel.

Zornia gibbosa Span. in Linnaea 15: 192. 1841; Mohlenbr. in Webbia 16: 139. 1961; Sanjappa, Legum. India 280. 1992.

Annual herb; stem erect or prostrate, much branched; branches thin, wiry, 10–25 cm long. Leaves digitately 2-foliolate; leaflets lanceolate, 7–15 × 3–7 mm, acute, entire, glandular punctate. Flowers nearly sessile, in erect, axillary, 3–12-flowered racemes; each pair almost enclosed in a pair of leafy bracts. Calyx 3–4 mm long; teeth subequal. Corolla yellow, 6–7 mm long, exserted; standard broad; keel acute, incurved. Stamens monadelphous. Pods protruding from the bracts, 0.8–1.4 × 0.2 cm, densely prickly, flat, 2–6-jointed. Seeds yellowish brown, sub-reniform, c. 1 mm long.

Flowering & Fruiting: August – December.

Common in open fields, along roadsides preferably in wet and shady habitat.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha, Vineet K. Singh 75716 (BSA).

CAESALPINIACEAE**Bauhinia** L.

Bauhinia racemosa Lam., Encycl. 1: 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. parviflora* Vahl, Symb. Bot. 3: 55. 1794. *Piliostigma racemosa* (Lam.) Benth. in Miq., Pl. Jungh. 262. 1852.

Small tree, deciduous, 3–6 m high, with a short unbranched trunk and spreading crown. Bark dark brown, rough with vertical cracks. Leaves broader than long, 2–4 × 2.5–5.5 cm, divided 1/3 to 1/2 way down into two lobes, rounded at apex, usually cordate at base, glabrous above, hairy beneath. Flowers in terminal or leaf-opposed, up to 10 cm long racemes; rachis hairy. Calyx spathaceous, up to 6 mm long, reflexed. Petals white, oblanceolate, 9–12 mm long, narrow, acute. Stamens 10, all fertile; filaments hairy at base. Pods linear-oblong, 13–16 × 1.4–1.6 cm, turgid, falcate, with c. 1.5 cm long tip. Seeds up to 15, black, oblong, 6–7 mm long, compressed.

Flowering & Fruiting: April – March.

Common in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75693 (BSA).

Bauhinia vahlii Wight & Arn., Prodr. Fl. Ind. Orient. 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. racemosa* Vahl, Symb. Bot. 3. 56, t. 62. 1794, *non* Lam., 1785. *Phanera vahlii* (Wight & Arn.) Benth. in Miq., Pl. Jungh. 263. 1852. *Mahurayan*.

Large woody climbers; branches rusty brown tomentose; branchlets terminating in a pair of revolute tendrils. Leaves alternate, almost orbicular, broader than long, up to 30–40 cm across, lobed at apex, cordate at base, glabrescent above, densely tomentose beneath, 11–13-nerved; petioles 7–13 cm long. Flowers in long pedunculate, terminal, corymbose or subcorymbose, densely hairy racemes. Calyx 3–5-lobed, *c.* 6 mm long, splitting into 2–3 parts, densely villous. Petals 5, white, buff with age, spatulate, 2–4 cm long, shortly clawed, hairy outside. Stamens 3. Pods woody, 20–25 × 4–6 cm, rusty velvety, 6–12-seeded. Seeds dark brown, flat, compressed, polished.

Flowering & Fruiting: April – February.

Rare in mixed and Sal forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69745 (BSA).

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. candida* Aiton, Hort. Kew. 2: 49. 1789. *Phanera variegata* (L.) Benth. in Miq., Pl. Jungh. 262. 1852. *Kachnar*.

Small to medium-sized tree, 4–6 m high; branches hairy. Bark dark brown, smooth. Leaves slightly broader than long, 5–12 cm long, divided 1/3 way down, cordate at base, 9–15-nerved; lobes obtuse. Flowers few in lateral corymbose, pubescent racemes; bracts deltoid. Calyx 5-dentate, *c.* 2.0 cm long, tomentose. Petals white or pale purple, one petal darker with purple veins, obovate, 4–6 cm long; claw broader. Stamens 5; staminodes absent. Pods dark brown, 15–20 × 1–2 cm, flat, 10–15-seeded. Seeds brown, ellipsoid.

Flowering & Fruiting: September – April.

Common in mixed forests.

Specimen examined: Tikri reserve forest, Near forest rest house, Vineet K. Singh 69759 (BSA).

Caesalpinia L.

Caesalpinia bonduc (L.) Roxb., Fl. Ind. 2: 362. 1832 p.p. excl. pl. descr. emend. Dandy & Exell in J. Bot. 76: 179. 1938; Baker in Hook.f., Fl. Brit. India 2: 255. 1878; Sanjappa, Legum. India 9. 1992. *Guilandina bonduc* L., Sp. Pl. 381. 1753 (not of later eds.). *Caesalpinia crista* L., Sp. Pl. 380. 1753. *Guilandina bonducella* L., Sp. Pl. ed. 2. 545. 1762, nom. illeg. *Caesalpinia bonducella* (L.) Fleming in Asiat. Res. 11: 159. 1810, nom. illeg.; Baker in Hook.f., Fl. Brit. India 2: 254. 1878; Duthie, Fl. Gangetic Plain 1: 302. 1903. *Kanja*.

Scandent or scrambling shrub; branches armed with straight prickles, hairy. Leaves 30–40 cm long; rachis with 1–2 recurved stipulate spines at the base of each pinna and scattered straight or recurved prickles between the pinnae; pinnae 6–8 pairs, opposite, 5–12 cm long; leaflets 6–10 pairs on each pinna, opposite, elliptic-oblong, 1.5–4 cm long, obtuse or mucronate, more or less hairy, subsessile; stipules large, foliaceous, lobed. Racemes axillary and terminal, pedunculate, 15–25 cm long; pedicels ca 5 mm long; bracts and pedicels hairy with brown tomentum. Calyx 5–7 mm long. Petals oblanceolate, 1–1.5 cm long, upper smaller, often spotted with red. Filaments flattened and hairy in lower half. Pods ovoid, 5–6.5 × 3–4 cm, shortly stalked, densely covered with prickles. Seeds 1–2, shining grey-coloured, oblong.

Flowering & Fruiting: September – March.

Common along the road sides of the forest area and planted for fencing.

Specimens examined: Tikri reserve forest, Near Tikri Railway station, Vineet K. Singh 67505, 75618 (BSA).

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.

Tree, deciduous, 8–12 m high, with spreading crown. Bark pale white or greenish grey; blaze red-brown. Leaves 20–35 cm long; rachis cylindrical; leaflets 4–8 pairs, ovate, oblong or ovate-lanceolate, 5–15 × 4–8 cm, acuminate or acute at apex, cuneate at base. Racemes axillary, pendulous, 25–50 cm long. Sepals 5, distinct, ovate, c. 6 mm long, obtuse. Petals 5, bright yellow, obovate, clawed. Stamens 10, all fertile. Pods dark brown or black, cylindrical, 30–55 cm long, drooping, many-seeded. Seeds obovate, 5–8 mm long, embedded in pulp.

Flowering & Fruiting: April – June.

Common in dry deciduous forests and planted as avenue tree.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69769 (BSA).

Delonix Raf.

Delonix regia (Bojer ex Hook.) Raf., Fl. Tellur. 2: 92. 1837; Sanjappa, Legum. India 27. 1992. *Poinciana regia* Bojer ex Hook. in Curtis, Bot. Mag. 56: 5, t. 2884. 1829; Baker in Hook.f., Fl. Brit. India 2: 260. 1878; Duthie, Fl. Gangetic Plain 1: 303. 1903. *Gulmohar*.

Tree, deciduous, 7–14 m high, with spreading crown. Leaves feathery, bipinnate, up to 50 cm long; pinnae 11–18 pairs; leaflets 20–30 pairs, oblong, 6–8 mm long; stipules pectinate. Flowers in lax, terminal or axillary, corymbose racemes. Sepals 5, crimson inside, subequal, valvate. Petals 5, bright red with yellow or white streaks, c. 3.7 cm wide, clawed; standard c. 5 cm wide. Stamens 10, free, much exerted; filaments villous. Pods strap-shaped, 30–70 × c. 5 cm, flat, woody, 20–40-seeded. Seeds red-brown, oblong, mottled.

Flowering & Fruiting: April – August.

Planted as an ornamental tree along the roadsides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75701 (BSA).

Senna Mill.

Senna alata (L.) Roxb., Fl. Ind. (Carey & Wall. ed.) 2: 349. 1824; Irwin & Barneby in Mem. New York Bot. Gard. 35(2): 460. 1982; V.Singh, Monograph Indian Cassiinae 99. 2001. *Cassia alata* L., Sp. Pl. 378. 1753; Baker in Hook.f., Fl. Brit. India 2: 264. 1878; Sanjappa, Legum. India 14. 1992.

Shrub; stem erect, glabrous or subglabrous, 2–3 m high. Leaves 20–50 cm long, subsessile; leaflets 8–14 pairs, broadly oblong or elliptic-oblong, 3–12 × 2–5 cm, obtuse or retuse at apex, obliquely truncate or subcordate at base, glabrous above, downy beneath; stipules auriculate. Flowers in long, erect, axillary or apparently terminal, pedunculate racemes; bracts coloured, ovate or elliptic, 2–3 cm long, imbricating the bud. Sepals petaloid, obovate, 1–2 × 0.4–0.5 cm. Petals 1.5–2 cm long. Stamens 7 fertile, subequal; staminodes 3. Pods 10–12 × 1.1–1.5 cm, straight, sub-compressed with longitudinal wings, 40–50-seeded. Seeds dark brown, rhomboid, c. 5 mm long, compressed.

Flowering & Fruiting: December – June.

Common in shady places along wetland area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 69787 (BSA).

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. *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. *Kasondi*.

Annual or perennial herb or undershrub, 0.5–1.5 m high. Stems and branches angular, striated with reddish purple, glabrous except young parts. Leaves 10–15 cm long, with a single gland at the base of petiole; leaflets 3–5 pairs, ovate to ovate-oblong, 4–10 × 2.5–4.0 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, 6–8 mm long, obtuse. Petals bright yellow with orange veins, c.1.5 cm long, unequal, obtuse. Stamens 7 fertile, 3 lower longer than 4 laterals; staminodes 3. Pods 10–12 cm long, laterally compressed, septate between the seeds. Seeds many, pale brown, ovoid, 3–4 mm long, laterally compressed.

Flowering & Fruiting: August – November.

Common in wastelands and along the roadsides.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67584 (BSA).

Senna sophera (L.) Roxb., Fl. Ind. 2: 347. 1832; Irwin & Barneby in Mem. New York Bot. Gard. 35(1): 440. 1982; V. Singh, Monograph Indian Cassiinae 199. 2001. *Cassia sophera* L., Sp. Pl. 379. 1753; Baker in Hook.f., Fl. Brit. India 2: 262. 1878; Duthie, Fl. Gangetic Plain 1: 293. 1903; Sanjappa, Legum. India 21. 1992.

Perennial Shrubs, erect, branched, faintly foetid, 1–2.5 m high; young parts pubescent. Leaves 15–20 cm long; rachis grooved, with conical glands at base; leaflets 3–9 pairs, ovate-lanceolate or elliptic-lanceolate, 2–5 × 1.2–1.8 cm, acute or acuminate at apex, oblique at base, ciliolate or glabrous, sometimes with identical additional gland between lowest pairs of leaflets. Flowers in axillary and terminal corymbose racemes. Sepals oblong, 4–10 mm long, obtuse,

glabrous or pubescent outside. Petals bright yellow, *c.* 1.5 cm long. Stamens 10, 6–7 fertile. Pods subterete, 5–10 cm long, straight or curved, nearly glabrous, inflated along sutures, 30–35-seeded. Seeds dark brown, broadly ovoid, 1.5–2.0 mm long, compressed.

Flowering & Fruiting: September – January.

Common in wastelands.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 75657 (BSA).

Senna tora (L.) Roxb., Fl. Ind. 2: 340. 1832; Randell in J. Adelaide Bot. Gard. 11: 45. 1988; V.Singh, Monograph Indian Cassiinae 222. 2001. *Cassia tora* L., Sp. Pl. 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 263. 1878, *p.p.*; Sanjappa, Legum. India 22. 1992.

Annual herb or undershrub, 0.2–1.0 m tall; stem erect, very foetid, flexuous. Leaves 5–8 cm long; leaflets 3 pairs, obovate or ovate to oblong, 2–4 × 1.5–2.0 cm, obtuse, rounded or mucronate at apex, glabrous above, appressed hairy beneath; glands between the two lowest pair of leaflets; stipules linear, 8–10 × *c.* 1 mm, acute, hairy. Flowers paired, on axillary, 0.5–1 cm long peduncle; pedicels 0.4–1 cm long. Sepals ovate, 5–6 mm long. Petals 6–8 mm long, unequal. Stamens 7 fertile, unequal. Pods sub-cylindrical or sub-tetragonal, 10–15 cm long, slightly falcate, 20–25-seeded. Seeds dark brown, rhomboid, 3–4 mm long, with areole on both sides.

Flowering & Fruiting: August – December.

Common along the roadsides and in wastelands.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Vineet K. Singh 67639, 69786 (BSA).

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. *Imli*.

Tree, evergreen, 10–25 m high, with spreading crown. Bark dark grey, rough, cracked. Leaves paripinnate, 5–12 cm long; leaflets 10–20 pairs, opposite, linear or oblong, 10–15 × 3–5 mm, obtuse at apex; stipules linear-lanceolate. Flowers in lax, 10–15-flowered racemes at the end of lateral branchlets; pedicels 6–8 mm long; bracts cymbiform. Calyx-lobes lanceolate, the

lowest two connate; tube turbinate. Petals pale yellow with red veins, *c.* 1.1 cm long, the lower two reduced to scales. Stamens monadelphous, 3 fertile, others reduced to bristles. Pods linear, 5–18 × 2.5–3.0 cm, slightly compressed, indehiscent. Seeds 3–8, chocolate brown, obovate-oblong, 1–1.2 cm long, polished, truncate at both ends.

Flowering & Fruiting: May – April.

Common along the road sides and near habitations.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75695 (BSA).

MIMOSACEAE

Acacia Mill., nom. cons.

Acacia auriculiformis A. Cunn. ex Benth. in Hook., Lond. J. Bot. 1: 377. 1842; Sanjappa, Legum. India 45. 1992.

Tree, unarmed, 6–12 m high; branches slightly angular. Bark smooth, white. Phyllodes curved, 8–12 × 1–2 cm, coriaceous, laterally compressed, falcate, with 4–6 principal, sub-parallel nerves. Flowers in small, axillary, 3–5 cm long spikes. Calyx campanulate, *c.* 0.6 mm long, minutely dentate. Corolla yellow, *c.* 1 mm long, spreading. Pods brown, woody, compressed, twisted into a spiral. Seeds black with long coiled, orange-yellow funicle, 4–6 mm across, compressed.

Flowering & Fruiting: August – January.

Planted along the roadsides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75643 (BSA).

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. *Mimosa catechu* L.f., Suppl. Pl. 439. 1782. *Khair*.

Medium-sized tree, deciduous, 3–7 m high; branches armed with hooked spines. Bark dark grey to black, splitting blaze red. Leaves 2-pinnate; rachis often prickly, 5–10 cm long with a gland at base; pinnae 7–18 pairs, 1.5–4 cm long; leaflets 30–45 pairs, linear, 2–5 mm long, glabrous. Flowers white or cream-coloured, in cylindrical, axillary, 3–10 cm long spikes. Calyx campanulate, 2–3 mm long, dentate, pubescent. Corolla ovate-oblong, 2.5–3.5 mm long, pubescent. Pods dark brown, 5–8 cm long, flat, torulose, beaked, 3–10-seeded.

Flowering & Fruiting: June – April.

Common in mixed forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 77227, 75639 (BSA).

Acacia nilotica (L.) Delile subsp. **indica** (Benth.) Brenan in Kew Bull. 12: 84. 1957; Sanjappa, Legum. India 42. 1992. *A. arabica* (Lam.) Willd. var. *indica* Benth. in Hook., Lond. J. Bot. 1: 500. 1842. *A. arabica* (Lam.) Willd., Sp. Pl. 4: 1085. 1806, *p.p.*; Baker in Hook.f., Fl. Brit. India 2: 293. 1878; Duthie, Fl. Gangetic Plain 1: 314. 1903. *Mimosa nilotica* L., Sp. Pl. 521. 1753. *Babool*.

Trees, 4–12 m high. Bark blackish, rough, deeply fissured. Leaves 2-pinnate, 5–8 cm long; rachis with a cup-shaped gland at base; pinnae 2–7 pairs, 1.5–5 cm long; leaflets 10–20 pairs, linear-oblong, 3–6 × 1–1.5 mm, obtuse at apex, oblique at base, glabrous; stipular spines white, 0.4–4 cm long, straight. Heads 6–14 mm across; peduncles 1–2 cm long. Calyx campanulate, 1–1.4 mm long, 5-dentate. Corolla bright yellow, 2–3 mm long, 5-lobed. Pods strap-shaped, 8–13 × 1.2–1.7 cm, beaked, minutely grey tomentose, later black, moniliform, constricted between seeds. Seeds blackish, ovoid, 6–7 mm long, compressed.

Flowering & Fruiting: May – April.

Common along the road sides.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67572, 75765 (BSA).

Albizia Durazz.

Albizia lebbeck (L.) Benth. in Hook. Lond J. Bot. 3:87. 1844; Fl. Brit. India 2: 298; Baker in Hook.f., Fl. Brit. India 2: 298. 1878; Duthie, Fl. Gangetic Plain 1:320. 1903; Sanjappa, Legum. India 56. 1992. *Mimosa lebbeck* L. Sp. PL. 516. 1753. *Siris*.

A medium-sized or large, deciduous tree with spreading crown. Bark dark-grey, rough, irregularly cracked; Blaze crimson. Leaves bipinnate with a large sessile gland on the petiole above the base and in between terminal pair of pinnae; pinnae 2–4 pairs. Leaflets 6–10 pairs, opposite, sub-sessile, 1–3.0 × 0.5–1 cm, elliptic-oblong or obovate-oblong, entire, obtuse, base obliquely rounded, glabrous, unequal sided, lateral nerves 4–5 pairs. Flowers greenish-white in axillary, solitary, fascicled or corymbose pedunculate heads. Pods 10–20 × 1.5–3.5 cm, flat,

glabrous, straw-coloured, alternately depressed on either side over the seeds. Seeds 4–12, brown.

Flowering & Fruiting: April – February.

Sporadically found in roadside. The flowers are fragrant.

Specimen examined: Parvati Aranga Wildlife Sanctuary, K.K. Khanna 63878 (BSA).

Leucaena Benth., nom. cons.

Leucaena latisiliqua (L.) Gillis in Taxon 23: 190. 1974; Sanjappa, Legum. India 56. 1992. *Mimosa latisiliqua* L., Sp. Pl. 519. 1753. *Leucaena leucocephala* (Lam.) de Wit in Taxon 10: 54. 1961. *Leucaena glauca* Benth. in Hook., J. Bot. 4: 416. 1842; Baker in Hook.f., Fl. Brit. India 2: 290. 1878; ; Duthie, Fl. Gangetic Plain 1: 310. 1903.

Shrub or small trees, up to 6 m high, fast-growing; trunk 10–20 cm in diam., forming dense stands; where crowded, slender trunks are formed with short bushy tuft at crown, spreading if singly grown; leaves evergreen, alternate, 10–30 cm long, malodorous when crushed, bipinnate with 3–10 pairs of pinnae, these each with 10–20 pairs of sessile narrowly oblong to lanceolate, gray-green leaflets 1–2.5 cm long, less than 0.4 cm wide; flowers numerous, axillary on long stalks, white, in dense global heads 1–2.2 cm across; fruit pod with raised border, flat, thin, becoming dark brown and hard, 10–12 cm long, 1.5–2.5 cm wide, dehiscent at both sutures; seeds copiously produced, 15–30 per pod, oval, flattish, shining brown.

Flowering & Fruiting: September – April.

Common near habitations and along the road sides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77269 (BSA).

Mimosa L.

Mimosa himalayana Gamble in Bull. Misc. Inform. Kew 1920: 4. 1920; Sanjappa, Legum. India 68. 1992. *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.

Straggling shrub or small tree, deciduous, up to 5 m high; branches slender, prickly, hairy. Leaves 2-pinnate; rachis 6–20 cm long, prickly; pinnae 7–10 pairs, 2–4 cm long; leaflets 16–20 pairs, linear or oblong, 3–8 × 1–2.0 mm, obtuse, hairy below; stipules 5–6 mm long.

Heads pink-red, 8–12 mm across, pedunculate, 1–2- together in leaf axils and in terminal panicles; peduncles 1–2 cm long. Calyx campanulate, *c.* 1 mm long, glabrous. Corolla *c.* 2 mm long; lobes 4. Stamens 8. Pods pale or dark brown, strap-shaped, 4–8 × 0.8–1.3 cm, slightly curved, with 4–10 joints, 4–10-seeded; sutures smooth, rarely prickly.

Flowering & Fruiting: August – April.

Common in forest edges and in grasslands.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67571 (BSA).

Mimosa pudica L., Sp. Pl. 518. 1753; Baker in Hook.f., Fl. Brit. India 2: 291. 1878; Duthie, Fl. Gangetic Plain 1: 311. 1903; Sanjappa, Legum. India 69. 1992. *Chui-mui*.

Diffuse herb; branches slender, erect or curved, prickly, glandular hairy; prickles *c.* 3 mm long. Leaves 2-pinnate; rachis bristly; pinnae 1–2 pairs, digitate, 3–5 cm long; leaflets 10–20 pairs, linear, 3–8 × 1–2 mm, glabrous; stipules ciliate. Heads 1–2, reddish purple, axillary, globose, *c.* 10 mm across, pedunculate; peduncles 10–20 mm long. Calyx campanulate, slightly dentate. Petals connate towards base. Stamens 4. Pods 15–20 × *c.* 2 mm, flat, slightly curved, closely prickly on the sutures, glabrous, with 3–10, one-seeded joints.

Flowering & Fruiting: September – November.

Common in moist places under the forest floor.

Specimen examined: Tikri reserve forest, Near Rest house, Vineet K. Singh 69763 (BSA).

Pithecellobium Mart. nom cons.

Pithecellobium dulce (Roxb.) Benth. in Hook., Lond. J. Bot. 3: 199. 1844; Baker in Hook.f., Fl. Brit. India 2: 302. 1878; Duthie, Fl. Gangetic Plain 1: 322. 1903; Sanjappa, Legum. India 71. 1992. *Mimosa dulcis* Roxb., Pl. Coromandel 1: 67, t. 99. 1798. *Jangal jalebi*.

Tree, evergreen, 5–15 m high, armed with pairs of straight, stipular spines on the trunk. Leaves 2-pinnate; rachis 1–2 cm long; pinnae 2; leaflets 2 on each pinnae, obovate or obliquely elliptic-oblong, 2–4 × 1–2 cm. Flowers white, in globose, *c.* 10 mm across, axillary, paniculate heads. Calyx infundibuliform, 1–1.3 mm long, pilose. Corolla 3–4 mm long. Stamens monadelphous. Pods reddish brown, 8–10 × 0.5–0.9 cm, turgid, coiled, 6–8-seeded. Seeds shining brown or black, ovoid, 1–1.3 cm long, embedded in whitish pulp, with edible aril.

Flowering & Fruiting: January – May.

Common along the road sides.

Specimen examined: Tikri reserve forest, Near Rest house, Vineet K. Singh 77229 (BSA).

COMBRETACEAE

Combretum Loefl., nom. cons.

Combretum indicum L., Sp. Pl. ed. 2. 1: 556. 1762; C.B. Clarke in Hook. f., Fl. Brit. India 2: 459. 1878; Haines, Bot. Bihar & Orissa 359. 1922 (Repr. ed., 2: 374. 1961); M. Gangop. & Chakrab. in J. Econ. Taxon. Bot. 21(2): 331. f. 11 B. 1997; N.P. Singh & al., Fl. Bihar, Analysis 195. 2001. *Malti ki bel*.

Showy scandent shrub. Leaves 5–12 × 2–6 cm, elliptic-oblong or elliptic-ovate, base rounded or subcordate, apex acuminate or apiculate, margins entire; petioles 5–15 mm long. Flowers in axillary and terminal 4–8 cm long spikes, white, turning to dark pink-red, fragrant, 5-merous. Petals 1–2 cm long, oblanceolate-obovate. Stamens 5+5. Fruits 2–3 cm long, ovoid-ellipsoid, dark brown, glabrous, with 5 stiff narrow wings.

Flowering & Fruiting: Almost throughout the year.

Planted in villages for its attractive flowers, also found as escape in wastelands.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75759 (BSA).

Terminalia L., nom. cons.

Terminalia alata Heyne ex Roth. Nov. Pl. Sp. 379. 1821; For. Fl. U.P. 2: 322; FG: 131. *T. tomentosa* Wight & Arn. Prodr. 1: 314, 1834; Fl. Brit. India 2: 447; Duthie, Fl. Gangetic Plain 1: 310. *Pentaptera tomentosa* Roxb. ex DC. Prodr. 3: 14. 1828. *Asna*.

Large, deciduous tree. Bark black, rough, deeply cracked, exfoliating in thin rectangular plates; blaze reddish-brown. Leaves alternate or sub-opposite, hard, coriaceous, 10–15 × 4–6 cm, ovate-oblong or elliptic-oblong, entire, obtuse, lateral nerves 10–15 pairs, parallel, prominent; petioles 0.5–1.5 cm long with 2 turbinate glands near the base of midrib. Flowers dull-white, sessile in terminal tomentose panicles. Fruits 3–4 × 2–3 cm, ovoid-oblong, 4–5 winged; wings transversely striate, coriaceous with cranulate edge, dark brown.

Flowering & Fruiting: July – March.

Commonly found in Sal Forest.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75778 (BSA).

Terminalia arjuna (Roxb. ex DC.) Wight & Arn. Prodr. 314. 1834; Fl. Brit. India 2: 447; For. Fl. U.P. 2: 321; FG: 131. *Pentaptera arjuna* Roxb. [Hort. Beng. 34. *nom. nud.*] ex DC. Prodr. 3: 14. 1828. *Terminalia glabra* Wight & Arn. Prodr. 314. 1834; Duthie, Fl. Gangetic Plain 1: 309. *Arjun*.

Large semi-evergreen tree with pendulous branches. Bark greenish-white or pale-grey, smooth; blaze pinkish. Leaves sub-opposite or opposite, 10–15 cm long, oblong or elliptic-oblong, sub-acute, main lateral nerves 10–12 pairs, arcuate; petiole short with 2 glands at the top. Flowers sessile, small, greenish-yellow in short axillary spikes or terminal panicles. Fruits 2–4 cm long, brown, ovoid or obovoid-oblong, fibrous, woody, 5–6 winged; wings, hard, striated with many veins curving upwards.

Flowering & Fruiting: April – December.

Commonly found in near streams, buttressed at the base.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69725 (BSA).

Terminalia bellirica (Gaertn.) Roxb., Pl. Coromandel 2: 54. t. 198. 1798; C.B. Clarke in Hook. f., Fl. Brit. India 2: 445. 1878, incl. vars.; Talbot, For. Fl. Bombay 2: 13. f. 294. 1911; Haines, Bot. Bihar & Orissa 352. 1922 (Repr. ed., 2: 367. 1961); M. Gangop. & Chakrab. in J. Econ. Taxon. Bot. 21(2): 338. 1997; N.P. Singh & al., Fl. Bihar, Analysis 196. 2001. *Myrobalanus bellirica* Gaertn., Fruct. Sem. Pl. 2: 90. t. 97. 1791. *Bahera*.

Large tree, 10–16 m high; bark yellowish brown with shallow vertical fissures. Leaves 6–18 × 4–10 cm, obovate or broadly elliptic, clustered at ends of branchlets, base cuneate, apex obtuse or cuspidate, glabrous, coriaceous; petioles 3–8 cm long. Flowers in axillary and terminal simple or paniced 5–12 cm long spikes, upper one's male, lower hermaphrodite, yellowish green, foetid. Calyx tube 3–4 mm long, pubescent outside, densely villous inside; teeth 1–2 mm long, triangular, reflexed. Drupes 2.5–3 × 1.5–2 cm, broadly ellipsoid or subglobose, velutinous, brown, obscurely angled when dry.

Flowering & Fruiting: April – February.

Common in dry deciduous and mixed forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75705, 77262 (BSA).

Terminalia chebula Retz., *Observ. Bot.* 5: 31. 1788; C.B. Clarke in Hook. f., *Fl. Brit. India* 2: 446. 1878, incl. vars.; Haines, *Bot. Bihar & Orissa* 352. 1922 (Repr. ed., 2: 368. 1961); M. Gangop. & Chakrab. in *J. Econ. Taxon. Bot.* 21(2): 345. f. 19 B. 1997; N.P. Singh & al., *Fl. Bihar, Analysis* 196. 2001. *T. travancorensis* Wight & Arn., *Prodr. Fl. Ind. Orient.* 1: 314. 1834; C.B. Clarke in Hook. f. *Brit. India* 2: 449. 1878, *syn. nov.*; M. Gangop. & Chakrab. in *J. Econ. Taxon. Bot.* 21(2): 361. 1997. *T. angustifolia* Roxb. ex Roxb., *Fl. Ind.* 2: 437. 1832, *non* Jacq., 1777; C.B. Clarke in Hook.f. *Brit. India* 2: 449. 1878. *Harra*.

Small or medium sized trees, 6–10 m high; bark dark grey, with shallow vertical fissures; young parts rusty pubescent. Leaves 6–15 × 5–8 cm, elliptic-ovate or elliptic-oblong, base obtuse or acute, apex acute-acuminate; petioles 1.5–2.5 cm long; glands at apex of petiole. Flowers in axillary and terminal simple or paniced 6–12 cm long spikes, creamy white, all hermaphrodite. Calyx tube 2–2.5 mm long, glabrous outside, hairy within; teeth *c.* 1 mm long, triangular. Drupes 2–3 × 1.5–2.0 cm ellipsoid-obovoid, shining, glabrous, 5-ribbed when dry, dark brown or black.

Flowering & Fruiting: April – February.

Common in dry deciduous and mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69732 (BSA).

MYRTACEAE

Psidium L.

Psidium guajava L., *Sp. Pl.* 470. 1753; Duthie in Hook.f., *Fl. Brit. India* 2: 468. 1878; Duthie, *Fl. Gangetic Plain* 1: 317.1903. *Amrood*.

Small tree. Bark smooth, pinkish-brown, exfoliating in thin flakes; blaze cream-coloured. Leaves opposite, coriaceous, 3–12 × 2–5 cm, elliptic-oblong, entire, acute, base rounded, faintly aromatic and pellucid dotted, lateral nerves 7–17 pairs, prominent, arcuate; petiole upto 2.5 mm long. Flowers white, 2–3 cm across, 1–3 cm axillary peduncles. Berries 2–7 × 2–6 cm, globose or pyriform, green when young, yellow when ripe with pleasantly flavored white or deep-pink pulp. Seeds many, very hard.

Flowering & Fruiting: July – March.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Watch tower, Vineet K. Singh 75668 (BSA).

Syzygium Brown ex Gaertn. nom. cons.

Syzygium heyneanum (Duthie) Gamble, Fl. Pres. Madras 3: 482. 1919 1: 341. 1957 (repr. ed.). *Eugenia heyneana* Duthie in Hook.f., Fl. Brit. India 2: 500. 1878; Duthie, Fl. Gangetic Plain 1: 315. 1903. *Kathjamun*.

Small or medium-sized, evergreen tree. Bark light-grey, smooth; blaze pale-yellow. Leaves 5–8 × 1.5–2.5 cm, oblong-lanceolate, entire, shortly acuminate, glabrous, gland-dotted, lateral nerves numerous, fine, uniting in an intra marginal nerve; petiole up to 1.5 cm long, channeled. Flowers greenish-white, about 5 mm across, sub-sessile in small heads at the end of branches or in lateral cymes. Berries 8 × 6 mm, oblong or obovoid, crowned by the calyx limb, 1-seeded.

Flowering & Fruiting: March – August.

Gregariously found along the banks of wetland in forest area.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75690, 75733 (BSA).

LECYTHIDACEAE

Barringtonia J.R. Forst. & G. Forst.

Barringtonia acutangula (L.) Gaertn., Fruct. Sem. Pl. 2: 97. t. 101. 1791; C.B. Clarke in Hook.f., Fl. Brit. India 2: 508. 1879; *Eugenia acutangula* L., Sp. Pl. 471. 1753. *Hijjal, Paniha*.

Small or medium sized tree, 6–12 m high. Leaves 5–12 × 3–7 cm, obovate-oblong or elliptic, base cuneate, apex rounded or subacute, margins minutely denticulate, glabrous; petioles 0.5–1.2 cm long. Flowers in terminal pendulous many flowered 15–55 cm long racemes, yellowish scarlet, fragrant. Calyx lobes 4, distinct in bud, suborbicular. Petals 4–5, 5–6 mm long, ovate-oblong. Filaments much exerted, pinkish red. Fruits 2–3 cm long, ovoid-oblong quadrangular, fibrous, truncate at both ends, crowned by persistent calyx, 1-seeded.

Flowering & Fruiting: June – November.

Commonly found along banks of streams in the forest.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67615, 75735 (BSA).

LYTHRACEAE***Ammannia* L.**

***Ammannia baccifera* L.**, Sp. Pl. 120.1753; C.B. Clarke in Hook. f., Fl. Brit. India 2: 569. 1879; Duthie, Fl. Gangetic Plain 1: 350. 1903.

Annual erect glabrous herb, 20–60 cm high. Leaves 2–8 × 0.4–1.2 cm, narrowly elliptic-lanceolate or oblanceolate, narrowed at both ends. Flowers in axillary few flowered or dense cymes, reddish, 4-merous, rarely 5-merous. Calyx tube campanulate; teeth triangular. Petals absent, abortive. Capsules sub-globose, depressed, minute, exceeding the calyx, reddish.

Flowering & Fruiting: September – February.

Common in wet and marshy places and along streams.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Watch tower, Vineet K. Singh 77281 (BSA).

***Rotala* L.**

***Rotala indica* (Willd.) Koehne** in Bot. Jahrb. Syst. 1(2): 172. 1880; N.P. Singh & al., Fl. Bihar, Analysis 208. 2001. *Peplis indica* Willd., Sp. Pl. 2: 244. 1779. *Ammannia peploides* Spreng., Syst. Veg. (ed. 16) 1: 444. 1824; C.B. Clarke in Hook.f., Fl. Brit. India 2: 566. 1879; Haines, Bot. Bihar & Orissa 377. 1922 (Repr. ed., 2: 394. 1961).

Annual herb, 15–25 cm high, rooting at base; stems and branches, erect or decumbent, quadrangular. Leaves 0.5–1.5 cm long, obovate or spatulate-oblong, opposite decussate, base attenuate-obtuse, apex obtuse or subacute. Flowers solitary in leaf axils or in leafy spikes from short lateral branches, pinkish red; bracts leaf like on main axis, scale like on lateral branches; bracteoles 1.5–2 mm long, linear-lanceolate. Calyx tube 1.5–2.5 mm long, campanulate, angled on nerves; lobes 4, 0.5–2.0 mm long, triangular. Petals 4, 0.5–0.6 mm long, elliptic-obovate or rudimentary. Stamens 4, inserted near middle of calyx tube, reaching upto mouth of calyx tube. Style c.1 mm long. Capsules 1.5–2.5 mm long, ellipsoid, 2-valved.

Flowering & Fruiting: September – January.

Common in wet and marshy places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Parvati temple, Vineet K. Singh 75634 (BSA).

Woodfordia Salisb.

Woodfordia fruticosa (L.) Kurz in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 40: 56. 1871; Haines, Bot. Bihar & Orissa 374. 1922 (Repr. ed., 2: 390. 1961); N.P. Singh & al., Fl. Bihar, Analysis 209. 2001. *Lythrum fruticosum* L., Syst. Nat. ed. 10. 2: 1045. 1759. *Woodfordia floribunda* Salisb., Parad. London t. 42. 1806; C.B. Clarke in Hook.f., Fl. Brit. India 2: 572. 1879; Talbot, For. Fl. Bombay 2: 58. f. 322. 1911. *Dhai*.

Branched shrub, 1–2.5 m high. Leaves 4–8 cm long, ovate-lanceolate, opposite, subsessile, base rounded or cuneate, apex acute, softly pubescent above, hoary and glandular punctate beneath. Flowers in fascicled axillary racemes, red. Calyx 1.3–1.5 cm long, campanulate at base, tubular above, covered with glandular dots, oblique at mouth; teeth triangular, acute. Petals red, slightly longer than calyx teeth, narrowly linear. Stamens 12. Capsules 1–1.2 cm long, ellipsoid, enclosed by persistent calyx tube, many-seeded.

Flowering & Fruiting: January – May.

Common in outskirts of scrub, mixed and dry deciduous forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69774 (BSA).

ONAGRACEAE

Ludwigia L.

Ludwigia adscendens (L.) Hara in J. Jap. Bot. 28 (10): 291. 1953. *Jussiaea repens* L., Sp. Pl. 1: 388. 1753; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 587. 1879. *J. adscendens* L., Mant. Pl. 69. 1767; Duthie Fl. Gangetic Plain 1: 355. 1903.

Aquatic or semiaquatic herb with a creeping stem rooting at the nodes, usually with pseudo-pneumatophores. Leaves alternate, elliptic-oblong, glabrous, rounded at the apex, narrowed at the base; petioles 6–12 mm long, sparsely pubescent; bracteoles deltoid. Flower solitary, axillary, pentamerous. Sepals 5, deltoid-acuminate. Petals 5, white obovate. Capsule terete sparsely pubescent or glabrous, thick walled, irregularly dehiscent, 2–3 cm long, 10 ribbed; seed uniseriate in each cell, pale brown.

Flowering & Fruiting: November – June.

Occurs near edges of the lake.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Parvati temple, Vineet K. Singh 67548, 75775 (BSA).

Ludwigia octovalvis (Jacq.) Raven in Kew Bull. 15: 467. 1962 et in Reinwardita 6: 362, f. 3. 1963, incl. ssp. *brevisepala* (Brenan) Raven and ssp. *Sessiliflora* (Mich.) Raven in Steenis, Fl. Males, I, 8: 101. 1977. *Jussiaea suffruticosa* L., Sp. Pl. 1: 388. 1753; Clarke in Hook.f., Fl. Brit. Ind. 2:587.1879. *Oenothera octovalvis* Jacq., Enum. Syst. Pl.19.1760; Duthie Fl. Gangetic Plain 1: 355. 1903.

Much branched herb or undershrub, up to 1.5–2.5 m high. Leaves lanceolate or linear lanceolate; lateral veins 10–20 pairs; petiole up to 0.6 cm long. Flower solitary, axillary. Sepals 4, obovate or cuneate. Stamen 8, epipetalous one shortest; filament 1–2 mm long; anthers 0.5–2.5 mm long; pollen shed in tetrads. Capsule thin walled, pale brown with 8 darker ribs. Seed pluriseriate in each cell, free, brown.

Flowering & Fruiting: October – June.

Occurs near edges of the lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75605 (BSA).

Ludwigia perennis L., Sp. Pl. :119.1753; *L. parviflora* Roxb., Hort. Bengal: 11. 1814; Clarke in Hook.f., Fl. Brit. Ind. 2:588. 1879. *Jussiaea perennis* (L.) Brenan in Kew Bull. 8: 163.1953; Duthie Fl. Gangetic Plain 1: 356. 1903.

Erect herb, upto 45–55 cm high. Stems less angular, much branched, leaves variable in size, elliptic lanceolate, up to 5 × 1 cm, base cuneate, margins subentire to entire, apex shortly acuminate; flowers small, solitary. Capsule 4-angled up to terete, pale brown. Seed pluri-seriate in each cell, free brown, ellipsoid-rounded.

Flowering & Fruiting: August – April

Occurs in marshy areas.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67638, 67647 (BSA).

PASSIFLORACEAE

Passiflora L.

Passiflora foetida L., Sp. Pl. 959, 1753; Mast. in Hook.f., Fl. Brit. India 2: 599. 1879; Raizada, Suppl. Fl. Gangetic Plain: 80. 1976.

Slender, foetid, climbing herb. Tendrils simple. Leaves alternate, distant, 2.0–5 × 2.2–6.2 cm, palmately 3-lobed, ciliate and denticulate with gland-tipped setaceous hairs; stipules lacinate with gland-tipped segments; petioles 1.2–4 cm long, glandular-hairy. Flowers greenish, solitary, axillary with an involucre of finely pinnatifid bracteoles, segments capillary glandular. Capsule about 2 cm in diam. Globose, greenish. Seeds numerous, ellipsoid, warted, yellowish.

Flowering & Fruiting: August – December.

Frequently found climbing on *Ipomoea fistulosa*, *Ziziphus* species.

Specimens examined: Tikri reserve forest, Near Pipri village, Vineet K. Singh 67585, 75604, 75700 (BSA).

CUCURBITACEAE

Coccinia Wight & Arn.

Coccinia grandis (L.) Voigt, Hort. Suburb. Calc. 59, 1845. *Bryonia grandis* L., Mant. 1: 126, 1767. *Coccinia indica* Wight & Arn. Prodr. 347, 1834; Duthie, Fl. Gangetic Plain 1: 345. *Cephalandra indica* Nand. in Arn. Sc. Nat. (Ser.5) 5: 16, 1866; C.B. Clarke in Hook.f., Fl. Brit. India 2: 621. 1879. *Kundru*.

Perennial, climbing herb with tuberous roots and simple tendrils. Leaves 2.3–7 × 2.2–6 cm, 5-angled or lobed, base cordate and 5-nerved, lobes obtuse or acute, apiculate, more or less sinuate-toothed, bright-green above, slightly paler beneath, rough, studded with papillae, often with circular glands between the nerves near the petiole; petioles 1–2 cm long. Flowers white, dioecious; male and female solitary axillary. Fruits 1.3–4 × 0.5–2.0 cm, ellipsoid, green and with usually 10 white streaks when ellipsoid, green and with usually 10 white streaks when unripe, scarlet when ripe. Seeds yellowish-grey, embedded in red pulp.

Flowering & Fruiting: August – December.

Very common throughout the area especially along road-sides and forest margins.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67508, 67588 (BSA).

Cucumis L.

Cucumis melo L., Sp. Pl. 1011. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 2: 620. 1879. Duthie, Fl. Gangetic Plain 1: 371. 1903; Chakrav. in Fasc. Fl. India 11: 32. 1982. *Bryonia callosa* Rottl. in Neue Schrift. Ges. Nat. Fr. Berl. 4: 210; Duthie, Fl. Gangetic Plain 1: 373. 1903. *Bhetkula*.

Perennial, trailing, scabrous, herb with angled stems and simple short tendrils. Leaves 3–5 cm in diam., sub-orbicular, base cordate, usually deeply 5–7 lobed, lobes lobulate or toothed; petiole up to 4 cm long. Flowers yellow, monoecious. Male generally solitary, shortly peduncled. Stamens 3. Female solitary. Ovary hairy. Fruits about 2.5–3.5 cm long, obovoid, longitudinally variegated with 10 green strips, pale-yellow when ripe. Seeds white, ellipsoid.

Flowering & Fruiting: February – October.

Commonly found during rainy season along road-sides.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari Village, Vineet K. Singh 69742 (BSA).

Luffa Cav.

Luffa echinata Roxb., Hort. Bengal.: 104. 1814 & Fl. Ind. 3: 716. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 2: 615. 1879. Duthie, Fl. Gangetic Plain 1: 367. 1903. *Kheski*.

Annual, slender, climbing herb. Stems 5-angled. Tendrils 2-fid. Leaves 3–6 cm in diam., broadly ovate, reniform or sub-orbicular, base deeply cordate, obscurely 5-angled or 5-lobed, lobes rounded or sub-acute, minutely denticulate, hispid or hairy on both sides; petioles about as long as the blade, striate, hairy with peculiar oblong, glandular, axillary bracts. Flowers white, small, dioecious. Males in few flowered racemes. Females' solitary, axillary, peduncles densely echinate with soft hispid spines. Capsules 2–3 cm long, broadly ellipsoid, densely clothed with ciliate bristles, operculum conical without bristles. Seeds many, compressed oval, grey-black, slightly scabrous.

Flowering & Fruiting: September – January.

Commonly found climbing on small trees and shrubs near wetland area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari, Village Vineet K. Singh 75772 (BSA).

Momordica L.

Momordica charantia L., Sp. Pl. 1009. 1753; CB. Clarke in Hook.f., Fl. Brit. India 2: 616. 1879; Duthie, Fl. Gangetic Plain 1: 369. 1903; Chakrav. In Fasc. Fl. India 11: 89. 1982. *Karela*.

Slender, softly hairy climbing herb. Tendrils simple. Leaves 2–5 cm in diam., reniform-orbicular, deeply 5–7 lobed, lobes again lobulate or sinuate-denticulate, the teeth ending in a fine point, base cordate; petioles 0.5–2 cm long. Flowers yellow, monoecious. Male peduncles with orbicular, foliaceous bracts at the middle. Female peduncles with small bracts at or near the base. Fruits 8–10 × 4–6 cm, fusiform, beaked, longitudinally ribbed with rows of triangular tubercles, orange-coloured when ripe. Seeds embedded in red pulp, compressed with corrugated margins.

Flowering & Fruiting: July – December.

Abundantly found spreading over bushes.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari Village, Vineet K. Singh 75743 (BSA).

Momordica dioica Roxb. ex. Willd. Sp. Pl. 4: 605. 1805; C.B. Clarke in Hook.f., Fl. Brit. India 2: 617. 1879; Duthie, Fl. Gangetic Plain 1: 370. 1903; Chakrav. In Fasc. Fl. India 11: 94. 1982. *Kareli*.

Climbing or spreading, foetid herb with tuberous roots. Tendrils simple. Leaves 3–6 × 2–5 cm, broadly ovate, entire or slightly 3–5 lobed, denticulate, shortly acuminate, base deeply cordate; petioles 0.5–1.2 cm long, pubescent. Flowers yellow, dioecious. Male on slender peduncle with large, spathaceous, deeply concave, orbicular bracts with large, spathaceous, deeply concave, orbicular bracts at the apex. Female peduncle with a small bract below the middle. Fruits 2–4 cm long, ellipsoid, shortly beaked, densely covered with soft spines. Seeds compressed, corrugated on margin, embedded in red pulp.

Flowering & Fruiting: July – October.

Commonly found throughout the area especially in grasslands spreading over bushes and small trees.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Village, Vineet K. Singh 67613 (BSA).

Mukia Arn.

Mukia maderaspatana (L.) M. Roem. Syn. Pep.: 47, 1846; Santapau, Fl. Khandala (ed. 3): 104, 1967; FG: 150, 1976. *Cucumis maderaspatana* L. Sp. Pl. (ed.1): 1912; 1753. *Bryonia scabrella* L.f. Suppl.: 424, 1781. *Mukia scabrella* Arn. in Hook. Journ. Bot. 3: 276, 1841; C.B. Clarke in Hook.f., Fl. Brit. India 2: 623. 1879. *Melothria maderaspatana* Cogn. in DC. Mon. Phan. 3: 623. 1881; Duthie, Fl. Gangetic Plain 1: 347.1903. *Bilari, shiv-lingi*.

Annual climbing, scabrous, herb. Tendrils simple. Leaves 4–8 × 3–7 cm, deltoid-ovate, entire, 5-angled or 3–5 lobed, margins dentate or sub-serrate, acute at the apex, deeply-cordate at the base, very scabrid above, scabrid or shortly hispid beneath; petioles 1–4.5 cm long. Flowers yellow, monoecious, nearly sessile, solitary or in small clusters. Berries 0.5–1 cm across, globose, bright red when ripe. Seeds ellipsoid, compressed, turgid, dark-brown.

Flowering & Fruiting: September – December.

Commonly found along road-sides, climbing on shrubs and small trees.

Specimen examined: Tikri reserve forest, Near Pipri village, Vineet K. Singh 67653 (BSA).

Trichosanthes L.

Trichosanthes dioica Roxb., Fl. Ind. 3 : 701. 1832 ; 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: 110. 1982. *Parwal*.

Annual slender rather succulent, more or less pubescent climber. Tendrils 2–4 fid. Leaves 4–10 cm in diam., usually 5 rarely 7 lobed or angular, orbicular-reniform, lobes broad, acute or obtuse, distantly denticulate, glabrous above, pubescent beneath; petioles 2.2–3.6 cm long. Flowers white, monoecious, 2–8 cm long with fimbriate petals; male peduncles paired; female solitary. Fruits 3–8 cm long, ovoid-fusiform, tapering on both the ends with a blunt beak, Seeds many, globose, rugulose.

Flowering & Fruiting: July – September.

Mainly cultivated but found as an escape near wetland area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Village, Vineet K. Singh 69775 (BSA).

AIZOACEAE

Trianthema L.

Trianthema portulacastrum L., Sp. Pl. 223. 1753; Baker in Fl. Males. 4(3): 274. 1951; C.B. Clarke in Hook.f., Fl. Brit. India 2: 660. 1879; Duthie, Fl. Gangetic Plain 1: 385. *Patharchatta*.

Herb, prostrate, glabrous or puberulous, succulent. Stems angular, much-branched, often purple tinged. Leaves opposite or sub-opposite, unequal paired, 1–3 × 0.6–3 cm, broadly obovate, margins usually undulate, apex rounded, base cuneate; petioles 0.4–1.3 cm long, membranous at the base. Flowers white, sessile, solitary in pouch-like petiolar sheaths. Style 1. Capsules 4 × 3 mm, breaking transversely into an upper coriaceous lid and lower membranous cup. Seeds black, muriculate.

Flowering & Fruiting: July – November.

Abundantly found on hard, sandy and clayey soils in large clumps.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bahadura Village, Vineet K. Singh 67578 (BSA).

MOLLUGINACEAE

Glinus L.

Glinus oppositifolius (L.) Aug. DC. in Bull. Herb. Boissier ser. 2. 1: 552. 1901. *Mollugo oppositifolia* L. Sp. Pl.: 89, 1753; Duthie, Fl. Gangetic Plain 1:387. 1903. *M. spergula* L., Syst. Nat. ed. 10. 881. 1759; C.B. Clarke in Hook.f., Fl. Brit. India 2: 662. 1879.

Herb, diffuse or prostrate, glabrous or thinly pubescent; stems numerous, dichotomously branched with long internodes. Leaves sub-sessile, pseudo-whorled, unequal, 1–2.0 × 0.5–0.7 cm, spatulate, obovate or oblanceolate, acute or obtuse, apiculate, base cuneate. Flowers dull-white in 2–4 axillary clusters; pedicels 0.5–1.4 cm long, filiform. Tepals 2–3 mm long, oblong with membranous margins. Stamens 3. Styles 3, very short. Capsules ellipsoid, 3-celled. Seeds deep brown, tuberculate with a small white scale curved around them.

Flowering & Fruiting: July – December.

Commonly found on moist, sandy soils.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Bahadura Village, Vineet K. Singh 75638, 67635, 75739 (BSA).

Mollugo L.

Mollugo pentaphylla L., Sp. Pl. 89. 1753; Duthie, Fl. Gangetic Plain 1: 387. 1903. *M. stricta* L., Sp. Pl. ed. 2. 131. 1762; C.B. Clarke in Hook.f., Fl. Brit. India 2: 663. 1879.

Annual herb, erect, annual, glabrous, 10–30 cm high. Stems leafy, quadrangular, dichotomously branched. Leaves in whorls of 2–8, linear-lanceolate, acute, base narrowed into obscure petiole. Flowers greenish-white, numerous in lax corymbose terminal cymes; peduncles and pedicels filiform. Tepals 1–1.3 mm long. Capsules globose, thin walled. Seeds numerous, reniform, bright chestnut in colour, distinctly granulate.

Flowering & Fruiting: July – March.

Frequently found in grasslands and in moist, shady places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bahadura Village, Vineet K. Singh 77287 (BSA).

APIACEAE**Centella L.**

Centella asiatica (L.) Urb. in Mart., Fl. Bras. 11: 287. 1879; Mukherjee & Constance, Umbellif. (Apiac.) India: 15. 1993. *Hydrocotyle asiatica* L., Sp. Pl. 234. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 2: 669. 1879; Duthie, Fl. Gangetic Plain 1: 391.1903. *Brahmi-buti*.

Annual slender creeping herb, rooting at the nodes. Stems long, filiform, often reddish with long internodes. Leaves simple, 1–3 at each node, rather broader than long, 2.5–5.5 cm in diam., orbicular-reniform, sub-entire or shallowly crenate, base deeply cordate, nerves numerous, glabrous; petiole up to 8 cm long; stipules adnate to the petioles. Flowers small, pink, sub-sessile in umbellate clusters; bracts sub-amplexicaul, 2–4 with each umbel. Fruits didymous, indehiscent with 5 vein-like, similar primary ridges on each coccus; pericarp thickened. Seeds 2, dull-brown, oblong, laterally compressed.

Flowering & Fruiting: October – April

Abundantly and gregariously found on moist, shady, sandy or clayey soils and along marshy palces.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Bahadura Village, Vineet K. Singh 69738, 77242, 67658 (BSA).

Oenanthe L.

Oenanthe javanica (Blume) DC., Prodr. 4: 138, 1830; Mukherjee & Constance, Umbellif. (Apiac.) India 79. 1993. *Sium javanicum* Blume, Bijdr. 15: 881, 1826. *Phellandrium stoloniferum* Roxb., Fl. Ind. 2: 93. 1832. *Oenanthe stolonifera* (Roxb.) Wall. ex DC., Prodr. 4: 138, 1830; C.B. Clarke in Hook.f., Fl. Brit. India 2: 696. 1879; Duthie, Fl. Gangetic Plain 1: 395. 1903.

Stoloniferous herb with stout fistular, erect or decumbent stem, rooting from lower nodes, glabrous. Leaves uni to bipinnate, sometimes 3-pinnate; pinnae lanceolate or rhomboid-lanceolate, serrate, acute-acuminate, base obtuse or cuneate; petiole sheathed with scarious margins. Flowers white, fragrant in leaf-opposed, compound umbels. Anthers pinkish. Fruits sub-quadrate, cocci 2.5–3 mm long. Seeds terete.

Flowering & Fruiting: January – April.

Commonly found in moist, shady places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Village, Vineet K. Singh 69746, 75750 (BSA).

RUBIACEAE

Cerisoides (Hook.f.) Tirveng.

Cerisoides 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: 422. 1905. *Kharhar*.

Shrubs or small tree, deciduous, 3–6 m high; branches armed with strong, straight, opposite thorns; bark white or pale grey. Leaves crowded at the end of branchlets, obovate, suborbicular or elliptic, 3–8 × 2–5 cm, acute or abruptly subacuminate at apex, narrowed at base, glabrous above, tomentose beneath, entire; stipules triangular, caducous. Flowers unisexual; male flowers fascicled, female one's solitary. Calyx turbinate or flask-shaped; lobes linear. Corolla white; lobes oblong, 0.4–1 cm long. Stamens 5–6, sessile. Stigmas 2-lobed, grooved. Fruits grey to light brown, globose, 3–6 cm across, smooth. Seeds red, angular.

Flowering & Fruiting: March – November.

In scrub and mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75689 (BSA).

Dentella J.R.Forst. & G.Forst.

Dentella repens (L.) J.R.Forst. & G.Forst., Char. Gen. Pl. 26. t. 13. 1776; Hook.f., Fl. Brit. India 3: 42. 1880, *p.p.*; Duthie, Fl. Gangetic Plain 1: 410. 1903. *Oldenlandia repens* L., Mant. Pl. 40. 1767.

Annual herb; stem prostrate, dichotomously branched, rooting at nodes. Leaves opposite, elliptic-oblong or subspathulate, 2–8 × 1–2 mm, acute at apex, cuneate at base, entire, glabrous, sessile or subsessile; stipules minute, connate. Flowers solitary, axillary or in the fork of branches. Calyx campanulate, persistent; limb tubular; lobes equal, linear, *c.* 1.5 mm long. Corolla white, infundibuliform; lobes ovate, 1.5–2.5 mm long. Stamens 5, inserted at the middle of corolla-tube. Ovary 2-locular, with many ovules. Capsules globose or obliquely ellipsoid, dry, glabrous. Seeds angular, rugose, finely echinulate.

Flowering & Fruiting: December – July.

In moist places of wastelands, along ponds and fields; usually in sandy alluvial soil.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Near Kotha Village, Vineet K. Singh 67533, 75768 (BSA)

Hedyotis L.

Hedyotis corymbosa (L.) Lam., Tabl. Encycl. 1: 272. 1792; Dutta & Deb, Tax. Revis. Hedyotis Indian Subcont. 147. 2004. *Oldenlandia corymbosa* L., Sp. Pl. 119. 1753; Hook.f., Fl. Brit. India 3: 64. 1880; Duthie, Fl. Gangetic Plain 1: 413. 1905. *Pania*.

Annual herb; stem erect or prostrate, diffusely branched angular, glabrous or scabridulous, up to 25–35 cm high. Leaves linear or elliptic, 1.5–2.5 × 0.1–0.6 cm, acute or apiculate at apex, narrowed at base, glabrous; stipules membranous, 2–3 mm long. Flowers in axillary, 3–5-flowered corymbs or cymes; peduncles 1–2.5 cm long. Calyx-lobes 4, triangular, 0.4–1.4 mm long. Corolla white, tubular; lobes ovate, *c.* 1.3 mm long; tube 1–2 mm long. Stamens 4, inserted on the throat of corolla-tube. Ovary with many ovules; stigma 2-lobed. Capsules greyish white, globose, didymous. Seeds many, black, angular, reticulate.

Flowering & Fruiting: July – March.

In moist wastelands near wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67634 (BSA).

Hymenodictyon Wall., nom. cons.

Hymenodictyon orixense (Roxb.) Mabb. in Taxon 31: 66. 1982. *Cinchona orixensis* Roxb., Bot. Descr. Swietenia 21. 1793 & in Med. Facts Obs. 6: 152. 1793. *Hymenodictyon excelsum* (Roxb.) Wall. in Roxb., Fl. Ind. (Carey & Wall. ed.) 2: 149. 1824; Hook.f., Fl. Brit. India 3: 35. 1880; Duthie, Fl. Gangetic Plain 1: 409. 1905. *Bhurkur*.

Large tree, deciduous, 8–16 m high. Bark smooth. Leaves opposite, usually towards the end of branches, broadly elliptic or ovate-elliptic, 8–20 × 4–10 cm, abruptly acuminate at apex, narrowed at base, entire, finely pubescent; petioles 3–6 cm long; stipules broadly oblong, recurved. Flowers in terminal, densely flowered panicles; bracts foliaceous. Calyx campanulate, c. 2 mm long, pubescent. Corolla greenish white, 4–5 mm long, pubescent outside; lobes 5. Stamens 5, inserted in the middle of corolla-tube; filaments dilated upwards. Ovary 2-locular. Capsules reddish brown, ellipsoid, on decurved c. 1 cm long pedicels. Seeds winged.

Flowering & Fruiting: June – March.

Sparse in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75684 (BSA).

Mitragyna Korth., nom. cons.

Mitragyna parvifolia (Roxb.) Korth., Observ. Naocl. Indic. 19. 1839; Duthie, Fl. Gangetic Plain 1: 408. 1905. *Nauclea parvifolia* Roxb., Pl. Coromandel 1: 40. t. 52. 1796. *Stephegyne parvifolia* Korth., Verh. Nat. Gesch. Ned. Bezitt. Bot. 161. 1842; Hook.f., Fl. Brit. India 3: 25. 1880. *Krishna Kadamba*.

Tree, deciduous, up to 12–16 m high. Leaves opposite, variable, broadly ovate, suborbicular, obovate-oblong or broadly elliptic, 5–12 × 4–8 cm, acute or obtuse at apex, rounded, cuneate or subcordate at base, subcoriaceous, glabrous; veins 5–8 pairs, oblique; petioles 1–2 cm long; stipules obovate, caducous. Heads globose, 2–3 cm across, usually solitary; bracts caducous; bracteoles linear or clavate. Calyx infundibuliform, truncate or 5-toothed. Corolla creamy-yellow, infundibuliform. Stamens 5, on the throat of corolla. Ovary 2-locular; style filiform; stigma mitriform. Capsules black, ellipsoid, in globose heads, verrucose, splitting into 2 cocci. Seeds winged.

Flowering & Fruiting: July – March.

In mixed forests, sometimes along roadsides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69703 (BSA).

Neolamarckia Bosser

Neolamarckia cadamba (Roxb.) Bosser in Bull. Mus. Natl. Hist. Nat., B, Adansonia 1984 (3): 247. 1984. *Nauclea cadamba* Roxb., Fl. Ind. 1: 512. 1832. *Anthocephalus chinensis* (Lam.) A. Rich. ex Walp., Repert. Bot. Syst. 2: 491. 1843. *Cephalanthus chinensis* Lam., Encycl. 1: 678. 1785. *Anthocephalus cadamba* (Roxb.) Miq., Fl. Ind. Bat. 2: 135. 1856; Hook.f., Fl. Brit. India 3: 23. 1880; Duthie, Fl. Gangetic Plain 1: 432. 1905. *Kadam, Kadamb*.

Tree, deciduous, 7–14 m high, with spreading branches. Bark with longitudinal fissures. Leaves elliptic, ovate or elliptic-ovate, 9–15 × 5–8 cm, acute-acuminate at apex, obtuse at base, entire, with prominent veins, glabrous above, pubescent beneath; stipules lanceolate, caducous. Flowers in solitary, terminal, orange-coloured, pedunculate heads. Calyx tubular, 5-lobed; lobes oblanceolate, persistent. Corolla infundibuliform. Stamens 5. Ovary 4-locular above, 2-locular below; style exserted. Fruit a fleshy, globose, 4–5 cm across pseudocarp. Seeds angular.

Flowering & Fruiting: July – March.

Usually planted along roadsides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75651 (BSA).

ASTERACEAE

Ageratum L.

Ageratum conyzoides L., SP. Pl. 839. 1753; Hook.f., Fl. Brit. India 3:243. 1881; Duthie, Fl. Gangetic Plain 1:443. 1905; Uniyal in Hajara & al. Fl. India 12: 348. 1995.

Annual herb, 40–50 cm high; stem erect. leaves 4–6 × 2.5–5 cm, sub-rhomboid–ovate, 3-nerved from base, usually crenate, sparsely pilose above, glandular punctate beneath. Heads 3–4.5 mm across in corymbs. Involucral bracts 2-seriate; outer bracts *c.* 3 mm long, oblong - lanceolate 2-ribbed; Inner bracts *c.* 2.5 mm long, lanceolate with scarious margins. corolla *c.* 1.5 mm long. white or blue, hairy along the angles. Achenes *c.* 1 mm long. black, short bristly on the ribs; pappus scales 5, *c.* 1.5 mm long, lanceolate.

Flowering & Fruiting: Throughout the year.

Common, grows in waste places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67633, 77212, 77266, 77241 (BSA).

Blumea DC.

Blumea bifoliata (L.) DC. in wight, contrib. Bot. Ind. 14. 1834; Hook.f., Fl. Brit. India 3: 261. 1881; Duthie, Fl. Gangetic plain; S. Kumar in Hajra & al, 1: 1.18. 1905: Fl. India 13: 120. 1995. *Conyza bifoliata* L., S.P. Pl. cd. 2: 1207. 1753.

Annual herb, 7–50 cm high; stem branched at the base, Leaves 1–4 × 0.5–2.2 cm oblong–spathulate membranous. margins entire or distantly serrate, villous and stipitate glandular on both surfaces. Heads c. 5 mm across, terminal and axillary. Involucral bracts many seriate; outer bracts c. 2 mm long, linear, herbaceous, pubescent outside; inner bracts c. 5 mm long, linear lanceolate with scarios margins. Corollas of bisexual florets 3–4 mm long, 5-lobed, yellow, pubescent; corolla of female florets c. 3 mm long. filiform 2–3 lobed, sparsely pubescent. Achenes c. 0.5–0.7 mm long oblong elliptic, puberulous; Pappus c. 2.5 mm long yellowish-white.

Flowering & Fruiting: January – March.

Common, grows along the road side and waste places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69750 (BSA).

Blumea laciniata (Roxb.) DC., Prodr. 5: 436. 1836; Hook.f., Fl. Brit. India 3: 264. 1881; Duthie, Fl. Gangetic Plain 1: 415. 1905; S. Kumar in Hajra & al. Fl. India 13: 128. 1995. *Conyza laciniata* Roxb, Fl. Ind. 3: 428. 1832.

Annual, aromatic herb, 20–70 cm high; stem and branches erect, pilose, younger parts glandular hairy. Lower Leaves 5–25 × 1–15 cm lyratly lobed; upper leaves obovate, base tapering, apiculate, entire to coarsely dentate, pilose on both surfaces. Heads 5–7 mm across in large terminal dense or lax panicles. Involucral bracts many seriate; outer bracts c. 2 mm long, acicular, glandular hairy on dorsal surface; middle 2–20 mm long; inner bracts 3–3.5 mm long lanceolate, acuminate. Corolla of bisexual florets yellow 3–5 mm long, 5-lobed, papillate pubescent; corolla of female florets filiform 3.5–4.5 mm long, 2–3-lobed, glabrous. Achenes c. 1 mm long, brown sparsely pubescent; Pappus c. 4 mm long white.

Flowering & Fruiting: January – April.

Common, grows along the road side in waste places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67669 (BSA).

Chrysanthellum Rich.

Chrysanthellum americanum (L.) Vatke, Abh. Nat. Ver. Brem. 9:122. 1887; Chowdhery in Hajra & al. Fl. India 12: 379. 1995. *C. indicum* DC., Prodr. 5: 631. 1836., Hook.f., Fl. Brit. India 3: 310. 1881; Duthie, Fl. Gangetic Plain 1: 432. 1905.

Annual herb, 10–15 cm high; stem diffuse to procumbent, quadrangular, grooved. Leaves alternate, pinnatifid, segments oblong or cuneiform, obtusely lobed, membranous at margins petioles 5–12 mm long. Heads *c.* 3 mm across terminal, solitary, peduncled. Involucral bracts biseriate; outer bracts *c.* 2 mm long obtuse, with membranous margins; inner ones *c.* 2 mm long, obtuse, membranous. Ray florets *c.* 2.5 mm long, ligulate 2-toothed; disc florets *c.* 2.8 mm long, tubular 5-fid. Achenes 2.5–3 mm long oblong. cuneate, outer margin thick obtuse, inner flate with winged margins.

Flowering & Fruiting: August – December.

Common, grows in open fields and rocky slopes.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69753 (BSA).

Conyza Less., nom. cons.

Conyza bonariensis (L.) Cronq. in Bull. Torrey Bot. Club. 70: 632. 1943; Hajra in Hajra & al. Fl. India 12: 104. 1995. *Erigeron limifolius* Willd., Sp. Pl. 3: 1955. 1803; Hook.f., Fl. Brit. India 3: 254. 1881. *Erigeron bonariensis* L., Sp. Pl. 863. 1753.

Annual herb, 30–55 cm high; stem erect, branched, ribbed hirsute. Leaves 2–3 × 0.2–0.4 cm linear-lanceolate, cuneate at base, coarsely serrate incised at margin, acute at apex. Heads *c.* 7 mm across in long leafy panicles. Involucral bracts 3-seriate, linear, pilose *c.* 3 mm long. corolla of marginal flowers filiform *c.* 2.5 mm long. disc florets 3–4 mm long pale yellow. Achenes *c.* 1 mm long thinly hairy; Pappus 2.5–3.0 mm long, yellowish.

Flowering & Fruiting: June – January.

Common, grows as weeds in gardens.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67691 (BSA).

Eclipta L., nom. cons.

Eclipta prostrata (L.) L., Mant. Pl. 2: 286. 1771; Chowdhery in Hajra & al. Fl. India 12: 381. 1995. *Verbesina prostrata* L., Sp. Pl. 902. 1753. *Eclipta alba* (L.) Hussk., Pl. Jav. Rav. 528. 1848; Hook.f., Fl. Brit. India 3: 304. 1881. *E. erecta* L., mant. 2: 286. 1771; Duthie, Fl. Gangetic Plain 1: 427. 1905.

Annual or perennial herb, 20–50 cm high; stem prostrate, decumbent, ascending or erect, hairy, often rooting from lower nodes. Leaves opposite, subsessile 2–4 × 1.5–2 cm elliptic-lanceolate, mucronulate, cuneate at base, appressed pilose on both surfaces. Heads 2–4 mm across, white, solitary or fascicled, axillary on 0.4–1 cm long peduncle. Involucral bracts 2-seriate; outer bracts *c.* 4 mm long, ovate-lanceolate, appressed pubescent; inner bracts *c.* 4 mm long oblong-ovate. Ray florets *c.* 1.5 mm long, ligulate bidentate, white; disc florets *c.* 1.5 mm long tubular 4–5-lobed. Achenes 2.5–3.5 mm long, 3-angled in female and 4-angled in bisexual florets. Pappus absent, only scales present.

Flowering & Fruiting: Throughout the year.

Common, grows in moist and shady places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67525 (BSA).

Elephantopus L.

Elephantopus scaber L., Sp. Pl. 814. 1753; Hook.f., Fl. Brit. India 3: 242. 1881; Duthie, Fl. Gangetic Plain 1: 404. 1905; Uniyal in Hajra & al. Fl. India 13: 333. 1995.

Perennial herb, subscapose, 30–40 cm high; stem erect, terete simple below, corymbosely branched at above, appressed-pubescent. Leaves usually in basal rosettes, 3–12 × 0.5–5 cm obovate oblong, spatulate, tapering at base, obtuse at apex, sparsely hairy beneath; cauline leaves smaller. Heads axillary and terminal on 4–10 cm long peduncles. Bracts 3, at the top foliaceous 1–2 cm long 1-nerved. Involucral bracts 2-seriate; outer bracts 4–5 mm long, ovate-lanceolate, inner bracts 6–8 mm long, lanceolate. Corolla tubular *c.* 5 mm long violet, deeply 5-cleft. Achenes *c.* 4 mm long, 10-ribbed, slightly pubescent; Pappus-bristles 5, hairy *c.* 4 mm long with dilated at base.

Flowering & Fruiting: October – December.

Common, grows under Sal Forest.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75603, 77239 (BSA).

Emilia Cass.

Emilia sonchifolia (L.) DC. in wight, contrib. Bot. Ind. 24. 1834; Hook.f., Fl. Brit. India 3: 336. 1881; Duthie, Fl. Gangetic Plain 1: 436. 1905; Mathur in Hajra & al. Fl. India 13: 212. 1995. *Cacalia sonchifolia* L., Sp. Pl. 835. 1753.

Annual herb, 25–35 cm high; stem erect, brached glaucescent, often decumbent, ascending, glabrous. Leaves sessile; lower leaves 5–10 cm long pinnatifid with triangular-ovate terminal lobe and irregularly toothed lateral lobes; upper leaves smaller, lanceolate amplexicaul with lyrate auricles. Heads 6–8 mm long on 2–4 cm long peduncles, combined into corymbs. Involucral bracts 6–9 mm long, lanceolate, acute corolla purple *c.* 8 cm long, Achenes 2–3 mm long with 5 hairy ribs, alternating with faint glabrous ribs; Pappus 6–7 mm long white.

Flowering & Fruiting: February – March.

Common, grows in waste lands and sandy soil.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77297 (BSA).

Gnaphalium L.

Gnaphalium luteo-album L., Sp. Pl. 851. 1753. Hook.f., Fl. Brit. India 3: 288. 1881, Duthie, Fl. Gangetic. Pl. 1: 421. 1905. Pant in Hajra & al. Fl. India 13: 87. 1995. *G. Luteo-album* L. subsp. *pallidum* (Lam.). Maheshw. in J. Bombay Nat. Hist. Soc. 57(2): 377. 1960.

Annual densely woolly herb, 10–40 cm high; stem erect or ascending. Leaves 1–5 × 0.5–1.4 cm oblong–spathulate obtuse, hairy above, densely woolly beneath; upper leaves narrow linear-lanceolate. Heads *c.* 2.5 mm across, in dense or branched terminal corymbs. Involucral bracts 3-seriate, elliptic-lanceolate yellow to pale or dark brown; outer bracts *c.* 2 mm long ovate or oblong; inner bracts *c.* 1.5 mm long. Ray florets *c.* 2.2 mm long, filiform 3–4 toothed. Disc florets bisexual *c.* 2 mm long 5-toothed. Achenes *c.* 0.4 mm long oblong. brown; Pappus *c.* 1.5 mm long, yellowish, deciduous.

Flowering & Fruiting: February – April.

Common, grows moist waste places and dry areas near wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69748 (BSA).

Gnaphalium pensylvanicum willd., Enum. Hort. Berol. 867. 1809; Pant in Hajra & al. Fl. India 13:89. 1995. *G. Peregrinum* Fernald in Rhodora 45:479. t. 795. 1943; *G. purpureum auct. non L.*, Hook. f., Fl. Brit. India 3: 289. 1881.

Annual herb, 10–45 cm high, stem erect or decumbent, simple or branched, whole plant grey cottony tomentose. Leaves dull green 2–5 × 0.8–2.5 cm spatulate lanceolate, tapering at base, apiculate at apex, upper surface sparsely lanate, lower surface greyish tomentose. Heads 1–2.5 mm across in axillary and terminal clusters, densely white woolly tomentose. Involucral bracts 2–3 seriate; outer bracts 2–3 mm long ovate-lanceolate, acuminate, scarious at margins, lanate; inner bracts *c.* 2.5 mm long oblong – lanceolate. Ray florets *c.* 1.5 mm long filiform 3–4-fid; disc florets bisexual *c.* 2 mm long, tubular 5-lobed. Achenes *c.* 0.4 mm long, elliptic, oblong minutely glandular; Pappus hairs *c.* 1.5 mm long white, connate at base.

Flowering & Fruiting: January – February.

Common, grows in moist and shady places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67680, 69729 (BSA).

Grangea Adans.

Grangea maderaspatana (L.) Poir. in Lamk, Encycl. suppl. 2: 825.1812: Hook.f., Fl. Brit. India 3: 247. 1881; Hajra in Hajra & al. Fl. India 12: 127. 1995. *Artemisia maderaspatana* L., Sp. Pl. 849. 1753.

Annual herb, prostrate, tufted leafy branches 5–25 cm long forming circular patches. Leaves 2–5 cm long pinnatifid, opposite in subopposite lobes, largest at apex, coarsely serrate-dentate at margins, pubescent on both surfaces. Heads 4–6 mm across, solitary. Involucral bracts 2–3 seriate, 3–5 mm long elliptic-oblong with ciliate margins. Ray florets *c.* 1.5 mm long tubular, ligule 2-lobed; disc florets bisexual campanulate 4–5 lobed. Achenes 1–1.8 mm long, compressed, glandular–turbinate, truncate at tip with 2 hairy tubular Pappus.

Flowering & Fruiting: December – May.

Common, grows on dry beds of the wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75740 (BSA).

Launaea Cass.

Launaea procumbens (Roxb.) Ramayya & Rajagopal in Kew Bull. 23 (3): 465. t. 1969; Mamgain & Rao in Hajra & al. Fl. India 12: 309. 1995. *Prenanthes procumbens* Roxb., Fl. Ind. 3: 404. 1832. *Launaea nudicaulis sensu auct. plur.* (Ind.), non *L. nudicaulis* (L.) Hook.f., *sensu stricto*. Fl. Brit. India 3: 416. 1881; Duthie, Fl. Gangetic Pl. 1: 450. 1905.

Annual herb, 20–30 cm high; stem branched, glabrous, naked or sometimes leaf-bearing, Leaves in basal rosette, 4–15 cm long, pinnatifid, obovate-oblong or spatulate, dentate, teeth cartilaginous. Heads 10–16 mm long, cylindric, remotely sub, racemose along the branches. Involucral bracts 2–3 seriate; outer bracts 1.5–4 mm long ovate, glabrous; inner 7–14 mm long linear or linear-oblong, glabrous. Ligules yellow c. 10 mm long 5-toothed. Achenes 2.5–3 mm long, compressed, thick 4-ribbed, rugulose; pappus 5–6 mm long, soft white.

Flowering & Fruiting: March – September.

Common, grows in waste places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69719 (BSA).

Parthenium L.

Parthenium hysterophorus L., SP. Pl. 988. 1753; Rao in J. Bombay Nat. Hist. Soc. 54: 218. 1956; Chowdhery in Hajra & al. Fl. India 12: 403. 1995.

Annual herb, 40–120 cm tall, stem erect, branched, longitudinally grooved, covered with white hairs. Leaves deeply 1–2 Pinnately dissected 2–10 × 3 – 5 cm; Pinules oblong, lanceolate, entire to deeply lobed, puberulous, acute with decurrent base. Inflorescence a lax panicle of numerous small heads. Heads 3–5 mm across. Involucral bracts 2-seriate; outer bracts c. 3 mm long, herbaceous; inner bracts c. 2.5 mm long, thinner, subtending. Ray florets c. 4.2 mm long, urceolate with indistinct lobes, membranous; disc florets c. 3 mm long, in fundibuliform, 5-lobed. Achenes c. 2.2 mm long obovate, black-crowned with remnant of Corolla appendage and style.

Flowering & Fruiting: October – March.

Common, grows on waste places and along the road side.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67565 (BSA).

Senecio L.

Senecia nudicaulis Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825; Hook.f., Fl. Brit. India 3: 340. 1881; Duthie, Fl. Gangetic. Pl. 1: 436. 1905. Mathur in Hajra & al., Fl. India 13: 273. 1995.

Annual or perennial, scapigerous herb, 20–60 cm high. Basal Leaves rosette 2–10 × 1–3 cm obovate-oblong to obovate spatulate, obtuse, irregularly serrate, pubescent above, tomentose beneath; cauline leaves oblong-lanceolate 2–7 cm long dentate to lobulate with auricled base. Heads *c.* 0.6–1 cm across. yellow on 1–1.5 cm long bracteate peduncles, arranged in corymbiform panicles. Involucral bracts *c.* 5 mm long lanceolate, acute, with scarious margins. Ray florets *c.* 8 mm long, ligulate 3-dentate at tip; disc florets *c.* 4.5 mm long. Achenes *c.* 1.3 mm long elliptical, deeply grooved; Pappus *c.* 4 mm long white.

Flowering & Fruiting: March – November.

Common, grows on forest road side.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75800 (BSA).

Senecio vestitus Berg., Descrip. Pl. Cap. 282. 1767; Raizada, Suppl. Fl. Gangetic Pl. 131. 1976; Mathur in Hajra & al. Fl. India 13: 279. 1995.

Perennial, undershrub, 50–90 cm high; stem terete, woody, glabrous. Leaves 2–5 × 1–2.5 cm oblong or obovate, obtuse, serrate, membranous, broadly amplexicaul at base, Heads 8–10 mm across. branched corymbose 2–25 flowered. Involucral bracts scalay, glabrous. Ray florets 5–8 yellow, 3-dentate; disc florets tubular 5-lobed. Achenes striate, hispidulous.

Flowering & Fruiting: February – March.

Rare, grows on sandy alluvial soil near forest edges.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69742 (BSA).

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.

Annual corpulent herb, 20–45 cm high; stem erect or ascending. Leaves 1.3–6 × 1–4 cm ovate-elliptic to elliptic acute or obtuse, undulate serrate along margins. Heads 6–9 mm across

in axillary and terminal panicles involucre bracts biseriata, 2–4 mm long oblong-elliptic, obtuse or subacute. Ray florets few inconspicuous. Disc florets *c.* 2.5 mm long campanulate, 5-lobed. Achenes *c.* 1.5 mm long dorsally compressed, ciliate along the margins black; pappus of 2–3 weak strigose awns.

Flowering & Fruiting: February – April.

Common, grows in open moist areas in the forest.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67593, 75648 (BSA).

Tridax L.

Tridax procumbens L., Sp. Pl. 900. 1753; Hook.f., Fl. Brit. India 3: 311. 1881; Duthie, Fl. Gangetic Pl. 1: 433. 1905; Chowdhary in Hajra & al. Fl. India 12: 418. 1995.

Annual herb, 10–40 cm high; stem procumbent-ascending, hispid, branching at the base. Leave 1–5×0.5–3.5 cm ovate-lanceolate serrate-dentate, acute cuneate at base, petioles 5–13 mm long. Heads 7–9 mm across solitary. Involucre bracts 2–3 seriate, outer bracts 3–6 mm long lanceolate acuminate, hairy; inner bracts 4–6 mm long, oblong membranous. Ray florets yellow 2–4.5 mm long, ligulate 2–3-lobed; disc florets 3–5 mm long, 5-lobed, bright yellow. Achenes 1.2–2.5 mm long narrowly-obconical, obscurely angular brown, beak densely pilose; Pappus 2.5–5 mm long, unequal, plumose bristles.

Flowering & Fruiting: Throughout the year.

Common, grows along the waste places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67514 (BSA).

Vernonia Schreb.

Vernonia cinerea (L.) Less. in Linnaea 4(1) 291. 1829; Hook.f., Fl. Brit. India 3: 233. 1881; Duthie, Fl. Gangetic Pl. 1: 404. 1905; Uniyal in Hajra & al. Fl. India 13: 367. 1995. *Conyza cinerea* L., SP. Pl. 862. 1753.

Annual or perennial herb, 12–85 cm high; stems erect, terete, ribbed, greyish pubescent. Leaves petioled, 2–7 × 1–3 cm ovate, subspathulate-lanceolate or elliptic, obtuse or acute attenuate at base, pubescent on both surfaces. Heads 1.5–2.5 mm across in terminal corymbs. Involucre bracts many-seriate; outer bracts *c.* 1 mm long narrowly lanceolate; inner bracts 2–3

mm long oblong–lanceolate, acute or apiculate with white tinged tip. Corolla 3–4 mm long, 5-fid bluish mauve or white. Achenes *c.* 1.2 mm long, obscurely 4–5 angled, finely white, puberulous; Pappus 3–4 mm long white, biseriate.

Flowering & Fruiting: Throughout the year.

Commonly grows in waste places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67599 (BSA).

Xanthium L.

Xanthium indicam Koenig in Roxb., Fl. India 3: 601. 1832; Chowdhary in Hajra & al. Fl. India 12: 427. 1995; *X. strumarium* L., Sp. Pl. 987. 1753, *p.p.*; Hook.f., Fl. Brit. India 3: 303. 1881; Duthie, Fl. Gangtic Pl. 1: 426. 1905.

Annual herb, 60–120 cm high; stem erect. Leaves alternate 3–10 × 2–8 cm broadly ovate to cordate, 3–5 lobed, acute or acuminate, rounded or cordate at base, irregularly serrate on margins, hispid on both surfaces. Heads monoecious; male heads with involucre bracts 1–2 seriate, ciliate; corolla rough *c.* 3 mm long; female heads with larger connate involucre bracts, corolla absent. Achenes 1.2–1.4 mm long ovoid or elliptic, enclosed in hardened spinescent involucre of brown colour; Pappus absent.

Flowering & Fruiting: March – November.

Commonly grows in waste land.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69785, 75744, 67577 (BSA).

CAMPANULACEAE

Campanula L.

Campanula colorata Wall. ex Roxb. Fl. Ind. ed. Carey & Wall. 2: 101, 1828; C.B. Clarke in Hook.f. Fl. Brit. India 3: 440, 1881; Raizada, Suppl. Duthie, Fl. Gangetic Plain (ed.1): 138, 1976. *C. ramulosa* Wall. in Roxb. Fl. Ind. Ed. Carey & Wall. 2: 101, 1824.

Annual herb, up to 40 cm high; stem erect, hispid. Leaves alternate, sessile, 2–4 × 0.5–1.1 cm, linear-oblong or lanceolate; lower and radical elliptic or oblanceolate, repand-dentate or crenate-serrate, softly pilose on both surfaces. Flowers pale-lilac or yellowish-white, dimorphic, usually sub-spicate on the branches of narrow panicles. Calyx deeply 5-lobed, persistent.

Corolla regular. Capsules about 2 mm in diam., obconic, dehiscent at the base or sides below the calyx-teeth. Seeds numerous, ellipsoid, minute.

Flowering & Fruiting: March – April.

Commonly found along the bank of lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67694 (BSA).

Wahlenbergia Schrad. ex Roth nom. cons.

Wahlenbergia marginata (Thunb.) A. DC., Mon. Camp.: 143, 1830; FG: 183. *Campanula marginata* Thunb., Fl. Jap.: 89, 1784. *C. gracilis* Forst. Prodr.: 84, 1786; R.Br. Prodr.: 561, 1810 (incl. var.). *Wahlenbergia gracilis* Schrad. Blumenbachia: 38 in Obs. 1827; A. DC. Mon. Camp.: 142, 1830 (incl. var.); Fl. Brit. India 3: 429; Duthie, Fl. Gangetic Plain 1: 453.1905.

Perennial herb, up to 35–40 cm high; stem erect or decumbent, glabrous or slightly hairy, branched. Leaves alternate rarely opposite, sessile, 2–6 × 0.2–0.6 cm, linear-oblong or obovate-oblong, more or less toothed. Flowers white or pale-blue in lax cymose panicles. Corolla regular. Capsules 5–7 mm long, turbinate, crowned with the calyx lobes, 3-valved, dehiscent at the top within the calyx. Seeds yellowish-brown, ellipsoid.

Flowering & Fruiting: September – January.

Abundantly found on marshy grounds generally along the bank of the lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67681 (BSA).

PLUMBAGINACEAE

Plumbago L.

Plumbago zeylanica L., Sp. Pl. 151, 1753; Fl. Brit. India 3: 480. 1879; Duthie, Fl. Gangetic Plain 1: 457. 1905. *Chitri*.

Perennial, diffuse undershrub; branches green, striate. Leaves alternate, 3–8 × 2–4 cm, ovate or oblong-ovate, entire. Flowers white, sub-sessile in bracteate, glandular-pubescent, spiciform racemes. Calyx 1–1.3 cm long, tubular, persistent, covered with sticky, stipitate glands. Corolla-salver-shaped. Capsules oblong, apiculate, enclosed within the calyx. Seeds oblong.

Flowering & Fruiting: September – December.

Rarely found along road-sides and forest margins.

Specimens examined: Tikri reserve forest, Vineet K. Singh 69712, 75616, 77220 (BSA).

PRIMULACEAE

Anagallis (Tourn.) L.

Anagallis arvensis L., Sp. Pl. 148. 1753; Hook.f., Fl. Brit. India 3: 506. 1882; Duthie, Fl. Gangetic Plain 1: 461. 1905; Taylor in Kew Bull. 1955: 329. 1955.

Annual herb, 6–45 cm high; stem erect or procumbent, glabrous; branches quadrangular, flattish or winged. Leaves sessile, opposite, 2–3 × 1–1.5 cm, ovate, entire, acute, base cordate. Flowers blue, solitary, axillary on long slender peduncles, decurved in fruits. Stamens 5, filaments villous. Capsules about 4 × 4 mm, dehiscing transversely. Seeds numerous, minute, trigonous.

Flowering & Fruiting: December – March.

Commonly found in moist or marshy places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69733 (BSA).

SAPOTACEAE

Madhuca J.F. Gmel.

Madhuca indica J.F. Gmel. Syst. Nat. 2: 799, 1791. *Bassia latifolia* Roxb., Pl. Cor. 1: 20, t. 19, 1795; C.B. Clarke in Hook.f., Fl. Brit. India 3: 544. 1882; Duthie, Fl. Gangetic Plain 1: 465. 1905. *Madhuca latifolia* (Roxb.) Macbride in Contrib. Gray Herb. (N.S.) 3(53): 17. 1918. *Mahua*.

large dense-crowned deciduous tree, up to 15 m high; young shoots pubescent or tomentose. Bark blackish-grey with vertical cracks; blaze pink or red and white, laticiferous, fibrous. Leaves clustered at the ends of branches, coriaceous, 10–15 × 6–8 cm, elliptic or oblong-elliptic, entire, short-acuminate, base rounded or acute, rusty-tomentose or copper-coloured when young, lateral nerves 11–14 pairs; petioles 3–4 cm long. Flowers cream-coloured, fleshy in dense fascicles near the ends of leafless branches; pedicels 2–4 cm long, drooping, rusty-tomentose. Berries 2–4.5 cm long, ovoid, fleshy, green. Seed one, rarely more than one, dark-brown, shining.

Flowering & Fruiting: March – August.

Commonly found in mixed Sal Forest. The flowers are scented.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69710 (BSA).

EBENACEAE

Diospyros L.

Diospyros cordifolia Roxb., Pl. Corom. 1: 38. t. 50. 1795; Duthie, Fl. Gangetic Plain 2: 17. 1911. *D. Montana auct. non* Roxb. 1795; C.B. Clarke in Hook. f., Fl. Brit. India 3: 555. 1882, *p.p.*; Singh, Monogr. Indian *Diospyros* L. Ebenaceae 73. f. 15. 2005. *Bis-tendu*.

Tree, up to 5–7 m high, often with branched thorns. Leaves alternate, oblong, oblong-lanceolate or ovate-oblong, 1.9–5.5 × 1–2 cm, velvety on both surfaces, lateral nerves inconspicuous, apex acute or obtuse, base subcordate or rounded; petioles 3–5 mm long. Male flowers axillary, peduncles 3-flowered; calyx campanulate, *c.* 2 mm long, pubescent, 4-lobed, lobes elliptic, pubescent inside; corolla white, urceolate, *c.* 4 mm long, slightly pubescent outside. Female flowers solitary; calyx campanulate, *c.* 3 mm long, 4-partite, lobes oblong-ovate; corolla white, urceolate, 6–8 mm long, 4-partite, lobes obtuse; staminodes 12; ovary globose, styles 4, bifid. Berries globose or ovoid, 1.5–2.5 cm across, yellow when ripe; seeds elliptic-oblong or wedge-shaped.

Flowering & Fruiting: May – September.

Common, in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67575 (BSA).

Diospyros montana Roxb., Pl. Coromandel 1: 37. t. 48. 1795 non Neyne ex Hath 1821, *nec* Panch. & Serbert. 1874; C.B. Clarke in Hook. f., Fl. Brit. India 3: 555. 1882, *p.p.*; Duthie, Fl. Gangetic Plain 2: 15. 1911; Singh, Monogr. Indian *Diospyros* L. Ebenaceae 166. f. 38. 2005. *Bis-tendu*.

Shrub or Tree, up to 6–8 m high, sometimes armed; young branches pubescent. Leaves ovate, ovate-oblong, 4–10 × 2–5 cm, subcoriaceous, pubescent when young, apex subacute or obtusely acuminate, base rounded or cuneate; petioles 3–6 mm long. Male flowers in short few-flowered axillary cymes; calyx campanulate, 2–8 mm long, 4-lobed, lobes ovate, ciliate; corolla white, urceolate, 1–1.3 cm long, 4-lobed, lobes rounded, recurved; stamens 16 in opposite pairs, unfiled at the base, anthers lanceolate, apiculate due to produced connectives. Female flowers

solitary, axillary, calyx campanulate, 5–8 mm long, 4-partite, lobes ovate-elliptic, ciliate, contorted; corolla white, urceolate, 1.3–1.8 cm long, 4-lobed, lobes ovate, obtuse, contorted; staminodes 4; ovary globose, styles 4, stigmas bifid. Fruits globose, 2.5–3 cm across, supported on accrescent and reflexed calyx-lobes, 2–8-seeded; seeds wedge-shaped.

Flowering & Fruiting: March – October.

Common, in mixed forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67639 (BSA).

OLEACEAE

Jasminum L.

Jasminum multiflorum (Burm.f.) Andr., Bot. Repos. 8. t. 496. 1807 *Nyctanthes multiflora* Burm.f., Fl. Indica 5. t. 3. f. 1. 1768. *N. pubescens*, Retz., Observ. Bot. 5: 9. 1788; C.B. Clarke in Hook.f., Fl. Brit. India 3: 592. 1882; Duthie, Fl. Gangetic Plain 2: 22. 1911. *Chameli*.

Scandent shrub, up to 2.5 m high with hairy branches. Leaves simple, opposite, 3–7 × 1.5–3 cm, broadly-ovate, entire, acute or shortly acuminate, lateral nerves 4–8 pairs. Flowers, sessile, white in lax terminal trichotomous, hairy cymes. Calyx hairy, lobes 6–9, persistent. Berries 1–2, simple or didymous, globose.

Flowering & Fruiting: November – August.

Frequent in forests and near habitations.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69761 (BSA).

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 2: 24. 1911. *Harsingar*.

Trees, up to 4–8 m high; young branches 4-angled, hairy. Leaves opposite, ovate, scabrous above, pubescent beneath, margin entire or distantly toothed, apex acute or acuminate, base rounded or slightly cuneate. Flowers sessile in axillary and terminal trichotomous cymes; bracts elliptic or ovate, pubescent; calyx-tube infundibuliform, 2–4 mm long, obscurely 5-toothed; corolla-tube orange, coloured, 0.6–1.2 cm long, lobes white, 5–7, obcordate, contorted

in bud; ovary suborbicular, style filiform, stigma slightly bifid. Capsules orbicular, chartaceous, compressed, apex mucronate or often emarginated, 2-seeded; seeds orbicular, compressed.

Flowering & Fruiting: August – March.

In Mixed forests and planted near rest house compound.

Specimen examined: Tikri reserve forest, near forest rest house, Vineet K. Singh 69736 (BSA).

APOCYNACEAE

Carrisa L., nom. cons.

Carissa opaca Stapf ex Haines in Indian Forester 47: 348. 1921. *C. Spinarum auct. non.* L., 1771; Hook. f. Fl. Brit. India 3: 631. 1882, *p.p.*; Duthie, Fl. Gangetic Plain 2: 32.1911. *Karaunda*.

Spiny shrub, up to 3 m high. Spines simple or forked. Leaves suborbicular, ovate-elliptic or elliptic, 1.5–3.5 × 0.6–3.5 cm, apex spine-tipped or mucronate, base subacute; petioles 5–7 mm long. Flowers in terminal corymbose cymes; calyx 5-partite, lobes lanceolate, *c.* 2.5 mm long, ciliate; corolla white, hypocrateriform, tube 5–8 mm long, lobes 5, lanceolate, *c.* 3 mm long, overlapping to right; stamens included near the apex of corolla-tube; ovary subglobose, style slender, stigma bifid. Berries purple on ripening, subglobose, 4-seeded.

Flowering & Fruiting: May – November.

Common in shrub forests, also cultivated.

Specimen examined: Tikri reserve forest, Near forest rest house, Vineet K. Singh 69771 (BSA).

Holarrhena R. Br.

Holarrhena pubescens (Buch.-Ham.) Wallich ex G. Don, Gen. Hist. 4: 78. 1837–1838. *Echites pubescens* Buch.-Ham. in Trans. Linn. Soc. Bot. 13: 524. 1822. *Holarrhena antidysenterica* Wallich, Numer. List No. 1672. 1829, non (L.) Wallich, 1829; Hook.f., Fl. Brit. India 3: 644. 1882; Duthie, Fl. Gangetic Plain 2: 35. 1911. *Dudhi*.

Tree, up to 6 m high. Leaves ovate, ovate-elliptic or elliptic, 4–12 × 2–7 cm, membranous, glabrous or tomentose beneath, base acute or sometimes rounded; petioles 2–4 mm long. Flowers in terminal corymbose cymes; bracts lanceolate, pubescent; calyx glandular

inside, 5-partite, lobes lanceolate, 2–2.5 mm long, ciliate; corolla white, hypocrateriform, tube, hairy at apex on inner surface, lobes 5, oblong, 0.6–1.4 cm long, pubescent, overlapping to left; stamens inserted at the base of corolla-tube; carpels 2, apocarpous, style filiform, stigma fusiform. Follicles 5–10 cm long, divergent, terete, many-seeded; seeds linear-oblong.

Flowering & Fruiting: May – January.

Common, in sal and mixed forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 77253, 75762 (BSA).

Ichnocarpus R.Br., non. cons.

Ichnocarpus frutescens (L.) R.Br. in Mem. Werner. Soc. 1: 62. 1811 & in Aiton, Hortus Kew. Ed. 2.2: 69. 1811; Hook.f., Fl. Brit. India 3: 669. 1882; Duthie, Fl. Gangetic Plain 2: 41. 1911. *Apocynum frutescens* L., Sp. Pl. 213. 1753. *Dudhibel*.

Scandent shrub or climber; young branches tomentose. Leaves elliptic or ovate-elliptic, 3–6 × 1.5–2.5 cm, apex subacuminate or acuminate, base acute; petioles up to 1 cm long. Flowers in terminal and axillary rusty pubescent paniculate cymes; calyx pubescent, 5-partite, lobes ovate; corolla greenish white, hypocrateriform, tube c. 2.5 mm long, lobes with slender twisted acumen at apex, deflexed in bud, overlapping to right; stamens included below the middle of corolla-tube; carpels 2, apocarpous, style short, stigma avoid. Follicles terete, straight or subfalcate, many-seeded; seeds linear, comose at apex.

Flowering & Fruiting: October – March.

Common, in mixed forests.

Specimens examined: Tikri reserve forest, Vineet K. Singh 69790, 69762 (BSA).

Vallaris Burm.f.

Vallaris solanacea (Roth) Kuntze, Revis. Gen. Pl. 417. 1891. *Peltanthera solanacea* Roth, Nov. Pl. Sp. 132. 1821; Hook.f., Fl. Brit. India 3: 650. 1882; Duthie, Fl. Gangetic Plain 2: 37. 1911.

Climbing, woody shrub. Leaves 2–8 × 1.5–4 cm, elliptic or elliptic-oblong, pellucid-dotted, apex subacuminate, base acute. Flowers in terminal pubescent cymes; calyx 5-partite, pubescent; corolla white subrotate, 5-lobed, lobes rounded; anthers exerted, pubescent. Follicles 6–12 cm long, oblong, striate, acuminate, many seeded. Seeds ovoid, beaked.

Flowering & Fruiting: November – April.

Rare in forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69752 (BSA).

ASCLEPIADACEAE

Calotropis R.Br.

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 2: 48. 1911. *Asclepias gigantea* L. Sp. Pl. 214. 1753. *Madar*.

Tall shrub or small tree, up to 3.5 m high, covered with white tomentum. Bark ash-coloured; blaze yellowish with milky latex. Leaves thick, opposite-decussate, sub-sessile, 10–17 × 5–8.5 cm, elliptic-oblong, acute or short-acuminate, base cordate. Flowers purple or white, ovoid in bud 2–4 cm in diam. in axillary or sub-terminal pedunculate, simple or compound umbels or corymbs. Corolla-lobes spreading; coronal scales 5, fleshy with a recurved spur at the base and a pair of tubercles at the apex. Follicles 5–8 × 2.5–3.5 cm, thick fleshy, ventricose, green. Seeds many, black with silky coma, broadly-ovate.

Flowering & Fruiting: February – June.

Commonly found on dry, sandy hard soil and in waste places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75675, 75752 (BSA).

Calotropis procera (Aiton) R.Br. in W.T. Aiton Hort. Kew. ed. 2. 2: 78, 1811; Hook.f., Fl. Brit. India 4: 18. 1883; Duthie, Fl. Gangetic Plain 2: 48. 1911. *Asclepias procera* Aiton, Hort. Kew. 1: 3-5. 1789. *Madar*.

Erect shrub, up to 1–1.5 m high covered with white-tomentum. Leaves sub-coriaceous, opposite, sub-sessile, 7–16 × 5–8 cm, ovate or obovate, acute, base rounded, glabrous above, white-tomentose beneath, lateral nerves 5–6 pairs. Flowers purplish, 1.5–2 cm in diam., hemispherical in bud, in umbellate cymes. Corolla lobes erect; coronal scales acute. Follicles recurved, smooth, green. Seeds obovate, many with silky-white coma.

Flowering & Fruiting: April – July.

Commonly found in open dry places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67552, 67632 (BSA).

Hemidesmus R. Br.

Hemidesmus indicus (L.) R.Br. in Aiton, Hort. Kew. Ed.2, 2: 75. 1811; Hook.f., Fl. Brit. India 4: 5. 1883; Duthie, Fl. Gangetic Plain 2: 48. 1911. *Periploca indica* L. Sp. Pl.: 211. 1753.

Twining or trailing shrub, evergreen. Leaves opposite, 3–7 × 1.5–3 cm, elliptic-oblong, lanceolate or linear-lanceolate, acute or obtuse, apiculate, dark-green above, paler beneath, lateral nerves 5–9 pairs; petioles 4–8 mm long. Flowers greenish-purple in axillary clustered cymes. Corona coralline like fleshy knobs at the throat of the corolla. Follicles 8–12 × 0.4 cm, slender, divaricate, smooth.

Flowering & Fruiting: August –December.

Very common throughout the area spreading over trees and bushes.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67551, 69739 (BSA).

Oxystelma R.Br.

Oxystelma secamone (L.) K. Schum. in Engl. & Prantl. Nat. Pfam. 4(2): 229. 1895. *Periploca secamone* L., Mant. 216. 1771. *Oxystelma esculentum* R.Br. in Mem. Wern. Soc. 1: 40. 1810; Hook.f., Fl. Brit. India 4: 17. 1883 ; Duthie, Fl. Gangetic Plain 2: 51. 1911.

Perennial, herbaceous, twiner. Stem glabrous. Leaves thin, opposite, 4–10 × 0.5–1.2 cm, linear-lanceolate, acuminate, base acute or rounded, pale-green, lateral nerves looping within the margin; petioles 0.5–1.2 cm long. Flowers white or pink with purple veins, 2–3 cm in diam. in long-white or pink with purple veins, in long-peduncled drooping sub-umbellate or racemose cymes. Corolla saucer-shaped margins densely villous. Staminal corona of 5 erect processes with subulate tips projecting above the stigma. Follicles 4–7 cm long, ovoid-lanceolate, oblique, glabrous, pointed. Seeds many, black.

Flowering & Fruiting: August – November.

Frequently found along the banks of the lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69736 (BSA).

Telosma Coville

Telosma pallida (Roxb.) Craib in Kew Bull.: 418. 1911. *Asclepias pallida* Roxb. Fl. Ind. 2: 48. 1832. *Pergularia pallida* Wt. & Arn. in Wight Contrib.: 42. 1834; Hook.f., Fl. Brit. India 4: 38. 1883; Duthie, Fl. Gangetic Plain 1: 59. 1911.

Twining, slender shrub with watery juice. Leaves 4–10 × 2–6 cm, ovate, acuminate, base obtuse or sub-cordate, lateral nerves 4–6 pairs; petioles 2–7 cm long, pubescent. Flowers yellowish-white or pale-yellow about 1.5 cm in diam. in dense umbellate, interpetiolar cymes. Coronal processes 5, flattened at the back arising from the base of the staminal column and adnate to it. Follicles 6–10 × 1.8–1.5 cm, lanceolate, bluntly beaked, longitudinally wrinkled, deeply grooved on one side.

Flowering & Fruiting: August – November.

Commonly found along forest margins climbing over shrubs and trees.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69759 (BSA).

Tylophora R.Br.

Tylophora fasciculata Buch.-Ham. in Wight Contrib: 50, 1834; Fl. Brit. India 4: 40. 1883; Duthie, Fl. Gangetic Plain 1: 60. 1911.

Annual herb; stem erect, flexuous or sub-scandent, pubescent. Leaves 2–4.5 × 1.5–3 cm, ovate or lanceolate; petioles 0.5–1.2 cm long. Flowers greenish in lateral umbelliform or racemose cymes; peduncles interpetiolar, slender; pedicels filiform. Corona of 5 broadly ovoid fleshy lobes radiating from the staminal-column. Pollen masses minute, subtransverse. Pollicles 3–4 cm long, fusiform, striate, glabrous. Seeds broadly ovate, flat.

Flowering & Fruiting: July – September.

Commonly found in moist, shady places.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75712 (BSA).

GENTIANACEAE**Canscora** Lam.

Canscora decussata (Roxb.) Roem. & Schult., Syst. Veg. 1: 229. 1822; C.B. Clarke in Hook.f., Fl. Brit. India 4: 104. 1883; S. Garg, Indian Gent. 1. 1988. *Pladera decussata* Roxb.,

Fl. Ind. (Carey & Wallich ed.) 1: 418. 1820 & Fl. Ind. 1: 402. 1832. *Sankhaphuli*.

Annual herb, up to 20–25 cm high; stems erect, sparingly branched, glabrous. Leaves ovate-lanceolate, 2–3 × 0.5–1.1 cm, acute at apex, subcordate at base, minutely ciliate, sessile. Flowers in leafy cymes, c. 1.3 cm long. Calyx-lobes ovate-lanceolate, c. 1.5 mm long, acute. Corolla white; lobes oblong, up to 1.2 cm long; tube c. 1 cm long. Capsules linear-oblong, 5–7 mm long.

Flowering & Fruiting: August – October.

Along roadsides in open forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77263 (BSA).

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; S. Garg, Indian Gent. 1. 1988. *Gentiana diffusa* Vahl, Symb. Bot. 3: 47. 1794. *Bhuin-neem*.

Annual herb, c. 15–20 cm high; stem erect, 4-angled, not winged. Leaves ovate or elliptic, 1–2.5 × 0.5–1.5 cm, narrowed at both ends, sessile. Flowers in paniculate cymes; pedicels subterete or 4-angled, 12–18 mm long. Corolla pink; tube as long as calyx. One stamen longer than the other three. Capsules oblong, 9–12 mm long.

Flowering & Fruiting: September – April.

In shady places along drains and streams.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77296 (BSA).

MENYANTHACEAE

Nymphoides J. Hill

Nymphoides cristatum (Roxb.) O. Kuntze, Rev. Gen. Fl.: 429. 1891; Subramanyam, Aquat. Aug.: 24, f. 11. 1962. *Menyanthes cristata* Roxb. Pl. Cor. 2: 3, t. 105. 1798. *Limnanthemum cristatum* Griseb. Gen. & Spec. Gent.: 342, 1839; Hook.f., Fl. Brit. India 4: 131. 1883; Duthie, Fl. Gangetic Plain 2: 78. 1911.

Attached aquatic herb with floating leaves and flowers. Rhizome short, erect. Stems petiole-like ascending up to the water-surface and bearing at the nodes a tuft of roots, a cluster of flowers, a single leaf and a single branch which again proceeds in the same manner. Leaves alternate, 5–14 × 3–8 cm, sub-orbicular, deeply cordate, green above, purplish beneath, margins

entire. Flowers white, 1–2 cm across; pedicel up to 5 cm long, slender. Corolla glabrous, lobes obovate, wavy on the margins with a median longitudinal crest. Stamens 5 with small soft, yellow, hairy pads in between. Ovary glabrous with a disc of 5 orange-yellow ovoid or sub-globose. Seeds 12 or more, tubercled, pale yellowish-brown.

Flowering & Fruiting: June – September.

Abundantly found in shallow water of ponds and ditches.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67582 (BSA).

Nymphoides indicum (L.) Kuntze, Rev. Gen. Pl.: 429. 1891. *Menyanthes indica* L., Sp. Pl. 145, 1753. *Limnanthemum indicum* Griseb. Emend. Thw. Enum. 205, 1850; Hook.f., Fl. Brit. India 4: 131. 1883; Duthie, Fl. Gangetic Plain 2: 79.1911.

Attached aquatic herb with floating leaves and flowers. Rhizome horizontal or oblique. Stems petiole-like ascending up to the water-surface and bearing at the nodes a tuft of roots, a cluster of flowers, a single branch which again proceeds in the same manner. Leaves alternate, 8–18 cm in diam., orbicular, deeply cordate with obtuse basal lobes and a triangular sinus, margins more or less sinuate, green beneath, fleshy. Flowers white with a yellow centre, dimorphic in clusters appearing above the water between the basal lobes of the leaves; pedicel up to 10 cm long; bracts ovate, acute, membranous. Corolla densely clothed with white hairs, lobes oblong without longitudinal crest. Capsule sub-globose. Seeds more than 25, smooth, shining yellow.

Flowering & Fruiting: June – September.

Frequently found in shallow water of ponds and ditches along with *Nymphoides oristatum*.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67509 (BSA).

BORAGINACEAE

Bothriospermum Bunge

Bothriospermum tenellum (Hornem.) Fisch. and Mey. Ind. Sem. Hort. Petrop. 1: 24. 1835; C.B. Clarke in Hook.f., Fl. Brit. India 4: 167. 1883; Duthie, Fl. Gangetic Plain 2: 97. 1911. *Anchusia tenella* Hornem. Hort. Hafn. 1: 176. 1813; Hutchinson in Kew Bull. 221. 1918.

Annual, delicate, herb; stem procumbent or prostrate, hairy. Leaves alternate, 1–2.5 × 0.5–1.5 cm, ovate-oblong or elliptic, entire, sub-acute, base cuneate, scarcely 3-nerved, softly-hairy, lower petioled, upper sub-sessile. Flowers white, minute, pentamerous in axillary bracteate racemes. Sepals 5, narrowly lanceolate, accrescent. Nutlets oblong, minutely tubercled glandular-scabrid about half as long as calyx.

Flowering & Fruiting: February – May.

Abundantly found on moist sandy, shady places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67677 (BSA).

Coldenia L.

Coldenia procumbens L. Sp. Pl.: 125. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 144. 1883; Duthie, Fl. Gangetic Plain 2: 88. 1911. *Ban-andi*.

Annual herb; stem procumbent, much-branched, scabrous-hairy with trailing flattened branches. Leaves alternate, crisped, 1–2 × 0.4–1.4 cm, obovate-oblong, coarsely serrate or sub-pinnatifid, apex rounded, base cuneate, scabrous and hispid on both the surfaces; petiole up to 0.6 cm long. Flowers pale-yellow or dull-white, tetramerous, small, solitary axillary, nearly sessile. Sepals 4, ovate, acute, ciliate. Drupes pyramidal, 4-lobed with a sharp central double beak, hairy, muriculate, separating when ripe into 1-seeded beaked pyrenes.

Flowering & Fruiting: August – April.

Commonly found in open areas on moist as well as dry soils, sometimes forming large clumps.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75742 (BSA).

Cordia L.

Cordia dichotoma G. Forster, Fl. Ins. Austr. 18. 1786. *C. indica* Lam., Encycl. 7: 49. 1806. *C. myxa auct. non* L., 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 136. 1883; Duthie, Fl. Gangetic Plain 2: 82. 1911. *Lasoor*.

Trees, polygamodioecious, 3–7 m high. Leaves elliptic or ovate, 8–10 × 3–6 cm, obtuse at apex, acute to rounded at base, entire, glabrescent or puberulent; petioles 2–3 cm long. Flowers in dichotomous, loosely branched cymes, bisexual or unisexual (only male), ebracteate; male flowers shorter than bisexual. Calyx campanulate, 4–5 mm long. Corolla 6–8 mm long;

lobes recurved. Drupes globose, yellow to reddish orange, with sticky juice.

Flowering & Fruiting: March – June.

Common along roadsides, near villages and forest edges.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75672 (BSA).

Cynoglossum L.

Cynoglossum lanceolatum Forsk. Fl. Aegypt.-Arab.: 41, 1775; C.B. Clarke in Hook.f., Fl. Brit. India 4: 156. 1883; Duthie, Fl. Gangetic Plain 2: 96. 1911. *C. micranthum* Desf. Tab. Ecol. Bot. (ed.1): 220. 1804.

Annual herb; stem erect, hispid, up to 1–1.2 m high. Leaves alternate, 2–8 × 0.5–2.0 cm, broadly lanceolate or oblanceolate to linear, entire or sub-denticulate, acute, base attenuate, covered with tubercled-based hairs and scabrous on both the surfaces, nerves prominent beneath, villous, uniting into intramarginal vein, lower distinctly petiolate, upper sessile or subsessile. Flowers white with a purple centre, pedicelled in ebracteate circinate scorpioid cymes. Nutlets 2 × 2 mm, densely glochidiate all over, inconspicuously margined with the connate bases of the prickles.

Flowering & Fruiting: September – April.

Commonly found along road-sides on sandy, moist and shady places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67571 (BSA).

Heliotropium L.

Heliotropium indicum L., Sp. Pl. 130, 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 152. 1883; Duthie, Fl. Gangetic Plain 2: 90. 1911. *Tiaridium indicum* Lehm., Pl. Asperif. Nucif. 14. 1818. *Hathisunda*.

Annual herb, up to 50 cm high; stem coarse, erect, branches ascending, hirsute. Leaves alternate or sub-opposite, 3–8 × 1.4–4 cm, ovate or ovate-oblong, undulate or sub-serrate, obtuse or sub-acute, base rounded or cordate, asymmetrical, rugose above, pilose beneath, lateral nerves 5×9 pairs, conspicuous beneath; petioles 1×3 cm long, hirsute. Flowers pale-violet, sessile, 2-ranked in simple or rarely forked extraxillary bristly ebracteate spikes up to 12 cm long. Fruits deeply 2-lobed, each lobe bluntly 4-ribbed, containing 2-angular beaked 1-seeded pyrenes each with an empty cavity on the inner side.

Flowering & Fruiting: Throughout the year.

Commonly found in moist situations.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75665, 75746 (BSA).

Heliotropium strigosum Willd. Sp. Pl. 1: 743. 1790; C.B. Clarke in Hook.f., Fl. Brit. India 4: 151. 1883; Duthie, Fl. Gangetic Plain 2: 91.1911.

Herb, up to 25 cm high; stem prostrate or procumbent, strigose, tufted, spreading, much-branched. Leaves alternate, nearly sessile, 0.4–2.4 × 0.1–0.4 cm, linear or linear-lanceolate, entire, acute. Flowers white 2-ranked, sessile or lower often shortly stalked in terminal bracteate simple spikes up to 4 cm long. Nutlets 4, minute, 1-seeded, dark grey-brown, glabrous or minutely hispid.

Flowering & Fruiting: April – November.

Common in wasteland along the wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75753 (BSA).

CONVOLVULACEAE

Convolvulus L.

Convolvulus arvensis L., Sp. Pl. 153. 1753 ; C.B. Clarke in Hook.f., Fl. Brit. India 4: 219. 1883; Duthie, Fl. Gangetic Plain 2: 106. 1911. *Hirankhuri*.

Climbing or trailing herb; stem glabrous or pubescent. Leaves ovate-lanceolate, linear-oblong, linear-elliptic or lanceolate, 1.5–5.2 × 0.3–3 cm, obtuse or acute at apex, sagittate to hastate at base; glabrous to pubescent; petioles 0.5–3 cm long. Flowers 1–2 on axillary 1–2 cm long peduncles, pedicels 0.5–1.1 cm long; sepals elliptic-oblong, 2.3–3.8 mm long, obtuse, margin scarious; corolla campanulate, 1–1.2 cm long, pinkish white or white; stamens 5, unequal, included; ovary 2-locular, style filiform, stigmas 2, linear. Capsules globose, 2–3 mm across; seeds 4, subtrigonal, dark brown, tuberculate.

Flowering & Fruiting: November – March.

Common, in cultivated fields, wasteland and along railway tracts.

Specimen examined: Tikri reserve forest, Near Railway track, Vineet K. Singh 69720 (BSA).

Evolvulus L.

Evolvulus alsinoides (L.) L., Sp. 392. 1762; C.B. Clarke in Hook.f., Fl. Brit. India 4: 220. 1883; Duthie Fl. Gangetic Plain 2: 104. 1911. *Convolvulus alsinoides* L., Sp. Pl. 157. 1753. *Shankhpushpi*.

Annual or perennial herb; stem ascending or prostrate. Leaves elliptic, linear-elliptic or oblong, 0.5–2.0 × 0.4–1 cm silky pilose, acute or obtuse at both ends; petioles 0–2 mm long. Flowers 1–3 in axillary 1–3 cm long peduncles; pedicles 3–6 mm long; sepals elliptic or lanceolate, 1.5–2.5 × 1 mm, acute or subacuminate; corolla rotate or campanulate, bluish white (rarely white), 3–4 mm long, subentire; stamens 5, filaments filiform, inserted; ovary 2-locular, styles 2, each style bifid. Capsules globose, 2–3 mm long; seeds 4, ovoid.

Flowering & Fruiting: July – March.

Common, in wasteland, cultivated fields and on outskirts of forests.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69783 (BSA).

Evolvulus nummularius (L.) L., Sp. Pl. 391. 1762. *Convolvulus nummularius* L., Sp. Pl. 157. 1753. *Volulopsis nummularia* (L.) Roberty in Candollea 14: 28. 1952; Raizada, Suppl. Fl. Gangetic Plain 166. 1976. *Safed-shankhpushpi*.

Perennial Herb; stem prostrate, often rooting at nodes. Leaves broadly ovate to orbicular, 0.4–1.5 × 0.2–1.2cm, apex rounded, base cordate; petioles 2–6 mm long. Flowers solitary or paired in leaf-axils, pedicles 1–3 mm long; sepals ovate-elliptic to ovate-oblong, 1.5–3.5 mm long, pubescent, ovate-elliptic to ovate-oblong, 1.5–3.5 mm long, pubescent, glabrescent; corolla campanulate, white 3–5 mm long, subentire; stamens 5, filaments filiform; ovary 1-locular, styles 2, each style deeply bifid. Capsules globose, 1.3–2.5 mm across; seeds globose, slightly muricate.

Flowering & Fruiting: August – March.

Common in wasteland and dry mixed deciduous forest.

Specimen examined: Tikri reserve forest, Near Railway track, Vineet K. Singh 67654 (BSA).

Ipomoea L.

Ipomoea aquatica Forssk., Fl. Aegypt.-Arab. 44. 1775; C.B. Clarke in Hook.f., Fl. Brit. India 4: 210. 1883. *I. reptans* Poir. in Lam., Encycl. Suppl. 3: 460. 1814; Duthie, Fl. Gangetic Plain 2: 114. 1911. *Karemu*.

Herb; stem prostrate or floating, hollow, rooting at the nodes. Leaves elliptic-oblong or deltoid, entire, rarely 3-lobed, 2–6 × 1.5–5 cm, obtuse, acute or acuminate at apex, cordate or hastate at base; petioles 3–8 cm long. Flowers 1 or few on 2.5–6 cm long axillary peduncles; pedicles 1.5–2.5 cm long; sepals subequal, linear-oblong or ovate, 5–7 mm long, glabrous, subacute or acute; corolla purple, infundibuliform, 2–4 cm long, lobes obscure; stamens 5, included; ovary ovoid, style filiform. Capsules ovoid, 5–7 mm long; seeds 2 or 4, pilose, sometimes glabrous.

Flowering & Fruiting: Throughout the year.

Common in ponds, lakes and puddles.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69744 (BSA).

Ipomoea carnea Jacq., Enum Syst. Pl. 13. 1760. *I. fistulosa* Mart. ex choisy in DC., Prodr. 9: 349. 1845; Raizada, Suppl. Fl. Gangetic Plain 163. 1976. *I. carnea* Jacq. subsp. *Fistulosa* (Mart. ex choisy) Austin in Taxon 26: 237. 1977. *Behaya*.

Shrub, up to 2–3 m high; stem woody at base, herbaceous and hollow at tips, white tinged. Leaves ovate, 4–15 × 3–10 cm, pubescent, acuminate at apex, cordate at base; petioles 3–8 cm long. Flowers solitary or in cymose-paniculate clusters at apex of branches or in leaf-axils; pedicles 1.5–2.5 cm long; sepals ovate-suborbicular, 4–5 × 4 mm, obtuse; corolla pink or rose-purple infundibuliform, 5–7 cm long, pubescent outside, stamens 5, filaments filiform; ovary ovoid-subglobose, style filiform. Capsules ovoid or subglobose, 1.1–1.5 cm long; seeds woolly.

Flowering & Fruiting: Throughout the year.

Common on roadsides and along cultivated fields.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75787, 77247, 67611 (BSA).

Ipomoea nil (L.) Roth, catal. Bot. 1: 36. 1797. *Convolvulus nil* L., Sp. Pl. ed. 2. 219. 1762. *Ipomoea hederifolia auct non Jacq.*, 1787. C.B. Clarke in Hook.f., Fl. Brit. India 4: 199. 1883; Duthie, Fl. Gangetic Plain 2: 116. 1911. *Nilkalmi*.

Annual or perennial twiners. Leaves ovate, entire or 3-lobed, 2–9 × 3–7 cm, pubescent acute to acuminate at apex, cordate at base. Flowers 1–3, axillary on 1.2–2 cm long peduncles; pedicels 2–7 mm long; sepals ovate-acuminate, 1.2–2.2 cm long, hirsute in the basal portion; corolla blue, violet or pink, infundibuliform, 2–5 cm long; stamens 5, filaments filiform; ovary globose or orbicular, style filiform. Capsules globose or orbicular, 4–6 mm across, with persistent sepals; seeds pyriform, pubescent.

Flowering & Fruiting: August – December.

Common in gardens, waste places and on outskirts of forests.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75653 (BSA).

Ipomoea pes-tigridis L., Sp. Pl. 162. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 204. 1883; Duthie, Fl. Gangetic Plain 2: 116. 1911. *I. hepaticifolia* L., Sp. Pl. 161. 1753. *I. pes-tigridis* var. *hepaticifolia* (L.) C.B. Clarke in Hook.f., Fl. Brit. India 4: 204. 1883. *Panch-patiya*.

Annual, Twiners; stem hispid. Leaves shallowly 5-lobed or palmately 5–6-lobed, 3–5 × 3–10 cm. strigose, lobes elliptic to obovate, subacuminate or acuminate at apex; petioles 3–9 cm long. Flowers in involucrate cymes on 2–8 cm long peduncles, bracts foliaceous; sepals ovate or ovate-elliptic, pubescent acute; corolla pinkish white or white, infundibuliform, 2.5–3.5 cm long; stamens 5, filaments filiform; ovary ovoid, style filiform. Capsules ovoid, 4–6 mm long, acute; seeds 2–3 mm long, grey.

Flowering & Fruiting: August – October.

In wasteland and cultivated fields.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75658 (BSA).

Ipomoea quamoclit L., Sp. Pl. 159. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 199. 1883. *Convolvulus pinnatus* Derr. in Lam., Encycl. 3: 567. 1792. *Quamoclit pinnata* (Derr.) Boj., Hort. Maurit. 224. 1837 ; Duthie, Fl. Gangetic Plain 2: 122. 1911.

Annual twiners; stem slender. Leaves 2.5–4 × 2.2–3.5 cm, pinnatipartite; lobes linear 6–12, alternate or opposite, subacute at apex, narrowed at base. Flowers 1–3, on axillary 4–6 cm

long peduncles; pedicles 1.5–2 cm long; sepals elliptic, 2–3 cm long, obtuse, mucronulate; corolla scarlet or pink, salverform, 2.5–3 cm long; stamens 5, filaments slender; ovary ovoid, style filiform. Capsules broadly ovoid, 5–7 mm across; seeds brown to black.

Flowering & Fruiting: September – December.

Commonly grown in garden, found as an escape in forests and in vicinity of villages.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69789 (BSA).

Merremia Dennst. ex Endl.

Merremia aegyptia (L.) Urb., Symb. Antill. 4: 505. 1910; Raizada, Suppl. Fl. Gangetic Plain 165. 1976. *Ipomoea aegyptiaca* L., Sp. Pl. 162. 1753. *Convolvulus pentaphyllus* L., Sp. Pl. ed. 2. 223. 1762; C.B. Clarke in Hook.f., Fl. Brit. India 4: 202. 1883. *Merremia pentaphylla* (L.) Hall. f., in Engler, Bot. Jahrb. Syst. 16: 552. 1893; Duthie, Fl. Gangetic Plain 2: 110. 1911. *Ghiabel*.

Annual twiners; stem covered with silky spreading hairs. Leaves digitate; leaflets 5, elliptic-obovate, acuminate at apex, acute at base, outer 2 smaller, 2.2–3.5 × 1–2 cm, inner 3 larger, petioles 3–9 cm long with spreading brown stiff hairs. Flowers 1-few, axillary on 4–7 cm long hairy peduncles; pedicels 1.4–2.2 cm long; sepals elliptic, outer 3 sepals hirsute; corolla white, infundibuliform, 2.5–3.1 cm long; stamens 5, filaments filiform; ovary ovoid, style filiform, stigmas 2. Capsules ovoid, 0.6–1 cm long; seeds coriaceous.

Flowering & Fruiting: September – December.

Common in, roadside and on outskirts of forests.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67561, 75620 (BSA).

Operculina Manso

Operculina turpethum (L.) Manso, Enum. Subst. Braz. 16: 49. 1836; Duthie, Fl. Gangetic Plain 2: 110. 1911. *Convolvulus turpethum* L., Sp. Pl. 155. 1753. *Ipomoea turpethum* (L.) R.Br., Prodr., Prodr., 485. 1810; C.B. Clarke in Hook. f., Fl. Brit. India 4: 212. 1883. *Nisoth*.

Twiners; stem ridged, 3–5-winged. Leaves ovate, entire or shortly lobed, 4.5–9.5 × 2.1–7.7 cm, acute or obtuse at apex, subcordate or cordate at base; petioles 1–4 cm long, pubescent. Flowers axillary, 1–3 on 2–3 cm peduncles; pedicels 0.5–2.2 cm long; bracts lanceolate, 1.4–2.4

cm long; sepals ovate, 1.5–2.0 cm long, pubescent, acute; corolla white, campanulate, 3–4 cm long; stamens 5, filaments filiform; ovary globose, style filiform, stigma 2-lobed. Capsules globose, 0.5–1 cm across circumscissile, enclosed by accrescent sepals; seeds solitary.

Flowering & Fruiting: February – April.

On bushes and hedges near wetland area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75640 (BSA).

CUSCUTACEAE

Cuscuta L.

Cuscuta reflexa Roxb. Pl. Cor. 2: 3 t. 104. 1799; C.B. Clarke in Hook.f., Fl. Brit. India 4: 225. 1883; Duthie, Fl. Gangetic Plain 2: 100. 1911. *C. santapau* Banerji & Das in J. Arnold Arb. 46: 87. 1965. *Amarbel*.

Parasitic twiner; stem leafless; branches fleshy, yellow or greenish-yellow, glabrous, forming dense, pendulous masses, often covering almost entire host body. Flowers pale-white, shortly stalked, solitary or in few-flowered clusters or in racemes. Corolla lobes reflexed. Style 1, stout with 2 fleshy lanceolate stigmas. Capsules depressed-globose, circumscissile near the base. Seeds 2–4, black.

Flowering & Fruiting: November – March.

Common on a variety of hosts.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67564 (BSA).

SOLANACEAE

Datura L.

Datura metel L., Sp. Pl. 179. 1753. *D. fastuosa* L., Syst. Nat. ed. 10. 932. 1759; C.B. Clarke in Hook.f., Fl. Brit. India 4: 242. 1883; Duthie, Fl. Gangetic Plain 2: 132. 1911; Deb in J. Econ. Tax. Bot. 1: 37. 1980. *D. alba* Nees in Trans. Linn. Soc. London 17: 73. 1837; Duthie, Fl. Gangetic Plain 2: 132. 1911. *D. fastuosa* L. var. *alba* (Nees) C.B. Clarke in Hook.f., Fl. Brit. India 4: 243. 1883. *Dhatura*.

Undershrub, up to 1.2–1.5 m high; stem purple. Laves ovate-elliptic, 5–9 × 2–6 cm, glabrescent, margin entire or sinuate, acute or sub-acuminate at apex, inequilateral at base; petioles 1.5–4 cm long. Flowers solitary, axillary; pedicels slightly decurved in fruits; calyx

tubular, 4–5 cm long, lobes ovate, acute; base persistent and reflexed in fruits; corolla white with purple tinge outside, infundibuliform, 10–12 cm long, 5-lobed near the apex, lobes ovate-deltoid, subacuminate, stamens 5, filaments filiform, anthers linear; ovary globose, style filiform, stigma 2-lobed. Capsules spherical, 3–4 cm across, dehiscent irregularly, covered with 2–4 mm long blunt tubercles or prickles; seeds compressed or 3-gonous.

Flowering & Fruiting: Throughout the year.

Common in wastelands.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67573 (BSA).

Nicotiana L.

Nicotiana plumbaginifolia Viv., Elench. Pl. 26. t. 5. 1802; C.B. Clarke in Hook.f., Fl. Brit. India 4: 246. 1883; Raizada, Suppl. Fl. Gangetic Plain 170. 1976; Deb in J. Econ. Tax. Bot. 1: 42. 1980. *Jangli-tambakhu*.

Annual herb, up to 40 cm high, viscid-pubescent throughout. Leaves radical as well as cauline, radical leaves larger than the cauline sessile ovate, elliptic or obovate, 3–8 × 0.8–4.2 cm, acute or obtuse at apex, cuneate at base. flowers in terminal racemes; calyx 0.5–1 cm long, lobes linear or linear-lanceolate; acuminate; corolla white or pale violet, salverform, corolla-tube 2–3 cm long, lobes lanceolate, acute; stamens inserted at base or corolla-tube, unequal; ovary globose, style filiform, stigma capitate. Capsules ovoid-ellipsoid, 0.5–1.5 cm long; seeds many, minutely rugose.

Flowering & Fruiting: Throughout the year.

Along the edges of the forests and wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67629 (BSA).

Nicotiana tabacum L., Sp. Pl. 180. 1753; C.B. Clarke in Hook. f., Fl. Brit. India 4: 245. 1883; Duthie, Fl. Gangetic Plain 2: 135. 1911; Deb in J. Econ. Tax. Bot. 1: 43. 1980. *Tambaku*.

Annual herb, up to 80 cm high, viscid-pubescent throughout. Leaves elliptic or obovate, 15–25 × 5–10 cm, acute or obtuse at apex, cuneate at base. flowers in terminal racemes; calyx c. 1.6 cm long, lobes linear or linear-lanceolate; acuminate; corolla greenish white, glandular pubescent outside; lobes ovate, acuminate. Capsules ovoid-globose, 2–2.5 cm long.

Flowering & Fruiting: December – April.

Widely Cultivated in most parts of the area as cash crop.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Near Bhitari Village, Vineet K. Singh 75771 (BSA).

Physalis L.

Physalis minima L., Sp. Pl. 183. 1753; C.B. Clarke in Hook. f., Fl. Brit. India 4: 238. 1883; Duthie, Fl. Gangetic Plain 2: 127. 1911; Deb in J. Econ. Tax. Bot. 1: 43. 1980. *P. indica* Lam., Encycl. 2: 102. 1786. *P. minima* L. var. *indica* Lam., C.B. Clarke in Hook. f., Fl. Brit. India 4: 238. 1883; Duthie, Fl. Gangetic Plain, 2: 128. 1911. *Bhambhola*.

Annual herb, up to 20–40 cm high; stem striate, more or less pubescent, often purple tinged. Leaves ovate or elliptic, 2–5 × 1–3.5 cm, sinuate-dentate, acute to sub-acuminate at apex, cuneate at base; petioles 0.5–3 cm long, puberulous. Flowers solitary, axillary; pedicels 1–2 cm long; calyx 4–5 mm long, lobes ovate, sub-acuminate or caudate; corolla yellow, campanulate, 4–8 mm long; stamens 5, filaments glabrous, anthers yellow. Berries yellow when ripe, globose, 3.5–7 mm across, enclosed in accrescent 1.5–2.5 cm long, inflated, reticulately veined. 5-angled calyx.

Flowering & Fruiting: August – January.

Common in, cultivated fields and bank of the lake.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67592, 69798, 75663 (BSA).

Solanum L.

Solanum incanum L., Sp. Pl. 188. 1753; Duthie, Fl. Gangetic Plain 2: 126. 1911. *S. coagulans* Forssk., Fl. Aegypt. Arab. 47. 1775; C.B. Clarke in Hook. f., Fl. Brit. India 4: 236. 1883. *S. melongena* L. var. *incanum* (L.) Kuntze, Revis. Gen. Pl. 454. 1891; Deb in J. Econ. Tax. Bot. 1: 49. 1980. *Banbhatwa*.

Undershrub or shrub, up to 1.5–2 m high, prickly; young parts and inflorescence stellate tomentose. Leaves ovate, 2–7 × 1.5–5.5 cm, sinuately lobed, sparsely prickly on mid rib, stellate tomentose above, wooly beneath, acute or subacute at apex, subcordate or truncate at base; petioles 1–3 cm long, prickly. Peduncles extra-axillary, paired, one bearing a solitary fertile flower, the other bearing cyme of male flowers; pedicels, often prickly; calyx 5–7 mm long,

tomentose and prickly outside, lobes ovate-triangular, acute; corolla bluish purple, 1.3–2 cm long, lobes 3–6 mm long, ovate, acute, stellately hairy on both sides; filaments *c.* 1 mm long, anthers opening by small pores; ovary globose, pubescent, style hairy at base. Berries spherical, 1.3–2.3 cm in diam., with accrescent calyx; seeds discoid, pitted.

Flowering & Fruiting: December – April.

Common along roadsides, railway tracks, bunds of cultivated fields and in forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67579 (BSA).

Solanum nigrum L., 186. 1753; C.B. Clarke in Hook. f., Fl. Brit. India 4: 229. 1883; Duthie, Fl. Gangetic Plain 2: 124. 1911; Deb in J. Econ. Tax. Bor. 1: 49. 1980. *Makoi*.

Annual herb, erect divaricately branched, up to 65–70 cm high; stem glabrous or sparsely hairy. Leaves ovate or ovate-lanceolate, 2–8 × 2–3.5 cm, glabrous, subacute or acuminate at apex, decurrent along the petioles at base, margin subentire or sinuately toothed; petioles 0.5–2.2 cm long. Flowers in extra-axillary umbellate cymes; peduncles 1–2 cm long, pedicels 0.5–1.2 cm long; calyx 1–3 mm long, lobes oblong, 1–2 mm long, obtuse; corolla white, 2–5 mm long, lobes oblong, subacute; filaments hairy at base, anthers oblong, *c.* 2 mm long, notched at apex; ovary globose, style hairy. Berries black when ripe, globose, 3–6 mm across; seeds discoid, 1.2–1.6 mm in diam, pitted.

Flowering & Fruiting: September – March.

Common in cultivated fields, wastelands and along river-banks in moist places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77259 (BSA).

Solanum virginianum L., Sp. Pl. 187. 1753; Hepper & Jaeger in Kew Bull. 41(2): 434. 1986. *S. surattense* Burm.f., Fl. Ind. 57. 1768; Deb in J. Econ. Tax. Bot. 1: 51. 1980. *S. xanthocarpum* Schrad. & Wendl. in Schard., Sert. Hannov. 1: 8. t. 2. 1795; C.B. Clarke in Hook.f., Fl. Brit. India 4: 236. 1883. *Bhatkattaiya*.

Perennial herbs, diffuse, prickly, woolly; branches zigzag, bearing strong, yellow prickles. Leaves ovate or elliptic, sinuate or sub-pinnatifid, 4–7 × 2–5 cm, 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. Corolla bluish purple to violet; lobes deltoid, pubescent outside. Berries globose, 1.3–2.3 cm across, yellow-orange. Seeds compressed, smooth.

Flowering & Fruiting: November – June.

In open wasteland near wetland.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77246 (BSA).

SCHROPHULARIACEAE

Bacopa Aubl., nom. cons.

Bacopa monnieri (L.) Wettst. in Engler & Prantl, Pflanzfam. IV. 3b: 77. 1891. *Lysimachia monnieri* L., ant. Pl. 2: 9. 1756. *Monniera cuneifolia* Michx., Fl. Bor. Amer 2: 22 1803; Duthie, Fl. Gangetic Plain 2: 142. 1911. *Herpestis monnieri* (L.) Kunth in Humb., Bonpl. & Kunth, Nov. Gen. Sp. 2: 366. 1818, *nom. illeg.*; Benth., Seroph. Ind. 30. 1835; Hook. f., Fl. Brit. India 4: 272. 1884. *Brahmi*.

Herb; stem suberect, prostrate or creeping, stem rooting at the lower nodes. Leaves sessile, obovate or oblanceolate, 0.7–1.8 × 0.3–0.5 cm, margin entire or crenulate, apex obtuse or rounded, narrowed at the base. Flowers solitary, axillary; bracteoles linear; pedicels 0.5–2 cm long; calyx 5-partite, 3 larger segments ovate, 2 inner ones lanceolate; corolla pale blue, 0.5–1 cm long, lobes more or less equal, rounded; stamens 4, didynamous, included; ovary ovoid, style dilated at apex. Capsules ovoid, 2.5–4 mm long, acute, many-seeded; seeds oblong, striate.

Flowering & Fruiting: August – April.

Common in wet and marshy habitats.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67532, 69757 (BSA).

Bacopa procumbens (Mill.) Greenm., Field Columb. Mus. Bot. ser. 2. 261. 1907; Raizada, Suppl. Fl. Gangetic Plain 180. 1976. *Erinus procumbens* Mill. Gard. Dict. ed. 8. no. 6. 1768. *Lindernia dianthera* (Sw.) Pennell in Proc. Nat. Acad. Nat. Sci. Philadelphia 98: 87. 1976.

Herb; stem branched, prostrate, branches 15–30 cm long, rooting at the lower nodes. Leaves sessile, ovate-orbicular, 0.6–2 × 0.5–1.2 cm, margin crenate, apex obtuse, narrowed at the base. Flowers solitary, axillary; pedicels 1–2 cm long; calyx 2–3 mm long, outer 3 sepals

ovate, 3–5 veined, 2 inner ones linear, 1-veined, enlarged in fruits; corolla yellow, 3–4 mm long, bilabiate, throat hairy; ovary globose, style dilated at apex. Capsules globose, 2–3 mm long, many-seeded; seeds minute, reticulate.

Flowering & Fruiting: September – May.

In moist shay places along forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77278 (BSA).

Limnophila R.Br., nom. cons.

Limnophila indica (L.) Druce, Rep. Bot. Exch. Club Brit. Isles 1913 (3): 420. 1914. *Hottonia indica* L., Syst. Nat. ed. 10. 919. 1759. *Limnophila gratioloides* R.Br., Prodr. 442. 1810; Hook.f., Fl. Brit. India 4: 271. 1884, incl. vars. *elongata* and *intermedia*; Duthie, Fl. Gangetic Plain 2: 146. 1911 incl. vars. *elongata* and *intermedia*.

Perennial herb, 20–40 cm high; stem branched. Aerial leaves opposite or whorled, the lower whorled, pinnatifid or multifid; the upper opposite, linear-oblong, 2–4 × 0.4–0.8 cm, margin crenate, apex acute, base amplexicaul. Flowers solitary, axillary or in terminal 10–15 cm long racemes; pedicels glandular; bractioles linear-subulate; calyx 3–5 mm long, 5-partite, lobes linear, c. 2.3 mm long, glabrous or pubescent; corolla white with violet tinge, 0.8–1.4 cm long, bilabiate; stamens 4, didynamous, included; ovary globose or ellipsoid, style slender, stigma 2-lamellate. Capsules globose or ellipsoid, 3–6 mm long, many-seeded; seeds minute, truncate or rounded at ends.

Flowering & Fruiting: In most parts of the year.

Common near wetland area.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67529 (BSA).

Lindernia All.

Lindernia ciliata (Colsm.) Pennell in Brittonia 2: 182. 1936; Mukherjee in J. India Bot. Soc. 24: 133. 1945. *Gratiola ciliata* Colsm., Prodr. Descr. Gratiol. 14. 1793. *G. serrata* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 139. 1820. *Bonnaya brachiata* Link & Otto, Icon. Pl. Select. 2: 25. t. 11. 1820; Hook. f., Fl. Brit. India 4: 284. 1884; Duthie, Fl. Gangetic Plain 2: 151. 1911.

Annual herbs, up to 3–15 cm high; stem branched. Leaves sessile, oblong, 1–3 × 0.5–1 cm, margin serrate, apex obtuse or subacute, base rounded or narrowed. Flowers in terminal

racemes; pedicels 2–4 mm long; calyx 3–5 mm long, divided nearly to the base, segments linear-subulate, aristate; corolla purple, pink or blue, 4–6 mm long, bilipped; stamens 2, perfect; staminodes 2, short, pubescent; ovary oblong, style slender, stigma 2-lanceolate. Capsules linear-oblong, 1–1.2 cm long, acute at apex, many-seeded; seeds minute, truncate at both ends.

Flowering & Fruiting: August – February.

Abundant, in moist shady places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67621, 75708 (BSA).

Lindernia crustacea (L.) F.V. Mull., Syst. Consus Austral. Pl. 97. 1882; Mukherjee in J. Indian Prot. Soc. 24: 130. 1945. *Capraria crustacea* L., Mant. Pl. 87. 1767. *Vandellia crustacea* (L.) Benth., Scroph. Ind. 35. 1835; Hook.f., Fl. Brit. India 4: 279. 1884; Duthie, Fl. Gangetic Plain 2: 149. 1911.

Annual herb, up to 15 cm high; stem erect or decumbent, branched. Leaves ovate, 0.5–2 × 0.4–1.2 cm, margin crenate, apex subacute or obtuse, narrowed at base into a petiole; petioles 2–6 mm long. Flowers axillary, solitary or in racemes; pedicels 1–2 cm long; calyx 3–4 mm long, lobbed only one-fourth of its length, teeth triangular, acute; corolla bluish or purple, 0.5–1.2 cm long, bilipped; stamens 4, perfect, didynamous; ovary ellipsoid, style slender, stigma 2-lanceolate. Capsules ellipsoid-oblong, 2–3 mm long, obtuse at apex, many-seeded, seeds ovoid, rugose.

Flowering & Fruiting: July – December.

Common, in moist places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67518 (BSA).

Mazus Lour.

Mazus pumilus (Burm.f.) Stanis in Nova Guinea (n.s.) 9: 31. 1958. *Lobelia pumila* Burm.f., Fl. Ind. 186. t. 60. 8. 3. 1768. *Lindernia japonica* Thunb., Fl. Jap. 253. 1784. *Mazus japonicus* (Thunb.) Kuntze, Revis. Gen. Pl. 462. 1891. *M. rugosus* Lour., Fl. Cochinch. 2: 385. 1790; Hook. f., Fl. Brit. India 4: 259. 1884; Duthie, Fl. Gangetic Plain 2: 144. 1911. *Nakh-chinkni*.

Annual herb, up to 15–20 cm high; stem erect-ascending. Basal leaves rosulate, obovate-elliptic, glabrous or hairy, margin distantly crenate, apex obtuse, narrowed at the base into a petiole. Flowers in 5–15 cm long, glandular-hairy racemes; pedicels 0.5–1.3 cm long; calyx 4–6 mm long, accrescent, divided up to the middle, lobes ovate-lanceolate, acute; corolla white or pale prple, 6–8 mm long, bilipped, glandular hairy; stamens 4, didynamous, anther-cells contiguous; ovary globose, stigma 2-lamellate. Capsules globose, 2–3 mm long, many-seeded; seeds minute, ovoid.

Flowering & Fruiting: September – April.

Common, in moist places especially along water channels.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67682 (BSA).

Scoparia L.

Scoparia dulcis L., Sp. Pl. 116. 1753; Hook. f., Fl. Brit. India 4: 289. 1884; Duthie, Fl. Gangetic Plain 2: 153. 1911. *Ghodatulsi*.

Perennial Herb, up to 80 cm high; stem branched. Leaves ternate or opposite, ovate-elliptic, elliptic or rhomboid, 0.6–3.4 × 0.5–1.7 cm, margin coarsely serrate, apex acute or obtuse, narrowed at the base in a petiole; petioles 0.6–1.2 cm long. Flowers axillary, solitary or 3–6 in whorls; pedicels 0.5–1 cm long; calyx 4-partite, lobes oblong, subacute, 3–5-nerved; corolla white, rotate, 4-lobed, densely bearded on throat, lobes subequal, obtuse; stamens 4, subequal, filaments filiform, anthers subsagittate; ovary globose, style subclavate, stigma truncate. Capsules globose, 1.5–3.0 mm across, many-seeded; seeds obovoid, angled, scrobiculate.

Flowering & Fruiting: Almost throughout the year.

Common, in wastelands, cultivated fields and on outskirts of forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67515 (BSA).

Verbascum L.

Verbascum chinense (L.) Santapau, Fl. Purandhar 90. 1958 & Rec. Bot. Surv. India 16: 177. 1967. *Scrophularia chinensis* L., Mant. Pl. 250. 1771. *Celsia coromandeliana* Vahl, Symb. Bot. 3: 79. 1794 ; Hook.f., Fl. Brit. India 4: 251. 1883; Duthie, Fl. Gangetic Plain 2: 139. 1911.

Annual herb, annual, simple or branched, glandular-pubescent, up to 90 cm high. Radical leaves in a rosette, elliptic-oblong or oblong-lyrate pinnatifid, 4–14 × 2–5 cm, margin serrate-dentate, apex obtuse; petioles 2.2–5.2 cm long; upper ones sessile, ovate or oblong, smaller, margin dentate-serrate, apex acute or subacuminate; all leaves glabrous or sparsely hairy. Flowers in lax, glandular-hairy 13–25 cm long racemes; calyx 3–5 mm long, glandular-pubescent, 5-partite, segments ovate-lanceolate, obtuse; corolla yellow, rotate, 0.6–1.1 cm across, 5-lobed, lobes subequal, obtuse; stamens 4(-5), filaments bearded, anther-cells confluent; ovary globose, style dilated at apex, stigma simple. Capsules globose, 4–6 mm long, many-seeded; seeds rugose.

Flowering & Fruiting: November – June.

Common, in wastelands, cultivated fields and along edges of lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67590 (BSA).

Veronica L.

Veronica anagallis-aquatica L., Sp. Pl. 12. 1753; Hook. f., Fl. Brit. India 4: 293. 1884; Duthie, Fl. Gangetic Plain 2: 154. 1911.

Annual herb, up to 50 cm high; stem more or less succulent, decumbent and rooting at the base. Leaves sessile, linear-oblong, linear-elliptic or linear-lanceolate, margin subentire or serrate, apex subacute or obtuse, narrowed or amplexicaul at the base. Flowers in axillary, 4–14 cm long racemes; pedicels filiform, 2–5 mm long; calyx 1–3 mm long, segments ovate, subacute; corolla white, rotate, 1–2.2 mm long, lobes rounded; stamens 2, exserted, anther-cells confluent at their apices; ovary ovoid, style short, stigma sub-capitate. Capsules orbicular-oblong, 3–4 mm long, emarginated; seeds ellipsoid-oblong, convex.

Flowering & Fruiting: November – May.

Common along the moist places near lake and in forest.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67693 (BSA).

BIGNONIACEAE

Oroxylum Vent.

Oroxylum indicum (L.) Vent. Dec. Nov. 9, 1808; C.B. Clarke in Hook.f., Fl. Brit. India 4: 378. 1884; Duthie, Fl. Gangetic Plain 2: 42. 1911. *Bignonia indica* L., Sp. Pl.: 625. 1753.

Spathodea indica Pers., Syn. Pl. 2: 173. 1806. *Calosanthes indica* Blume, Bijdr. 760. 1826. *Ullu*.

Trees, 10–12 m high; bark greenish-grey, soft; blaze yellowish-green. Leaves very large reaching up to height of 1 m, 2–3 pinnate, pinnae 3–4 pairs, opposite. Leaflets 3–6, 4–10 × 3–6 cm, elliptic or ovate, entire, acuminate, base oblique or rounded, paler beneath, lateral nerves 5–7 pairs, arcuate. Flowers dark purple, fleshy, foetid in large erect lax terminal racemes. Corolla campanulate up to 8 cm long. Stamens 5, all perfect. Capsules. 35–60 × 5–7 cm, flat, oblong, narrowd on both ends. Seeds about 4 × 6 cm, discoid, numerous, silvery white, winged.

Flowering & Fruiting: June – March.

Rarely found in mixed and Sal forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75699 (BSA).

PEDALIACEAE

Sesamum L.

Sesamum indicum L. Sp. Pl.: 634. 1753; Nicolson & al. in Regnum Vegetab. 119: 2017. 1988. *S. orientale* L., Sp. Pl. 634. 1753; Baker & Bakh.f., Fl. Java 2: 544. 1965; Duthie, Fl. Gangetic Plain 2: 175. 1911. *S. mulayanum* Nair in Bull. Bot. Surv. India 5: 252–253. 1963. *Til*.

Annual herb, up to 1 m high; Stem erect glandular-pubescent, foetid. Leaves 3–12 × 0.8–7 cm; lower opposite, often lobed or pedatisect; upper alternate, simple, ovate-lanceolate to linear-oblong, entire or toothed. Flowers pink, pedunculate, solitary axillary with two extra-floral tallow glands at the base of peduncles. Stamens 4. Capsules 2.5–3 cm long, oblong, erect, 4-valvular, and 4-gonous, dehiscent from above downwards. Seeds black or white, glabrous.

Flowering & Fruiting: September–October.

Frequently found in open places as an escape.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67597 (BSA).

MARTYNIACEAE

Martynia L.

Martynia annua L. Sp. Pl. 618, 1753. *M. diandra* Glox. Obs. Bot.: 14. t. 1. 1785; Duthie, Fl. Gangetic Plain 2: 176; C.B. Clarke in Hook.f., Fl. Brit. India 4: 386. 1884. *Bicchua*.

Annual herb, up to 1.5 m high; stem erect stout branched viscidly glandular-pubescent rounded, fistular. Leaves opposite, 3.5–30 × 3–12 cm, deltoid-ovate, sinuate-dentate, sub-acute, base cordate, 6-nerved, densely covered with hairs on both sides; petiole up to 20 cm long. Flowers pinkish, drooping in lax terminal glandular-sticky racemes. Bracts and bracteoles petaloid. Perfect stamens 2. Fruits woody, beaked by two strong curved spines, black.

Flowering & Fruiting: August – December.

Commonly found during rainy season along road-sides.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67547, 75624 (BSA).

ACANTHACEAE

Adhatoda Mill.

Adhatoda zeylanica Medik. in Hist. Comment. Acad. Theod.-Palat. 6: 393. 1790. *Justicia adhatoda* L., Sp. Pl. 15. 1753; Duthie, Fl. Gangetic Plain 2: 207. 1911. *Adhatoda vasica* Nees in Wall., Pl. Asiat. Rar. 3: 103. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 540. 1885. *Adusa*.

Perennial shrub or undershrub, 1–1.3 m high. Leaves simple, elliptic-lanceolate or ovate-lanceolate, 6–15 × 3–6 cm, usually acuminate at apex, sometimes acute at apex, decurrent or cuneate at base, subentire or crenulate-undulate, glabrous at maturity. Flowers in leafy spikes; bracts foliaceous, elliptic-ovate, ciliate, exceeding the calyx. Calyx 5-lobed; lobes lanceolate. Corolla cream-coloured, bilabiate; upper lip curved, notched at apex; lower lip 3-lobed, with rose-purple lines and dots in the throat; villous. Stamens 2, adnate near the top of corolla-tube. Capsules dark brown clavate, 1.5–3 cm long. Seeds suborbicular, rugose.

Flowering & Fruiting: December – April.

Common in scrub forests, wastelands and along roadsides.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75639 (BSA).

Barleria L.

Barleria cristata L., Sp. Pl. 636. 1753; C.B. Clarke in Hook. f., Fl. Brit. India 4: 488. 1884; Duthie, Fl. Gangetic Plain 2: 201. 1911. *Bajradanti*.

Perennial herb or undershrub, 1 m high; stem erect, unarmed, quadrangular. Leaf elliptic or oblong-lanceolate, 8–12 × 1.5–2.5 cm, acute or acute-acuminate of apex, narrowed at base,

entire, tomentose. Flowers in axillary and terminal capituliform spikes; bracts *c.* 1.3 cm long, acute, membranous; bracteoles absent. Calyx partite nearly up 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, *c.* 5 mm long. Stamens 2 fertile and 2 rudimentary. Capsules ellipsoid, 1.5–2.5 cm long, 4-seeded. Seeds brown, silky hairy.

Flowering & Fruiting: Almost throughout the year.

In mixed forests and along roadsides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 69707 (BSA).

Eranthemum L.

Eranthemum purpurascens Wight ex Nees in Wall., Pl. Asiat. Rar. 3: 106. 1832. *E. pulchellum* Roxb., Fl. Ind. 1: 111. 1832, *non* Andrews, 1800. *Justicia pulchella* Roxb., Pl. Coromandel 2: 41, t. 177. 1805. *Daedelacanthus purpurascens* (Wight ex Nees) T. Anderson in J. Linn. Soc., Bot. 9: 488. 1867; C.B. Clarke in Hook.f., Fl. Brit. India 4: 420. 1884; Duthie, Fl. Gangetic Plain 2: 194. 1911.

Herb or undershrub, 0.4–1 m high; stem erect, branches quadrangular. Leaves elliptic, ovate or ovate-elliptic, 10–16 × 4–8 cm, acuminate at apex, cuneate at base. Flowers in axillary or terminal, dense 2–5 cm long spikes; bracts ovate to ovate-lanceolate, 1.5–2.5 cm long, glandular pubescent; bracteoles lanceolate, glandular pubescent, ciliate on margin. Calyx white 5-lobed, pubescent; lobes lanceolate. Corolla bluish purple, 5-lobed, 2–4 cm long; lobes ovate, pubescent outside. Stamens 2, fertile. Staminodes 2, small. Disk annular. Capsules oblong, glabrous. Seeds discoid.

Flowering & Fruiting: October – March.

Common in floor of mixed forest.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75710 (BSA).

Hygrophila R. Br.

Hygrophila serpyllum (Nees) 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 2: 186. 1911.

Physichilus serpyllum Nees in Hook., Comp. Bot. Maj. 2: 311. 1837. *Hygrophila serpyllum* (Nees) T. Anderson var. *hookeriana* C.B. Clarke in Hook.f., Fl. Brit. India 4: 407. 1884.

Annual herb; stem procumbent, pubescent usually rooting at lower nodes. Leaves elliptic or suborbicular, 2.5–3 cm long, acute at apex, tapering at base, entire, pubescent. Flowers in terminal, dense, leafy spikes; bracts and bracteoles elliptic or oblong, pubescent. Calyx 5-partite; segments linear, densely ciliate. Corolla purple or bluish purple, bilabiate; upper lip 2-lobed; lower lip 3-lobed; throat white, bearded. stamens 4, all fertile. Capsules oblong, glabrous, many-seeded.

Flowering & Fruiting: December – April.

Common in dried lake bed.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75748 (BSA).

Justicia L.

Justicia quinqueangularis Koenig ex Roxb., Fl. Ind. 1: 133. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 536. 1885; Duthie, Fl. Gangetic Plain 2: 209. 1911. *Rostellaria quinqueangularis* (Koenig ex Roxb.) Nees in DC., Prodr. 11: 375. 1847.

Annual herb, 25–45 cm high; stem erect or ascending, glabrous, quadrangular. Leaves linear, linear-lanceolate or ovate-oblong, 2–7 cm long, subacute or obtuse at apex, rounded at base, entire or subentire, glabrous. Flowers in lax, terminal, short or elongated spikes; bracts and bracteoles linear, c. 3.5 mm long, glabrous. Calyx 4-partite; segments linear, c. 3 mm long, glabrous. Corolla white with purplish blotch. Stamens 2. Capsules oblong or ellipsoid, 5–7 mm long, stalked. Seeds ovoid or suborbicular.

Flowering & Fruiting: August – October.

Common in moist shady places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77232 (BSA).

Peristrophe Nees

Peristrophe paniculata (Forssk.) Brummitt in Kew Bull. 38: 451. 1983. *Dianthera paniculata* Forssk., Fl. Argyp.-Arab. 7. 1775. *D. bicalyculata* Retz. in Vet. acad. Handl. 297. t. 9. 1775. *Justicia bicalyculata* (Retz.) Vahl, Symb. Bot. 2: 13. 1791. *Peristrophe bicalyculata*

(Retz.) Nees in Wall., Pl. Asiat. Rar. 3: 113. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 554. 1885; Duthie, Fl. Gangetic Plain 2: 210. 1911.

Perennial herb, 0.5-1 m high; stem much branched, hispid, ., branches 6-angled. Leaves ovate-lanceolate, 2–6 × 1.5–2.5 cm, acute-acuminate at apex, rounded at base, crenulate, pilose, ciliate on margin; petioles 5–10 mm long. Flowers in terminal and axillary, lax, divaricate, paniculate cymes; bracts 2, linear, unequal; bracteoles 4, sub-equal. Calyx 5-partite; segments linear-lanceolate, c. 3 mm long. Corolla rosy-pink, c. 1.8 cm long, hairy outside bilabiate; upper lip subentire; lower lip shortly 3-lobed; tube slender. stamens 2. Capsules oblong, c. 1.2 cm long, covered with glandular and simple hairs, usually 4-seeded. Seeds orbicular.

Flowering & Fruiting: August – April.

Common in wastelands throughout the area.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69716, 77273 (BSA).

Ruellia L.

Ruellia tuberosa L., Sp. Pl. 635. 1753; Tripathi & al., Fl. Elem. Madhya Pradesh 122. 1994.

Herb, 30-45 cm high; Roots tuberous. Stems erect, quadrangular, grooved. Leaves opposite, elliptic or elliptic-obovate, 4–10 × 3–5 cm, obtuse at apex, decurrent at base, subentire, shortly petiolate. Flowers in terminal and axillary, pedunculate cymes; bract absent; bracteoles linear-subulate, c. 4 mm long. Calyx 5-partite; segments linear, 1.5–2 cm long, glandular. Corolla blue-violet tubular-ventricose, c.4.5 cm long, hairy outside; lobes subequal, irregularly dentate. Stamens 4, didynamous. Capsules linear-fusiform, 1.5–2 cm long, grooved, many-seeded. Seeds orbicular, hygroscopically hairy.

Flowering & Fruiting: July– October.

Common in wastelands and sometimes palnted.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75625, 75792 (BSA).

Rungia Nees

Rungia pectinata (L.) Nees in DC., Prodr. 11: 470. 1847. *Justicia pectinata* L., Cent. Pl. 2: 3. 1756 & Amoen. Acad. 4: 299. 1759. *Rungia parviflora* (Retz.) Nees var. *pectinata* (L.) C.B. Clarke in Hook.f., Fl. Brit. India 4: 550. 1885; Duthie, Fl. Gangetic Plain 2: 212. 1911.

Annual herb; stem, branched, procumbent. Leaves lanceolate or elliptic, 3–6 × 0.6–2.1 cm, acute-acuminate at apex, tapering at base, serrulate, sessile or shortly petiolate. Flowers in axillary and terminal, dense, unilateral spikes; sterile and fertile bracts dissimilar; sterile bracts lanceolate; fertile ones obovate-orbicular, scarious-margined; bracteoles oblong, scarious-margined. Calyx 5-partite; segments linear-lanceolate, ciliate on margin. Corolla light blue with 2 rows of darker patches in the lower lip, bilabiate; upper lip emarginated; lower lip 3-lobed. Stamens 2. Capsules ovoid, 2.5–2.8 mm long, 4-seeded. Seeds compressed.

Flowering & Fruiting: January – April.

Common in mixed forests and wastelands.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77245, 67697 (BSA).

Staurogyne Wall.

Staurogyne glutinosa (Wall. ex C.B. Clarke) Kuntze, Revis. Gen. Pl. 499. 1891; Duthie, Fl. Gangetic Plain 2: 182. 1911. *Ebermaiera glutinosa* Wall. ex C.B. Clarke in Hook.f., Fl. Brit. India 4: 396. 1884.

Annual herb; stem prostrate on diffuse. Leaves elliptic or oblong, 1–2.5 × 0.5–1.5 cm, obtuse at apex, tapering at base entire, glabrous. Flowers solitary in clusters pseudoaxillary; bracts 2, oblong, glandular pubescent. Calyx 5-partite; segments unequal, largest one oblong, smaller ones linear. Corolla light, pink blue violet, campanulate, shallowly 5-lobed; lobes pubescent outside. Stamens 4, didynamous; filaments hairy. Capsules oblong, c. 4 mm long, glabrous.

Flowering & Fruiting: December – March.

Rare. In moist places of mixed and sal forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67699 (BSA).

VERBENACEAE

Clerodendrum L.

Clerodendrum indicum (L.) O. Kuntze, Rev. Gen. Pl.: 586. 1891. *Siphonanthus indica* L. Sp. Pl.: 109, 1753. *Clerodendrum siphonanthus* R.Br. in Aiton Hort. Kew 4: 65, 1812; C.B. Clarke in Hook.f., Fl. Brit. India 4: 595. 1885; Duthie, Fl. Gangetic Plain 2: 227. 1911. *Agiya khar*.

Annual, woody shrub, 1–2.5 m high; stem erect, glabrous fistular, virgate. Leaves in whorls of 3–5, sub-sessile, 8–22 × 1–3.5 cm, linear-lanceolate, sub-entire, lateral nerves 6–10 pairs, intramarginally uniting. Flowers white or cream-coloured in axillary cymes, forming a large pendulous terminal panicle. Calyx accrescent, red and leathery in fruit. Corolla tube 5–10 cm long, drooping. Drupes of 4, 1-seeded pyrenes about 1.4 cm long, ovoid, dark-blue, supported by enlarged spreading red calyx.

Flowering & Fruiting: August–November.

Rarely found in grasslands.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67583 (BSA).

Clerodendrum viscosum Vent. Jard. Malm. t. 25. 1803; Santapau in Bull. Bot. Surv. India 3: 14. 1961. *C. Infortunatum auct. non L.*; C.B. Clarke in Hook.f., Fl. Brit. India 4: 594. 1885; Duthie, Fl. Gangetic Plain 2: 228. 1911. *Bhantwasi*.

erect Stout shrub up to 2.5 m high; stem erect. Branches densely fulvous-hairy. Leaves opposite, 6–12 × 4–12 cm, broadly-ovate, acute or shortly acuminate, denticulate, base cordate or rounded, thinly hairy on both surfaces, lateral nerves 6–8 pairs; petioles 3–8 cm long. Flowers white, tinged with pink, fragrant in large lax pyramidal terminal panicles. Calyx accrescent, red and leathery in fruit. Corolla tube 1.5 cm long. Drupes of 4, 1-seeded pyrenes, 7 mm in diam., fleshy, bluish-black, enclosed within accrescent calyx which open towards maturity.

Flowering & Fruiting: April – July.

Gregariously found as undergrowth in Sal forests and along forest margins.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67605, 67698, 69708 (BSA).

Gmelina L.

Gmelina arborea Roxb., Pl. Cor. 3: 42. t. 246. 1819; C.B. Clarke in Hook.f., Fl. Brit. India 4: 581. 1885. *Premna tomentosa* Miq. *apud* C.B. Clarke in Hook.f., Fl. Brit. India 4: 581. 1885; Duthie, Fl. Gangetic Plain 2: 220. 1911. *Kambhar*.

Moderate-sized tree, up to 10–12 m high. Bark grayish-yellow, smooth, exfoliating in scurfy flakes; blaze thick, yellowish-white. Leaves 8–15 × 5–12 cm, broadly-ovate or roughly triangular, entire, acute or acuminate, base cordate, truncate or cuneate, 3–5 nerved, finely tomentose and glaucous beneath, lateral nerves 5–10 pairs; petioles 3–10 cm long, glandular at the top. Flowers brownish-yellow in tomentose panicles with opposite, decussate, 3-flowered cymose branches. Drupe of 1, 4-seeded pyrenes, 1.5 cm long, ovoid, succulent, pericarp leathery, shining, yellow when ripe. Seeds lenticular.

Flowering & Fruiting: March–June.

Commonly found in Sal areas and in grasslands.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75795 (BSA).

Lantana L.

Lantana camara L. var. **aculeata** (L.) Moldenke in Torreya 34: 9. 1934; Santapau in Bull. Bot. Surv. India 3: 18. 1961. *L. aculeata* L., Sp. Pl. 627.1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 562; Duthie, Fl. Gangetic Plain 2: 216. 1911. *Raimuniya*.

Scandent shrub, up to 2.5 m high; Stem roughly hairy, branches long rambling or straggling, 4-sided, armed with small scattered prickles. Leaves opposite, 4–8 × 1.5–5 cm, ovate or ovate-oblong, crenate-serrate, acute or sub-obtuse, base cuneate, rounded or truncate, rugose and finely pubescent above, softly white-pubescent beneath, lateral nerves 3–6 pairs; petioles 1–3 cm long. Flowers white, pale-purple or yellow, crowded in axillary long-stalked bracteole ovoid heads or spikes. Drupes of 2 bony 1-seeded pyrenes, 3–4 × 2.5–3.5 mm, globose, smooth, purple when ripe.

Flowering & Fruiting: August–November.

Frequently found along the forest-margins.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67545 (BSA).

Lippia L.

Lippia alba (Mill.) N.E. Br. ex Britton & Wilson in Sc. Surv. Porto Rico & Virgin Islands 6: 141, 1925; Raizada, Suppl. Duthie, Fl. Gangetic Plain (ed.1): 214, 1976. *Lantana alba* Mill. Gard. Dict. (ed.8) No. 8, 1768. *Lippia geminata* H.B.K., Nov. Gen. et Sp. 2: 266, 1818; Clarke in Hook.f., Fl. Brit. India 4: 563, 1885.

Straggling aromatic shrub, 1.5–2 m high. Leaves 2–4 cm long, ovate, crenate-serrate, sub-obtuse, base obtuse and decurrent, rugose. Flowers pink in dense cylindrical spikes up to 2.5 cm long; peduncles into two 1-seeded pyrenes.

Flowering & Fruiting: April – November.

Commonly found along the banks of nalas near forest.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67644 (BSA).

Phyla Lour.

Phyla nodiflora (L.) Greene in Pittonia 4: 46. 1899; Meeuse in Blumea 5(1): 69. 1942; *Verbena nodiflora* L. Sp. Pl. 20. 1753. *Lippia nodiflora* A. Rich. in Michx., Fl. Am. Bor. 2: 15. 1803; C.B. Clarke in Hook.f., Fl. Brit. India 4: 563. 1885; Duthie, Fl. Gangetic Plain 2: 217. 1911.

Perennial herb; Stem prostrate or creeping much-branched often rooting at the nodes, roughly 4-angular. Leaves opposite, sub-sessile, 2–4 × 0.6–1.2 cm, obovate or spatulate, cuneate and entire at the base, sharply serrate at the rounded apex, minutely strigose on both surfaces, lateral nerves obscure. Flowers pale-pink or white, small, sessile in dense long peduncled axillary oblong-ovoid or globose bracteate heads up to 2 cm long. Drupes dry, 2 – 2 mm, of two, 1-seeded plano-convex pyrenes.

Flowering & Fruiting: August–November.

Abundantly found in moist, shady places and in low lying areas.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67522 (BSA).

Tectona L.f. nom. cons.

Tectona grandis L.f. Suppl.: 151, 1781; C.B. Clarke in Hook.f., Fl. Brit. India 4: 570.1885; Duthie, Fl. Gangetic Plain 2: 220. 1911; Rajendran & Daniel, The Indian Verbenaceae 320. 2002. *Sagon*.

Large tree; branchlets 4-sided, channelled, stellately tomentose. Bark pale-brown, striate, fibrous, peeling off in thin flakes; blaze cream-coloured. Leaves opposite, 10–60 × 8–55 cm, oval or obovate, entire or wavy, acute or bluntly acuminate, base cuneate or rounded, rugose above, clothed with dense stellate grey or tawny tomentum beneath, lateral nerves 8–12 pairs; petioles 2–4 cm long. Flowers white, sweet-scented in large 2–3 cymously branched terminal tomentose cymose panicles. Drupes 1–1.3 cm in diam., globose, densely covered with branched hairs, enclosed in the inflated calyx, endocarp bony. Seeds 1–4, obovoid.

Flowering & Fruiting: May – December.

Commonly found in mixed and Sal forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77292 (BSA).

Vitex L.

Vitex negundo L. Sp. Pl. 638. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 583. 1885; Duthie, Fl. Gangetic Plain 2: 222.1911. *Shivri*.

Large shrub or small tree up to 2.5 m high; branchlets quadrangular, white-tomentose. Bark thin, grey. Leaves digitately 3–5 foliolate; leaflets petiole, unequal, 4–12 × 0.5–3 cm, lanceolate or linear-lanceolate, entire, acuminate, base acute, dark-green and glabrous above, densely white-tomentose beneath. Flowers bluish or purplish-white in opposite lateral cymes forming an elongated terminal pyramidal compound panicle. Drupes about 4 × 4 mm, 1-seeded pyrenes, black when ripe.

Flowering & Fruiting: June – November.

Rarely found along the banks of lake and forest margins.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67626 (BSA).

LAMIACEAE

Anisomeles R.Br.

Anisomeles indica (L.) O. Kuntze, Rev. Gen. Pl. 2: 512. 1891; Mukherjee, Lab. Ind. Emp.: 152. 1940. *Nepeta indica* L. Sp. Pl. 571. 1753. *Anisomeles ovata* R.Br. in W. Ait. Hort. Kew. 3: 364. 1811; Hook.f., Fl. Brit. India 4: 672; Duthie, Fl. Gangetic Plain 2: 245. 1911.

Suffruticose aromatic annual herb or undershrub, up to 2.5 m high. Stems softly pubescent, acutely four angled. Leaves 4–9 × 3–6 cm, ovate, crenate-serrate, acute or

acuminate, base rounded or sub-cordate, rarely cuneate, pubescent on both surfaces; petioles 0.8–3.5 cm long, densely hairy. Flowers bluish-purple in many-flowered axillary whorls forming dense interrupted spikes. Calyx accrescent. Stamens didynamous, posterior pair longer with bearded filaments. Nutlets about 2 mm long, ovoid, black, polished.

Flowering & Fruiting: September – February.

Commonly found in moist places.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69797, 69440 (BSA).

Leonotis (Pers.) R. Br.

Leonotis nepetaefolia (L.) R.Br., Prodr. 504. 1810; Hook.f., Fl. Brit. India 4: 691. 1885; Duthie, Fl. Gangetic Plain 2: 253. 1911. *Phlomis nepetifolia* L., Sp. Pl. 586. 1753. *Lal Gumma*.

Stout annual herb or undershrub up to 1.5 m tall. Stems erect, 4-angled and grooved, puberulous. Leaves 8–12 × 3–9 cm, ovate, coarsely crenate-serrate, acute, base cuneate, finely pubescent on both sides; petioles 3–7 cm long, winged in the upper part. Flowers orange-scarlet or yellow in dense globose distant axillary whorls, 6–8 cm in diam.; floral leaves lanceolate, deflexed; bracts linear, strongly spinous-pointed deflexed, pubescent. Calyx teeth sharply spinescent. Corolla with slender exerted tube, villous. Nutlets about 4 mm long, linear-oblong, truncate.

Flowering & Fruiting: October – February.

Frequently found on dry, sandy soil along road-sides and in grasslands often seen forming gregarious masses.

Specimens examined: Tikri reserve forest, Vineet K. Singh 69791, 77222 (BSA).

Leucas R.Br.

Leucas aspera (Willd.) Spreng. Syst. Veg. 2: 743, 1825; Hook.f., Fl. Brit. India 4: 690. 1885; Duthie, Fl. Gangetic Plain 2: 250. 1911. *Phlomis aspera* Willd. in Link. Enum. Hort. Bero. 2: 621. 1809.

Annual herb up to 40 cm high. Stems erect or diffuse branched, quadrangular, hispid or scabrid. Leaves 2–6 × 0.8–2.5 cm, petioles or sub-sessile, elliptic-oblong or linear-lanceolate,

entire or crenate, acute, base tapering, thinly pubescent on both sides, lateral nerves 2–4 pairs. Flowers white in terminal and axillary whorls reaching up to 3 cm in diam. Bracts linear tipped with bristle as long as calyx. Calyx tube curved, mouth very oblique, smooth and glabrous below, ribbed and hispid or scabrid above. Nutlets oblong, smooth, brown.

Flowering & Fruiting: August – April.

Commonly found on moist or dry soil.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75704 (BSA).

Leucas cephalotes (Roth) Spreng. Syst. Veg. 2: 743. 1825; Hook.f., Fl. Brit. India 4: 689. 1885; Duthie, Fl. Gangetic Plain 2: 251. *Phlomis cephalotes* Roth, Nov. Sp. Pl.: 262. 1821. *Leucas capitata* Desf. in Mem. Mus. Hist. Nat. Paris 11: 8.t. 4. 1824. *Gooma*.

Annual herb, up to 80 cm high. Stems erect, roughly hairy, obtusely-quadrangular. Leaves 4–8 × 1–2.5 cm, shortly petiolate, lanceolate or ovate-lanceolate, crenate-serrate, sub-acute, base cuneate, more or less pubescent. Flowers white in large dense terminal whorls up to 4 cm in diam.; bracts numerous, 1.2–2 cm long, lanceolate, acuminate or aristate, rigidly ciliate, forming an involucre around the whorl. Calyx mouth oblique, hairy within. Nutlets obovoid-oblong, smooth, brown.

Flowering & Fruiting: August – March.

Abundantly found in moist, sandy places and in grasslands.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67513 (BSA).

Nepeta L.

Nepeta hindostana (Roth) Haines, BBO 4: 744, 1922. *Glechoma hindostana* Roth Nov. Pl. Sp.: 258. 1821. *Nepeta ruderalis* Buch.-Ham. ex Benth. in Wall. Pl. As. Rar. 1: 64. 1830; Hook.f., Fl. Brit. India 4: 661. 1885; Duthie, Fl. Gangetic Plain 2: 254. 1911. *Bilai-buti*.

Aromatic annual herb up to 45 cm high, Stem erect or ascending, branched from the base; branches obtusely quadrangular, grooved, softly pubescent. Leaves 2–5 cm long, broadly-ovate or sub-orbicular, crenate, obtuse, base cordate or truncate; petioles 0.8–2.6 cm long. Flowers bluish-purple, pedicellate in long-peduncled axillary cymes forming dense spiciform terminal thyrses. Nutlets oblong, light brown with white spots.

Flowering & Fruiting: January – June.

Frequently found in damp situations often seen growing in large masses.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69731 (BSA).

Ocimum L.

Ocimum americanum L. Sp. Pl. 833. 1753 (*non* Jacq.). *O. canum* Sims in Bot. Mag. t. 2452. 1824; Hook.f., Fl. Brit. India 4: 607. 1885; Duthie, Fl. Gangetic Plain 2:235.1911. *O. basilicum* L. Sp. Pl. 597.1753. *Jungli-Tulsi*.

Annual herb, up to 85 cm high; Stem erect, much-branched, pubescent. Leaves 1.8–4 × 1–1.2 cm, elliptic or elliptic-lanceolate, entire or shallowly serrate, acute at both ends, glabrous or nearly so, gland-dotted; petioles 0.5–2 cm long, hairy. Flowers white or pale-purple in close whorls of 6 on terminal racemes. Bracts stalked, elliptic-lanceolate, ciliate. Calyx densely hairy inside. Stamens exerted, filaments twice as long as corolla, glabrous. Nutlets, ellipsoid, black, pitted.

Flowering & Fruiting: July – March.

Frequently found in open places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75617 (BSA).

Pogostemon Desf.

Pogostemon benghalense (Burm.f.) O. Kuntze, Rev. Gen. Pl. 2: 529. 1891; Raizada in Indian, For. 92(5): 321. 1966. *Origanum benghalense* Burm.f. Fl. Ind.: 128, t. 38, f. 3. 1768. *Pogostemon plectranthoides* Desf. in Ann. Mus. Nat. Hist. Paris 2: 155, t. 6. 1803; Hook.f., Fl. Brit. India 4: 632. 1885; Duthie, Fl. Gangetic Plain 2: 241.1911. *Bhantwas*, *Ban-tulsi*.

Large aromatic woody undershrub or shrub; branches sub-quadrangular, tomentose when young becoming smooth and often purple with age. Leaves opposite, 5–10 × 3–6 cm, ovate, doubly serrate, acute or acuminate, base sub-obtuse or cuneate, oblique, glabrescent above, pubescent and paler beneath, lateral nerves 4–6 pairs, arcuate, prominent beneath; petiole up to 4 cm long. Flowers white tinged with pink in dense whorls crowded in villous or pubescent cylindrical spikes forming large erect terminal panicles; bracts foliaceous. Calyx 5-toothed, glandular. Stamens exerted; filaments bearded with moniliform hairs. Nutlets ovoid, minute, reddish-brown, shining.

Flowering & Fruiting: August – March.

Abundantly found throughout the area.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67692 (BSA).

Salvia L.

Salvia plebeia R.Br. Prodr.: 501. 1810; Hook.f., Fl. Brit. India 4: 655. 1885; Duthie, Fl. Gangetic Plain 2: 256. 1911.

Annual herb, up to 70 cm tall; stems erect roughly pubescent, deep-rooted, obtusely 4-angled, grooved, fastigiately branched. Leaves 3–8 × 1–2 cm, ovate-lanceolate or oblong-lanceolate, crenate, obtuse or sub-acute, base acute or decurrent, glabrous or sparsely hairy; petioles 2–4 cm long. Flowers white or bluish-white in paniculate interrupted pubescent spicate racemes; bracts small, linear-spathulate. Calyx 2-lipped, lower reflexed, hairy, accrescent. Nutlets minute, ovoid, smooth, brown.

Flowering & Fruiting: September – April.

Commonly found throughout the area in moist situations.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75757 (BSA).

NYCTAGINACEAE

Boerhavia L.

Boerhavia diffusa L. Sp. Pl. 3. 1753; Mukherjee in J. Econ. Tax. Bot. 5: 582. 1984; Duthie, Fl. Gangetic Plain 3: 2. 1915. *B. Repens* L. Sp. Pl. 3. 1753; Hook.f., Fl. Brit. India 4: 709.1885. *Gadehpurna*.

Herb with woody rootstock; stem diffuse glabrescent branched. Leaves in unequal pairs, petiole, 1–3 × 1–2 cm, ovate or sub-orbicular, entire or undulate, sub-acute or obtuse, base rounded or sub-cordate, green above, silvery-white beneath. Flowers pink, minute, sub-sessile, 4–10 together in bracteate umbels on long peduncled axillary and terminal panicles; bracteoles 5, lanceolate, acute forming a minute calyx-like involucre. Perianth coralline; tube glandular-hairy, contracted above the ovary; limb funnel-shaped with 5 narrow vertical bands outside. Stamens 2 or 3, slightly exerted. Fruits 4 × 2 mm, clavate, 5-ribbed, viscidly-glandular on the ribs.

Flowering & Fruiting: September – March.

Commonly found throughout the area especially in grasslands.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69768, 75761 (BSA).

AMARANTHACEAE

Achyranthes L.

Achyranthes aspera L. Sp. Pl. 204. 1753; Hook.f., Fl. Brit. India 4: 730. 1885; Duthie, Fl. Gangetic Plain 3: 18. 1915. *Chirchita*.

Herb or undershrub, up to 1 m high; stem erect, pubescent. Leaves opposite, 2–7 × 1.5–4.5 cm, elliptic, obovate or sub-orbicular, entire, obtuse or rounded, base acute or cuneate, pubescent or glabrescent above, silky-tomentose beneath, lateral nerves about 6 pairs; petioles up to 2 cm long. Flowers greenish, deflexed in simple or paniced, terminal spikes, elongating in fruits up to 45 cm long; bracteoles ovate, spinescent. Stamens pink. Utricle about 2.5 × 1 mm, oblong-cylindric, truncate at the apex, enclosed in the hardened spinescent perianth. Seeds brown.

Flowering & Fruiting: August – March.

Commonly found along road-sides and in grasslands chiefly associated.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67586 (BSA).

Aerva Forsk. nom. cons.

Aerva sanguinolenta (L.) Blume, Bijdr.: 547. 1825. *Achyranthes sanguinolenta* L. Sp. Pl. (ed.2): 294. 1962. *Aerva scandens* Wall. ex. Moq. in DC. Prodr. 13(2): 302. 1849; Hook.f., Fl. Brit. India 4: 727. 1885; Duthie, Fl. Gangetic Plain 3: 16. 1915.

Straggling or scandent herb or undershrub, up to 60 cm high; branches striate, pubescent. Leaves alternate or opposite, 2–8 × 1–3 cm, elliptic-lanceolate or ovate, acute, base tapering into a short petiole, pubescent. Flowers silvery-white in axillary and terminal ovoid or oblong paniculate spikes 1–2.5 cm long. Stamens 5, united in a green cup below; staminodes reduced to teeth; anthers yellow. Utricle broadly-ovate.

Flowering & Fruiting: October – April.

Commonly found in grasslands amongst bushes.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67581, 69770, 67604, 75718 (BSA).

Alternanthera Forssk.

Alternanthera pungens Kunth in H.B.K. Nov. Gen. et. Sp. 2: 206. 1818; Raizada, Suppl. Duthie, Fl. Gangetic Plain (ed.1): 233. 1976. *Achyranthes repens* L. Sp. Pl.: 205. 1753. *Illecebrum achyrantha* L. Sp. Pl. 299. 1962. *Alternanthera achyrantha* R.Br. Prodr.: 417. 1810. *A. repens* (L.) Link, Pum, Fl. Hort. Berol. 1: 154, 1821.

Perennial herb; stems prostrate or decumbent, clothed with shaggy hairs. Leaves opposite, unequal, 1.5–3 × 1.2–3 cm, orbicular or ovately orbicular, entire, obtuse, base tapering; petioles short. Flowers white in axillary heads; bracts and bracteoles scarious with spinescent awns, keeled. Tepals becoming spiny in fruits. Stamens 5. Fruit an utricle. Seeds rounded, brownish.

Flowering & Fruiting: Throughout the year.

Frequently found along marshy places and in grasslands.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67631, 75645, 75749 (BSA).

Alternanthera sessilis (L.) DC. Cat. Hort. Monsp.: 77. 1813; Hook.f., Fl. Brit. India 4: 732. 1885; Duthie, Fl. Gangetic Plain 3: 20. 1915. *Gomphrena sessilis* L. Sp. Pl. (ed.1): 225. 1753. *Alternanthera triandra* Lamk. Encycl. 1: 95. 1783. *A. nodiflora* R.Br., Prodr. 417. 1810.

Herb; stem prostrate or ascending, nearly glabrous, branching from the base, often rooting at the lower nodes. Leaves opposite, sub-sessile, 1–5 × 0.5–1 cm, linear-oblong or elliptic-lanceolate, entire or sub-denticulate, obtuse or sub-acute, base acute or cuneate. Flowers white or pinkish, shining in small axillary sessile clusters; bracteoles ovate, scarious. Stamens 3. Utricle broadly obcordate or orbicular with thickened margins. Seeds sub-orbicular, brown.

Flowering & Fruiting: Throughout the year.

Commonly found in grasslands and in moist situations.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67526, 75607, 77233 (BSA).

Amaranthus L.

Amaranthus spinosus L. Sp. Pl. 991. 1753; Hook.f., Fl. Brit. India 4: 718. 1885; Duthie, Fl. Gangetic Plain 3: 10. 1915. *Kateli-Chauli*

Herb or undershrub up to 80 cm high armed with sharp, straight axillary spines; stem erect glabrous. Leaves 2–9 × 1–2.5 cm, ovate or lanceolate, entire, obtuse, spinous-apiculate, base cuneate; petiole up to 4 cm long. Flowers greenish in axillary clusters and in long terminal and axillary more or less spreading spicate racemes. Tepals 5. Stamens 5. Utricle ovoid, compressed. Seeds dark-brown or black, shining.

Flowering & Fruiting: Throughout the year.

Commonly found in moist and dry places, often growing in large masses.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67580 (BSA).

Amaranthus viridis L. Sp. Pl. (ed.2): 1405. 1763, ex parte. *A. gracilis* Desf. Tabl. Ec. Bot.: 43. 1804; Becker in Fl. Males. 4(2): 76, 1949.; Hook.f., Fl. Brit. India 4: 720. 1885; Duthie, Fl. Gangetic Plain 3: 13. 1915. *Chaulai*.

Annual herb, up to 50 cm high; stem erect, glabrous, branched. Leaves 2–7 × 1.5–4 cm, ovate or deltoid-ovate, apex rounded or notched, base truncate or cuneate; petiole up to 3.5 cm long. Flowers pale-green in small axillary clusters and in axillary and terminal paniced spicate racemes; bracteoles shorter than the tepals. Tepals 3. Stamens 3. Utricle about 2.2 × 1.2 mm, compressed, sub-orbicular, beaked, corrugated. Seeds 1 × 1 mm, black, lenticular, shining.

Flowering & Fruiting: Throughout the year.

Commonly found in moist situations.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67576 (BSA).

Digera Forssk.

Digera muricata (L.) Mart. Beitr. Amarantac. 77. N. 2. 1825 & in Nova Acta Leop. 13 (1): 285. 1826. *Achyranthes muricata* L. Sp.Pl. 2: 295. 1762. *A. alternifolia* L., Mant. Pl. 50. 1767. *Digera arvensis* Forssk., Fl. Aegypt.-Arab. 65. 1775; Hook.f., Fl. Brit. India 4: 717. 1885; Duthie, Fl. Gangetic Plain 3: 8. 1915. *Lesua*.

Annual herb, up to 70 cm high; stem erect, glabrous, branched. Leaves 2–6 × 1–3 cm, ovate or deltoid-ovate, apex rounded or notched, base truncate or cuneate; petiole up to 2.5 cm long. Flowers in axillary, 12–25 cm long racemes, white, often pink, carmine or red tinge; peduncles slender, up to 12 cm long; bracts persistent pale-green. Fruit subglobose, 2.5–3 mm long, bluntly keeled, with persistent style.

Flowering & Fruiting: July – November.

Commonly found in moist situations.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67537 (BSA).

Gomphrena L.

Gomphrena celosiodes Mart. Biert. Amar.: 193, 1825 and in Nov. Act. Nat. Curr. 13: 301, 1826; FG: 276, 1976; Raizada, Suppl. Duthie, Fl. Gangetic Plain (ed.1): 235, 1976. *G. decumbens* Sensu Gamble, Fl. Madras 12(7): 1179, 1925 *et auct. al., non* Jacq.

Herb with a deep tap root; Stem diffuse, much-branched, ascending branches clothed with white hairs. Leaves opposite, sub-sessile, 2–6 × 1–2 cm, elliptic-oblong or spatulate, entire, or ciliate, acute, mucronate, base cuneate, upper surface glabrescent, lower clothed with long white hairs. Flowers white, shining about 4 mm long in dense, cylindric or globose terminal spikes subtended by two small leaves. Bracts and bracteoles much shorter than the perianth, glabrous. Perianth lobes 5, compressed, cottony-woolly. Style short; stigma 2-lobed. Fruits enclosed by the hardened perianth. Seeds brown.

Commonly found in grasslands.

Flowering & Fruiting: Most part of the year chiefly from August – October.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69781 (BSA).

CHENOPODIACEAE

Chenopodium L.

Chenopodium album L. Sp. Pl. 219. 1753; Hook.f., Fl. Brit. India 5: 3. 1886; Duthie, Fl. Gangetic Plain 3: 22. 1911. *Bathua*.

Annual herb up to 50–55 cm high; stem erect or ascending. Stems ribbed. Leaves 1–4 × 0.3–1.3 cm, oblong-lanceolate or rhombic-lanceolate, entire, toothed or lobed, acute or obtuse; petioles long, slender. Flowers green in short axillary spikes and often forming a terminal thyrses. Tepals slightly keeled, closely investing the utricle. Styles 2. Utricle membranous. Seeds minute, smooth, shining-black.

Flowering & Fruiting: September – March.

Commonly found in cultivated fields and along wetland.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75798, 75766 (BSA).

BASELLACEAE

Basella L.

Basella alba L. Sp. Pl. 272. 1753. *B. Rubra* L. Sp. Pl. 272. 1753; Hook.f., Fl. Brit. India 5: 20. 1886; Duthie, Fl. Gangetic Plain 3: 27. 1915. *Poi patta*.

Succulent twiner. Stems glabrous, much-branched, usually tinged with pink. Leaves alternate, 3–8 × 2–4 cm, broadly ovate or orbicular, entire, apiculate, base often cordate, thick; petiole up to 2.5 cm long. Flowers pinkish or whitish sessile in lax pedunculate spikes up to 12 cm long. Bracteoles coloured like the perianth. Perianth very fleshy. Utricle about 5 × 5 mm, ovoid, black with deep-purple juice.

Flowering & Fruiting: October – March.

Frequently found climbing over bushes and small trees.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77201, 69793 (BSA).

POLYGONACEAE

Polygonum L., nom. cons.

Polygonum barbatum L. Sp. Pl. 362. 1753; Hook.f., Fl. Brit. India 5: 37. 1886; Duthie, Fl. Gangetic Plain 3: 36. 1915; Steward, Contrib. Gray Herb. 88: 52. 1930. *P. stagninum* Buch.-Ham. ex Meisn. In Wall., Pl. Asiat. Rar. 3. 56. 1832.

Annual herb, up to 80 cm high; stem ascending stout more or less pubescent. Leaves sessile or sub-sessile, 2–8 × 0.5–2 cm, lanceolate or linear-lanceolate, acuminate, base cuneate or acute; ochrea tubular, coarsely ciliate, cilia usually longer than the tube. Flowers white or pink in dense racemes up to 9 cm long. Bracts glabrous, margins sparingly and shortly ciliate. Perianth about 1.5 × 2 cm, eglandular. Styles 3-cleft. Nutlets trigonous.

Flowering & Fruiting: February – October.

Frequently found in moist and marshy places, often forming a gregarious mass.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67528 (BSA).

Polygonum plebium R.Br. Prodr.: 420. 1810; Hook.f., Fl. Brit. India 5: 27. 1886; Duthie, Fl. Gangetic Plain 3: 31. 1915.

Herb, often with a woody root-stock; stem prostrate diffusely branched tufted glabrous. Leaves sessile or sub-sessile, $0.5-2 \times 0.2-0.3$ cm, linear, oblong or obovate-oblong, acute or obtuse, often with revolute margins. Stipules hyaline, short, lacerate to the middle, fimbriate. Flowers about 2 mm across, pink or white, solitary axillary or 2–3 in cluster. Perianth free nearly to the base. Styles 2–3. Nutlets 3-gonous, smooth, shining.

Flowering & Fruiting: October – March.

Abundantly found in moist situations especially in drying up ditches forming large clumps.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69721, 75734 (BSA).

Polygonum serrulatum L. Sp. Pl.: 361. 1753; Hook.f., Fl. Brit. India 5: 35. 1886; Duthie, Fl. Gangetic Plain 3: 36. 1915.

Suffruticose annual herb; stem ascending or erect branches, glabrous or puberulous. Leaves sub-sessile, $4-8 \times 0.5-1.5$ cm, lanceolate, usually with a dark-brown spot in the centre. Ochreae cylindrical, short or long-ciliate. Flowers pink or reddish, 2–3 mm long, slightly inserted in cylindrical terminal spikes. Bracts ciliate. Styles 2. Nutlets $2-3 \times 1.5-3.5$ mm, triangular, rarely lenticular, smooth, shining.

Flowering & Fruiting: August – November.

Commonly found along the banks of lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67624 (BSA).

Rumex L.

Rumex dentatus L. Mant. 2: 226. 1771. *Rumex klotzschianus* Meisn. In DC., Prodr. 14(1) : 57. 1856 ; Hook.f., Fl. Brit. India 5: 59. 1886; Duthie, Fl. Gangetic Plain 3: 41. 1915.

Annual herb up to 70 cm high; stem, erect deep-rooted, glabrous, sometimes decumbent at the base, grooved and usually tinged with red. Leaves alternate, $2-12 \times 1-5$ cm, oblong or oblong-lanceolate, entire or toothed, obtuse, base rounded or cordate; radical much longer than the cauline; petiole up to 5 cm long. Flowers green, bisexual in leafy or leafless verticillate clusters, Perianth biseriolate; segments 4×3 cm, inner tubercled on the back, irregularly toothed or pectinate on the margins and much enlarged in fruit turning to brownish red. Nutlets about 2×2 mm, acutely trigonous, brown.

Flowering & Fruiting: January – April.

Commonly found in ditches and low-lying areas.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69740, 67686 (BSA).

PIPERACEAE

Peperomia Ruiz & Pav.

Peperomia pellucida (L.) Kunth in Humb., Bonpl. & Kunth, Nov. Gen. Sp. 1: 64.1816.

Piper pellucidum L., Sp. Pl. 30.1753; Duthie, Fl. Gangetic Plain 3: 41. 1915.

Herb; stems erect or diffuse, rarely rooting at lower nodes, glabrous, pellucid up to 20 cm high. Leaves alternate, deltoid-ovate, 1.5–2.5 × 1.5–2 cm, subtruncate or cordate at base, 5-nerved. Flowers in axillary, terminal or leaf-opposed, 2 cm long spikes. Fruits globose, brown-black, sulcately striate, pointed at apex.

Flowering & Fruiting: August – November.

In cultivated fields and in shady habitats.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75687 (BSA).

LORANTHACEAE

Dendrophthoe Mart.

Dendrophthoe falcata (L.f.) Ethingsh. in Denkschr. Kaiserl Akad. Wissen. Math. Naturw. Kl. 32: 52. 1872. *Loranthus falcatus* L.f. Suppl.: 211. 1781. *L. Longiflorus* Desr. In Lam., Encycl. 3: 598. 1792; Hook.f., Fl. Brit. India 5: 214. 1886; Duthie, Fl. Gangetic Plain 3: 63. 1915. *Banda*.

Semi-parasitic shrub; stem glabrous. Bark grey, fissured. Leaves opposite or alternate, 4–15 × 1.5–7 cm, elliptic-oblong, broad-ovate or rotundate, entire or undulate, obtuse or notched, base acute, rounded or unequal, coriaceous, mid-rib prominent usually red, lateral nerves obscure; petioles 0.5–1 cm long. Flowers deep-orange, bracteate about 4 cm long in stout spreading axillary or extra-axillary unilateral racemes. Corolla-tube curved. Stamens exerted. Stigma knob-shaped. Fruits 1–2 cm long, ellipsoid, crowned by the cup-shaped calyx, black when ripe.

Flowering & Fruiting: October – March.

Common parasitic shrub of the area found on a wide range of host trees.

Specimen examined: Tikri resrve forest, Vineet K. Singh 77289 (BSA).

EUPHORBIACEAE

Acalypha L.

***Acalypha indica* L.**, Sp. Pl. 1003. 1753; Hook.f., Fl. Brit. India 5: 416. 1887; Duthie, Fl. Gangetic Plain 3: 108. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 125. 2007.

Annual herb, 50 cm high; stem angular, pubescent. Leaves ovate or ovate-rhomboid, 3–5 × 2–4 cm, obtuse or acute at apex, cuneate-truncate at base, serrate in upper half, glabrous; petioles 2–8 cm long, pubescent. Flowers in axillary, 5–10 cm long, lax spikes. Male flowers towards the upper part of spikes, ebracteate. Tepals 5, connate. Stamens 8, curved. Female flowers 3–5 together in the axil of bracts scattered in the lower part of spike; bracts 4–6 mm long. Tepals 3, ovate, ciliate. Ovary hispid; styles 3, lacinate. Capsules hispid; enclosed in bracts. Seeds pale brown, ovoid, smooth.

Flowering & Fruiting: September – November.

Commonly found in moist and shady places.

Specimen examined: Tikri resrve forest, Vineet K. Singh 67655 (BSA).

Antidesma Burm.f. ex L.

***Antidesma ghaesembilla* Gaertn.**, Fruct. Sem. Pl. 1: 189, t. 39, f. 5. 1788 (sphalm. *ghesaembilla*); Wight, Icon. Pl. Ind. Orient. 3(1): t. 820. 1844-45; Hook.f., Fl. Brit. India 5: 357. 1887, *p.p.*; Duthie, Fl. Gangetic Plain 3: 101. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 305. 2007. *A. pubescens* Roxb., Pl. Coromandel 2: 35, t. 167. 1802.

Tree, up to 8 high; branchlets rusty tomentose. Leaves variable, ovate, oblong or suborbicular, 3–5 × 3–5 cm, obtuse at apex, rounded at base, coriaceous, pubescent above, brown tomentose beneath. Flowers greenish yellow, in slender, paniculate spikes. Male flowers *c.* 2.5 mm across, terminal. Tepals 5–7, ovate, connate at base. Stamens 4. Pistillodes linear. Female flowers subsessile. Disk pubescent. Ovary pubescent. Drupes red or black on ripening, sub-globose, *c.* 4 mm across. Seeds brown, ovoid.

Flowering & Fruiting: July – November.

Sparse, in the forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75763 (BSA).

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

Breynia vitis-idaea (Burm.f.) C.E.C. Fischer in Bull. Misc. Inf. Kew 1932: 65. 1932; Airy Shaw in Kew Bull. 26: 227. 1972; Chakrab. & M. Gangop. in J. Econ. Taxon. Bot. 20: 509, f. 4. 1996; N.P.Balakr. & Chakrab., Fam. Euphorb. India 340. 2007. *Rhamnus vitis-idaea* Burm.f., Fl. Indica 61. 1768, *p.p. quoad lectotypus*. *Phyllanthus rhamnoides* Retz., Obs. Bot. 5: 30. 1788, nom. illeg. *Phyllanthus rhamnoides* Willd., Sp. Pl. 4: 580. 1805. *Melanthesa rhamnoides auct. plur.: sensu* Wight, Icon. Pl. Ind. Or. 5(2): 26, t. 1898 (1). 1852 (*non* Blume). *Breynia rhamnoides* (Willd.) Muell. Arg. in DC., Prodr. 15(2): 440. 1866, *nom. illeg.*; Hook.f., Fl. Brit. India 5: 330. 1887; Duthie, Fl. Gangetic Plain 3: 93. 1915.

Shrub or small tree, monoecious, 5 m high; branches glabrous. Leaves distichous, ovate-elliptic, 1.5–2.5 × 1–1.5 cm, obtuse at apex, rounded at base, membranous; stipules subulate, persistent. Flowers minute; pedicels filiform. Male flowers fascicled. Perianth campanulate. Stamens 3; filaments connate in a staminal column. Female flowers mostly solitary. Perianth campanulate, slightly enlarged in fruit. Ovary truncate, obscurely 3 or 6-lobed. Capsules dull red, globose, obscurely 3–6-lobed.

Flowering & Fruiting: April – November.

Occasional, near wetland in forest.

Specimen examined: Tikri resrve forest, Vineet K. Singh 67538 (BSA).

Briedelia Willd., orth. cons.

Briedelia retusa (L.) Adr. Juss., Euphorb. Gen. 109, t. 7, f. 22. 1824; Muell.Arg. in DC. Prodr. 15(2): 493. 1866; Duthie, Fl. Gangetic Plain 3: 85. 1915; N.P.Balakr. & Chakrab., Fam. Euphorb. India 319. 2007. *Clutia retusa* L., [Fl. Zeyl. 175. 1747] Sp. Pl. 1042. 1753 (as '*Cluytia*'). *C. squamosa* Lam., Encycl. Meth. Bot. 2: 54. 1786; Hook.f., Fl. Brit. India 5: 268. 1887; Prain, Beng. Pl. 927. 1903; C.E.C. Fischer in Gamble, Fl. Pres. Madras (repr. ed.) 3: 896. 1967. *B. retusa* var. *squamosa* (Lam.) Muell. Arg., l. c. 493. 1866; Hook.f., l. c. 268. 1887. *B. retusa* var. *glauca* Hook.f., l. c. 268. 1887. *B. roxburghiana* (Muell.Arg.) Gehrm. in Engler, Bot. Jahrb. Syst. 41, Beibl. 95: 30. 1908. *B. squamosa* (Lam.) Gehrm., l. c. 30. 1908. *B. cinerascens* Gehrm., l. c. 30. 1908. *Briedelia retusa* var. *glabra* Gehrm., l. c. 30. 1908. *B. squamosa* var. *meeboldii* Gehrm., l.

c. 30. 1908. *B. retusa* var. *pubescens* Gehrm., l. c. 30. 1908. *B. airy-shawii* P.T. Li in Acta Phytotax. Sin. 20(1): 117. 1982, *nom. nov. superfl.*

Tree, 3–7 m high, spinous when young. Leaves elliptic-oblong, 6–15 × 3–5 cm, obtuse at apex, bright green above, glaucous and finely tomentose beneath; secondary nerves 12–18 pairs. Flowers in axillary clusters on 8–12 cm long, axillary or terminal spikes with male and female flowers intermixed. Male outer tepals greenish, fleshy; inner tepals greenish white, shorter than outer ones. Stamens 5, connate below. Female tepals spatulate. Drupes purplish black, globose, c. 6 mm across, on accrescent tepals.

Flowering & Fruiting: August – March.

Common, in the forests.

Specimen examined: Tikri resrve forest, Vineet K. Singh 67640 (BSA).

Briedelia stipularis (L.) Blume, Bijdr. Fl. Ned. Ind. 597. 1826; Hook.f., Fl. Brit. India 5: 270. 1887; Duthie, Fl. Gangetic Plain 3: 87. 1915; N.P.Balacr. & Chakrab., Fam. Euphorb. India 320. 2007. *Clutia stipularis* L., Mant. Pl. 127. 1767 (as '*Cluytia*'). *C. scandens* Roxb., Pl. Coromandel 2(3): 39, t. 173. 1802 (as '*Cluytia*'). *Briedelia scandens* (Roxb.) Willd., Sp. Pl. 4: 979. 1806; Gamble, Fl. Pres. Madras 7(2): 1281. 1925.

Scandent shrub, monoecious; branchlets tomentose. Bark grey. Leaves elliptic-oblong or obovate, 2–9 × 1–4 cm, obtuse at apex, obtuse or subcordate at base, sub-coriaceous, glabrescent above, pubescent beneath; secondary nerves 8–12 pairs. Flowers in dense, axillary clusters on long spikes. Male flowers sessile. Female flowers pedicellate. Tepals greenish yellow. Drupes black on ripening, oblong-ellipsoid, c. 1.2 cm long, on accrescent tepals.

Flowering & Fruiting: November – April.

Common, on the outskirts of the forests.

Specimens examined: Tikri resrve forest, Vineet K. Singh 75794, 75723 (BSA).

Chrozophora A. Juss., *nom. et orth. cons.*

Chrozophora rottleri (Geisel.) Adr. Juss. [Euph. Tent. 28. 1824, *nom. nud.*] ex Spreng., Syst. Veg. 3: 850. 1826; Duthie, Fl. Gangetic Plain 3: 105. 1915; Prain in Bull. Misc. Inf. Kew 1918: 95. 1918; N.P.Balacr. & Chakrab., Fam. Euphorb. India 167. 2007. *Croton rottleri* Geisel.,

Croton Monogr. 54. 1807. *Chrozophora plicata* (non Adr. Juss. ex Spreng.) Voigt, Hort. Sub. Calc. 156. 1846.

Annual herb; stem erect, diffusely branched, stellately tomentose, 50 cm high. Leaves broadly ovate or suborbicular, 4–8 × 3–6 cm, obtuse-rounded at apex, cuneate-cordate at base, entire or 3-lobed, undulate-crenate, stellately tomentose. Flowers in axillary or terminal racemes; bracts linear, caducous. Tepals 10, 2-seriate; male outer tepals ovate, stellately hairy, inner tepals yellow, ovate-lanceolate, longer than outer; female outer tepals deltoid, hairy, inner tepals yellow, shorter than outer. Stamens 10–12, 2-seriate. Styles 3, 2-fid. Capsules purple, sub-globose, c. 6 mm across, stellately tomentose, 3-lobed. Seeds grey.

Flowering & Fruiting: March – May.

Common, in wasteland near wetland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67574 (BSA).

Croton L.

Croton bonplandianus Baill. in Adansonia 4: 339. 1863-4; Croizat in J. Bombay Nat. Hist. Soc. 41: 573. 1940; Chakrab. & N.P. Balakr. in Bull. Bot. Surv. India 34: 31. 1992 (publ. 1997); N.P. Balakr. & Chakrab., Fam. Euphorb. India 212. 2007. *C. sparsiflorus* Morong in Ann. New York Acad. Sci. 7: 221. 1893; Prain in Rec. Bot. Surv. India 3(2): 276. 1905.

Perennial Herb, 50 cm high; stem diffusely branches, covered with stellate hairs. Leaves crowded towards the apex of branchlets, ovate-lanceolate, 3–6 × 1–3 cm, acute at apex, cuneate or rounded at base, serrate. Flowers in 5–10 cm long, terminal racemes; male flowers towards the top of racemes; female ones towards the base; pedicels with 2 glands at base. Male outer tepals obovate; inner ones linear. Stamens 10–15. Female tepals lanceolate. Ovary densely stellate-hairy. Capsules trigonous, 4 mm long, stellate-hairy. Seeds oblong, shining.

Flowering & Fruiting: April – August.

Common along roadsides and in wastelands.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67567 (BSA).

Euphorbia L.

Euphorbia heterophylla L., Sp. Pl. 453. 1753; N.P. Balakr. & Chakrab., Fam. Euphorb. India 278. 2007. *E. geniculata* Ortega, Nov. Pl. Descr. Decas 2: 18. 1797; Boiss. in DC., Prodr.

15, 2: 72. 1862; Hook.f., Fl. Brit. India 5: 239. 1887; Duthie, Fl. Gangetic Plain 3: 83. 1915. *E. prunifolia* Jacq., Pl. Hort. Schoenbr. 3: 15, t. 277. 1798; Hook.f., l. c. 5: 266. 1887, in adnot. *Poinsettia geniculata* (Ortega) Klotzsch & Garcke in Klotzsch, Monatsber. Akad. Wiss. Berlin 1859: 253. 1859.

Annual herb, 60 cm high; stems glabrous, fistular. Leaves variable, oblong, ovate or lanceolate, 3–8 × 1–4 cm, acute or obtuse at apex, narrowed at base, dentate to serrate, glabrous above hairy and whitish beneath. Involucres in densely corymbose cymes, campanulate; lobes 5, ovate, fimbriate; gland 1, long-stalked. Capsules globose, 4–5 mm across, glabrous. Seeds grey, subglobose, c. 3 mm long, tuberculate.

Flowering & Fruiting: August – October.

Commonly found near railway track.

Specimens examined: Tikri reserve forest, Vineet K. Singh 75650, 77285 (BSA).

Euphorbia hirta L., Sp. Pl. 454. 1753; Burm.f., Fl. Indica 112. 1768; Roxb., Fl. Indica 2: 472. 1832; Duthie, Fl. Gangetic Plain 3: 80. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 256. 2007. *E. pilulifera* L., Sp. Pl. 454. 1753, *p.p.* excl. lectotype; Hook.f., Fl. Brit. India 5: 250. 1887. *Chamaesyce hirta* (L.) Millsp., Publ. Field Columb. Mus. Nat. Hist. Bot. Ser. 2: 303. 1909. *Dudhi*.

Annual herb; stems hispid, suberect or decumbent ascending, 30 cm long. Leaves opposite, decussate, elliptic or broadly oblong, 1.2–1.8 × 0.3–0.6 cm, obtuse or subacute at apex, rounded or cuneate at base, serrulate; stipules subulate. Cyathia 12–18, in axillary, shortly pedunculate cymes. Involucres campanulate, appressed hairy outside; lobes subulate; glands pink, globose, shortly stalked. Capsules globose, c. 1 mm across, 3-lobed, appressed hairy. Seeds reddish, globose, 6–8 mm across, 4-angled, transversely rugose.

Flowering & Fruiting: Almost throughout the year.

Common, in wasteland and along roadsides.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67524, 69741 (BSA).

Euphorbia prostrata Ait., Hort. Kew. ed. 1, 2: 139. 1789; Hook.f., Fl. Brit. India 5: 266. 1887, in adnot.; N.P. Balakr. & Chakrab., Fam. Euphorb. India 259. 2007. *E. chamaesyce auct.*

non L. 1753: Raizada, Suppl. Fl. U. Gang. Pl. 247. 1976. *Chamaesyce prostrata* (Ait.) Small, Fl. SE. U.S.A. 713. 1903.

Annual herb; stem prostrate or ascending; branches slender, covered with minute curved hairs. Leaves opposite, ovate-oblong or elliptic-oblong, 2–5 × 1.5–3 mm, rounded at apex, slightly oblique and cordate-rounded at base, glabrous above sparsely hairy beneath, minutely serrate in the upper half. Involucres campanulate, axillary, solitary; lobes lanceolate, ciliate; glands red. Capsules sub-globose, *c.* 1.3 mm across, usually deflexed, pubescent on the keel of cocci. Seeds reddish, narrowly ovoid, *c.* 1.1 mm long, 4-angled, transversely rugose.

Flowering & Fruiting: August – October.

Mainly found in wasteland.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67539 (BSA).

Euphorbia thymifolia L., Sp. Pl. 454. 1753; Hook.f., Fl. Brit. India 5: 252. 1887; Duthie, Fl. Gangetic Plain 3: 81. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 261. 2007. *E. foliata* Buch.-Ham. ex Dillwyn, Rev. Hort. Malab. 52. 1839. *Chamaesyce thymifolia* (L.) Millsp., Publ. Field Mus. Columb., Bot., ser. 2: 412. 1916.

Annual herb; stem prostrate, hispidly pubescent, 25 cm long, divaricately branched. Leaves opposite, distichous, oblong or obovate-oblong, 3–6 × 1–3 mm, obtuse at apex, oblique at base, crenulated, glabrous above, pubescent beneath; stipules fimbriate. Involucres axillary, solitary or in clusters, campanulate; lobes short, ciliate; glands 4, equal. Capsules ca 1.5 mm long, obtusely keeled, hairy. Seeds ca 1 mm long, 4-angled, with 5–6, transverse furrows.

Flowering & Fruiting: August – December.

Common in moist places on edges.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67655, 69765 (BSA).

Jatropha L., nom. cons.

Jatropha curcas L., Sp. Pl. 1006. 1753; Hook.f., Fl. Brit. India 5: 383. 1887; Duthie, Fl. Gangetic Plain 3: 116. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 223. 2007. *Safed arand*.

Shrub, 2–3 m high; branches with large leaf-scars. Leaves broadly ovate to suborbicular, 6–12 × 6–10 cm, acute at apex, cordate at base, entire or shallowly 3–5-angled or lobed; stipules

caducous. Flowers yellowish green, in terminal, corymbose, 6–8 cm long cymes; bracts lanceolate, 1.1–1.4 cm long. Perianth campanulate, 5–10-lobed; outer tepals equal, ovate, *c.* 3 mm long, sericeous at base inside. Stamens 10, 2-seriate (5+5). Ovary *c.* 2.4 mm across; styles *c.* 3 mm long; stigma bifid. Capsules yellow, turning black, globose, 2–5 cm across, rugose when dry. Seeds oblong.

Flowering & Fruiting: August – November.

Common, near habitations.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67549 (BSA).

Jatropha gossypifolia L., Sp. Pl. 1006. 1753 (as '*gossipifolia*'); Hook.f. Fl. Brit. India 5: 383. 1887; N.P. Balakr. & Chakrab., Fam. Euphorb. India 224. 2007. *Lal arand*.

Shrub, up to 2 m high; branches glandular hairy, deep reddish purple. Leaves orbicular, palmately 3–5-lobed, 7–10 × 6–12 cm, cordate at base; lobes acute at apex, glandular hairy on margin; stipules 3–5 mm long, glandular. Flowers red, in glandular, corymbose cymes; bracts ovate, acute. Outer tepals acuminate, glandular hairy; inner tepals obtuse, ciliate. Stamens 8, 2-seriate (5+3); filaments connate at base; inner 3 longer. Ovary *c.* 2.2 mm across; styles *c.* 1.2 mm long. Capsules broadly oblong, 1.3–1.5 cm long, 3-lobed, smooth, glabrous. Seeds greyish brown, oblong.

Flowering & Fruiting: April – November.

Often found near habitation in vicinity of wetland.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75652, 75756 (BSA).

Mallotus Lour.

Mallotus philippensis (Lam.) Muell.Arg. in Linnaea 34: 196. 1865 & in DC., Prodr. 15(2): 981. 1866; Hook.f., Fl. Brit. India 5: 442. 1887; Duthie, Fl. Gangetic Plain 3: 110. 1915; N.P.Balakr. & Chakrab., Fam. Euphorb. India 150. 2007. *Croton philippense* Lam., Encycl. 2: 206. 1786. *Rottlera tinctoria* Roxb., Pl. Coromandel 2: 36, t. 168. 1802 & Fl. Indica 3: 827. 1832; Dalzell & Gibson, Bombay Fl. 230. 1861. *Rohini*.

Small tree, 8 m high; young parts rusty pubescent. Leaves ovate, ovate-lanceolate or lanceolate, 10–20 × 5–10 cm, acute or acuminate at apex, rounded or cuneate at base, entire or

dentate, glabrous above, glaucous and glandular beneath; petioles 4–8 cm long. Flowers whitish yellow. Male flowers clustered in 8–15 cm long, erect, terminal spikes. Tepals 4, lanceolate. Stamens numerous. Female flowers distant, in 3–5 cm long spikes. Tepals 3–4, thick. Ovary reddish glandular; styles papillose. Capsules globose, 8–10 mm across, 3-lobed, covered with red granules. Seeds black, subglobose.

Flowering & Fruiting: October – April.

Common in forests.

Specimen examined: Tikri resrve forest, Vineet K. Singh 67607 (BSA).

Phyllanthus L.

Phyllanthus amarus Schum. & Thonn., Kongl. Danske Vidensk. Selsk. Skr. 4: 195–196. 1829; G.L. Webster in J. Arnold Arb. 38: 313, t. 19, ff. I - K. 1957; Mitra & Jain in Bull. Bot. Surv. India 27: 164. 1987; Chakrab. & N.P. Balakr. in J. Econ. Taxon. Bot., Add. ser. 9: 93. 1992; N.P. Balakr. & Chakrab., Fam. Euphorb. India 386. 2007. *P. nanus* Hook.f., Fl. Brit. India 5: 298. 1887; Hook.f., Fl. Brit. India 5: 298. 1887, *p.p.*; Duthie, Fl. Gangetic Plain 3: 98. 1915.

Annual herb 25 cm high; stem erect. Leaves oblong or oblong-elliptic, 0.5–1.2 × 0.2–0.4 cm, obtuse at both ends, slightly inequilateral at base; petioles *c.* 0.5 mm long; stipules lanceolate, *c.* 1 mm long. Flowers yellowish green, in axillary with unisexual cymules of male flowers, all succeeding axils with bisexual cymules unisexual and bisexual cymules; proximal 2–3 axils. Tepals 5, rarely 6, ovate or oblong-spathulate. Stamens 3, exserted; filaments connate. Disc glands 5. Ovary globose; styles 3, shallowly 2-fid, recurved. Capsules depressed globose, *c.* 2.2 mm across, smooth. Seeds light brown, 3-angled, with 6–7 longitudinal ribs on the back.

Flowering & Fruiting: August – December.

In moist places of wastelands.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 75791 (BSA).

Phyllanthus fraternus G.L. Webster in Contrib. Gray Herb. 176: 53. 1955 & in J. Arn. Arb. 38: 309, f. 19 G. & H. 1957; Mitra & S.K. Jain in Bull. Bot. Surv. India 27: 172, f. 3. 1985 (1987); N.P. Balakr. & Chakrab., Fam. Euphorb. India 387. 2007. *P. niruri auct. plur. non L.* 1753: Hook.f., Fl. Brit. India 5: 298. 1887, *p.p.* *P. erectus* (Medic.) M.R. Almeida, Fl. Maharashtra 343. 2003 (as 'erecta'), excl. basionym *Urinaria erecta* Medic. 1787.

Annual herb, 30 cm high; stem erect; branchlets usually scabridulous on the angles. Leaves elliptic-oblong, 0.5–1.7 × 0.2–0.5 cm, rounded at apex, obtuse or cuneate at base, dark green above, paler beneath; petioles 0.4–0.5 cm long; stipules lanceolate, c. 1 mm long. Flowers yellowish, in axillary, unisexual cymes. Male tepals 6, elliptic, 0.5–0.8 mm long. Disc segments 6. Stamens 3; filaments connate. Female tepals 6, elliptic or spatulate, 1.2–1.4 mm long. Disc irregularly laciniately toothed segments. Styles 3, free, erect. Capsules rounded, c. 2 mm across, smooth. Seeds with 6–7 longitudinal ribs.

Flowering & Fruiting: August – December.

In shady and moist places.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67511 (BSA).

Phyllanthus reticulatus Poir. in Lam., Encycl. Meth. 5: 298. 1804; Hook.f., Fl. Brit. India 5: 288. 1887; Duthie, Fl. Gangetic Plain 3: 95. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 382. 2007. *P. multiflorus* Willd., Sp. Pl; 4: 581. 1805. *Anisonema multiflorum* (Willd.) Wight, Icon. Pl. Ind. Or. 5: 26, t. 1899. 1852. *Kirganelia reticulata* (Poir.) Baill., Etude Gen. Euphorb. 613. 1858; C.E.C. Fisch. in Gamble, Fl. Pres. Madras (Repr. ed.) 3: 905. 1967 *Cicca microcarpa* Benth., Fl. Hongk. 312. 1861. *Cicca reticulata* (Poir.) Bedd. Fl. Sylv. S. India 190. 1872; Kurz, For. Fl. Brit. Burma 2: 354. 1877.

Straggling shrub, 2–2.5 m high; branches pinkish, slender, glabrous or pubescent. Leaves oblong-elliptic, 1.5–2.5 × 0.7–1.7 cm, obtuse at apex, cuneate at base, glabrous, pale beneath; petioles 2.5–3 mm long; stipules lanceolate, 1–1.8 mm long. Flowers axillary; male flowers in cluster; female one solitary. Tepals 5, unequal, obovate, 1.5–2.5 mm long. Stamens 5; inner 3 connate longer; outer 2 free, shorter. Disk-glands 5. Ovary sub-globose, 5–12-locular. Berries purplish black, globose, 5–6 mm across, smooth. Seeds 3-angled, finely granulate.

Flowering & Fruiting: September – March.

Common in grassy fields and in the forests.

Specimen examined: Tikri resrve forest, Vineet K. Singh 75745 (BSA).

Phyllanthus urinaria L., Sp. Pl. 982. 1753; Muell. Arg. in DC., Prodr. 15(2): 364. 1866; Hook.f., Fl. Brit. India 5: 293. 1887; Duthie, Fl. Gangetic Plain 3: 97. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 389. 2007. *P. hookeri* Muell. Arg. in Linnaea 32: 19. 1863 & in

DC., Prodr. 15(2): 366. 1866. *P. urinaria* var. *hookeri* (Muell. Arg.) Hook.f., Fl. Brit. India 5: 294. 1887; A. Das in Kanjilal & al., Fl. Assam 4: 155. 1940. *P. urinaria* var. *oblongifolius* Muell. Arg. Linnaea 32: 19. 1863.

Annual herb, 50 cm high; stem erect, with numerous spreading leafy branchlets. Leaves distichous, oblong or oblong-obovate 0.5–2.5 × 0.3–0.4 cm, apiculate at apex, obliquely rounded at base, glabrous, minutely ciliate along margins; stipules ovate, 1–2.5 mm long. Flowers reddish, axillary; bracts linear, c. 1.3 mm long, scarious. Tepals 6, oblong or oblong-obovate, 0.5–0.8 mm long. Stamens 3; filaments connate. Disc-glands 6, peltate. Styles horizontally spreading, connate at base. Capsules globose, 2–3.5 mm across, verrucose. Seeds greyish brown, 3-angled.

Flowering & Fruiting: July – November.

Common, near habitations and along forest roads.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67601, 75609 (BSA)

Phyllanthus virgatus J.G. Forst. Prodr. 65. 1786. *P. simplex* Retz. Obs. 5: 29. 1789; Fl. Brit. India 5: 295. 1887; Duthie, Fl. Gangetic Plain 3: 98. 1914.

Perennial herb; stem erect or ascending deep-rooted glabrous. Leaves sub-sessile, 1–2.5 × 0.3–0.6 cm, oblong or obovate, apiculate; stipules scarious, peltate. Flowers whitish, minute, usually with 2 short-pedicelled males and one long-pedicelled female in a cluster from the axils of minute bracts. Capsules 2.5 × 2.5 mm, globose. Seeds trigonous, covered with tubercles in irregular lines, dark-brown.

Flowering & Fruiting: July – September.

Frequently found on moist sandy soil.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67637, 67512 (BSA).

Tragia L.

Tragia involucrata L., Sp. Pl. 980. 1753; Hook.f., Fl. Brit. India 5: 465. 1888, *p.p.*, excl. *T. hispida* Willd. & excl. vars; Duthie, Fl. Gangetic Plain 3: 114. 1915; N.P. Balakr. & Chakrab., Fam. Euphorb. India 181. 2007.

Perennial twiners; stem, densely hispid with stinging hairs. Leaves alternate, variable, elliptic or ovate-oblong, 5–8 × 2–3 cm, acuminate at apex, rounded to subcordate at base, serrate; lateral nerves 4–5 pairs; petioles *c.* 2.5 cm long. Flowers in terminal, axillary and leaf-opposed hairy racemes; bracts lanceolate. Male tepals 3, *c.* 1.2 mm long. Stamens 3, free, alternate with tepals. Female tepals 6, *c.* 1.4 mm long, pinnatifid, accrescent. Ovary pubescent, 3-locular; ovule solitary in each locule; styles 3, united below. Capsules 3-lobed, hispid. Seeds globose, smooth.

Flowering & Fruiting: November – March.

Rare, in forest area.

Specimen examined: Tikri resrve forest, Vineet K. Singh 77283 (BSA).

URTICACEAE

Gonostegia Turez.

Gonostegia pentandra (Roxb.) Miq. Ann. Mus. Lugd.-Bat. 4: 302. 1869. *Urtica pentandra* Roxb. Fl. Ind. 3: 583. 1832. *Pouzolzia pentandra* Benn. Fl. Jav. Rar. 64, t. 14. 1832; Hook.f., Fl. Brit. India 5: 583. 1888.

Perennial herb, up to 1.2 m tall; stem erect or decumbent glabrous. Leaves sessile or shortly petioled, lower always opposite, upper gradually smaller and alternate, 3–6 × 0.5–1.5 cm, oblong-lanceolate or linear-lanceolate, entire, acuminate, base acute or obtuse, 3-nerved, sub-membranous, stipules ovate-lanceolate, scarious. Flowers pink, clustered in the axils of floral leaves. Tepals 5. Stamens 5. Achenes about 1.2 × 1.2 mm closely invested with 2–3 winged perianth.

Flowering & Fruiting: August – November.

Commonly found in marshy, shady places

Specimen examined: Tikri resrve forest, Vineet K. Singh 75711 (BSA).

Pouzolzia Gaud.

Pouzolzia zeylanica (L.) Benn. & Brown Pl. Jav. Rar. 67. 1838. *Parietaria zeylanica* L. Sp. Pl. 1052. 1753. *P. indica* (L.) Gaud. in Freyc. Voy. Bot. 503. 1826; Hook.f., Fl. Brit. India 5: 581. 1888; Duthie, Fl. Gangetic Plain 3: 132. 1915.

Perennial herb with creeping root-stock; stem erect or prostrate or ascending glabrescent. Leaves alternate or opposite, 1–3 × 0.8–2.4 cm, ovate or ovate-lanceolate, entire,

acute or acuminate, base acute or rounded, 3-nerved, lateral nerves 2 pairs; petioles 0.4–1.2 cm long; stipules ovate, acuminate, ciliate. Flowers green monoecious in small axillary clusters, strigose with simple or hooked hairs. Tepals 4, persistent in female flowers, 2-fid at the apex, closely investing the achene. Stamens 4. Achenes 0.9×0.9 mm, broadly ovoid, shining.

Flowering & Fruiting: July – November.

Commonly found in moist, sandy, shady places, growing, gregariously.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67531, 77209, 69734, 75769.

ULMACEAE

Holoptelea Planch.

Holoptelea integrifolia (Roxb.) Planch. in Ann. Sci. Nat. Bot. Ser. 3, 10: 259. 1848; Hook.f., Fl. Brit. India 5: 481. 1888; Duthie, Fl. Gangetic Plain 3: 120. 1915. *Ulmus integrifolia* Roxb. Pl. Cor. 1: 56, t. 78. 1795. *Chilbil*.

Large, tree buttressed at the base up to 12 m. Bark grayish-white; blaze yellow. Leaves alternate, $5-8 \times 4-6$ cm, elliptic, ovate or ovate-oblong, entire, acuminate, base rounded or subcordate, sub-coriaceous, glabrescent, lateral nerves 4–8 pairs, arcuate; petioles 0.6–1.2 cm long. Flowers green in numerous fascicles or abbreviated racemes on the leafless branches. Samara about 2.5 cm in diam., oval or orbicular, notched at the apex between the persistent style; wings reticulately veined. Seeds about 0.5 cm long, apex curved, ellipsoid, brown, smooth.

Flowering & Fruiting: February – March.

Found scattered in Sal areas.

Specimen examined: Tikri resrve forest, Vineet K. Singh 75676 (BSA).

CANNABACEAE

Cannabis Tournef. ex L.

Cannabis sativa L. Sp. Pl. 1027. 1753; Hook.f., Fl. Brit. India 5: 487. 1888; Duthie, Fl. Gangetic Plain 3: 124. 1915. *Bhang*.

Aromatic, annual herb or undershrub, up to 1.5 m tall; stem erect, suffruticose, pubescent. Leaves alternate or the lower opposite, palmately 3–8 foliolate; leaflets $5-10 \times 0.5-2$ cm, lanceolate, serrate, acuminate, base cuneate, dark-green above, pale beneath, glabrescent;

petiole up to 5 cm long, pubescent. Flowers greenish-white, dioecious; males in short cymose panicles; females crowded in leaf-axils with leafy bracts. Styles 2, filiform. Fruit and achene, closely invested by the persistent perianth and bracts.

Flowering & Fruiting: March – November.

Commonly found in moist places growing gregariously.

Specimens examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67510, 75676 (BSA).

MORACEAE

Artocarpus J.R. Forster & J.G.A. Forster, nom. cons.

Artocarpus heterophyllus Lam., Encycl. 3: 209. 1789. *A. integrifolia auct. non L.f.*, 1782; King in Hook. f. Fl. Brit. India. 5: 541. 1888. Duthie Fl. Gangetic Plain 3: 142. 1915. *Kathal*.

Trees, 10–12 m high. Leaves obovate or elliptic, 8–15 × 5–8 cm. entire, dark green, glossy above, pale beneath, glabrous; stipules large caducous. Flowers in cylindrical heads; young ones enclosed within leathery, caduceus sheath. Male heads clavate or ellipsoid. Perianth 2-lobed. Female heads with spatulate stigma. Syncarps oblong 20–40 cm long, tuberculate, stalked, hanging from old branches or on the trunk. Seeds oblong.

Flowering & Fruiting: November – June.

Mainly planted for its edible fruits.

Specimen examined: Tikri resrve forest, Vineet K. Singh 77278 (BSA).

Artocarpus lakoocha Roxb. Fl. Ind. 3: 524. 1832; King in Hook. f. Fl. Brit. India 5: 543. 1888. Duthie Fl. Gangetic Plain III: 141–142. 1915. *Barhal*.

Tree, 15 m. high. Bark thick, rough, dark grey; young parts tomentose. Leaves elliptic, oblong or ovate, 10–15 × 6–8 cm, entire or denticulate, glabrous above, pubescent beneath; stipules caducous. Flowers in axillary, globose or ovoid, shortly stalked heads. Male heads orange-yellow, ovoid. Anthers exserted. Female heads with exserted style. syncarps sub-globose, 4–8 cm across, yellow orange when ripe, irregularly lobulate, not tuberculate. Seeds oblong.

Flowering & Fruiting: March – June.

Mainly planted for its edible fruits.

Specimen examined: Tikri resrve forest, Vineet K. Singh 77261 (BSA).

Ficus L.

Ficus benghalensis L. Sp. Pl. 1059. 1753; King in Hook. f. Fl. Brit. India 5: 499. 1888. Coener in Gard. Bull. Singapore 17: 381. 1959. *Urostigma bengalense* Gasp. Nov. Gen. Fic. 7. 1844. Duthie, Fl. Gangetic Plain 3. 147. 1915. *Bargad, Bat.*

Tree, up to 25 m high; aerial roots forming prop roots. Leaves alternate, elliptic to ovate. 10–20 × 5–14 cm, obtuse at apex, rounded at base entire, coriaceous, glabrous above, puberulous beneath with abundant cystolith. Receptacles axillary, paired, sessile, globose, 1.5–3 cm across, red on ripening, basal bracts 3. Male flowers numerous, near the ostiole of receptacle. Tepals 3. stamen 1. Female flowers sessile. Gall flowers pedicellate. Achenes globose-ellipsoid.

Flowering & Fruiting: March – July.

Common throughout the area on road sides, in rural areas and villages.

Specimens examined: Tikri resrve forest, Vineet K. Singh 69728, 75782 (BSA).

Ficus heterophylla L.f., Suppl. Pl. 442. 1782; King in Hook. f. Fl. Brit. India 5: 518. 1888; Coner in Gard. Bull. Singapore 21: 73. 1965; Duthie, Fl. Gangetic Plain 3. 154. 1915.

Shrub, up to 3 m high; branches often prostrate. Leaves alternate, distichous, elliptic-oblong, ovate or lanceolate, 3–6 × 1–3 cm, acute or shortly acuminate at apex, rounded at base, dentate, young ones 3 to many-lobed, membranous to sub-coriaceous, scabrid, petiolate, stipulate. Receptacles axillary, solitary, pedunculate, ellipsoid, 10–15 × 8–10 mm, orange to red on ripening. Male flowers sessile. Gall flowers pedicellate. Achenes sub-compressed, slightly heeled.

Flowering & Fruiting: May – October.

Mostly in moist places near streams.

Specimens examined: Tikri resrve forest, Vineet K. Singh 75630, 77288 (BSA).

Ficus hispida L.f. Suppl. Pl. 442. 1782; King in Hook. f. Fl. Brit. India 5: 522. 1888; Corner in Gard. Bull. Singapore 21: 89. 1965. *F. oppositifolia* Roxb. Pl. coromandel 2: 14. t. 124. 1799. Duthie, Fl. Gangetic Plain 3: 155. 1915. *Kath Gular.*

Shrub or small tree, 7 m high; stem hispid. Leaves opposite, decussate, ovate or oblong-elliptic 5–20 × 3–8 cm, acute at apex, truncate at base, entire or minutely dentate, scabrid, hispid beneath; Petioles 2–3 cm long. Receptacles on leaflets hanging twigs and arising in clusters from trunk and main branches, depressed globose, pale yellow on ripening. Male flowers in 2 rows. Stamens 1. Female flowers sessile or pedicellate. Gall flowers sessile or pedicellate. Achenes lenticular.

Flowering & Fruiting: February – June.

Common on road sides & in fields.

Specimens examined: Tikri resrve forest, Vineet K. Singh 69701, 67560, 77250 (BSA).

Ficus palmata Forssk., Fl. Aegypt.-Arabe. 179. 1775. King in Hook. f., Fl. Brit. India 5: 530. 1888. *F. Caricoides* Roxb., Fl. Ind. 3: 529. 1832. *F. virgata* Roxb., Fl. Ind. 3: 530. 1832; Duthie Fl. Gangetic Plain 3. 158. 1915. *Kathgulariya*.

Small tree, 3.5 m high; Bark smooth, dull ashy grey, young shoots usually tomentose or pubescent. Leaves broadly ovate or orbicular, sometimes 3–5 lobed, 10–20 × 8–15 cm, acute at apex, cordate at base, denticulate, membranous, tomentose. Receptacles axillary, solitary, pedunculate, sub-globose or pyriform, c. 2 cm across, yellow purple on ripening, tomentose. Male flowers on hairy pedicels. Tepals 5. Stamens 2. Female and gall flowers sessile or pedicellate. Achenes 3 angled.

Flowering & Fruiting: May – September.

Along road sides. often planted. Fruits are edible.

Specimen examined: Tikri resrve forest, Vineet K. Singh 75621 (BSA).

Ficus racemosa L., Sp. Pl. 1060. 1753., Corner in Gard. Bull. Singapore 21: 34. 1965. *F. glomerata* Roxb., Pl. coromandel 2: 13. t. 123. 1799. King in Hook. f. Fl. Brit. India 5: 535. 1888; Duthie, Fl. Gangetic Plain 3: 160. 1915. *Gular*.

Tree, 15 m high; bark smooth, reddish brown. Young shoots glabrous. Leaves alternate, ovate-oblong 5–12 × 3–7 cm, obtuse or acute at apex, rounded at base, entire, sub-coriaceous, smooth, glabrous, stipulate. Receptacles in clusters on main branches of trunk or on leafless branches, pedunculate, sub-globose or pyriform, 2–3 cm across, green to red, Male flowers

sessile, in 2–3 rings near the ostioles. Stamen 2. Female flowers sessile or shortly pedicellate. Gall flowers long pedicellate. Achenes lenticular.

Flowering & Fruiting: February – September.

Common tree throughout the study area.

Specimen examined: Tikri resrve forest, Vineet K. Singh 67562 (BSA).

Ficus religiosa L., Sp. Pl. 1059. 1753; King in Hook.f., Fl. Brit. India 5: 513. 1888., Corner in Gard. Bull. Singapore. 21: 6. 1965; Duthie Fl. Gangetic Plain 3: 150. 1915. *Peepal*.

Large tree, up to 15 m high, Bark grey, branches without aerial roots. Leaves alternate long petioles, drooping broadly ovate, 10–15 × 6–10 cm, caudate-acuminate at apex, truncate at base, undulate, coriaceous, shining, glabrous; petioles 5–8 cm long. Receptacles axillary, paired, sessile, sub-globose, c. 1 cm across, pink-purple on ripening. Male flowers few, sessile, near the ostiole. Tepals 2. Stamen 1. Female and gall flowers sessile. Tepals 3–4. Achenes smooth.

Flowering & Fruiting: April – September.

Common throughout the area on roadsides and near the temples.

Specimen examined: Tikri resrve forest, Vineet K. Singh 75637 (BSA).

Ficus virens Dryander in Aiton, Hortus Kew. 3: 451. 1789; Corner in Gard. Bull. Singapore 17: 376. 1959 & 21: 9. 1965. *F. infectoria* Roxb., Fl. Ind. 3: 551. 1832. non willd., 1806; King in Hook. f., Fl. Brit. India 5: 515. 1888; Duthie; Fl. Gangetic Plain 3: 153. 1915. *Pakar*.

Large tree, 15 m high; bark greenish grey, smooth aerial roots arising from trunk or branches. Leaves alternate, oblong ovate, 6–12 × 4–8 cm., acuminate at apex, cuneate at base, entire, glabrous; petioles 4–6 cm long; stipules broadly ovate, c. 1 cm long, puberulous. Receptacles axillary, paired, sessile or subsessile, globose, white to cream coloured on ripening. Male flowers shortly pedicellate. Tepals 4. stamen 1. Female flowers sessile. Gall flowers pedicellate. Achenes smooth.

Flowering & Fruiting: April – February.

Occasionally met with near villages as a planted tree. Ripe figs are edible.

Specimens examined: Tikri resrve forest, Vineet K. Singh 75641, 69754, 69760 (BSA).

Morus L.

Morus alba L., Sp. Pl. 986. 1753; Hook. f., Fl. Brit. India 5: 492. 1888; Duthie; Fl. Gangetic Plain 3: 137–138. 1915. *Shahtoot*.

Small tree, dioecious or monoecious. 3–4 m. high. Leaves ovate to lanceolate, 5–12 × 4–8 cm; acute at apex, cordate at base, serrate or dentate, sometimes lobed, glabrous above, puberulous beneath. Catkins pendulous, green. Male catkins elongated, Female catkins short, ovoid. Peduncles shorter than spikes. Tepals 4, styles free. Sorosis purple to red when ripe, sweet.

Flowering & Fruiting: February – May.

Cultivated in villages and along road sides.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69730 (BSA).

Streblus Lour.

Streblus asper Lour; Fl. Cochinch. 2: 615. 1790; Hook.f.; Fl. Brit. India. 5: 489. 1888; Duthie; Fl. Gangetic Plain 3: 138-139. 1915. *Sihore*.

Small trees, unarmed, 4-6 m high; stem profusely branched. Leaves elliptic obovate 2–5 × 1.5–3.5 cm; acute at apex, connate at base, irregularly dentate, coriaceous, scabrid; Petioles pubescent; stipules caduceous. Male flowers in globose, pedunculate heads. Tepals imbricate stamens 4. Female flowers usually solitary, pedicellate. Tepals imbricate, enlarged in fruit. Drupes yellow, enclosed by enlarged perianth, 1-seeded.

Flowering & Fruiting: April – August.

Along the roadsides in the forest.

Specimen examined: Tikri resrve forest, Vineet K. Singh 67642 (BSA).

CASURAINACEAE**Casuarina L.**

Casuarina equisetifolia L., Amoen. Acad. 4: 143. 1759, "*equisetifolia*"; Hook.f., Fl. Brit. India 5: 598. 1888. *C. muricata* Roxb., Fl. Ind. 3: 519. 1832; Duthie, Fl. Gangetic Plain 3: 162. 1915.

Tree, dioecious, up to 20 m high; branches drooping. Leaves scaly, 6–7 at each node, alternating with ribs of upper node. Male spikes terminal, cylindrical, 2–3 cm long. Tepals 2,

lanceolate. Female spikes axillary, ovoid, cone like, becoming woody, shortly pedunculate. Carpo-phores ovoid, 2–3 × 1–2 cm; nutlets thin, compressed.

Flowering & Fruiting: March – July.

Planted. in gardens, rest houses and forest nurseries.

Specimen examined: Tikri resrve forest, Vineet K. Singh 75790 (BSA).

CERATOPHYLLACEAE

Ceratophyllum L.

Ceratophyllum demersum L. Sp. Pl. 992. 1753; Hook.f., Fl. Brit. India 5: 639. 1888.

Slender, submerged much-branched rootless aquatic herb. Leaves 4–9 in a whorl, 1–3 cm long, variable, much dissected into filiform, spreading segments. Flowers minute, green, monoecious, solitary axillary. Male and female tepals 9–12, inner one's ciliate. Fruit an achene with basal spine and apical persistent base of style, ellipsoid or ovoid.

Flowering & Fruiting: September – November.

Commonly found in stagnant water of the lake and ditches.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67535 (BSA).

HYDROCHARITACEAE

Hydrilla Rich.

Hydrilla verticillata (L.f.) Royle, 3. Bot. Himal. Mts. t. 376. 1839; Hook.f., Fl. Brit. India 5: 659. 1888; Duthie, Fl. Gangetic Plain 3: 173. 1920; Subram., Aquatic Angiosp. 55. 1962. *Serpicula verticillata* L.f., Suppl. Pl. 416. 1782. *Hydrilla polysperma* Blatt. in J. Proc. Asiat. Soc. Bengal 26: 356. 1931.

Herb, aquatic, submerged, perennial; stems flaccid much branched, often rooting at nodes. Leaves 3–6 in a whorl, linear or linear-oblong, 0.8–1.8 cm long, apiculate at apex, entire or serrulate, sessile. Flowers unisexual, white. Male flowers shortly pedicellate, in solitary, subglobose, muricate spathes. Sepals ovate. Petals oblong. Stamens 3. Female flowers sessile, solitary in cylindrical, membranous spathes. Sepals and petals as in male. Fruits c. 4 mm long, smooth or muricate, shortly apiculate at both ends. Seeds oblong.

Flowering & Fruiting: November – March.

Common in ponds and ditches.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67523 (BSA).

Ottelia Pers.

Ottelia alismoides (L.) Pers., Syn. Pl. 1: 400. 1805; Hook.f., Fl. Brit. India 5: 662. 1888; Duthie, Fl. Gangetic Plain 3: 177. 1920; Subram., Aquatic Angiosp. 61. 1962. *Stratiotes alismoides* L., Sp. Pl. 535. 1753.

Herb, aquatic, submerged to floating and rooting in mud. Leaves both submerged and floating; floating leaves broadly ovate or suborbicular, 5–15 × 3–13 cm, rounded, acute or apiculate at apex, shallowly cordate or truncate at base, undulate, 7–11-nerved; submerged leaves oblong, 4–8 × 1–2 cm, tapering at both ends; petioles 3-angled with longitudinal air channels. Peduncles 10×45 cm long, 3-angled; spathes with 6 undulate wings, 2–4 cm long. Sepals 3, linear-oblong, 1–1.8 cm long. Petals 3, white with yellow spots at base. Stamens usually 6; filaments glandular hairy. Fruits oblong-ellipsoid, 2–4 cm long, crowned by sepals.

Flowering & Fruiting: October – March.

In pond and tanks.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 69718 (BSA).

Vallisneria L.

Vallisneria spiralis L., Sp. Pl. 1015. 1753; Hook.f., Fl. Brit. India 5: 660. 1888; Duthie, Fl. Gangetic Plain 3: 174. 1920; Subram., Aquatic Angiosp. 57. 1962.

Herb, aquatic, submerged, dioecious, acaulescent, rooting in mud. Leaves radical, linear, 6–25 × 0.5–1.5 cm, obtuse at apex, 3–8-nerved, sheathing at base. Flowers unisexual, males many in 4–5 mm long, 3-lobed spathe, females solitary in a tubular, 3-toothed spathe on long spiral filiform peduncle. Sepals 3, ovate-oblong. Petals absent. Stamens 1–3. Pistillode absent. Staminodes 3 in female flowers, each 2-fid. Ovary linear, cylindrical, 1-locular. Fruits linear, included in the spathe. Seeds numerous, oblong-fusiform.

Flowering & Fruiting: November – February.

In pond and ditches.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 77255 (BSA).

ORCHIDACEAE

Habenaria Willd.

Habenaria plantaginea Lindl., Gen. Sp. Orchid. Pl. 323. 1835; Hook.f., Fl. Brit. India 6: 141. 1890; Duthie, Fl. Gangetic Plain 3: 224. 1920.

Herb, terrestrial with 2, ellipsoid tubers. Leaves 3–5, in a basal rosette, 5–12 × 2–5 cm, elliptic or oblanceolate-oblong, acute. Flowers white, in lax, few to many-flowered racemes; bracts ovate-lanceolate; sepals unequal, dorsal sepal erect, lateral sepals falcately oblong; petals linear-lanceolate; lip rhomboid, 3-lobed, long spurred, mid lobe narrowly linear, lateral lobes broader, spur curved; pollinia 2. Capsules ellipsoid.

Flowering & Fruiting: September – November.

Occasional, in slope of fine silt on the forest floor.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77255 (BSA).

Vanda W. Jones ex R. Br.

Vanda tessellata (Roxb.) Hook. ex G. Don in Loud., Hort. Brit. 372. 1830. *Epidendrum tessellatum* Roxb., Pl. Coromandel 1: 34. T. 42. 1795. *Vanda roxburghii* R.Br. in Bot. Reg. 6: t. 506. 1821; Hook.f., Fl. Brit. India 6: 52. 1890. *Badang*.

Epiphytes. Stems thick, 25–45 cm long, sheathed. Leaves alternate, linear, recurved, 8–15 × 1–2 cm, thick, coriaceous, keeled. Flowers in axillary, up to 10-flowered, zig-zag, racemes, fragrant. Sepals unequal; obovate, 3-lobed. Petals yellowish green, oblong shorter than sepals. Labellum white or yellow with purple tips, infundibuliform, 3-lobed, spurred. Column cylindrical, fleshy. Capsule clavate, 5–6 cm long.

Flowering & Fruiting: Throughout the year.

Common on a number of roadside trees of the forest.

Specimens examined: Tikri reserve forest, Vineet K. Singh 69749, 75737, 77231 (BSA).

COSTACEAE

Costus L.

Costus speciosus (Koenig. ex Retz.) Sm. in Trans. L. Soc. 1: 249. 1791. Baker in Hook.f., Fl. Brit. India 6: 249. 1892; Duthie, Fl. Gangetic Plain 3: 236. 1920. *Banksea speciosa* Koenig ex Retz. Obs. 3: 75. 1783. *Keo-kanda*.

Perennial, stout tuberous-rooted undershrub, up to 80 cm tall; stem erect. Leaves alternate, spirally arranged, sub-sessile, 10–20 × 3.5–7 cm, elliptic-oblong or oblanceolate-oblong, entire, cuspidate or short acuminate, base acute or rounded, sub-membranous, glabrous above, silky-pubescent beneath, lateral nerves numerous fine; sheaths coriaceous. Flowers white, large in dense terminal spikes up to 12 cm long. Bracts 2–3 cm long bright-red, ovate, cuspidate or acuminate. Stamen 1, filament petaloid, hairy below. Style slender, stigma ciliate. Capsules about 2.5 × 2.5 cm, globose, trigonous, red. Seeds black with white aril.

Flowering & Fruiting: August – November.

Frequently found in Sal Forest areas and along road-sides.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67608 (BSA).

CANNACEAE

Canna L.

Canna indica L. Sp. Pl. 1. 1753. *C. orientalis* Roscoe, Monandr. Pl. Scitam. t. 12. 1826. *C. indica* L. var. *orientalis* (Roscoe) Baker in Hook. f., Fl. Brit. India 6: 260. 1892.

Herb; rhizomes creeping ; stems glabrous. Leaves ovate-elliptic or oblong, 20–40 × 8–10 cm, acuminate at apex, tapering at base, entire, glabrous. Flowers 12–18 cm long panicles, paired, large showy ; bracts ovate to narrowly linear, 4–5 cm long ; bracteoles up to 1.2 cm long. Sepals lanceolate. Petal yellow, orange or red. Staminodes 3, brightly red, spatulate-oblanceolate, up to 5 cm long, one staminode shorter. Capsules warty.

Flowering & Fruiting: Throughout the year.

Cultivated. Found as escape near the forest village.

Specimen examined: Tikri reserve forest, Vineet K. Singh 75652 (BSA).

AMARYLLIDACEAE

Zephyranthes Herb., nom. cons.

Zephyranthes flava G. Nichols., Ill. Dict. Gard. 4: 239. 1887. Perennial herb, slender. Bulbs covered with old leaf bases. Leaves linear, 25–35 × 0.6–0.8 cm, plicate. Flowers yellow, solitary; scape up to 20 cm long.

Flowering & Fruiting: May – November.

Cultivated in gardens. Found as an escape near the lake.

Specimen examined: Parvati Aranga Wildlife Sanctuary, Vineet K. Singh 67502 (BSA).

HYPOXIDACEAE

Curculigo Gaertn.

Curculigo orchioides Gaertn. Fruct. 1: 63, t. 16. f. 11. 1788; Hook.f., Fl. Brit. India 6: 279. 1892; Duthie, Fl. Gangetic Plain 3: 247. 1920. *kali-musli*.

Perennial herb with elongated black tuberous rootstock having fibrous sheath at the base of the stem. Leaves 10–30 × 1–2 cm, linear or linear-lanceolate, entire, plicate, acuminate, base tapering into an elongated petiole, membranous, glabrous or sparsely softly hairy. Scape short hidden by sheathing lanceolate membranous, bracts and leaf bases, the larger portion being underground. Flowers yellow, few in racemes, upper male, lower bisexual or female. Stamens 6; anthers dorsifixed. Ovary inferior 3-celled. Fruits 1.5–2 cm long baccate with a slender beak. Seeds 1–4, black shining.

Flowering & Fruiting: June – October.

Commonly found as undergrowth in Sal forest.

Specimen examined: Tikri reserve forest, Vineet K. Singh 77264 (BSA).

DIOSCOREACEAE

Dioscorea L.

Dioscorea bulbifera L. Sp. Pl. 1033. 1753; Duthie, Fl. Gangetic Plain 3: 254. 1920. *D. sativa* Thunb. Fl. Jap. 151. 1784, *non*. L. 1753; Hook.f., Fl. Brit. India 6: 295. 1892. *Ratalu*.

A large glabrous twiner with axillary globose warted bulbils. Leaves simple, alternate or opposite, 5–20 × 3–12 cm, variable, broadly-ovate or sub-orbicular, entire, acuminate or cuspidate, base deeply cordate with rounded lobes, 5–9 nerved; petioles 3–5 cm long, slender. Male flowers in long slender drooping spikes, clustered in the leaf axils; stamens 6. Female flowers in axillary solitary or fascicled pendulous spikes 6–22 cm long; stigmas 3. Capsule about 2 × 1.5 cm quadrately-oblong, reflexed. Seeds winged at the base.

Flowering & Fruiting: September – December.

Commonly found climbing over trees in the forest area.

Specimens examined: Tikri reserve forest, Vineet K. Singh 67555, 75677 (BSA).

Dioscorea oppositifolia L. Sp. Pl. 1033. 1753; Hook.f., Fl. Brit. India 6: 292. 1892, *p.p.*; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 392. 1938. *Nagar kanda*.

Large climber; stem glabrous, often purplish, deeply in soil. Leaves simple, opposite, 3–10 × 3–8 cm, elliptic-oblong, ovate or sub-orbicular, margin thinly cartilaginous, cuspidate, base rounded or sub-truncate, 3–5 nerved, of which the 3 unite to the tip; petiole up to 3.5 cm long. Male flowers in dense pedunculate spikes, 1–3 cm long. Female flowers distant in solitary or fasciculate axillary spikes up to 20 cm long. Capsule about 2.5 × 3 cm, sub-orbicular with depressed base and apex. Seeds orbicular with large wing all round.

Flowering & Fruiting: August – November.

Frequently found climbing on small trees in association with some other climbing species.

Specimen examined: Tikri resrve forest, Vineet K. Singh 77260 (BSA).

LILIACEAE

Asparagus L.

Asparagus racemosus Willd., Sp. Pl. 2: 152. 1799; Hook.f., Fl. Brit. India 6: 316. 1892. Duthie, Fl. Gangetic Plain 3: 259. 1920. *Satawar*.

Scandent or climbing much-branched spinous shrub with tuberous rootstocks. Stem woody, striate, whitish-grey; spines 2–4 mm long, sub-erect or recurved. Cladodes 2–6 together, 1–2 cm long, acicular, curved. Flowers white, slightly fragrant small in solitary or fascicled simple or branched racemes, 2–7 cm long; pedicels 2–4 mm long, filiform, articulated at the middle. Stamens 6; anthers purplish. Stigmas 3. Berries 3–4 mm in diam., globose, scarlet when ripe. Seeds black.

Flowering & Fruiting: May – November.

Rare, throughout the area especially along forest margins and road-sides.

Specimen examined: Tikri resrve forest, Vineet K. Singh 77274 (BSA).

Gloriosa L.

Gloriosa superba L. Sp. Pl. 309. 1753; Hook.f., Fl. Brit. India 6: 358. 1892; Duthie, Fl. Gangetic Plain 3: 262. 1920. *Kalahariya*.

Herbaceous climber with white tuberous rootstocks; stem glabrous. Leaves sessile or sub-sessile, alternate, sub-opposite or whorled, 7–12 × 2–4 cm, ovate-lanceolate, entire, sharply acuminate ending in circinate tendrils, base acute or rounded, bright green and shining, secondary nerves numerous, prominent. Flowers scarlet, large, axillary solitary or sub-corymbose towards the ends of the branches. Perianth segments 6 up to 7 cm long, linear-lanceolate, margins crisply undulate, yellow with bright-red blotch in the upper portion. Stamens 6; filaments 2–4 cm long, golden-yellow. Capsules 2–3 × 1–2 cm, oblong. Seeds about 2.5 mm in diam., sub-globose, brown.

Flowering & Fruiting: August – November.

Rare, in moist, shady situations on bushes.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67562 (BSA).

SMILACACEAE

Smilax L.

Smilax perfoliata Lour., Fl. Cochinch. 2: 622. 1790. *S. prolifera* Roxb., Fl. Ind. 3: 795. 1832; Hook. f., Fl. Brit. India 6: 312. 1892; Duthie, Fl. Gangetic Plain 3(2): 261. 1920; B.L. Gupta, For. Fl. Chakr., Dehradun & Saharanp. For. Div. 521. 1928 (Third ed.); P.C. Kanjilal, For. Fl. Pilibhit, Oudh, Gorakhp. & Bundelkh. 377. 1982. *Ramdatun*.

Climbers, robust; branches more or less angled, prickly. Leaves elliptic or elliptic-oblong, 10–15 × 5–8 cm, coriaceous, 5–7-nerved, apex subtruncate, shortly cuspidate; petioles 1.5–3 cm long with clasping, auricled sheath at the base, tendrils 6–10 cm long arising from the apex of sheath. Flowers dioecious, umbellate. Umbels 7–20, whorled on axillary or terminal, 8–22 cm long peduncles, bracteate at the nodes; bracts 2.5–3 mm long, acute; pedicels 3–6 mm long. Perianth segments 6, free, subequal, linear, linear-oblong or lanceolate, 2–3 mm long, reflexed, greenish yellow. Male flowers: stamens 6, about as long as the perianth segments, anthers linear. Female flowers: staminodes 3, filiform; ovary oblong, 3-locular, stigmas 3. Berries globose, red when ripe. Seeds 1–2, globose.

Flowering & Fruiting: February – December.

Frequent in forests and along wetland banks.

Specimen examined: Tikri resrve forest, Vineet K. Singh 69751(BSA).

PONTERIACEAE**Eicchornia** Kunth, nom. cons.

Eicchornia crassipes (Mart.) Solms. in A. DC., Monogr. Phan. 4: 527. 1883; Raizada, Suppl. Fl. Gangetic Plain 279. 1976; Subram., Aquat. Angiosp. 70. f. 48. 1962; *Pontederia crassipes* Mart., Nov. Pl. Gen. Sp. Pl. 1: 9. t. 4. 1823. *Jalkumbhi*.

Perennial herb, floating or creeping, rooting at nodes, 20–35 cm high. Leaves in rosettes, rhomboid or ovate-rhomboid, 3–8 × 2.5–6 cm, succulent, coriaceous; petioles 5–25 cm long, swollen, spongy. Inflorescence terminal, 12–27 cm long, spicate. Perianth zygomorphic, lilac blue, posterior tepal often with a yellow blotch. Capsules ovoid-oblong, membranous, 1.4–1.6 cm long. Seeds ovoid.

Flowering & Fruiting: August – November.

Abundant in water logged area.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67501 (BSA).

Monochoria K. Presl

Monochoria vaginalis (Burm.f.) K. Presl, Reliq. Haenk. 1: 128. 1827; Hook. f., Fl. Brit. India 6: 363. 1892; Duthie, Fl. Gangetic Plain 3: 270. 1920, incl. var. *plataginea* (Roxb.) Solms-Laub; Subram., Aquat. Angios 69. f. 47. 1962. *Potederia vaginalis* Burm.f., Fl. Ind. 80. 1768.

annual or perennial herbs, up to 30 cm long; rootstock short, suberect or oblique. Leaves ovate, ovate-elliptic or ovate-oblong, 4–8 × 3–5.5 cm, coriaceous, apex acuminate, base subcordate or cordate; petioles 10–20 cm long. Racemes 2–4 cm long, erect, subtended by leaf-sheath, deflexed afterwards. Flowers actinomorphic, blue; outer tepals narrower than the inner; stamens 6, subequal, one of the filaments longer with a lateral tooth near the apex, all filaments glabrous, anthers basifixed; ovary ellipsoid, 3-locular, glandular, style slender, stigma obscurely 3-lobed. Capsules ovoid-globose, 3-lobed, 6–8 mm long, membranous. Seeds many, ovoid, longitudinally ribbed.

Flowering & Fruiting: July – March.

Sparse in ditches with in forest.

Specimen examined: Tikri resrve forest, Vineet K. Singh 77276 (BSA).

COMMELINACEAE

Commelina L.

Commelina attenuata J. Koenig ex Vahl, Enum. Pl. 2: 168. 1805; Hook. f., Fl. Brit. India 6: 372. 1892; Duthie, Fl. Gangetic Plain 3: 274. 1920.

Herb, up to 25 cm long. Leaves lanceolate, 2–6 × 0.6–1.4 cm, acute at apex; sheaths 0.4–1.2 cm long, ciliate. Spathes ovate-lanceolate, 2–3 × 0.7–1 cm, acute at apex, cordate or sagittate at base; peduncles 1–2.5 cm long. Flowers small, blue, zygomorphic, in solitary cymes; sepals 3, membranous; petals 3, ovate, clawed; fertile stamens 3, staminodes 2–3, anthers oblong; ovary 2-locular, ovules 1–2 in each locule. Capsules subquadrate, 3–4 mm long, 2-locular; 1–2 seeded. Seeds smooth, appendaged at both ends.

Flowering & Fruiting: July – September.

Sparse in damp shady places in forests.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67620 (BSA).

Commelina benghalensis L., Sp. Pl. 41. 1753; Hook. f., Fl. Brit. India 6: 370. 1892; Duthie, Fl. Gangetic Plain 3: 274. 1920.

Herb, branched, up to 35 cm high, rooting at lower nodes. Leaves ovate, 2–5 × 1.4–3.4 cm, pubescent on both sides, obtuse or subacute at apex, oblique at base; sheaths 1–2 cm long. Spathes sessile or subsessile, turbinate, broadly ovate or suborbicular, pubescent, 0.7–1.3 × 0.5–0.8 cm, subacute at apex, rounded at base; peduncles 3–5 mm long. Cymes 2–5-flowered, bifid. Flowers blue, zygomorphic; sepals 3, oblong; petals 3, larger petals suborbicular; fertile stamens 2.5–3, staminodes 2–3; ovary oblong, 3-locular, ovules 2 in two locules and 1 in one locule. Capsules oblong or pyriform, 3–5 mm long, 3-locular, 5-seeded. Seeds oblong, pitted. Cleistogamous flowers.

Flowering & Fruiting: July – November.

Common in moist places.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67549 (BSA).

Commelina suffruticosa Blume, Enum. Pl. Jav. 1: 3. 1827; Hook.f., Fl. Brit. India 6: 374. 1892.

Herb, branched, stout, up to 45 cm high; roots slightly thick. Leaves lanceolate, 4–8 × 1–3 cm, scabridly-pubescent, acute or sub-acuminate at apex, base obliquely cuneate; sheaths 1–2 cm long, pubescent. Spathes axillary, ovate, 2–2.5 × 1.5–2 cm, cucullate, mucronate, acute or subacuminate at apex; peduncles up to 10 cm long. Racemes 6–12-flowered. Flowers white or blue, zygomorphic; sepals 3; petals 3, subequal; fertile stamens 2–3, staminodes 3–4; ovary ovoid-oblong, 2-locular, ovule 1 in each locule. Capsules ovoid-oblong, 3–5 mm long, 2-locular, each locule usually 2-seeded. Seeds ellipsoid, puberulous, rugose.

Flowering & Fruiting: August – November.

Rare in moist shady places.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67651 (BSA).

Cyanotis D. Don, nom. cons.

Cyanotis cristata (L.) D. Don, Prodr. Fl. Nepal. 46. 1825 ; Hook. f., Fl. Brit. India 6: 385. 1892; Duthie, Fl. Gangetic Plain 3: 279. 1920.

Annual herb; stem, diffusely branched, glabrous or pubescent, rooting at lower nodes; branches ascending, up to 25 cm long. Leaves ovate-lanceolate or lanceolate, 1–2.5 × 0.4–0.9 cm, glabrous or sparsely pubescent, sub-acute or acute at apex, base obliquely rounded or subcordate; sheaths 3–6 mm long, hairy at mouth. Flowers in scorpioid cymes; bracts ovate, subacuminate, ciliate; bracteoles 2-seriate, ovate, acute; sepals 3, lanceolate, acuminate; petals blue, 3, subequal, united near the tip; stamens 6, subequal, filaments bearded near the tip; ovary oblong, 3-locular. Capsules oblong, 3-gonous. Seeds 3-gonous, striate with 2 pits.

Flowering & Fruiting: August – November.

Common in moist shady places.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75682 (BSA).

Murdannia Royle, nom. Cons.

Murdannia nudiflora (L.) Brenan in Kew Bull. 1952: 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 3(2): 277. 1920. *Kankawwa*.

Herb, up to 35 cm high; stem branched. Leaves lanceolate-oblong or linear-oblong, 4–12 × 0.4–0.7 cm, glabrous, subacute at apex, narrowed at base in 0.5–1.2 cm long sparsely hairy sheath. Flowers bluish purple or purple in terminal and axillary, 3–9 cm long cymose panicles; sepals 3, 3–4 mm long, oblong or ovate; petals 3, suborbicular; fertile stamens 2, staminodes 4, filaments bearded; ovary subglobose, 3-locular, ovules 2 in each locule. Capsules subglobose, 3–4 mm long, apiculate or mucronate, 3-locular; each locule 2-seeded. Seeds, tuberculate, truncate at one end, obtuse at other end, outer face convex, inner face angular.

Flowering & Fruiting: July – November.

Common in wet places and along border of cultivated fields.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75635 (BSA).

Tonningia Neck. ex Adr. Juss.

Tonningia axillaris (L.) Kuntze, Revis. Gen. Pl. 2: 721. 1891. *Commelina axillaris* L., Sp. Pl. 42. 1753. *Tradescantia axillaris* (L.) L., Mant. Pl. 321. 1771. *Cyanotis axillaris* (L.) D. Don, Prodr. Fl. Nepal. 46. 1825; Hook. f., Fl. Brit. India 6: 388. 1892; Duthie, Fl. Gangetic Plain 3: 280. 1920. *Zygomenes axillaris* (L.) Salisb. in Trans. Linn. Hort. Soc. 1: 271. 1812. *Amischophacelus axillaris* (L.) Rolla Rao & Kammathy in J. Linn. Soc. London (Bot.) 59: 306. 1966.

Herb; stem branched, rooting at lower nodes; branches ascending or suberect, up to 25 cm long. Leaves sessile, linear or linear-oblong, 5–12 × 0.4–0.9 cm, glabrous or sparsely hairy, acute at apex, narrowed at base; sheaths 4–7 mm long, inflated, ciliate. Flowers blue, sessile, fascicled in leaf-sheaths; bracteoles linear; sepals 3, lanceolate, petals united at base, lobes ovate; stamens 6, filaments fusiform below the apex, bearded; ovary oblong, 3-locular, ovules 2 in each locule. Capsules ellipsoid-oblong, 4–6 mm long, 3-locular, acute; each locule, 2-seeded. Seeds subterete, 1–2 mm long, acute or rounded at apex, truncate at base, pitted.

Flowering & Fruiting: August – December.

Common in marshy habitats.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75636 (BSA).

ARECAEAE**Phoenix L.**

Phoenix sylvestris (L.) Roxb. Fl. Ind. 3: 787. 1832; Becc. & Hook.f. in Hook.f., Fl. Brit. India 6: 425. 1892; Duthie, Fl. Gangetic Plain 3: 286. 1929. *Elate sylvestris* L. Sp. Pl. 1189. 1753. *Khajoor*.

Medium-sized palm, up to 15–20 m high with dense hemispherical crown; stem unbranched. Trunk rough, covered with the persistent petiole bases. Leaves large, pinnate, grayish-green. Leaflets numerous, alternate or sub-opposite, sessile, 20–40 × 1.5–2.5 cm linear or ensiform, spinous pointed, base amplexicaul; petioles short, compressed towards the apex with a few short spines at the base. Spadices 30–50 cm long; branches slender. Spathes, scurfy divided into boat-shaped valves. Flowers white, fragrant, dioecious; male spikes compact towards the apex of peduncle; female spikes arranged in distinct groups. Drupes 2–3 cm long, oblong-ellipsoid, orange-yellow, edible. Seed 1, pale-brown.

Flowering & Fruiting: March – June.

Commonly found in grasslands with the forest.

Specimens examined: Tikri reserve forest, Vineet K. Singh 69774, 75774, 77206 (BSA).

TYPHACEAE**Typha L.**

Typha angustifolia L. Sp. Pl. 971. 1753. *T. Angustata* Bory. & Chaub. Exp. Sc. Mor. Bot. 1: 338, 1832; Hook.f., Fl. Brit. India 6: 489. 1893; Duthie, Fl. Gangetic Plain 3: 293. 1929. *Pater*.

Perennial robust undershrub, up to 2.5–3.5 m high; stem erect. Leaves radical, erect, 45–80 × 1–2.5 cm, bayonet-shaped, plano or concave-convex above the sheath, acute, spongy. Spikes cylindrical; male spikes 10–18 cm long, pale-coloured and female spikes 15–25 cm long, pale-brown, often separated by long interval. Follicles fusiform. Seeds fusiform.

Flowering & Fruiting: July – November.

Commonly found in gregarious masses in marshy places and shallow water.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67504 (BSA).

ARACEAE

Pistia L.

Pistia stratiotes L. Sp. Pl. 963. 1753; Hook.f., Fl. Brit. India 6: 497. 1893 ; Duthie, Fl. Gangetic Plain 3: 297. 1929. *Jal-gobhi*.

Aquatic herb, free-floating stemless gregarious tufted. Leaves sessile, 4–8 cm long, variable, obovate-cuneate, rounded or retuse, undulate at the apex, pubescent on both sides, nerves flabellately arranged. Spathe white about 1.2 cm long, obliquely campanulate, gibbous below. Spadix adnate to back of the tube of the spathe, free above; male inflorescence a whorl of few sessile connate stamens below the apex of spadix with a whorl of minute neuters below it; female of a solitary oblong 1-celled ovary. Fruit ovoid, membranous. Seeds many, albuminous.

Flowering & Fruiting: July – December.

Abundantly found in stagnant water of lake and ditches in forest.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 69785 (BSA).

Typhonium Schott

Typhonium trilobatum (L.) Schott in Wien. Zeitschr. 3: 72, 1829; Hook.f., Fl. Brit. India 6: 509. 1893. *Arum trilobatum* L. Sp. Pl. 965. 1753.

Herb, up to 40 cm high with sub-globose tuber; stem erect glabrous. Leaves radical, 10–20 cm across, hastately 3-lobed or sub-3-partite; lobes ovate, acute, entire; petioles 25–35 cm long, slender with sheathing bases. Peduncles radical 2–12 cm long. Spathes 8–15 cm long, ovate, red-purple, narrowed into a long slender point. Spadices exerted, male and female inflorescence distant with neuters above the female and sometimes below the males, appendage elongate, smooth. Berries ovoid. Seeds 1–2, globose, albuminous.

Flowering & Fruiting: August – November.

Abundantly found in moist, shady situations, often forming large clumps.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75728, 75793 (BSA).

ALISMATACEAE**Caldesia Parl.**

Caldesia oligococca (F. Muell.) Buchenau in Engl., Bot. Jahrb. 2: 479. 1882; Subram., Aquatic Angiosp. 84. 1962. *Alisma oligococcum* F. Muell., Fragm. 1:23. 1858; Hook. f., Fl. Brit. India 6: 560. 1893.

Herb, scapigerous, sometimes submerged. Leaves ovate, 5–10 × 3–6 cm, very flaccid, cordate at base, with acute lobes and narrow sinus; nerves 10–16, nervules 2–3.5 mm apart, perpendicular to the principal nerves; petioles 35–50 cm long. Panicles 15–20 cm long; peduncles as long as the petioles. Stamens 6; filaments *c.* 1.2 mm long; anthers *c.* 0.8 mm long. Carpels 3; style ventral, *c.* 1 mm long. Achenes somewhat reniform, spinulose warty.

Flowering & Fruiting: November – May.

Along bank of the lake in muddy and shallow places.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67543 (BSA).

Sagittaria L.

Sagittaria trifolia L., Sp. Pl. 993. 1753. *Sagittaria sagittifolia* L. ssp. *leucopetala* (Miq.) Hartog in Steenis, Fl. Males ser. I, Illustr. Fl. Arch. Ind. 2: 49. 1870. *S. sagittata* Thunb., Fl. Jap. 242. 1784; Hook.f., Fl. Brit. India 6: 561. 1893; Duthie, Fl. Gangetic Plain 3: 310. 1929.

Flowering & Fruiting: October – March.

Common in shallow water, along the margin of the lake.

Specimen examined: Parvati Aranga Wildlife sanctuary, K.K. Khanna 68445 (BSA).

Aquatic herb; stem glabrous with thick stolons bearing tubers at tip. Leaves mostly emerged, upright, sagittate or somewhat hastate, blade ovate or linear-lanceolate and acute. Petiole 40–50 cm long, triangular. Inflorescence an unbranched scapose raceme, 20–40 cm long. Flowers in 2–6 whorls, unisexual, 1–2.5 cm across, white. Pedicels 5–10 mm long, short in females; bracts triangular-ovate, acute-acuminate. Sepals elliptic, somewhat keeled, margins broadly membranous, reflexed in fruit. Petals broadly elliptic-suborbicular, white, without basal purple spot. Stamens *c.* 13, filaments lanceolate; anthers yellow, oblong, as long as the filaments. Achenes triangularly obovate, with laterally bent beak.

NAJADACEAE

Najas L.

Najas marina L., sp. Pl. 1015. 1753. *N. major* All., Fl. Pedem. 2: 221. 1785; Hook.f., Fl. Brit. India 6: 569. 1893.

Annual, aquatic Herb, up to 30 cm high; stem slender, dioecious. rather stout, fragile, dentate. Leaves sub-ternately whorled, linear, almost pinnatifidly dentate, with 5–8 teeth on either side and a few on the back; sheaths with rounded sides, entire or minutely denticulate. Outer perianth present in the male flowers. Anthers 4-celled. Achenes oblong ellipsoid.

Flowering & Fruiting: September – March.

In fresh water bodies.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67664 (BSA).

APONOGETONACEAE

Aponogeton L.f., nom. cons.

Aponogeton undulatus Roxb., Fl. Ind. 2: 211. 1832 (*'undulatum'*); Sundara Raghavan in Fasc. Fl. India 22:136.1996. *A. microphyllum* Roxb., Fl. Ind. 2: 210. 1832; Hook.f., Fl. Brit. India 6: 564. 1893. *A. crispus auct. non* Thunb., 1781; Hook f., Fl. Brit. India 6: 564. 1893, *p.p.*; Duthie, Fl. Gangetic Plain 3: 313. 1929.

Perennial, aquatic, herb, up to 40 cm high. Rootstock stoloniferous; tubers ellipsoid or globose. Leaves often submerged, rarely floating, in a radical rosette; submerged leaves lanceolate-oblong or elliptic-lanceolate, membranous, 4–20 × 1–2.5 cm, subacute at apex, tapering at base into 5–12 cm long petioles. Inflorescence a long scape; spathe 1.5–2.5 cm long, usually persistent; spike 5–9 cm long. Flowers bisexual, ebracteate; tepals white, 2, obovate or spatulate, 2–5 × 1–4 mm, caducous; stamens 6, filaments pink, dilated at base, anthers basifixed, 2-celled; carpels 3, 1-locular, ovules 2 on basal placenta. Follicles 3, slightly curved, short beaked at apex; seeds 2, sub-globose.

Flowering & Fruiting: July – October.

Occasional, in stagnant water.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 77256 (BSA).

POTAMOGETONACEAE**Potamogeton L.**

Potamogeton crispus L., Sp. Pl. 126. 1753; Hook. f., Fl. Brit. India 6: 566. 1893; Duthie, Fl. Gangetic Plain 3: 315. 1929; Sharma & Dhakre, Fl. Agra Distr. 271. 1995.

Perennial, aquatic, rhizomatous herb; branches up to 35 cm long. Leaves submerged, sessile, translucent, linear-oblong, 3–5 × 0.4–0.8 cm, margin crisped and serrulate, obtuse at apex. Peduncles axillary, 2–4 cm long, slightly curved; spike 0.5–1 cm long, lax-flowered. Flowers bisexual ebracteate; tepals green, 4, suborbicular, 1.5–2 × 1–1.5 mm, clawed; stamens 4, anthers sessile, didymous; carpels 4, free, 1-locular, ovule solitary in each locule. Drupelets obliquely ovoid, turgid, ribbed, with a short beak at apex; seed solitary, sub-reniform.

Flowering & Fruiting: February – April.

Common in ponds, tanks and streams.

Specimen examined: Parvati Aranga Wildlife sanctuary, K.K. Khanna 68450 (BSA).

ERIOCAULACEAE**Eriocaulon L.**

Eriocaulon cinereum R.Br., Prodr. 254. 1810; Ansari & Balakrishnan, Fam. Eriocaul. India (Rev. ed.) 172. 2009; *E. sieboldianum* Siebold & Zucc. ex Steud., Syn. Pl. Glumac. 2: 272. 1855; Hook.f., Fl. Brit. India 6: 577. 1893; Duthie, Fl. Gangetic Plain 3: 318. 1929. *E. redactum* Ruhland in Engl., Das Pflanzenr. 13. IV. 30: 113. 1903.

Acaulescent herb, rootstocks absent, up to 15 cm high. Leaves rosulate, acicular or linear, 2–5 × 0.04–0.2 cm, acute at apex; sheaths 1–1.5 cm long, limb ovate. Peduncles up to 14 cm long. Heads hemispherical, 2–2.5 mm across. Receptacles glabrous-villous. Involucral bracts oblong-obovate, 1–1.3 × 0.6 mm, chartaceous, obtuse, straw-colored. Floral bracts linear-elliptic, acute. Male flowers: sepals obovate, connate in to 3-lobed *c.* 0.5 mm long spathe; petals 3, minute, glabrous or sparsely hairy, with a black gland in each; anthers 6, white. Female flowers: sepals 1 or 2, linear-subulate, *c.* 1.2 mm long; petals absent; ovary ovoid or rounded, styles 3-fid. Seeds ovoid-ellipsoid, *c.* 0.2 × 0.2 mm, cells of seed-coat transversely elongated, aligned in vertical rows, appendages absent.

Flowering & Fruiting: August – January.

Sparse in moist places under forest cover.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67672 (BSA).

CYPERACEAE

Carex L.

Carex phacota Spreng. Syst. Veg. 3: 826; C.B. Clarke in Hook.f., Fl. Brit. India 6: 708. 1894; Karthik. & al., Fl. Ind. Enum. Monocot.: 40. 1989; C.D.K. Cook, Aquat. Wetl. Pl. Ind.: 99. 1995.

Perennial, culms 35–80 cm tall, triquetrous. Leaves cauline, 12–60 × 0.5–1 cm, linear, 3-costate; sheath keeled, open. Spikelets 5–7 in a terminal raceme, cylindrical; terminal one fully or partly male, others female, 4 cm long, 4 mm wide; pistillate glumes 2.5 × 1 mm, obovate, truncate at apex, aristate, blotched with red spots, hirtus; utricle 2 × 1.5 mm, puberulus, deep brown; staminate glumes 3 × 2 mm. Female glumes stramineous-ferruginous, reddish brown. Style base persistent. Utricles scarcely inflated, usually ferruginous. Nuts obovoid, lenticular.

Flowering & Fruiting: February–March.

Perennial herb found growing in swamps, marshes.

Specimen examined: Tikri reserve forest, Vineet K. Singh 67687 (BSA).

Cyperus L.

Cyperus alulatus Kern, Reinwardtia. 1:464. 1952; *Cyperus iria* L. var. *paniciformis* C.B. Clarke in Hook.f., Fl. Brit. Ind. 6: 607. 1893; Kern in Reinwardtia 1: 465, fig. 1. 1952; A. Ahuja, Illustrations of Indian plants, Cyperus I, Bull. Nat. Bot. Gardens 85: pl. 6 (as *C. iria* L.) 1963; Uniyal & al., Cyperaceae of Uttar Pradesh: 16. 1997.

Annual herb, up to 40 cm. Roots numerous, glabrous. Stem, sharply trigonous, smooth. Leaves shorter than to equalling stem length, rather rigid; sheaths 15–40 mm, yellowish or grey, wide, mouth margin deeply concave; blades up to 10 cm, 2.5 mm wide, flat or slightly keeled, with brown dots and stripes, margins smooth, apex acute, scabrous. Inflorescence a simple or compound anthelodium, 4–12 cm, primary branches 6–8, secondary anthelodium to 25 mm, tubular prophyll loosely sheathing, to 12 mm; lowest 4–6 bracts foliose, to more than 15 cm. Cluster of 5-15 spikes in loose spirals; spikes 4–8 × 2–2.5 mm, spreading at almost right angles, glume-like bract, blunt, bi-nerved; rachis 4-angled, compressed, reddish brown, internodes ca 1

mm; glumes 1–2 mm, cymbiform, keel scabrous, sides prominently nerved, margins widely leathery, hard, brown. Stamens 2, anthers stigmas 3. Nut c. 1.2×0.8 mm, plano-convex, sharply triangular, from brown to dark-brown, finely reticulate, with papilla in each areole.

Flowering & Fruiting: July – November.

In moist wastelands.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75616 (BSA).

Cyperus brevifolius (Rottb.) Hassk. Cat. Hort. Bogor.: 24, 1844; Singh & Dixit in Bull. Bot. Soc. Bengal 23(2): 199, 1969 and Ind. For. 98 (2): 121, 1972; FG: 335, 1976. *Kyllingia brevifolia* Rottb. Desc. & Icon. 13. t. 4, f. 3, 1773; Hook.f., Fl. Brit. India 6: 588. 1893.

Perennial sedge with horizontal rhizome; stem erect slender, 40–70 cm high. Stems covered with brown leaf-sheaths at the base. Leaves shorter or as long as the stem, linear, erect. Spikes aggregated into terminal solitary globose green heads, 0.5–1.5 cm in diam. Spikelets lanceolate or ovate-lanceolate, 1-flowered. Stamens 2. Style with 2 filiform arms. Nuts obovate-ellipsoid, strongly lateral compressed, yellowish or yellowish-brown.

Flowering & Fruiting: July – October.

Commonly found in marshy areas.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67595, 67569, 75780 (BSA).

Cyperus compressus L. Sp. Pl. : 46. 1753 ; C.B. Clarke in Hook.f., Fl. Brit. India 6: 605; Duthie, Fl. Gangetic Plain 3: 328. 1929.

Annual sedge with fibrous roots, 35 cm high. Stems erect, glabrous, tufted, trigonous with round smooth angles. Leaves narrowly linear, finely acuminate, often as long as the stems. Bracts overtopping the umbellate inflorescence. Spikelets much compressed, whitish-green, flattened in short compact spikes. Rachilla stout, angular, closely scarred, scarcely winged. Glumes 2–3 mm long, closely imbricate winged. Stamens 3. Nuts broadly obovoid, triquetrous, dark-brown, one third the length of the glumes.

Flowering & Fruiting: July – October.

Commonly found in in moist situations.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67594 (BSA).

Cyperus cyperoides (L.) O. Kuntze, Rev. Gen. Pl. 3. 2: 133. 1898; Singh & Dixit in Bull. Bot. Soc. Beng. 23(2): 200. 1969; Raizada, Suppl. Duthie, Fl. Gangetic Plain (ed.1): 296. 1976. *Scirpus cyperoides* L. Mant. 2: 181, 1771. *Mariscus sieberianus* Nees (Linnsea 9: 286, 1835 nom. nud.) ex C.B. Clarke in Hook.f., Fl. Brit. India 6: 622.

Perennial sedge with horizontal rhizome, up to 80 cm high. Stems erect, slender, covered with brown leaf-sheaths at the base, trigonous, slightly swollen at the base. Anthela simple, usually evolute. Spikes cylindrical, 5–35 × 5–12 mm. Spikelets linear-lanceolate 3–4 mm long. Glumes greenish, sometimes red blotches. Ovate-oblong. Stamens 3. Stigma 3. Nuts linear-oblong., yellowish or yellowish-brown.

Flowering & Fruiting: August–February.

Frequently found in moist, shady places.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75661 (BSA).

Cyperus rotundus L. Sp. Pl. 45, 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 614. 1893; Duthie, Fl. Gangetic Plain 3: 332. 1929; Kern in Steenis, Fl. Males. Ser. 1. 7: 604. 1974. *Motha*.

sedge up to 40 cm high with slender rhizome; stem erect, glabrous. Leaves 1–2.5 mm in breadth, flat, finely acuminate, usually shorter than the stem. Spikelets 3–8, brown, 0.8–2 cm long, linear-lanceolate, shortly spicate on the branches of irregular compound umbels. Rachilla with hyaline wings. Glumes linear-oblong, keel rounded with 3–7 nerves. Stamens 3. Style 3-fid. Nut obovoid, trigonous, greyish-black.

Flowering & Fruiting: July – March.

Abundantly found on dry as well as moist places.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75664, 67527 (BSA).

Cyperus pumilus L. in Torner Cent. Pl. 2: 6, 1756; Singh & Dixit in Bull. Bot. Soc. Beng. 23(2): 200. 1960. *Pycneus pumilus* (L.) Dorn. In Bibl. Bot. 85: 417. 1915. *P. nitens* Nees in Nov. Nat. Cur. 19, Suppl. 1: 53. 1843; Hook.f., Fl. Brit. India 6: 591.1893.

Small, tufted, annual sedge, 5–20 cm high with fibrous roots; stem slender, glabrous. Leaves 1–2.5 mm in breadth, shorter or as long as stem, linear, acuminate. Spikelets pale-green,

clustered in simple umbel. Rhachilla slender, persistent. Glumes 10–40, boat-shaped, mucronate, wings hyaline. Stamen usually 1. Style slightly longer than nut, 2-fid. Nut ovoid, biconvex, laterally compressed, brown.

Flowering & Fruiting: August – October.

Commonly found in swampy places.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67593, 75633 (BSA).

Eleocharis R.Br.

Eleocharis dulcis (Burm.f.) Henschel, Vita Rumph. 186. 1833. *Andropogon dulce* Burm.f., Fl. Ind. 219. 1768. *E. plantaginea* (Retz.) R. & Schult. Syst. Veg. 2: 150, 1817; C.B. Clarke in Hook.f., Fl. Brit. India 6: 625. 1893; Duthie, Fl. Gangetic Plain 3: 348. 1929. *Scirpus plantaginea* Retz. Obs. 5: 14. 1789.

Caespitose sedge, up to 80 cm high with elongated stolons; stems stout, terete, 3–4 mm in diam., distantly transversely septate when dry. Sheaths membranous and torn. Spikelets 2–5 × 0.3–0.5 cm, oblong, sub-acute, straw-coloured. Rachilla stout, angled. Glumes closely imbricate, persistent, broadly ovate, obtuse with scarious margins. Bristles 7–8, about as long as nut. Stamens 3. Style 3-fid, as long as or longer than the nut. Nut orbicular-obovoid, compressed, smooth, tipped with the persistent conical articulated base of the style.

Flowering & Fruiting: August–January.

Abundantly found in marshy areas.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67541 (BSA).

Fimbristylis Vahl, nom. cons.

Fimbristylis bisumbellata (Forsk.) Bub. Dodec. 30. 1850. *Scirpus bisumbellatus* Forsk. Fl. Aegypt.-Arab. 1: 15. 1775. *F. dichotoma auct. non Vahl*. 1806 Sensus Clarke in Fl. Brit. India 6: 635. 1893.

, Tufted annual sedge, up to 15–25 cm high with fibrous roots. Leaves shorter or as long as stem; sheaths softly, villous. Spikelets 3–4 × 1–2 mm, ellipsoid, pale-brown arranged in laxly compound umbel. Bracts filiform shorter or exceeding the umbels. Rachilla angular with large

pits. Glumes boat-shaped, spirally imbricate, mucronate, keel green, 1–3 nerved. Stamens 1–2. Style 2-fid, hairy. Nuts obovoid, biconvex, longitudinally 5–9 ribbed, white or straw-coloured.

Flowering & Fruiting: August – December.

Commonly found along the banks of lake.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 77282 (BSA).

Fimbristylis littoralis Gaud., Voy. Uranie 413. 1826. *F. miliacea auct. non* (L.) Vahl. Enum. Pl. 2: 1805; C.B. Clarke in Hook.f., Fl. Brit. India 6: 644. 1893; Duthie, Fl. Gangetic Plain 3: 356. 1929.

Caespitose annual sedge up to 10–50 cm high. Stem slender angled with large sheaths at the base. Leaves as long as or longer than the stems; sheaths with sub-scarious margins. Spikelets 1–2.5 mm in diam., globose, obtuse in decompound umbels, usually central one sessile, rays and pedicels filiform. Bracts filiform shorter than the umbels. Rachilla stout, pitted. Glumes closely imbricate, ovate, obtuse, obscurely nerved. Stamens 1–3. Style 3-fid villous below trifurcation, about equal to nut. Nut obovoid, 3-gonous, minutely tuberculate, pale straw-coloured.

Flowering & Fruiting: September – November.

Commonly found in moist conditions.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75646 (BSA).

Scirpus L., nom. cons.

Scirpus mucronatus L. Sp. Pl. 50. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 657. 1893; *Schoenoplectus mucronatus* (L.) Palla, Verh. K. K. Zool.-Bot. Ges. Wien 38: Sitzb. 49. 1888.

erect tufted sedge up to 1 m high with a short rhizome and fibrous roots. Stems 3-quetrous or 3-winged; sheaths loose, membranous, mouth, oblique. Spikelets 1–1.8 cm long, 1–12 in a single lateral cluster near the top. Bristles 5–6, retrorsely scabrid. Glumes about 3–4 mm long, obovoid, unequally trigonous or biconvex, shining black, scarcely transversely wavy, minutely apiculate.

Flowering & Fruiting: September – January.

Commonly found in shallow water of lake.

Specimen examined: Parvati Aranga Wildlife sanctuary, K.K. Khanna 68446 (BSA).

POACEAE

Bambusa Schreb., nom. cons.

Bambusa arundinacea (Retz.) Willd., Sp. Pl. 2: 245. 1799; Gamble in Hook.f., Fl. Brit India 7: 395. 1896. *Bambos arundinacea* Retz., Observ. Bot. 5: 24. 1789.

Arborescent, perennial bamboos with thorny culms, up to 15–20 m high; culm sheaths 20–25 cm long, apex apiculate. Leaves linear-lanceolate; ligules truncate, long ciliate. Inflorescence a branched panicle. Spikelets 1.5–2.5 cm long, lanceolate, 3–6 flowered; lemma lanceolate; palea keels ciliate; stamens 6. Caryopsis furrowed on one side.

Flowering & Fruiting: April – June (Once in life).

Common, along roadsides and near habitations.

Specimen examined: Tikri forest area, Vineet K. Singh 67648 (BSA).

Brachiaria (Trin.) Griseb.

Brachiaria ramosa (L.) Stapf. in Prain, Fl. Trop. Africa 9: 542. 1919; Bor, Grasses Burma, Ceylon, India & Pakistan 284. 1960; Raizada & Jain Grasses of Upper Gangetic plain Part-2 Ind. For. Rec. 5(3): 164. 1964. *Panicum ramosum* L., Mant. Pl. 29. 1767; Hook.f., Fl. Brit. India 7: 36. 1896.

Loosely tufted annuals, culms 30–60 cm high, decumbent ascending. Leaves 3–20 cm broadly linear-lanceolate, cordate at base, glabrous; sheaths loose, glabrous; ligule a short rim of hairs. Inflorescence of 3 racemes borne on an axis 3–8 cm long; racemes 1–6 cm long, bearing mostly paired loosely contiguous spikelets appressed to the triquetrous rhachis; pedicels shorter than the spikelets 1–2.5 mm long. Spikelets 2–3 mm long elliptic to broadly elliptic, glabrous or pubescent, acute to cuspidate, with or without a stipe up to 0.4 mm long. Lower glume c. 1 mm long broadly ovate 5–7 nerved; ; upper glume c. 2.1 mm long ovate to elliptic 5-nerved; florets 2, lower empty, upper bisexual. Lower lemma bisexual, transversely rugose, apiculate 1; palea equaling lemma. Anthers 3, yellow c. 1 mm long. Caryopsis, ovoid, apiculate, brown.

Flowering & Fruiting: July – November.

Common, grows throughout the area.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67516, 67652, 67663 (BSA).

Chrysopogon Trin., nom. cons.

Chrysopogon aciculatus (Retz.) Trin., Fund. Agrost. 188. 1820; Raizada & al. in Indian For. Rec. 4(7): 218. 1957. Bor, Grasses Burma Ceylon India & Pakistan 115. 1960. *Andropogon aciculatus* Retz., Observ. Bot. 5: 22. 1788; Hook.f., Fl. Brit. India 7: 188. 1896.

Perennials, culms 30–45 cm high, creeping and branching forming a close turf. Leaves 15–25 cm long, linear, lanceolate or oblong, acute at apex, cordate at base, scabrid on margins; sheaths overlapping, compressed, glabrous, flabellate on creeping part; ligule a hairy rim. Inflorescence an exserted panicle; branches in several whorls, purplish or dark brownish. Spikelets in groups of 3, one sessile, 2-pedicellate. Sessile spikelets bisexual 3–4 mm long, oblique callus very sharp, with golden brown hairs. Lower glume 2.5–3.2 mm long, lanceolate, 2-dentate, 3-nerved, upper part hirsute; upper glume *c.* 3 mm long, cymbiform, aristate, ciliate. Lower lemma 2.5–3 mm long, 2-nerved; upper lemma *c.* 3 mm long 1-nerved. Palea *c.* 1 mm long, hyaline. Anthers 3. Pedicellate spikelets 4–6 mm long. Lower glume 4–5 mm long, glabrous; upper glume 2–4 mm long. Lower floret empty. Lower lemma 3–3.5 mm long; upper lemma 2.5–3 mm long mucronate, Anthers 3, yellow-orange.

Flowering & Fruiting: July – November.

Common, grows in forest area.

Specimen examined: Tikri forest area, Vineet K. Singh 67643 (BSA).

Coix L.

Coix lacryma-jobi L., Sp. Pl. 972. 1753 ; Duthie, Fodder Grasses 18. 1888 ; Hook.f., Fl. Brit. India 7: 100. 1896; Raizada et.al. in Indian For. Rec. 4(7): 176. 1957. Bor, Grasses Burma, Ceylon, India & Pakistan 264. 1960.

Annual or perennial, culms 1–2.5 m high, robust, branching, rooting at lower nodes, spongy, glabrous, polished. Leaves 10–40 cm long flat, cordate at base; sheaths broad glabrous; ligule a narrow membrane. Inflorescence of suberect spikes. Spikelets unisexual, consisting of many male spikelets interterminal and female spikelets at base. Male spikelets terminal 2–3 nate, loosely imbricate on a slender rhachis, 8–10 mm long up to 1.5 m broad. Lower glume papery,

many-nerved, with winged margins, densely ciliate; upper glume oblong-lanceolate, acuminate thin 9-nerved. Lemma oblong-lanceolate, acuminate membranous, faintly 5-nerved. Palea hyaline, 2-keeled. Female spikelet basal, ovoid, surrounded by the hardened bract forming a head like bony involucre, yellowish white or bluish grey 5–10 mm long. Lower glume ovate-oblong, acute-papery; upper glume thinner. Lemma equal to spikelets. Anthers 3, *c.* 4 mm long, orange-yellow. Caryopsis 6–8 mm long ovoid-globose, bluish-grey, smooth, polished.

Flowering & Fruiting: August–December.

Common, grows in marshy areas of forest.

Specimen examined: Tikri forest area, Vineet K. Singh 75622 (BSA).

Cynodon Rich., nom. cons.

Cynodon dactylon (L.) Pers., Syn. Pl. 1: 85. 1805; Duthie, Fodder Grasses 52. 1888; Hook.f., Fl. Brit. India 7: 288. 1896; Bor, Grasses, Burma, Ceylon, India & Pakistan 469. 1960; Raizada & al. Grasses of Upper Gangetic plain Part-3. 1983. *Panicum dactylon* L., Sp. Pl. 1: 58. 1753.

Perennial stoloniferous, creeper, culms slender 10–35 cm high, rooting at nodes. Leaves 2–8 × 0.1–0.5 cm narrow, linear, glabrous, glaucous, sheaths compressed, glabrous; ligule ciliate. Inflorescence of 2–6 spikes, erect, spreading, rachis slender. Spikelets 1–2 mm long, elliptic-lanceolate, compressed, 1-flowered. Lower glume 1–1.8 mm long, narrowly oblong, membranous, acute keeled; upper glume 1.5–2 mm long, lanceolate. Lemma 2–2.5 mm long, acute, membranous 3-nerved, keels and margins hispid with white hairs. Palea boat-shaped oblong *c.* 2.5 mm long, keeled, 1–2 nerved. Anthers 3, *c.* 1.5 mm long. Caryopsis 1.2–1.4 mm long.

Flowering & Fruiting: Throughout the year.

Common, grows throughout the area, waste land and agricultural bands etc.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 69726 (BSA).

Digitaria Haller, nom. cons.

Digitaria ciliaris (Retz.) Koeler, Descr. Gram 27. 1802; Henr., Monogr. Gen. Digitaria 129. 1950. *Panicum ciliare* Retz., Observ. Bot. 4: 16. 1786. *Paspalum sanguinale* Lam. var.

ciliare (Retz.) Hook.f., Fl. Brit. India 7: 15. 1896; Bor., Grasses Burma, Ceylon, India & Pakistan 298. 1960; Raizada Jain in Indian For. Rec. 5(3): 192. 1964.

Annual, culms 20–50 cm high, erect or decumbent. Leaves 3–20 × 0.4–1 cm linear, glabrous, with bulbous-based hairs at base; sheaths 5–8 cm long; ligule membranous, truncate. Inflorescence of 2–9 variable sized racemes; rhachis 0.5–1 mm wide flat with a sharp median keel on one side, edges rough. Spikelets in pairs, one pedicelled, one sessile *c.* 3 mm long. Lower glume *c.* 0.2 mm long, triangular; upper glume *c.* 2 mm long, narrowly triangular, acute hairy 3-nerved. Lower florets sterile. Upper florets bisexual lemma *c.* 2.5 mm long, lanceolate, acute, glabrous 3-nerved; palea *c.* 2.6 mm long 2-nerved, clasped by lemma; stamens 3, anthers *c.* 1 mm long caryopsis *c.* 2.2 mm long.

Flowering & Fruiting: August – December.

Common, grows in waste lands, forest edges and among road side bushes.

Specimen examined: Tikri forest area, Vineet K. Singh 75666 (BSA).

Echinochloa P. Beauv., nom. cons.

Echinochloa picta (J. Koenig) P.W. Michael in Philipp. J. Weed Sci. 5: 18. 1978; Noltie in Fl. Bhutan 3(2): 704. 2000. *Panicum pictum* J. Koenig in Naturforscher (Halle) 23: 204. 1788. *Echinochloa stagnina* (Retz.) P. Beauv., Ess. Agrostogr. 53. 161. 171. 1812; Bor, Grasses Burma, Ceylon, India & Pakistan 311. 1960. *Panicum crusgalli sensu* Hook.f., Fl. Brit. India 7: 30. 1896 *p.p. non* L. 1753.

Annual or perennial, culms up to 80 cm high, floating, spongy from creeping rhizomes. Leaves 15–25 cm long, rigid, glabrous, scabrid on margins; sheaths glabrous, ciliate at mouth; ligule a fringe of stiff hairs. Inflorescence a nodding secund panicles, upto 20 cm long, racemes simple 2–4 cm long, coarsely apiculate. Spikelets paired, 4–6 mm long, elliptic-acuminate. Lower glume elliptic, acute-cuspidate, pubescent, 5-nerved; upper glume similar to lower glume as long as spikelets, oblong 5-nerved, acute or acuminate; lower lemma male or barren, similar to upper glume dorsally depressed, cuspidate or awned 4–6 mm long; upper lemma bisexual 3–4 mm long acuminate-mucronate, polished. Palea *c.* 2.5 mm long broadly-elliptic, acuminate, margins infolded. Anthers 3, translucent dotted, *c.* 1.5 mm long. Caryopsis *c.* 3.2 mm long, broadly ellipsoid, yellowish white.

Flowering & Fruiting: August – December.

Common, grows in water lagged and marshy places.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75671 (BSA).

Eragrostis Wolf

Eragrostis uniolooides (Retz.) Nees ex Steud., Syn. Pl. Glumac. 1 : 264. 1854; Duthie, Fodder Grasses 65. 1888 ; Bor, Grasses Burma, Ceylon, India & Pakistan 515. 1960. *Poa uniolooides* Retz., Observ. Bot. 5: 19. 1789. *Eragrostis amabilis auct. non wight & Arnott* ex Nees, 1838; Stapf in Hook.f., Fl. Brit. India 7: 317. 1896.

Annual or perennial, culms up to 45 cm high, erect or geniculately ascending. Leaves 3–12 cm long, linear-lanceolate, acute; sheaths glabrous; ligule membranous. Inflorescence a narrowly panicle 5–15 cm long. Spikelets 4–10 × 2–4 mm ovate-oblong, strongly compressed, often pink or purplish. Lower glume 1.4–1.8 mm long, oblong, lanceolate, 1-nerved; upper glume 1.5–1.9 mm long, lanceolate subacute 1-nerved. Lemma 1.8–2 mm long, broadly ovate, or ovate, lanceolate 3-nerved; palea 1–2 mm long elliptic 2-keeled, scabrid on keels. Anthers 3, deep pink, c. 0.4 mm long. Caryopsis c. 0.6 mm long obovoid or ellipsoid, laterally compressed, orange brown.

Flowering & Fruiting: September – February.

Common, grows in moist and water lagged places.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67517, 75631 (BSA).

Hygroryza Nees

Hygroryza aristata (Retz.) Nees ex Wight & Arnott in Edinburgh New Philos. J. 15: 380. 1833; Duthie, Fodder Grasses 20. 1888; Hook.f., Fl. Brit. India 7: 95. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan 597. 1960. *Pharus aristatus* Retz., Observ. Bot. 5: 23. 1789.

Aquatic perennials, free floating, mat forming, with fibrous roots. Culms up to 25 cm high, spreading, spongy. Leaves 2–3 × 0.8–1.5 cm ovate-lanceolate, obtuse, scaberulous above, smooth and glaucous beneath, rounded or subcordate at base; sheaths flat, loose, glabrous; ligule c. 0.9 mm long, membranous, truncate. Inflorescence a globose panicle 3–5 cm long. Spikelets 1-flowered, 14–16 mm long including awn. Glumes absent. Lemma c. 6 mm long,

chartaceous hispid, 5-nerved; awn *c.* 8 mm long. Palea *c.* 5 mm long, acute, chartaceous hispid, 3-veined. Anthers 6, light yellow, *c.* 4 mm long. Caryopsis *c.* 4 mm long, lanceolate awned.

Flowering & Fruiting: October – December.

Common, grows in ponds, water lagged places and marshy places.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67521 (BSA).

Oryza L.

Oryza rufipogon Griff., Nat. Pl. Asiat. 3: 5. 1851; Bor, Grasses Burma, Ceylon, India & Pakistan 605. 1960; Raizada & al. Grasses of Upper Gangetic plain 3: 101. 1983.

Annual, culms up to 1 m high, lower portion spongy. Leaves 15–25 cm long linear, acuminate at apex, scabrid on margins and main veins; sheaths terete, loose, glabrous, auricled; ligule *c.* 1.2 cm long, splitting at tip. Inflorescence an exserted, compound panicle; main branches angular and scabrid. Spikelets 7–8 mm long, falling with age. Glumes 1–2 mm long, ovate-oblong, chartaceous 1-nerved. Lemmas 5–6 mm long, ovate-oblong, laterally compressed, chartaceous 3-nerved, awned; awns 4–8 mm long; palea 3–6 mm long, oblong, apiculate. Anthers 6, pale yellow 2–3 mm long. Caryopsis 3–4 mm long elliptic or oblong.

Flowering & Fruiting: September – December.

Common, grows along the road side wetland.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67610, 75647 (BSA).

Panicum L.

Panicum sumatrense Roth ex Roem. & Schult., Syst. Veg. ed 15. 2: 424. 1817; Bor, Grasses Burma, Ceylon, India & Pakistan 701. 1960; *P. miliare auct. non* Lam. 1791; Hook.f., Fl. Brit. India 7: 46. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan 329. 1960.

Annual, culms 30–100 cm high, erect or geniculate at base, nodes glabrous. Leaves 20–50 × 0.5–1.5 cm linear-lanceolate, tapering at apex, shallowly cordate at base; ligule *c.* 1.5 mm long membranous, truncate, shortly ciliate at apex. Inflorescence an oblong, contracted panicle 5–30 cm long, densely branched, branches 3–15 cm long, alternate or thyriform, densely speculate; pedicels 1–5 mm long, angular, slender, scabrid, dilated at apex. Spikelets 2.5–3.5

mm long ovate-oblong or elliptic, acute greenish. Lower glume 1–1.25 mm long broadly ovate or orbicular, acute or apiculate membranous, 3–5 nerved; upper glume, ovate-lanceolate, chartaceous 11–13 nerved. Lower florets barren. Upper floret bisexual. First lemma 2–2.5 mm long ovate-lanceolate, chartaceous 9–11 nerved. Palea 2.0–2.70 mm oblong or elliptic, acute hyaline, 2-keeled. Second lemma 2–3 mm long ovate-oblong obtuse, apiculate, sub-coriaceous, faintly 7–9 nerved. Palea 1.8–2 mm long elliptic or oblong acute, sub-coriaceous, margins inflexed. Stamens 3, anthers *c.* 1.5 mm long orange-yellow. Caryopsis ovate or orbicular, with black hilum at base.

Flowering & Fruiting: August – October.

Commonly cultivated near wetland for its edible seeds.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67589 (BSA).

Paspalidium Stapf

Paspalidium flavidum (Retz.) A. Camus in Lecomte, Fl. Indo-Chine 7: 419. 1922; Bor, Grasses Burma, Ceylon, India & Pakistan 333. 1960; Raizada & Jain in Indian For. Rec. 5(3): 167. 1964. *Panicum flavidum* Retz., Observ Bot. 4: 15. 1786; Duthie, Fodder Grasses 7. 1888; Hook.f., Fl. Brit. India 7: 28. 1896.

Annual or perennial, culms up to 60 cm high, tufted erect or geniculate, nodes glabrous. Leaves 6–25 cm long linear-oblong or linear, blunt at apex; sheaths compressed; ligule hairy, very short. Inflorescence 5–25 cm long, spiciform; spikes 3–8 in number, alternate, each 1–2 cm long distant by 2–4 times of their length. Rhachis narrowly winged mid-rib triquetrous 0.5–0.8 mm wide. Spikelets 2.5–3 mm long, ovate gibbous. Lower glume 0.5–1 mm long ovate or orbicular, chartaceous, 3-nerved; upper glume ovate, chartaceous 3–9 nerved. Lower floret barren. Upper floret bisexual. First lemma 2–3.5 mm long ovate, chartaceous 5-nerved. Palea 1.5–2.5 mm long ovate-elliptic hyaline 2-keeled. 2-nerved. Second lemma 1.5–2.2 mm long, elliptic crustaceous, faintly 5–7 nerved granulose. Palea 1–2.1 mm long elliptic, sub-coriaceous 2-keeled, margins inflexed. Stamens 3, anthers *c.* 1 mm long, yellow. Caryopsis *c.* 1.5 mm long, broadly ellipsoid.

Flowering & Fruiting: July – December.

Common, grows along the field edges, ditches, moist places and paddy fields.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67591 (BSA).

Pennisetum Rich. ex Pers.

Pennisetum glaucum (L.) R.Br., Prodr. Fl. Nov. Holland 1: 159. 1810. *Panicum glaucum* L., Sp. Pl. 1: 56. 1753. *Panicum americanum* L. Sp. Pl. 56. 1753. *Pennisetum typhoides* (Burm.f.) Stapf & Hubb. in Kew. Bull. 1933: 271. 1933; Bor, Grasses Burma, Ceylon, India & Pakistan 350. 1960. *Alopecurus typhoides* Burm.f., Fl. Ind. 27. 1768. *Pennisetum typhoideum* Rich. in Pers., Syn. Pl. 1: 72. 1805; Duthie, Fodder Grasses 18. 1888; Hook.f., Fl. Brit. India 7: 82. 1896.

Annual, culms up to 2 m high, erect. Leaves 25–35 cm long, linear-lanceolate, scabrid; sheaths terete hairy above; ligule a ring of dirty white hairs. Inflorescence a compact, cylindrical 12–25 cm long, panicle, peduncle pubescent. Spikelets 2–4 nate, often with 1–2 imperfect ones, 2.5–3.2 mm long, ovate-elliptic. Involucre bristles many 3–4 mm long, cream-coloured or brownish; pedicels 2.5–3.5 mm long, white hairy. Lower glume *c.* 0.6 mm long orbicular, ciliate; upper glume absent. Lower floret male or barren. Upper floret bisexual. First lemma 2–3 mm long elliptic-oblong, truncate-mucronate, 3-nerved, ciliate at tip. Palea *c.* 2.2 mm long obovate-cuneate, 2–3 toothed. Second lemma 2.5–3.2 mm long ovate-elliptic 5-nerved, ciliate. Palea equalling lemma, lanceolate, smooth, shining. Caryopsis *c.* 2.4 mm long obovoid, grayish.

Flowering & Fruiting: August – November.

Commonly, cultivated for its, grains and fodder near wetland.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67598 (BSA).

Phragmites Adans.

Phragmites karka (Retz.) Trin. ex Steud. Nom ed. 2, 2: 324. 1841 ; Hook.f., Fl. Brit. India 7: 304. 1896. *Arundo karka* Retz. Obs. 4: 21. 1786. *Narkul*.

Tall perennial grass up to 3 m high with creeping rhizome. Culms hollow, terete, smooth. Leaves distichous, 25–50 × 2.5–4 cm, linear-lanceolate, acuminate, coriaceous; sheaths loose, glabrous; ligule very short, hairy. Panicles large, erect, oblong or oval, decompound; branches filiform, scaberulous. Spikelets grey or brown, 1.5–2 cm long, many-flowered, bisexual. Lemmas glabrous. Back of rhachilla and callus covered with long white silky hairs.

Flowering & Fruiting: September – December.

Commonly found in marshy situations along the banks of lake.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67507 (BSA).

Polypogon Desf.

Polypogon monspeliensis (L.) Desf., Fl. Atlant. 1: 67. 1798; Duthie, Fodder Grasses 50. 1888; Hook.f., Fl. Brit. India 7: 245. 1896; Bor, Grasses Burma Ceylon India Pakistan 403. 1960; Raizada & al., Grasses of Upper Gangetic plain 3: 53. 1983. *Alopecurus monspeliensis* L., Sp. Pl. 1: 61. 1753.

Annual, culms up to 50 cm high, erect or decumbent. Leaves 4–8 cm long, linear-lanceolate, glabrous; sheaths loose; ligule 4–6 mm long lacerate. Inflorescence cylindrical 5–8 cm long panicle. Spikelets 1.4–2 mm long, linear-lanceolate. Glumes 1.5–2.5 mm long nearly equal, lanceolate; 2-dentate, with a scabrid, 4–5 mm long awn. Lemma *c.* 1 mm long, oblong, 4-dentate 5-nerved; awn *c.* 1 mm long. Palea 2-toothed, 2-mucronulate. Stamens 3, anthers *c.* 0.5 mm long light yellow. Caryopsis *c.* 1.2 mm long, ellipsoid, grooved.

Flowering & Fruiting: December – March.

Common, grows in moist and shady places.

Specimens examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 69725, 67689 (BSA).

Saccharum L.

Saccharum bengalense Retz., Observ. Bot. 5: 16. 1789; Bor, Grasses Burma, Ceylon, India & Pakistan 211. 1960. *S. munja* Roxb., Fl. Ind. 1: 250. 1820. *S. arundinaceum auct. non* Retz., 1786; Hook.f., Fl. Brit. India 7: 119. 1896.

Perennial. Culms up to 3 m high. Caespitose; internodes solid and polished. Leaves mostly basal *c.* 1.2 m long, channeled, mid rib occupying the greater part of the width, glaucous, scabrid on margins; sheaths hairy at base, villous on the margins; ligule lacerate. Inflorescence a purplish to cream coloured 20–80 cm long, plumose panicle, racemes 2–4 cm long, considerably shorter than the supporting branches, the internodes and pedicels hirsute. Spikelets 4–5 mm long, covered with hairs of callus and lower glumes. Sessile spikelets longer than the pedicels of pedicellate spikelets. Lower glume *c.* 4 mm long with 2-strong lateral nerves, long hairy; upper glume equal to lower. Lower floret empty. Upper floret bisexual. First lemma oblong-elliptic, hairy on the back; second lemma ovate-lanceolate, ciliate on the margins, acute or very shortly awned. Stamens 3, anthers 2–2.5 mm long yellow or purplish. Caryopsis *c.* 2.5

mm long cymbiform. Pedicelled spikelets hairy; both glume of sessile spikelets hairy. Lemma similar to sessile spikelets.

Flowering & Fruiting: October – December

Commonly grows along the road side and often used as fence around the cultivated fields.

Specimen examined: Tikri forest area, Vineet K. Singh 77252 (BSA).

Saccharum spontaneum L., Mant. 2: 183. 1771; Hook.f., Fl. Brit. India 7: 118. 1896; Raizada & al. in Indian For. Rec. 4(7): 185. 1957; Bor, Grasses Burma, Ceylon, India & Pakistan 214. 1960.

Perennial with thick rhizome. Culms 2–3 m high erect, solid, polished. Leaves 40–85 cm long, rigid, linear, acuminate, margins scabrid, often involute; ligule *c.* 3 mm long membranous, with a few long hairs on the auricles. Inflorescence 20–35 cm long, panicle, the axis silky below, branches short and silky, articulate and whorled, each raceme with alternate pairs of spikelets one sessile, one pedicelled and breaking up into units with the spikelets pair and the joint subtending the pair next above. Sessile spikelets 2–4 mm long lanceolate or oblanceolate reddish brown; callus densely long villous *c.* 1.8 cm long. Lower glume 3–4 mm long ovate-lanceolate acuminate, sub-coriaceous below, slightly 2-keeled, 2–3 nerved, margins delicate, hyaline, ciliate; upper glume 3–4 mm long, ovate-lanceolate, acuminate, chartaceous, 1-nerved, margins delicate hyaline, ciliate. Lower floret empty. Upper floret bisexual. First lemma 2–3 mm long ovate-acute or elliptic 2–3 nerved, ciliate along margins. Second lemma 2–2.5 mm long linear-lanceolate, hyaline; palea ovate minute, ciliate. Stamens 3, anthers 1–2 mm long yellow or reddish. Pedicelled spikelets similar to sessile ones.

Flowering & Fruiting: October – December.

Common, grows along the lake banks, damp places and in cultivated fields.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 75649 (BSA).

Setaria P. Beauv., nom. cons.

Setaria intermedia Roem. & Schult., Syst. Veg. ed. 15. 2: 489. 1817; Duthie, Fodder Grasses 14. 1888; Hook.f., Fl. Brit. India 7: 79. 1896. *Panicum tomentosum* Roxb., Fl. Ind. 1:

303. 1820. *Setaria tomentosa* (Roxb.) Kunth, Revis. Gramin. 1: 47. 1829; Bor, Grasses Burma, Ceylon, India & Pakistan 365. 1960.

Annual. Culms up to 80 cm high, erect or decumbent rooting at lower nodes; nodes glabrous. Leaves 5–25 cm long linear or linear-lanceolate, sparsely hairy, acuminate at apex, margins scabrid; sheath lax, keeled, margins ciliate, mouth hairy; ligule ciliate. Inflorescence a spiciform, narrow interrupted, panicle 4–15 cm long, branches variable, rhachis angular, scabrid, ribbed; bristles up to 3 mm long antrorsely scabrid; pedicels small with disk-like tips. Spikelets *c.* 2 mm long broadly ovate to elliptic, sub-apiculate. Lower glume 0.5–1 mm long broadly-ovate, acute 3–5 nerved. Upper glume 1–1.5 mm long, broadly ovate or elliptic, concave 5–7 nerved. Lower floret barren or male. Upper floret bisexual. First lemma ovate or orbicular, apiculate, chartaceous 5-nerved. Palea 1–2 mm long ovate or orbicular, hyaline 2-keeled 2-nerved; second lemma 1–2.2 mm long boat-shaped, beaked, broadly ovate, crustaceous, transversely rugose, faintly 5-nerved. Palea 1–2.1 mm long broadly elliptic, crustaceous rugose 2-keeled. Stamens 3, anthers 0.5–1 mm long, yellow. Caryopsis *c.* 1.7 mm long rugose, brown.

Flowering & Fruiting: July – December.

Common, grows in moist and shady places.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67598 (BSA).

Setaria verticillata (L.) P. Beauv., Ess. Agrostogr. 51, 178. 1812; Duthie, Fodder Grasses 15. 1888; Hook.f., Fl. Brit. India 7: 80. 1896 ; Bor, Grasses Burma, Ceylon, India & Pakistan 365. 1960; Raizada & Jain in Indian For. Rec. 5(3): 203. 1964; *Panicum verticillatum* L., Sp. Pl. ed 2, 1: 82. 1762.

Annual. Culms 80 cm high, erect or ascending rooting at nodes. Leaves 10–25 cm long linear or linear-lanceolate, scabrid on both surfaces; sheaths glabrous; ligule truncate, ciliate. Inflorescence spiciform, interrupted panicle 3–15 cm long, rhachis angular, scabrid. Bristles 1–10 mm long, angular, scabrid, retrorsely barbed. Spikelets *c.* 2 mm long ellipsoidal obtuse. Lower glume 0.8–1 mm long broadly ovate, acute, hyaline faintly 1–3 nerved. Upper glume *c.* 2.2 mm long ovate, sub-acute membranous 5–7 nerved. Lower floret barren; upper floret bisexual. First lemma *c.* 2.4 mm long, membranous, dorsally flat 5–7 nerved. Palea hyaline or absent. Second lemma *c.* 2–4 mm long elliptic-oblong, plano-convex, sub-obtuse, smooth,

faintly-rugulose, coriaceous, margins incurved. Palea *c.* 2.5 mm long elliptic, coriaceous, faintly rugulose. Stamens 3, anthers *c.* 1 mm long, yellow. Caryopsis *c.* 1.3 mm long finely rugose.

Flowering & Fruiting: August – November.

Common, grows in moist waste places.

Specimen examine: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67667 (BSA).

Sporobolus coromandelianus (Retz.) Kunth, Revis, Gramin 1: 68. 1829; Duthie, Fodder Grasses 48. 1888; Hook.f., Fl. Brit. India 7 : 252. 1896. Bor, Grasses Burma, Ceylon, India & Pakistan 627. 1960; Riazada & al. Grasses of Upper Gangetic plain 3: 109. 1983. *Agrostis coromandeliana* Retz., Observ. Bot. 4: 19. 1786.

Annual, tufted. Culms up to 35 cm high, erect or ascending. Leaves 2–8 cm long, linear, glabrous or pilose, papillate on margins; sheaths compressed, glabrous, hairy at mouth; ligule short hairy. Inflorescence a dense panicle, primary branches in whorls, spreading horizontally soon after emergence from the upper most leaf sheath. Spikelets 1–1.3 mm long, glabrous or scaberulous, grayish green. Lower glume 0.1–0.4 mm long, oblong. Upper glume 1.3 mm long ovate-lanceolate 1-nerved. Lemma *c.* 1.4 mm long ovate-lanceolate. Palea 0.8–1 mm long oblanceolate or elliptic, acute at apex. Stamens 3, anthers *c.* 0.5 mm long, yellow. Caryopsis *c.* 0.4 mm long obovate.

Flowering & Fruiting: September – October.

Common, grows in open grass lands and sometimes grows in cultivated fields.

Specimen examined: Parvati Aranga Wildlife sanctuary, Vineet K. Singh 67517 (BSA).

Vetiveria Bory

Vetiveria zizanioides (L.) Nash in small, Fl. South-East U.S. 67. 1903; Raizada & al., Indian For. Rec. 4(7): 220. 1957. Bor, Grasses Burma, Ceylon, India & Pakistan 258. 1960. *Phalaris zizanioides* L., Mant. Pl. 183. 1771. *Andropogon squarrosus* L.f., Suppl. Pl. 433. 1782 (*nom. conf.*): Hook.f., Fl. Brit. India 7: 186. 1896.

Perennial, tufted. Roots fibrous, aromatic. Culms 60–80 cm tall with rhizomatous rootstock. Leaves 25–60 cm long linear-lanceolate, convolute, scabrid on margins; sheaths glabrous; ligule annular, membranous. Inflorescence a contracted panicle, elliptic or pyramidal. Lower glume 2–4 mm long oblong-lanceolate or lanceolate 5-nerved muricate all over; upper

glume 3–4 mm long boat shaped or lanceolate, spinulose. Lower floret empty; upper floret bisexual; first lemma 3–4 mm long broadly elliptic, hyaline, faintly 3–5 nerved, margin ciliate; second lemma 2–3 mm long oblong-lanceolate, mucronulate, faintly 3-nerved. Palea *c.* 2.5 mm long oblong, hyaline. Stamens 3, anthers *c.* 2 mm long orange yellow. Caryopsis *c.* 2 mm long, broader at base. Pedicelled spikelets, lanceolate acuminate. Lower glume 3–3.5 mm long lanceolate, acuminate coriaceous, faintly 5-nerved, sparsely spinulose. Upper glume 2–3.5 mm long lanceolate, acuminate spinulose along the keel, margin hyaline, ciliate; lower floret empty; upper floret male. First lemma 3–4 mm long elliptic hyaline 3–5 nerved, margins ciliate; second lemma 1.2–2.4 mm long lanceolate, hyaline faintly 3-nerved. Palea *c.* 1.2 mm long oblong. Stamens 3, anthers *c.* 1 mm long.

Flowering & Fruiting: August – November.

Common, grows in water lagged places.

Specimen examined: Tikri forest area, Vineet K. Singh 75678 (BSA).

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ABOUT THE BOOK

Being one of the 17 mega-diverse countries of the world, India has a noteworthy floristic wealth to offer. As per latest estimates India has a total of 55387 taxa so far documented (Plant Discoveries 2022) but there are gazillions of others waiting to be identified and documented.

Uttar Pradesh being the fourth largest state of the country has 26 Wildlife Sanctuaries covering an area of 5822.20 km² which is 2.42% of the geographical area of the state (National Wildlife Database, Jan. 2023). One of these 26 Wildlife Sanctuaries is the Parvati Aranga Wildlife Sanctuary. Being the ecotone zone between the Gangetic plain and the Terai region, Parvati Aranga Wildlife Sanctuary (PAWS) and adjacent Tikri Forest area, Gonda, Uttar Pradesh perform a significant role in conservation of biodiversity.

This book 'Floristic Diversity of Parvati Aranga Wildlife Sanctuary and adjacent Tikri Forest Area, Terai Region, Gonda, Uttar Pradesh' has documented a total of 358 species spread over 274 genera and 100 families of flowering plants. Out of these 64 species under 53 genera and 21 families belong to monocots and 294 species under 221 genera and 79 families belong to Dicots. It is highly anticipated that this book will be useful to the scientists, researchers, taxonomists, student, academicians and environment enthusiasts.



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