

Flora of India
Series 3

FLORA OF AGRA DISTRICT

A.K. SHARMA

&

J.S. DHAKRE



BOTANICAL SURVEY OF INDIA

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FOREWORD

Agra district with its historically famous city of Agra as its capital, occupies a geographically significant position in the state of Uttar Pradesh. With varied soil types and situated in between the Aravalli and the Vindhya Hill ranges, the district shows an intermingling of floristic elements and presents an interesting floristic study. Such a detailed study on the vegetation and flora of the district assumes more importance in drawing up of plans to check the problem of massive soil erosion and consequent denudation in the ravines of the Chambal river, by revegetating and greening with suitable species of flora, the details of which are now made available in the present work.

The 'flora' deals with the description of natural plant communities and their diversity in different ecological habitats, besides weeds, and escapes from cultivation; earlier botanical explorations in the district, and allied aspects on the flora. In all 609 species under 384 genera belonging to 103 families of flowering plants have been described with taxonomic Keys to the families, genera and species. Correct botanical names, relevant synonyms, short descriptions with ecological notes have been provided for each species.

It is hoped that this publication will be of interest and use to students of botany, nature lovers, tourists, foresters and environmentalists in closely knowing the plants of the district.

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Dated January 31, 1994

PREFACE

It was felt, long ago that there is a necessity for the revision of Hooker's Flora of British India. Therefore, Santapau (1952, 1962) and Janaki Amal (1954) suggested a way out - the revision of the regional floras by different workers working in Research Institutions, Colleges and Universities and publication of their works. Several districts of floristic significance in different states have been intensively and extensively botanized for writing district floras and to prepare revisions of different plant families.

The present work on the Flora of Agra District, Uttar Pradesh is one such study to assess the plant diversity in the area. The location of Agra district has been, since long, very significant from geographical, historical and strategic points of view. The flora deals with the description of the vegetation and its associated factors, taxonomic treatment of 609 taxa, each with notes on distribution, frequency, phenology, collector's names, field numbers, uses etc. Efforts have been made to bring the nomenclature upto date as per the present Botanical code.

I am deeply indebted to Dr. J.S. Dhakre, Principal, R.B.S. College, Agra for his able guidance and help. It was very kind of him to have accompanied me in visits for plant collection. I am also grateful to Mrs. Kamla Dhakre for her constant encouragement.

Sincere thanks are also due to Dr. Bahadur Singh, Dr. S.N. Chaturvedi, Dr. S.V.S. Chauhan, Dr. R.K.S. Rathore and Dr. N.R. Smith, R.B.S. College, Agra for their valuable suggestions. I am also thankful to Dr. M.S. Tayal, Principal, M.M. College, Modinagar.

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I am grateful to Dr. P.K. Hajra, Director, Botanical Survey of India for his cooperation. I am also extremely thankful to Dr. K.P.S. Chauhan, Joint Director, Ministry of Environment and Forests, New Delhi for constant encouragement and help. I also extend my thanks to Shri A.R.K. Sastry, Scientist SF, Incharge Publication Section, Botanical Survey of India, Calcutta, for his help.

I am also thankful to Mr. Vipin Kumar for his nice type setting of this manuscript.

I acknowledge with gratitude the patient help rendered by my wife Mrs. Suman Sharma throughout the preparation and publication of the book.

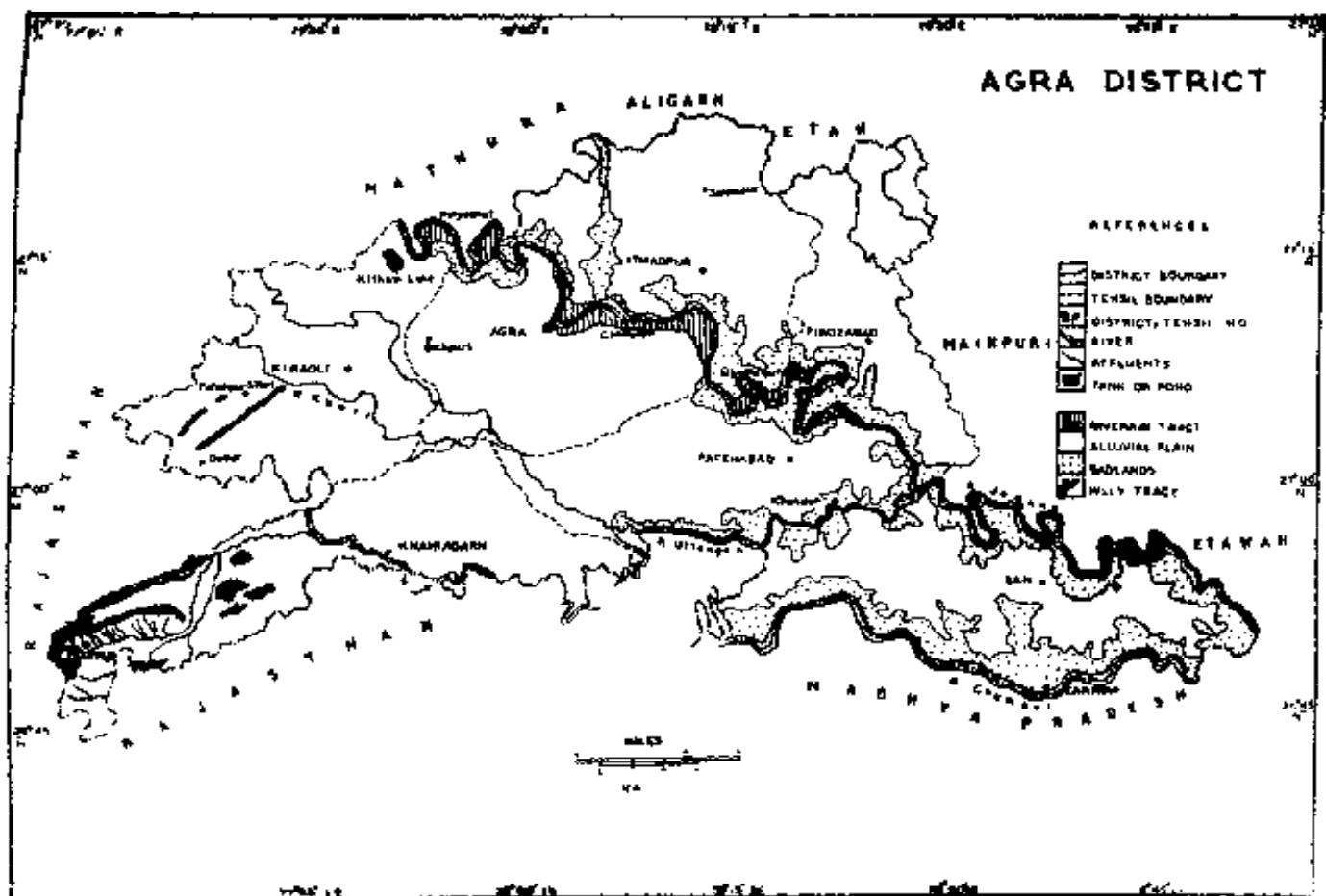
Last but not the least, thanks are also due to Shri Ravi Jain, M/s Deep Printers, New Delhi for nice processing of the materials and release of this work.

A. K. Sharma

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AGRA DISTRICT



INTRODUCTION

Agra District is situated between 26°44' and 27°55' N and 77°26' and 78°32' E on the south - west corner of Uttar Pradesh. The location of the subdivision has been, since long, very significant from the geographical, historical and strategic point of view. In recognition of this locational importance, Agra, the capital town of the district, had the privilege of being the royal seat of Mughal Kingdom for nearly the whole length of their reign in India. Of the two important rivers of Northern India, the Ganga and the Jamuna, it is the Jamuna which passes through the district for a distance of nearly 71 km. On one side of the river Jamuna, in the north - east, are Etawah and Firozabad subdivision of the district, while the other five subdivisions Agra, Kiraoli, Fatehpur Sikri, Fatehabad, and Bahi are in the south - west. In the south, the Chambal gives the district a natural boundary with the districts of Bhind and Morena of Madhya Pradesh. The total area is 4836.5 sq. km.

GEOLOGY

Geologically, the district is generally covered by a thick layer of Indo-Gangetic alluvium of pleistocene to sub-recent periods. This is more so in the southern part which has alluvial deposits of peninsular block, carried by the rivers of the Vindhyan foreland. The alluvium owes its origin to a continuous and conformable series of fluvatile and sub-aerial deposits, composed of interbedded layers of sand, silt and clay (Joshi, 1965). As revealed by the basic data report on tubewells, the depth of the alluvium varies from 153 metres near Basai Kalan, a village (27°9'30" N. Lat. and 78°4' E. Long) at a distance of nearly 5 km. east of Agra, to 251 metres near Arzi Round village (27°8'55" N. lat. and 78°24' E. Long) 3 km. NNE of Firozabad. As one moves south the thickness of the alluvium decreases, ending with no deposit on the rocky surface of peninsular block, which emerges at places in the form of hills in the Kiraoli and Kheragarh talisks.

The 'Khadar', the 'Bhangar' and the gravels found in abundance in the district are really the variants of the alluvium. Calcareous concretions, locally known as 'Kankar' are found throughout the district, both in the block and nodular forms. Extensive deposits of kankar are found in the Chambal ravines in Bahi taluk. They are locally known as 'Dant' and the material is extensively used for construction work.

In the south - western parts of the district remnants of the Vindhyan mountains are found and can be traced subterraneously even beyond the district boundaries

under the thick coating of alluvium. Tubewell borings show that the layers of these rocks steeply dip towards the N.E., because near Agra they were struck at a depth of 153 metres, while near Firozabad they were reached at 251 metres. The Vindhyan rocks are flagstones and freestones, homogeneous and soft and thus eminently suited for elaborate carving (Joshi, 1965). It is for this reason that the Great Mughals used them for their grand buildings.

Another important geological feature of the district is the Great Boundary Fault that separates the Aravallis in the West from the Vindhayas in the East. Though not visible on the surface, it may be traced to within the boundaries of district below the alluvium (Singh, 1971).

TOPOGRAPHY

The district is divisible into four well defined, natural, physiographic divisions, namely :

- I. Inter fluvial land (the Bhangar)
- II. Riverain tract (the Khadar)
- III. Bad lands (the Ravine belt)
- IV. Hilly tracts (the outcrops of Vindhyan sandstones)

I. INTER FLUVIAL LAND (the Bhangar) : This is the interstream area above the general flood level accounting for more than three - fourths of the total area of the district. Almost flat throughout and showing little tendency to elevation, this tract stretches out uniformly for miles in the Jamuna-Chambal Doab and in the trans - Jamuna area. Genetically, the tract may be divided into the Trans - Jamuna Plain and Doab.

(a) *The Trans-Jamuna Plain* : Stretching north of the Jamuna towards the Etahdpur and Firozabad tahsils, it includes a narrow belt running parallel to the Jamuna, up to the easternmost boundary of Agra tahsil in the south. It is an expanse of relentless plain, sloping gently from the north to the south and is composed of alluvium of Indo-Gangetic origin, made up mainly of sand, silt and clay. Light loam, locally known as "Dumal" where it assumes a yellow colour, characterises most of the area and accounts for nearly 77% of the cultivated land. However, the soil is not fine but full of gravel and is locally called 'Pakhar'.

In the north-west tip of this plain there is a narrow and low-lying belt where water-logging frequently occurs during the monsoon months.

(b) *The Jamuna-Chambal Doab* : This is the vast stretch of alluvial plains watered by the Utangan, Chambal and Jamuna rivers and is located south of the Trans-Jamuna Plain. It is different from its northern counterpart in two respects : (1) It contains both Indo-Gangetic and peninsular alluvium and its general gradient is oriented towards the east, unlike the southerly inclination of Trans-Jamuna plains. Towards the far east, beyond the town of Bah, its slope is relatively steeper, (2) There are Kankar pans at various depths of the sub-stratum, a feature missing in tract (a). The central part of this tract is characterised by fine loam which becomes sand towards the north and clay towards the south as the tract approaches the Jamuna and Chambal respectively.

2. RIVERAIN TRACT : In terms of expanse this is an insignificant unit. It is found in narrow strips on both sides of the Jamuna and the Chambal. Annual deposits of sand, silt and clay renew its fertility and make it an economically significant unit. Genetically, it is made up of recent deposits of alluvium.

3. BAD LANDS : Appropriately called the bad-lands, this tract is marked by deep cuts and incisions on the earth, caused by the wrath of fierce torrents rushing through soft surface. The ravines covering an area of 823 sq. km. contain a large variety of fluvial forms and may well be called Nature's stockyard of these forms.

4. HILLY TRACT : Running north-west to north-east, this tract comprises two belts of the Vindhyan sand-stones. The first, found in the Kiraoli tahsil may be called Bhandrauli Fatehpur Sikri Hill and the second, found in the Kherigarh tahsil, Jagnair Tantpur Hill, after the names of the major settlements of the area. Geologically, both belong to the upper Vindhyan system. The Bhandrauli-Fatehpur Sikri spurs have mild elevation, approximately 46 metres above the surrounding plain. The ridges of Jagnair-Tantpur are higher and more well defined than the former, the highest point 247 metres above mean sea level, lying in the ursa hills. Geologically, these ridges are relics of residual relief.

SOILS

The soil of the district is alluvial except for residual soils which occur in a narrow strip in the south and south-west. The alluvium north of the river Jamuna belongs to the Indo-Gangetic system, while south of the river, it is the legacy of the rivers of Peninsular India, the Chambal and the Utangan. The soils of the district are divisible into the following types :

1. Recent Alluvium (Khadirs)
2. Uplands

3. Flats
4. Low lands
5. Black clayey soils
6. Residual soils

1. RECENT ALLUVIUM : These soils are found in the riverain tract (Khadir) of the Jamuna with a ribbon-like pattern emerging in the tahsils of Agra, Fatehabad, Bah and to some extent in Etmadpur and Firozabad also. Every year the fertility of the soil is renewed through periodic flooding and silting. The colour is grey to ashy, the texture coarse and sandy, occasionally mixed with silty deposits. Soluble salts vary from average to high.

2. UPLANDS : These soils spread over a big area are so called as they are found above the general level of floods. Marked alluviation is a noteworthy feature of these soils, due to which the lower horizons have become heavier with the accumulation of clay content. In texture, they are loamy sand and brownish yellow in colour. Few calcareous nodules are also present. The soils are poor in organic matter and other plant nutrients.

3. FLATS : These soils occupy most of the Utangan basin in the tahsils of Kiraoli and Kheragarh and to some extent in Agra and Fathehabad. They are loamy in texture but in low-lying tracts, their texture becomes clayey-loam and in colour they vary from brownish grey to greyish brown. The clay content increases from the surface towards the sub-surface, making the lower strata progressively heavier and ultimately forming a zone of compaction and 'Kankar' pans. The soils are rich in plant nutrients and fairly fertile.

4. LOW LANDS : These soils are found in a crescent shaped area in the north-east of Firozabad tahsil and also in isolated patches in the Etmadpur tahsil. In texture, they are fine and in colour, grey to dark grey due to severe humid conditions. There appears to be a fairly high degree of salinity in these soils. The lower levels have a 'Kankar' layer in general.

5. BLACK CLAYEY SOILS : This type is common in the south-western part of Bah tahsil, north of the ravine belt of the river Chambal. Genetically, they are different from other soils in that they are derived from basaltic material of Central India. They are very fine in texture and black in colour and rich in mineral food. Cracks and fissures develop in these soils in the dry season.

6. RESIDUAL SOILS : These soils are found around the hillocks of the district in Kheragarh and Kiraoli tahsils. They have been formed by the detritus material brought down from these hillocks. They consist of rock fragments, pebbles,

boulders near the hillocks and sand at far off distances. These soils are calcareous in nature and neutral to alkaline in reaction.

CLIMATE

The climate is markedly periodic and of a semi-arid nature due to marked diurnal differences of temperature, high saturation deficit and moderately low rainfall. The climate is characterized by a dry and increasingly hot season from March to June, a warm monsoon period from July to September and dry and cold winter from October to February. Corresponding to these, there are three distinct vegetational seasons.

TEMPERATURE

Being far from the soothing effect of the sea, the district has to suffer from extremes of temperature, i.e. very low temperatures, sometimes below freezing point (as -1°C on December 29, 1961) in winter and extremely high (as 48.6°C on June 8, 1968) in summer.

The maximum monthly temperature of January ranges from 21.4°C to 23.1°C. It increases regularly in the subsequent months upto May where it is recorded between 39°C to 42.5°C. There is a decline afterwards with minor fluctuation in the month of August, September and October. The minimum monthly temperature show a similar rise from January (5°C to 7.1°C) to May (20.1°C to 26.6°C) and steady decline in subsequent months.

RAINFALL

Heavy precipitation of rainfall occurs in the second half of July and the first half of August. The average annual rainfall of the district is 607.1 mm., 90% of which is received during the monsoon season and nearly the half of the remaining 10% during winter.

RELATIVE HUMIDITY

Relative humidity in the district remains fairly high during summer months when the lowest range averaging 41% at 08.30 hours and 30% at 17.30 hours in the month of May has been recorded. From the month of June relative humidity

starts rising steeply touching the highest point of 85% at 08.30 hours and 73% at 17.30 hours. During the monsoon season commencing from the month of July and continuing upto the first week of October, it remains constantly high.

WIND

Wind is an important climatic factor for Agra. For most of the year, the wind is mild with a mean velocity of 5.3 kmph. Winds are strongest in June and lightest in October. In the summer months, hot and dust-raising winds, popularly known as 'Loo' are commonly experienced and may result in thunderstorms (andhi).

Towards the end of June a cooler breeze comes up from the south-west at mid-day heralding the advent of the monsoon. From July to September, the rainy season, the wind generally accompanies the rainfall and as such is cool and refreshing. In the winter months, winds blowing from the north are cold and icy. This is particularly so in late December, and early January, when the winds being what is called a cold-wave.

PREVIOUS BOTANICAL EXPLORATIONS

Royle (1799-1858), an English armyman, was the first man who explored the plants of Northern India and Himalayan mountains. The results of Royle's work published after his retirement in "Illustrations of the Botany and other branches of natural History of Himalayan mountains". This came out in eleven parts between 1833 and 1840. The work was based on the collections of Hardwick, Govan and Wallich and the personal collection of Royle in the Jamuna-Gangetic Doab, the upper Gangetic plain and the mountains of Garhwal, Sirmur and Kauwar. A large part of his collection is said to have gone to England but a substantial quantity is still in the Herbarium of Forest Research Institute, Dehra Dun. Then came the "Flora of British India" by Hooker (1872-1897) in seven volumes. This was the first comprehensive flora of the sub-continent. Hooker made an extensive use of the plants collected by Anderson, Hamilton, Brandis, Madden, Falconer, Thomson, Clarke, Royle, Wallich, Vicary, Duthie and others.

Other worth mentioning floras are "Notes on the Flora of Lucknow with catalogues of the cultivated and indigenous plants" by Anderson (1859), "Flora of Upper-Gangetic Plain and of Adjacent Siwalik and Sub-Himalayan tract" by Duthie (1903 - 1922) and "Hortus Agrensis" by Munro (1944). Duthie carried out intensive and laborious investigations at Dehra Dun and Saharanpur for many years and brought out this flora. He published his work in five parts, which included the families Ranunculaceae to Juncaceae. But he could not finish his plan and died in

1922. By that time he had completed the families Palmae to Aroidene and Alismataceae. These families and the remaining ones upto Cyperaceae were completed by R.N. Parker at Dehra Dun and W.B. Turrill at Kew, and finally published in 1929. Recently the Botanical Survey of India reprinted Duthie's work in two volumes. Constant use of Duthie's flora has been made during the course of the present study. From this study it appears that no special attention has so far been given to this Western district of Uttar Pradesh.

Raizada (1935, 36, 39, 50, 51, 54, 58, 62, 76) has published some publications to Duthie's flora adding some new noteworthy and recently introduced plants. Watts (1953) published a list of plants which were reported in the vast area of Agra district in the form of "Flora of Agra". Paliwal (1935) and Watts (1953) reported 37 and 39 species of grasses respectively. Bhattacharya (1956) on the other hand, described the grasses of Agra district and reported 89 species and varieties. There is no herbarium record of all these works. From the facts mentioned above it will be seen that the flora of Agra has not been studied thoroughly by anybody, so far.

PRESENT INVESTIGATION

The present work is the result of 3 years' intensive study of plants of the Agra district. For the purpose of obtaining a record of the plants of Agra as well as seasonal changes in its vegetation, excursions atleast once a month were made regularly during these years.

Twigs of the plants with flowering and possibly with fruiting were collected during a day's outing usually in sets of four. Herbaceous plants were collected with roots and radical or basal leaves as far as possible. The field notes of specimens collected were entered in the field book on the spot with regard to habit, habitat, abundance, local name, local uses, colour, smell of flowers etc. which can not be deduced from the examination of dried specimen. A particular species found growing in different habitats was collected from all such localities in order to study any change induced by different environmental conditions. For complete and full description of collected specimens, the material consisting of flowers and fruits of the same was preserved in F.A.A. or formalin solution in small tubes.

In the camp the specimens were pressed and dried in blotting papers. Poisoning was done with saturated solution of Mercuric Chloride in rectified spirit. The flowers of preserved material were studied under microscope. The structure and morphological peculiarities so observed were compared with the description given in Duthie's flora and other recent monographs. All the plants were identified to the species or variety level mainly with the help of Duthie's flora and comparison with specimens in Forest Research Institute, Dehra Dun. Constant use of every recent monograph and other available literature on the subject was made. Any

change in nomenclature or identification of plant was introduced on the authority of the monographer.

The poisoned and dried specimens were mounted on thick 39 X 26 cm. herbarium sheets and labelled. These herbarium sheets cited in this work are preserved in the Department of Botany, R.B.S. College, Agra.

PLAN FOLLOWED IN THE WORK

In the beginning a comprehensive key to the families of dicotyledinous and monocotyledinous plants has been given. The sequence of families followed is that of Bentham and Hooker (1862-83). In each family keys to the genera and species are given. Throughout this work the metric system has been used. In the treatment of individual species the following details are listed :

1. NOMENCLATURE : An attempt has been made to check the nomenclature and bring it up-to-date, as far as possible, according to the requirements of the International code of Nomenclature (1972 ed.). For this purpose various recent monographic revisionary works on different taxa, viz. families, genera and species have been consulted.

The name considered as the correct one has been placed first followed by its basionym. Of the synonyms, mention has been made especially of the adjoining areas and of the Hooker's 'Flora of British India' and Duthie's Flora of Upper Gangetic Plain.

2. DESCRIPTION : The description of the species has been shortened to the more important characters which help in the identification. The measurements of plant parts are according to the size of the specimens of my collection.

3. LOCAL NAME : The local name of all those plants which could be gathered from the forest guards and other knowledgeable people of the area, have been given.

4. FLOWERING AND FRUITING : The period of flowering and fruiting given for the species is based on my personal observations.

5. FIELD NOTES : These comprise the notes on the habits of the plants, habitat(s) in which these were observed, their relative abundance, etc., and some of the important localities from where a species can be collected have been given.

6. USES : In some cases the uses to which a plant is employed locally as well as elsewhere have been recorded. This information was gathered from the inhabitants of the area.

Cultivated species have not been included in the keys, unless they have been found totally naturalized but a list of the cultivated species has been added in the last.

ABBREVIATIONS

For economy of space, certain abbreviations have been used under citations for each species, they are as follows :

AKS	A.K. Sharma
Bor. Gr. Ind.	The grasses of Burma, Ceylon, India and Pakistan (excluding Bambuseae) by N.L. Bor, 1960. London.
Duthie, Fl. U. Gang. Pl.	Flora of Upper Gangetic Plain and of the Adjacent Siwalik and Sub-Himalayan Tracts by J. F. Duthie, 3 vols., 1903-29, Reprinted Edition, 1960. Calcutta.
Fls.	Flowers
Frts.	Fruits
Hook. f. Fl. Brit. Ind.	The Flora of British India by J. D. Hooker, 7 vols., 1872-97. London.
J. Asiatic Soc. Beng.	Journal of the Asiatic Society of Bengal. Calcutta.
J. Bombay Nat. Hist. Soc.	Journal of the Bombay Natural History Society, Bombay.
J. Ind. Bot. Soc.	Journal of the Indian Botanical Society. Madras.
J. Linn. Soc.	Journal of the Linnean Society (Botany)
Merr. Enam.	An Enumeration of Philippine Flowering plants Merrill, 4 vols., 1923-26. Manila.
nom. cons.	nomina conservanda
Pflanzenr.	Das pflanzenreich Regni Vegetabilis conspectus, etc. by A. Engler, Heft 1-102, 1900-37. Leipzig.

P.P.	<i>Pro parte</i>
Rec. Bot. Surv. Ind.	Records of the Botanical Survey of India, Calcutta.
Trans. Linn. Soc.	Transactions of the Linnean Society of London (Bombay). London.
Vern.	Vernacular name.
Wt. Ic.	<i>Icones Plantarum Indiae Orientalis</i> or fig- ures of Indian Plants, by Wight, R., 6 vols., 1938-53. Madras.

THE VEGETATION

Generally the vegetation of the area surveyed, is classified as the 'scrub jungle'. The vegetation presents a very open appearance so that the trees and shrubs are widely spaced. Mostly the annual vegetation is noticed during the rains, as this along is favourable for germination of seed and further growth of seedling. These are annuals which are mostly ephemerals and some are perennials which throw their aerial shoots during the favourable season alone.

For the sake of convenience of study, the vegetation can be classified as follows :

1. Seasonal Vegetation.
2. Weeds and Escapes of cultivation.
3. Vegetation of Hilly Tracts.
4. Vegetation of Aquatic habitats.

1. Seasonal Vegetation :

At the commencement of the spring most of the trees come in flower. Among the herbs, the earliest to flower are *Alternanthera pungens* H.B. & K., *A. sessilis* DC., *Veronica agrestis* L., *V. anagallis-aquatica* L., *Sisymbrium irio* L., *Scoparia dulcis* L., *Centaurium pulchellum* Druce, *Heliotropium eichwaldii* Steud., *Phyla nodiflora* Greene, *Euphorbia prostrata* Ait., *E. clarkeana* Hook., *E. hirta* L., *Justicia diffusa* Wild., *Convolvulus microphyllus* Sieb. etc.

From April as summer advances the temperature gradually rises till towards the end of June. These months are generally dry and the plants show various xeromorphic features such as thorns, woolly tomentum, thick cuticle etc. Such common herbs are *Citrullus colocynthis* Schrad., *Glinus lotoides* L., *Pluchea lanceolata* Cl., *Volutarella ramosa* Santapau, *Echinops echinatus* Roxb., *Laggera aurita* Sch.-Bip., *Euphorbia dracunculoides* Lamk., *Phyla nodiflora* Greene, *Alternanthera pungens* H.B. & K., *Erigeron bonariensis* L., *Alhagi pseudalhagi* Desv., *Arnebia hispidissima* DC., *Gomphrena celosioides* Mart., *Heliotropium dichwaldi* Steud. etc.

The commencement of rainy season in late June is the signal for the appearance of a very vigorous and luxuriant growth of plants, the seeds and rootstocks of which have been lying dormant in the soil awaiting the advent of heavy rain. In this season numerous species of *Fabaceae*, *Rubiaceae*, *Lamiaceae*, *Cucurbitaceae*, *Commelinaceae*, *Amaranthaceae*, *Euphorbiaceae*, *Tiliaceae*, *Aizoaceae*, *Convolvulaceae* and a great many grasses and sedges occur. Other plants occurring in this season are *Polycarphae corymbosa* Lamk., *Polygala eriopetra* DC., *Cassia occidentalis* L., *C. obtusifolia* L., *C. tora* L., *Polygonum plebeium* R. Br., *Pergularia daemia* Blatt. & McC., *Cardiospermum helicacabum* L., *Cayratia trifolia* Domin, *Dentella repens* Forst., *Chenopodium ambrosioides* L., *Blainvillea rhomboidea* Cass., *Lantana indica* Roxb., *Cocculus hirsutus* Diels etc.

With the commencement of winter (mid. Oct.) the vegetation of rainy season starts disappearing. In this season due to the prevailing dry conditions and low temperature, species of colder regions make their appearance. The common ones are *Coronopus didymus* Sm., *Argemone mexicana* L., *Stellaria media* Vill., *Silene conoidea* L., *Spergula arvensis* L., *Vicia hirsuta* Gray, *V. sativa* L., *Cirsium arvense* Scop., *Vernonia cinerea* Less., *Vicia indica* DC., *Cotula anthemoides* L., *Cichorium intybus* L., *Malva parviflora* L., *Oxalis corniculata* L., *O. corymbosa* DC., *Anagallis arvensis* L., *Rungia pectinate* Nees, *Launaea procumbens* R. & R., *Mazus pumillus* Steen., *Lathyrus aphaca* L., *L. sativus* L., *Rumex dentatus* L., *Barleria prionitis* L., *Adhatoda zeylanica* Medic., *Medicago lupulina* L., *M. denticulata* Willd., *Potentilla supina* L., *Melilotus indica* All., *M. alba* Desr., *Fumaria indica* Pugsley etc.

2. Weeds and Escapes of Cultivation :

Amongst the weeds occur in the winter session crop, the most common ones are prostrate herbs, viz. *Fumaria indica* Pugsley, *Coronopus didymus* Sm., *Veronica agrestis* L., *Malva parviflora* L.. Of the tiny and slender herbs, the most common ones are, *Stellaria media* Vill., *Spergula arvensis* L., *Melilotus indica* All. *M. alba* Desr., *Oldenlandia corymbosa* L., *Anagallis arvensis* L. Some of the herbs are prominent because of their size and the following are worth mentioning : *Vaccaria pyramidata* Medik., *Silene conoidea* L., *Lathyrus sativus* L., *Trigonella polycerata*

L., *Sonchus brachyotus* DC., *S. oleraceus* L., *Trichodesma amplexicaule* Roth, *Solanum nigrum* L., *Leucas aspera* Spreng., *Amaranthus* spp., *Chenopodium* spp., *Polypogon monspeliensis* Desf., *Diger muricata* Mart., *Asphodelus tenuifolius* Cav. Some of the climbers and twiners that occur as weeds are represented by *Vicia hirsuta* Gray, *Ipomoea pes-tigridis* L., *Lathyrus aphaca* L.

Some of the species are common for both rainy and winter season crops viz., *Diger muricata* Mart., *Ipomoea pes-tigridis* L., *Amaranthus* spp. while there are some which occur exclusively in the rainy season, viz. *Cleome gynandra* L., *Tribulus terrestris* L., *Gisekia pharnaceoides* L., *Trianthema portulacastrum* L., *Zaleya govindia* Nair, *Leucas cephalotes* Spreng., *Crotalaria medicaginea* Lamk., *Portulaca oleracea* L., *Corchorus aestuans* L., *C. trilocularis* L., *Heliotropium strigosum* Willd., *Phyllanthus fraternus* Webster, *Euphorbia parviflora* L.

Setaria intermedia R. & S., *S. glauca* Beauv., *Cenchrus ciliaris* L., *Brachiaria ramosa* Stapf, *Digitaria sanguinalis* Scop., *Saccharum spontaneum* L., *Sorghum halepense* Pers., *Cynodon dactylon* Pers., *Acrachne racemosa* Obwi, *Echinochloa crusgalli* Beauv., *Aristida adscensionis* L., *Dactyloctenium aegyptium* Beauv., *D. sindicum* Boiss, *Bothriochloa pertusa* A. Camus and *Dichanthium annulatum* Stapf are grasses that occur commonly as weeds in rainy season.

3. Vegetation of Hilly Tracts :

The hills mostly comprise of denuded rocks and only a small amount of soil fills the crevices between the rocks. Some grasses like *Aristida* spp., *Oropetium thomaeum* Trin., *Tetrapogon tenellus* Chiov., *Melanocenchrus jacquemontii* Jaub and Spach. grow and cover these hills during rainy season.

The trees mainly restricted to the hills are : *Flacourtia indica* Merr., *Helicteres isora* L., *Anogeissus pendula* Edgew., *Wrightia tinctoria* R.Br. Some other species like *Grewia tenax* Fiori, *G. flavescens* Juss., *Butea monosperma* Taub., *Acacia arabica* L., are restricted to the bases of the hills. Species like *Balanites aegyptiaca* Delile, *Maytenus emarginata* Ding-Hou, *Acacia leucophloea* Willd, *Dichrostachys cinerea* W. & A. occur in plains but only in vicinity of the hills. The same holds true for lianas like *Cocculus* spp., *Rivea ornata* Choisy.

The herbaceous flora of the general surface of hills is rich during rains and is composed mainly of small erect and prostrate herbs. Some of the prostrate herbs growing during the period are *Boerhavia diffusa* L., *B. chinensis* A. & S., *Elytaria acualis* Lindau, *Evolvulus alsinoides* L., *Glossocardia boswelliae* DC., *Indigofera linifolia* Retz., *I. cordifolia* Heyne, *Lepidagathis hamiltoniana* Wall. and *Zornia gibbosa* Span. These plants form carpet flora and grow either intermixed with the erect forms or sometimes these alone cover the entire area. Some of the erect forms

are *Tephrosia hamiltoniana* Drumm., *Triumfetta rhomboidea* Jacq., *Barleria cristata* L., *Dipteracanthus parvulus* Nees, *Vernonia cinerea* Less., *Echinops echinatus* Roxb., *Bidens biternata* M. & S., *Dicoma tomentosa* Cass., *Solanum indicum* L., *Achyranthus aspera* L., *Pupalia lappacea* Juss., *Euphorbia parviflora* L., *Acalypha ciliata* Forsk., *Urginea indica* Kunth is a common geophyte which can be identified by its leaves during rainy season and by its copper coloured scapes and flowers during the spring season.

The grasses are common during the rains. Some of the common ones are: *Cymbopogon parkeri* Stapf, *Dichanthium annulatum* Stapf., *Bothriochloa pertusa* A. Camus, *Digitaria stricta* Roth, *Alloteropsis cimicina* Stapf, *Chloris virgata* Sw., *Tragus roxburghii* Panigrahi, *Aristida adscensionis* L., *A. funiculata* Trin., *Oropetium thomaeum* Trin., *Tetrapogon tenellus* Choisy, and *Melanocenchrus jacquemontii* J. & S.

4. Vegetation of Aquatic Habitats :

Free floating and submerged vegetation consist of members of family Onagraceae, Gentianaceae, Hydrocharitaceae and Potamogetonaceae viz. *Ludwigia adscendens* Hara, *Nymphoides cristata* Kuntze, *N. indica* Kuntze, *Hydrilla verticillata* Royle, *Nechamandra alternifolia* Thw., *Vallisneria spiralis* L., *Potamogeton crispus* L., *P. pectinatus* L. respectively. Species of *Lemna*, *Wolffia* and *Spirodela* often form a scum on water and in places devoid of nitrogenous matter *Utricularia aurea* Lour, *U. stellaris* L. are seen occurring. These are the sole representatives of insectivorous plants in the area. *Ceratophyllum demersum* L. and *Zannichellia palustris* L. are the common rootless submerged aquatics.

Amongst rooted water plants, *Sagittaria guayanensis* H.B. & K., *Limnophyton obtusifolium* Miq. are the common ones. *Eichhornia crassipes* Solms., an introduced plant is a troublesome weed in the area. *Ipomoea aquatica* Forsk. and *Nymphaea pubescens* Willd. are also seen occurring frequently.

Plants growing on marshy banks are often submerged under water. The common ones of these are : *Aeschynomene indica* L., *Caesulia axillaris* Roxb., *Polygonum glabrum* Willd., *P. plebeium* R. Br., *Typha angustata* Bory & Chaub., *Ludwigia perennis* Brenan, *Sphenoclea zeylanica* Gaertn., *Paspalum puspoloides* Scribn., *Echinochloa colonum* Link., *Hemarthria compressa* R. Br., *Eriochloa procera* C. E. Hubb., *Imperata cylindrica* Beauvois., *Eleocharis acutangula* Schult., *Scirpus miliaceus* Vahl.

Plants of dry phase appear at the margins of canals and rivers as water recedes due to evaporation or its being used for some purposes. Some of the common species are prostrate plants like *Bergia ammannioides* Roxb., *Potentilla supina* L., *Dentella repens* Forst., *Eclipta alba* Hassk., *Phyla nodiflora* Greene, *Bacopa monnierii*

Pennell, *Alternanthera paronychioides* St., *A. punigena* Humb., *Polygonum plebeium* R. Br., and *Juncus bufonius* L. Some species of dry phase are erect herbs, viz. *Ammannia senegalensis* Lamk., *A. buccifera* L., *Ludwigia perennis* L., *Verbascum chinense* Santapau, *Veronica anagallis-aquatica* L. and some members of family Cyperaceae.

STATISTICAL SYNOPSIS OF THE INDIGENOUS FLORA

Except for *Cyperaceae* and *Poaceae*, the Monocotyledones are very poorly represented. Of the 140 species of Monocotyledones, 112 species belong to the two families mentioned above, while the remaining 28 species belong to 15 different families. The ratio of species belonging to Monocots and Dicots is 1 : 3.33, of genera 1 : 3.98 and of families 1 : 5.05 (Table 1).

Table I : Statistical Synopsis of the Flora.

	Dicots		Monocots		Total
	No.	%	No.	%	
Families	86	83.49	17	16.51	103
Genera	307	79.94	77	20.06	384
Species	469	77.01	140	22.99	609

DOMINANCE OF FAMILIES

Unlike in the rest of the country, (Hooker, 1907), Gramineae (Poaceae) tops the list of families in this area and the neighbouring areas (Table 2). The family Leguminosae occupies the second position; Compositae (Asteraceae) the third, followed by Cyperaceae.

With slight changes in position, the families occupying fifth to tenth positions are Acanthaceae, Convolvulaceae, Euphorbiaceae, Amaranthaceae, Scrophulariaceae, Malvaceae, Boraginaceae and Lamiaceae (Labiatae).

The main difference in the floristic position is with the Upper Gangetic plain (Hooker, 1907). Compared to this area, Cyperaceae and Compositae exchange their positions in the Upper Gangetic Plain ; Scrophulariaceae, which occupy fifth position in the list for the Upper Gangetic Plain are the eighth for Agra District.

Table 2 : A comparative statement of first ten predominant families in Agra District.

Sl. No.	Name of the Family	Agra district (present studies)	India (Hooker, 1907)	Upper Gangetic Plain (Hooker, 1907)	Delhi (Maheshwar, 1963)	Rajasthan desert (Bhatt, & Hall, 1948)
1.	Poaceae (Gramineae)	1	3	1	1	1
2.	Leguminosae	2	2	2	2	2
3.	Asteraceae (Compositae)	3	7	4	3	3
4.	Cyperaceae	4	8	3	4	4
5.	Acanthaceae	5	6	7	5	
6.	Convolvulaceae	6		9	7	5
7.	Euphorbiaceae	7	5	8	6	9
8.	Amaranthaceae	8			9	6
9.	Sapotaceae	8		5	10	
10.	Malvaceae	9		6	8	10
11.	Boraginaceae	10				7
12.	Lamiaceae (Labiatae)	10	9	10		
13.	Orchidaceae			1		
14.	Rubiaceae			4		
15.	Cucurbitaceae					8
16.	Urticaceae			10		

RELATIVE OCCURRENCE OF THE TAXA

The monocots due to the family Gramineae, predominate in the area and have 140 species, 77 genera and 17 families. The Bicarpellatae come next with 129 species, 85 genera and 19 families. The Calyciflorae have 116 species, 70 genera and 13 families. Considering the number of species per family, the ratio shown by the Iridaceae is the highest ; 53 species in four families, Rubiaceae, Compositae, Campanulaceae and Sphenoleaceae.

As regards the number of species per family the Gramineae occupy the first position (80 species), Papilionaceae, the next (52 species); and the third in the sequence are the Compositae (41 species).

Families that are represented in the area under survey by a single species are: Fumariaceae, Violaceae, Flacourtiaceae, Elatinaceae, Bombacaceae, Linaceae, Celastraceae, Vitaceae, Anacardiaceae, Moringaceae, Rosaceae, Myrtaceae,

Trapaceae, Cactaceae, Sphenocleaceae, Primulaceae, Ebenaceae, Loganiaceae, Hydrophyllaceae, Orobanchaceae, Bignoniaceae, Martyniaceae, Phytolaccaceae, Aristolochiaceae, Piperaceae, Proteaceae, Urticaceae, Ulmaceae, Cannabaceae, Casuarinaceae, Ceratophyllaceae, Amaryllidaceae, Agavaceae, Juncaceae, Arecales, Typhaceae, Butomaceae, Eriocaulaceae and Zamiellaceae. Of these 39 families, 31 belong to dicots and the remaining eight to monocots.

Families with more than one species in the single genus are : Ranunculaceae (2), Nymphaeaceae (2), Papaveraceae (2), Polygalaceae (2), Portulacaceae (2), Tamaricaceae (3), Rhamnaceae (2), Onagraceae (3), Oleaceae (3), Salvadoraceae (2) Leptilariaaceae (2), Nyctaginaceae (3). All these 12 families belong to dicots.

Leaving aside first three families, there are three families in which the number of species is more than 20: Convolvulaceae (21), Acanthaceae (25), Cyperaceae (33).

There are ten families, with the number of species ranging between 10 and 20. These constitute 9.07% of the total number of families represented in the area. These are : Malvaceae (16), Tiliaceae (10), Caesalpiniaceae (16), Mimosaceae (10), Cucurbitaceae (12), Boraginaceae (12), Scrophulariaceae (18), Labiate (12), Amaranthaceae (18), Euphorbiaceae (19).

There are 10 families in which the number of species is between six to nine. These are Brassicaceae (7), Capparidaceae (7), Caryophyllaceae (7), Tiliaceae (8), Aizoaceae (8), Rubiaceae (8), Asclepiadaceae (8), Solanaceae (8), Polygonaceae (6), Moraceae (7).

Thirty - six families have the number of species between two and five. Those with five species are Rutaceae, Lythraceae, Verbenaceae, Chenopodiaceae, Commelinaceae, those with four species are Menispermaceae, Sterculiaceae, Oxalidaceae, Gentianaceae, those with three species are Tamaricaceae, Meliaceae, Combretaceae, Onagraceae, Oleaceae, Nyctaginaceae, Hydrocharitaceae, Liliaceae, Lemnaceae. Twenty families are with two species each.

It can be observed, that out of the 103 families, 60 families are with one or two species each and this is the reason for a small number of species in spite of the representation of a fairly large number of families in the area.

The present study records 73 trees belonging to 35 families. Of these 37 are mesophanerophytes i.e. they attain a height of eight to 30 metres ; the rest are all small trees, microphanerophytes reaching a height of eight metres. There is not a single tall tree or megaphanerophyte in this area. Nineteen families are represented by trees exclusively viz. Flacourtiaceae, Tamaricaceae, Simaroubaceae, Bumbacaceae, Meliaceae, Celastraceae, Anacardiaceae, Moringaceae, Myristaceae, Sapotaceae, Ebenaceae, Salvadoraceae, Bignoniaceae, Proteaceae, Ulmaceae, Moraceae, Casuarinaceae, Salicaceae, Palmae.

Forty-six species, distributed over 10 families occur as climbers. Of these *Cuscuta reflexa* Roxb. is a total parasite, while the rest are all woody climbers, either twining over the plants or climbing with the help of spiny outgrowths e.g. *Asparagus racemosus* Willd.

Families showing all the habit forms viz. trees, shrubs, climbers and herbs are just two in number, namely, Capparidaceae and Papilionaceae. Those which are represented by herbs, shrubs and trees are Capparidaceae, Malvaceae, Rutaceae, Papilionaceae, Caesalpiniaceae, Mimosaceae, Verbenaceae.

Some of the families that altogether lack trees and are represented in this area by more than 10 species are Cucurbitaceae, Compositae, Convolvulaceae, Scrophulariaceae, Acaulethaceae, Labiate, Amaranthaceae, Euphorbiaceae, Cyperaceae, Gramineae. There are 40 families that are exclusively represented by herbs, but the total number of species in each of them is under 10.

Twenty-four hydrophytic species are distributed over 14 families, eleven of which are represented exclusively by Hydrophytes viz. Nymphaeaceae, Trapaceae, Lentibulariaceae, Ceratophyllaceae, Hydrocharitaceae, Pontederiaceae, Lemnaceae, Alismataceae, Butomaceae, Potamogetonaceae, Zannichelliaceae. Lentibulariaceae is an insectivorous family.

KEY TO THE FAMILIES

1a. Leaves net-veined; stem with open bundles; taproot usually present; cotyledons two:

2a. Flowers with two whorls of perianth, outer calycine, inner petaline:

3a. Inner whorl of perianth polyphyllous:

4a. Ovary apocarpous:

5a. Perianth and stamens perigynous

35. ROSACEAE

5b. Perianth and stamens hypogynous:

6a. Herbs; stamens spirally arranged

1. RANUNCULACEAE

6b. Climbers; stamens cyclic

2. MENISPERMACAEAE

4b. Ovary syn carpous:

7a. Plants aquatic with peltate leaves and many perianth lobes

3. NYMPHAEACEAE

7b. Plants terrestrial or if aquatic then not with peltate leaves and many perianth lobes:

8a. Sepals free; ovary superior:

9a. Disc not conspicuous; stamens borne below the ovary, rarely inserted on the disc:

10a. Ovary 1-locular:

11a. Placentation parietal:

12a. Placenta reduced to the base; leaves scale like

13. TAMARIACEAE

12b. Placenta on the entire length of the ovary; leaves not scale like:

- 13a. Ovary usually on a gynophore 7. CAPPARACEAE
- 13b. Ovary not on a gynophore :
- 14a. Corolla regular; stamens many 4. PAPAVERACEAE
- 14b. Corolla zygomorphic, spurred : stamens 5–6 :
- 15a. Spur of the corolla on the anterior petal; stamens 5; sepals 5 8. VIOLACEAE
- 15b. Spur of the corolla on a lateral petal; stamens 6; sepals 2 5. FIMARIACEAE
- 11b. Placenta free central :
- 16a. Plants succulent ; sepals 2 ; fruit a circumscissile capsule 12. PORTULACACEAE
- 16b. Plants not succulent ; sepals 5 ; fruit a capsule opening by valves 11. CARYOPHYLLACEAE
- 10b. Ovary 2–many locular :
- 17a. Placenta parietal :
- 18a. Stamens 6, tetrodynamicous ; fruit a siliqua or silicula; ovary 2-locular due to spurious septum 6. BRASSICACEAE
(Cruciferae)
- 18b. Stamens many ; fruit a very hard when dry ; ovary many locular due to involutions 9. FLACOURTIACEAE
- 17b. Placenta axile :
- 19a. Placenta on apical portion of ovary ; anthers opening by pores 10. POLYGALACEAE
- 19b. Placenta on the entire length of ovary ; anthers opening by slits :
- 20a. Stamens monadelphous :
- 21a. Anthers 2-celled 17. STERCULIACEAE
- 21b. Anthers 1-celled :
- 22a. Carpels 5 to many ; pollen rough 15. MALVACEAE
- 22b. Carpels 2–5 ; pollen smooth 16. BOMBACACEAE

- 20b. Stamens free or in 5 bundles :
- 23a. Stamens many, free or in 5 bundles ; plants terrestrial 18. THYMELAEAE
- 23b. Stamens less than 10 in two whorls ; plants usually hydrophytes 14. ELATINACEAE
- 24b. Disc a ring, cushion or gland ; spread over bases of calyx tube; stamens borne on the outer or inner edges of the disc or in between it when broken into glands
- 24a. Stamens more in number than the corolla lobes :
- 25a. Ovary on a stipe ; seeds winged 31. MELIACEAE
- 25b. Ovary not on a stipe ; seeds not winged :
- 26a. Stamens diplostemonous, united below in a tube :
27a. Stamens of outer whorl reduced to staminodes ; fruit capsule ; ovary more than 1 - Incular 19. LINACEAE
- 27b. Stamens all fertile ; fruit drupe ; ovary 1 - Incular 25. MELIACEAE
- 26b. Stamens obdiplostemonous, not united in a tube :
- 28a. Disc present below the ovary ; leaves dotted with glands 23. RUTACEAE
- 28b. Disc present between stamens and ovary, ring like; leaves not dotted with glands :
- 29a. Trees ; fruit a drupe or a samara 24. SIMAROUBACEAE
- 29b. Herbs; fruit otherwise :
- 30a. Fruit capsular ; plants acidic 22. OXALIDACEAE
- 30b. Fruit schizocarpic ; plants not acidic :

- 31a. Leaves simple ; fruit a regma 21. GERANIACEAE
- 31b. Leaves pinnately compound ; fruit breaking into 3-5 (spiny) hard pericarps 20. ZYGOPIPHYLLACEAE
- 24b. Stamens equal in number to or less than the corolla lobes :
- 32a. Flowers unisexual, irregular
- 33a. Ovary 1-celled ; fruit a drope 30. ANACARDIACEAE
- 33b. Ovary 3-celled ; fruit winged or lobed 29. SAPINDACEAE
- 32b. Flowers bisexual, regular :
- 34a. Stamens alternate with the petals ; ovary partly sunk in the disc 26. CHLORANTHACEAE
- 34b. Stamens opposite the petals ; ovary not sunk in the disc
- 35a. Plants usually shrubs or trees ; fruit dry or a drope 27. RHAMNACEAE
- 35b. Plants usually climbers ; fruit juicy 28. VITACEAE
- 36b. Sepals united ; ovary often inferior or perigynous :
- 36a. Carpel one ; fruit a legume or lomentum ;
- 37a. Corolla actinomorphic, valvate ; stamens usually many 34. MIMOSACEAE
- 37b. Corolla zygomorphic, imbricate ; stamens definite:
- 38a. Corolla descendingly imbricate, papilionaceous ; stamens united 32. FABACEAE
(Papilionaceae)
- 38b. Corolla ascendingly imbricate, not papilionaceous ; stamens free. 33. CAPSALPINIACEAE
- 36b. Carpels more than one ; fruit otherwise
- 39a. Plants succulent, phylloclades bearing spines or 'areoles' ; leaves usually much reduced or 0 42. CACTACEAE
(*Opuntia*)

- 39b. Plants otherwise ; leaves well developed
- 40a. Leaves glandular punctate 37. MYRICAEEAE
- 40b. Leaves not glandular punctate :
- 41a. Aquatic herbs 40. TRAPACEAE
- 41b. Terrestrial :
- 42a. Flowers in simple or compound umbels; foliage aromatic 44. APIACEAE
- 42b. Flowers solitary, axillary or in racemos, spikes or cymes :
- 43a. Placentation parietal ; leaves usually incised 41. OCIMUMACEAE
- 43b. Placentation axile ; leaves entire :
- 44a. Flowers epigynous :
- 45a. Leaves opposite ; fruit winged 36. COMBRITACEAE
- 45b. Leaves alternate ; fruit not winged 39. ONAGRACEAE
- 44b. Flowers perigynous or hypogynous :
- 46a. Perianth unisexual, consisting of tepals 43. AZOACEAE
- 46b. Perianth bisexual, petals sometimes small 38. LYTHRACEAE
36. Inner whorl of perianth gamophyllous
- 47a. Ovary inferior :
- 48a. Ovary 1-locular, ovule one in each locule; anthers connate ; sepals of pappus 46. ASTERACEAE (Compositae)

48b. Ovary more than 1-locular, ovules more than one in each locule ; anthers not connate; sepals sepaline :

49a. Leaves opposite with interpetiolar stipules

45. RUBIACEAE

49b. Leaves alternate, exstipulate :

50a. Amphibious herbs ; flowers in dense spikes

48. SPHEWOCLEACEAE

50b. Terrestrial herbs; flowers solitary, axillary or in panicled clusters

47. CAMPANULACEAE

47b. Ovary superior :

51a. Stamens more than the corolla lobes usually double; carpels more than two :

52a. Ovary two or more locular ; stamens more than corolla lobes :

53a. Flowers unisexual ; stamens inserted on the receptacle

52. BIGNONIACEAE

53b. Flowers bisexual; stamens inserted on the corolla

51. SAPOTACEAE

52b. Ovary 1-locular ; stamens equal to corolla lobes :

54a. Leaves usually opposite, dotted ; placentation free central

50. PRIMULACEAE

54b. Leaves alternate, glandular ; placentation basal

49. PLUMBAGINACEAE

51b. Stamens equal to or fewer than the corolla lobes; carpels two :

55a. Stamens equal to corolla lobes :

56a. Leaves opposite :

57a. Plants with milky latex ; fruits a pair of follicles :

- | | | |
|------|--|--------------------|
| 58a. | Style one ; corona absent ; filament of stamen free | 55. APOCYNACEAE |
| 58b. | Styles two ; corona present ; filaments fused with stigma to form gynostegium | 56. ASOLIRIADACEAE |
| 57b. | Plants without milky latex ; fruits otherwise : | |
| 59a. | Herbs ; placentation parietal | 58. GENTIANACEAE |
| 59b. | Trees ; placentation basal or axile : | |
| 60a. | Ovary usually 1-celled ; placentation basal, ovules 1-2 | 54. SALVADORACEAE |
| 60b. | Ovary usually 2-celled; placentation axile, ovules many in each cell | 57. LORANIACEAE |
| 56b. | Leaves alternate | |
| 61a. | Mature ovary 4-locular due to spurious partition ; fruit schizocarpic, breaking into four one seeded nutlets ; style gynobasic | 60. BORAGINACEAE |
| 61b. | Mature ovary 2-locular ; fruit not schizocarpic ; style terminal : | |
| 62a. | Ovules 2 in each locule | 61. CONVOLVULACEAE |
| 62b. | Ovules numerous in each locule | |
| 63a. | Placentation parietal | 59. HYDROPHYLACEAE |
| 63b. | Placentation axile | 62. SOLANACEAE |
| 55b. | Stamens less than the corolla lobes : | |
| 64a. | Flowers actinomorphic ; stamens 2 | 53. OLACACEAE |
| 64b. | Flowers zygomorphic ; stamens 2-4 : | |
| 65a. | Placentation parietal : | |
| 66a. | Root parasites ; flowers in spikes | 64. OKOBASHIACEAE |
| 66b. | Autophytes ; flowers not in spikes : | |
| 67a. | Fruit elongated ; seeds winged | 66. BIONONIACEAE |
| 67b. | Fruit small, woody with hooked prongs, seeds not winged | 68. MARYNIACEAE |

65b. Placentation axile :

68a. Rootless ; carnivorous aquatics ; leaf segments modified into bladders ; stamens 2

65. LENTIBULARIACEAE

68b. Plants terrestrial ; stamens 2-4 :

69a. Placenta enlarged ; ovules many in each locule

63. SCROPHULARIACEAE

69b. Placenta not enlarged ; ovules in one linear row in each locule

70a. Fruit capsular :

71a. Pedicels without swollen glands at the base; capsule opening elastically, seeds usually on hooked funicles

69. Acanthaceae

71b. Pedicels with swollen glands at the base; capsule not elastic; seeds not on hooked funicles

67. PEDALIACEAE

70b. Fruit a drupe or schizocarpic dividing into 4-nutlets :

72a. Style terminal ; fruit a drupe

70. VERBENACEAE

72b. Style gynobasic ; fruit with 4-nutlets

71. LAMIACEAE
(Labiatae)

2b. Flowers with perianth 0 or in one whorl (except Polygalaceae) usually sepaline :

73a. Perianth 0 ; stamens in two whorls

78. PIPERACEAE

73b. Perianth present ; stamens in one whorl :

74a. Flowers bisexual :

75a. Ovary inferior ; ovules many

77. ARISTOLOCHIACEAE

75b. Ovary superior ; ovules solitary

76a. Perianth bract like :

- | | | |
|------|---|----------------------|
| 77a. | Leaves not succulent; filaments of anthers connate at the base; bracts scarious | 73. AMARANTHACEAE |
| 77b. | Leaves succulent; filaments of anthers not connate; bracts not scarious | 74. CHENOPODIACEAE |
| 76b. | Perianth petaloid : | |
| 78a. | Leaves with excrete stipules; ovary trigonous | 76. POLYGONACEAE |
| 78b. | Leaves exstipulate; ovary never trigonous : | |
| 79a. | Trees | 79. PROTACEAE |
| 79b. | Herbs or shrubs : | |
| 80a. | Perianth united; fruit an achene | 72. NYCTAGINACEAE |
| 80b. | Perianth free; fruit a berry | 75. PHYTOLACACEAE |
| 74b. | Flowers unisexual : | |
| 81a. | Male and female flowers in catkins or spikes : | |
| 82a. | Stems jointed; leaves reduced to whorls of scales | 85. CASUARINACEAE |
| 82b. | Stems not jointed; leaves expanded : | |
| 83a. | Plants with milky sap; seeds few, glabrous | 83. MORACEAE |
| 83b. | Plants without milky sap; seeds many, woolly | 86. SALICACEAE |
| 81b. | Flowers not in catkins or spikes : | |
| 84a. | Aquatic herbs; leaves with setaceous segments | 87. CERATOPHYLLACEAE |
| 84b. | Terrestrial plants; leaves not as above : | |
| 85a. | Seed with a straight embryo; stinging hairs present; often with cystoliths | 81. UTRICULACEAE |
| 85b. | Seed with a curved embryo; stinging hairs absent; cystoliths absent : | |

- 86a. Fruit many seeded (capsule or regma) ; plants with milky latex ; ovary 3-locular ; styles 3 : 80. EUPHORBIACEAE
- 86b. Fruit single seeded (achene or samara) ; plants without milky latex ; ovary 1-locular ; styles 2 :
- 87a. Trees ; flowers tetramerous ; fruit samara 82. ULMACEAE
- 87b. Herbs ; flowers pentamerous ; fruit achene 84. CANNABINACEAE
- 1b. Leaves parallel veined ; stem with closed bundles ; taproot usually absent ; cotyledon one :
- 88a. Perianth absent or rudimentary ; represented by hairs or scales :
- 89a. Flowers subtended by glumes (chaffy scales) ; perianth reduced to scales or hypogynous setae or absent in Cyperaceae and represented by lodicules in Poaceae : 103. ERICAGULACEAE
- 90a. Inflorescence a solitary head on spirally ribbed peduncle
- 90b. Inflorescence various but not as above :
- 91a. Culms usually solid, triquetrous ; leaf sheaths not split; perianth represented by hypogynous bristles or absent ; ovary trigonous or lenticular ; fruit an achene 104. CYPERACEAE
- 91b. Culms hollow, cylindrical or compressed ; leaf sheaths split ; perianth represented by lodicules ; ovary usually not trigonous ; fruit a caryopsis 105. POAETIAE (Gramineae)
- 89b. Flowers not subtended by glumes ; perianth absent or represented by hairs :
- 92a. Flowers in cylindrical spadix :
- 93a. Inflorescence a simple fleshy spike (spadix) of inconspicuous flowers subtended by a usually large bract like spathe ; aquatic plants 97. ARACEAE

- 93b. Flowers in 2 cylindrical, superposed spikes, male and female flowers subtended by caducous bract like spathe ; marshy plants 96. TYPHACEAE
- 92b. Flowers not in cylindrical spadix :
- 94a. Plant body thallus-like, not differentiated into stem and leaf 98. LEMNACEAE
- 94b. Plant body differentiated into stem and leaf :
- 95a. Flowers bisexual ; carpels 4, free, not with dilated stigma 101. POTAMOGETONACEAE
- 95b. Flowers unisexual ; carpels 1 - 9, free, each with a dilated stigma 102. ZANNICHIELIACEAE
- 88b. Perianth well developed usually of 2-series, atleast the inner petaloid
- 96a. Ovary apocarpous :
- 97a. Carpels with diffuse parietal placentation 100. RUTACEAE
- 97b. Carpels with basal placentation 99. ALISMATACEAE
- 96b. Ovary syncarpous :
- 98a. Ovary superior :
- 99a. Perianth sepaloid :
- 100a. Perennial herbs ; placentation parietal; fruit a capsule 94. JUNCACEAE
- 100b. Shrubs or trees ; placentation basal or axile ; fruit a berry or drupe 95. ARACEAE (Palmac)
- 99b. Perianth petaloid
- 101a. Aquatic plants ; leaves with floats in petiolar region 92. PONTEDERIACEAE
- 101b. Terrestrial plants ; leaves otherwise :
- 102a. Flowers subtended by a cymbiform (boat-shaped) green spathe except *Murdannia* 93. COMMELINACEAE

- 102b. Flowers not subtended by such a bract 91. LILIACEAE
- 98b. Ovary inferior
- 103a. Flowers zygomorphic, bisexual 90. AGAVACEAE
- 103b. Flowers actinomorphic, unisexual or bisexual
- 104a. Plants aquatic, submerged or floating 88. HYDROSTYRACEAE
- 104b. Plants terrestrial 89. AMARYLLIDACEAE

DICOTYLEDONES

1. RANUNCULACEAE

RANUNCULUS L.

- | | |
|--------------------------------------|-------------------------|
| 1a. Heads globose; achenes tubercled | 1. <i>R. muricatus</i> |
| 1b. Heads oblong; achenes tubercled | 2. <i>R. sceleratus</i> |

1. **Ranunculus muricatus** L. Sp. Pl. 555. 1753; Hook. f., Fl. Brit. Ind. 1:20, 1872.

Erect or diffuse, glabrous, annual herbs, 10-30 cm high. Leaves petiolate, 2.5-4.0 cm across, 3-partite, lobes irregularly cut, base rounded or nearly cordate. Flowers 7-8 mm across, yellow, solitary, axillary. Sepals reflexed, shorter than the petals. Achenes in a large globose head, tubercles scattered over the flattened sides.

Fls. : Jan.-Mar.; *Frt.s.* : Mar.-Apr.; AKS 650, RBS College garden.

2. **Ranunculus sceleratus** L. Sp. Pl. 551. 1753; Hook. f., Fl. Brit. Ind. 1 : 19, 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 21. Repr. ed. 1960.

Erect, branched, glabrous, annual herbs, 30-60 cm high. Stems fistular, ribbed. Radical leaves long-petiolate, deeply 3-lobed, each lobe further dissected; segments obovate, cuneate; caudine leaves shortly petiolate, 3-partite, segments linear, lobed and toothed. Flowers about 6 mm in diam. Calyx reflexed. Petals yellow. Achenes many, in oblong heads, obliquely obovate, turgid.

Fls. : Jan.-May ; *Frt.s.* : May-June ; *Vern.* : *Jaldhania* ; AKS 91, Poiya ghat.

Common, particularly near water and in sandy soil on the banks of Jamuna and Utangan.

2. MENISPERMACEAE

- | | |
|--------------------------|---------------------|
| 1a. Woody climber | 3. <i>Tinospora</i> |
| 1b. Herbaceous climber : | |

- 2a. Stamens free 2. *Cocculus*
 2b. Stamens connate 1. *Cissampelos*

1. CISSAMPELOS L.

Cissampelos pareira L. Sp. Pl. 1031. 1753; Hook., f. Fl. Brit. Ind. 1:103. 1872; Duthie, Fl. U. Gang. Pl. 1 : 31. Repr. ed. 1960.

A twining, more or less tomentose, perennial shrub. Leaves long petiolate, 3.5 - 7.5 X 4.0 - 8.5 cm, hemispherical or suborbicular, usually peltate, base cordate. Flowers minute, pale green. Male flowers in pedunculate, branched cymes, clustered in the leaf axils, densely tomentose. Female flowers 1-2, in the axils of conspicuous bracts. Drupes subglobose, red when ripe.

Fls. : Sept. - Oct. ; *Frt.s.* : Oct. Nov. ; *Vern.* : *Patat Ki bel* ; AKS 538, 802, Chiknipur.

Found on the ridge and hilly tracts twining around shrubs.

2. COCCULUS DC. nom. cons.

- 1a. Leaves ovate - oblong; male flowers in axillary panicles 1. *C. hirsutus*
 1b. Leaves narrowly lanceolate; male flowers in sessile, axillary clusters 2. *C. pendulus*

1. *Cocculus hirsutus* (L.) Diels in Engl. Pflanzenr. 46 : 236. 1910; Santapau in Rec. Bot. Surv. Ind. 16(1) : 5. 1953. *Menispermum hirsutum* L. Sp. Pl. 341. 1753. *Cocculus villosus* DC. Syst. 1 : 525. 1818; Hook. f., Fl. Brit. Ind. 1 : 101. 1872; Duthie, Fl. U. Gang. Pl. 1 : 29. Repr. ed. 1960

An extensive, climbing shrub. Leaves petiolate, 2.5 - 6.0 X 1.5 - 5.5 cm, ovate or ovate - oblong, obtuse or mucronate, usually subauriculate at the base. Flowers minute, greenish yellow. Male flowers in short axillary panicles. Female flowers 1 - 3, on axillary pedicels; bracts small, linear. Drupes dark purple.

Fls. : Oct. - Jan. ; *Frt.s.* : Jan. Feb. ; *Vern.* : *Khareta Ki bel* ; AKS 72, 222, Chhalesar ; 323, Sikandra.

Common on the ridge climbing on shrubs and trees.

2. *Cocculus pendulus* (Forst.) Diels in Engl. Pflanzenr. 46 : 237, f. 78, 1910; Fl. Saur. I : 5, 1962; *Epibaterium pendulum* Forst. Char. Gen. 108, t. 54, 1776; Hook.f., Fl. Brit. Ind. I : 102, 1872; Duthie, Fl. U. Gang. Pl. 1 : 30. Repr. ed. 1960.

A climbing shrub. Leaves petiolate, 1.5–3.5 × 0.9–2 cm, linear, narrowly lanceolate, entire, obtuse. Flowers minute, greenish yellow. Male flowers short pedicelled, in axillary panicles. Female flowers solitary on axillary peduncles. Drupes reniform, dark purple.

Fls. : Feb. Apr.; *Frt.* : Apr. May; AKS 871, Tantpur.

Occurs on the slopes of the ridge and hilly tracts.

3. TINOSPORA Miers

Tinospora cordifolia (Willd.) Miers in Ann. & Mag. nat. Hist. ser. 2, 7 : 38, 1851; Hook. f., Fl. Brit. Ind. I : 97, 1872; Duthie, Fl. U. Gang. Pl. 1 : 27. Repr. ed. 1960. *Menispermum cordifolium* Willd. Sp. Pl. 4 : 826, 1806.

A large, succulent, glabrous, climbing shrub. Leaves petiolate, 7–12.5 × 6–8.5 cm, broad cordate, acute or acuminate. Flowers small, yellow; male ones in fascicles, females usually solitary.

Fls. & *frts.* : Mar. May; Vern. : Giloya; AKS 891, Paliwal Park.

Grown in the gardens and lawns.

3. NYMPHAEACEAE

NYMPHAEA L. nom. cons.

- | | |
|--|------------------------|
| 1a. Leaves glabrous on the lower sides;
anthers with appendages | 1. <i>N. nouchali</i> |
| 1b. Leaves pubescent on the lower sides;
anthers without appendages | 2. <i>N. pubescens</i> |

1. *Nymphaea nouchali* Burm. f. Fl. Ind. 120, 1768; Subram. Aq. Ang. 8, t. 1, f. 2, 1962. *N. stellata* Willd. Sp. Pl. 2 : 1153, 1799; Hook. f., Fl. Brit. Ind. I : 114, 1872; Duthie, Fl. U. Gang. Pl. 1 : 34, Repr. ed. 1960.

An aquatic, floating herb. Leaves orbicular or elliptic, cleft at base, blotched with purple beneath. Flowers large, solitary on long radical scapes, white, blue,

rose or purple, mildly scented. Sepals 4. Petals in many series. Anthers with long appendages. Fruits globular.

Fls. & frts. : July - Nov. ; *Vern.* : *Chhota Kamal* ; AKS 745 Shahjahan Garden ; 836, Salempur

Common in ponds and in water reservoirs of the low lying area.

2. *Nymphaea pubescens* Willd. Sp. Pl. 2 : 1154. 1799 ; Baker & Bakb. f. in Fl. Java 1 : 148. 1963. *N. lotus* auct. non L. ; Hook. f., Fl. Brit. Ind. 1 : 114. 1872, p.p.

A floating herb. Leaves sagittate when young, orbicular or reniform, sharply toothed, pubescent beneath. Flowers solitary, on long radical scapes, variable in size and colour. Anthers without appendages. Fruits globose, fleshy; stigmatic rays with clubbed appendages. Seeds broadly ellipsoid, rough.

Fls. & frts. : Sept. - Nov. ; *Vern.* : *Kamal Kakri* ; AKS 882, Kiraoli.

Occurs in the temporary ponds and in water streams.

4. PAPAVERACEAE

ARGEMONE L.

- 1a. Flowers bright yellow ; stigma - lobes more or less appressed 1. *A. mexicana*
- 1b. Flowers pale yellow or white; stigma - lobes spreading 2. *A. ochroleuca*

1. *Argemone mexicana* L. Sp. Pl. 508. 1753 ; Hook. f., Fl. Brit. Ind. 1 : 117. 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 37. Repr. ed. 1960.

A robust, branched, prickly herb, 30 - 100 cm high. Lower leaves crowded in a rosette, petiolate ; higher ones half amplexicaul, sinuately - pinnatifid, glaucous, prickly. Flowers 2.5 - 3.5 cm across, terminal, sessile or on very short peduncles. Sepals 3, green with an acute horn at the apex. Petals 6, bright yellow. Stigmas red. Capsules elliptic or oblong, erect, prickly, dehiscing by valves. Seeds black.

Fls. : Oct. - Apr. ; *Frts.* : Apr. - May ; *Vern.* : *Satyanasi* ; AKS 748, Bypass Road.

Common along the roadsides and in open waste places.

2. Argemone ochroleuca Sweet, Brit. Fl. Gard. 3 : t. 242. 1828 ; Ownb. in Mein. Torrey Bot. Cl. 21: 29–31. 1958. *Argemone mexicana* L. var. *ochroleuca* (Sweet) Lindl. Bot. Reg. 1343. 1830.

An erect, prickly, glaucous, annual herb, 20–100 cm high. Lower leaves in a rosette; upper ones half-amplexicaul, sinuately pinnatifid, prickly. Flowers sessile. Sepals 3. Petals 6, pale yellow or white. Stigmas dark red. Capsules ovate-lanceolate or lanceolate, clothed with spines.

Fls. : Oct. Mar. ; *Frt.s.* : Mar. Apr. ; *Vern.* : Satyanasi; AKS 943, Bypass Road.

Common in open waste lands and along roadsides.

5. FUMARIACEAE

FUMARIA L.

Fumaria indica (Hassk.) Pugsley in J. Linn. Soc. Bot. 44 : 313. 1919 ; *F. vaillantii* var. *indica* Hassk. in Flora 56 : 443. 1873. *F. parviflora* Wt. & Arn. Prodri. 18. 1834 (non Lamk.). *F. parviflora* subsp. *vaillantii* sensu Hook. f. in Fl. Brit. Ind. 1 : 128. 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 37. Repr. ed. 1960.

A diffuse, much-branched, annual herb. Leaves finely divided into narrow flat segments. Flowers small, in terminal or leaf-opposed racemes. Sepals 2, much smaller than the corolla. Petals rosaceous, two outer dissimilar, posterior produced at the base into a short spur, anterior one flat, narrow; two inner narrow, cohering by their tips, keeled at the base. Fruits globose, 2–2.5 mm in diam., 1-seeded, indehiscent.

Fls. : Nov. Jan. ; *Frt.s.* : Jan. Feb.; *Vern.* : Gajri : AKS 10, Dayalbagh.

Common in moist places of the gardens and cultivated fields.

6. BRASSICACEAE

(Cruciferac)

1a. Fruits indehiscent

3. *Cornutopus*

1b. Fruits dehiscent

2a. Fruits terete or compressed dorsally, many seeded.

3a. Fruits short and broad :	
4a. Flowers white ; seeds winged	4. <i>Farsetia</i>
4b. Flowers yellow ; seeds not winged	2. <i>Cochlearia</i>
3b. Fruits long and narrow :	
5a. Seeds in 2 rows	6. <i>Rorippa</i>
5b. Seeds in 1 row	7. <i>Sisymbrium</i>
2b. Fruits compressed laterally, 1 - 2 seeded :	
6a. Fruits 2 - seeded, compressed laterally	5. <i>Lepidium</i>
6b. Fruits 1 - seeded, orbicular - ellipsoid	1. <i>Alyssum</i>

1. ALYSSUM L.

Alyssum maritimum (L.) Lamk. Encycl. 1 : 98. 1783. *Clypeola maritima* L. Sp. Pl. 652. 1753.

An erect or diffuse, pubescent herb, 10 - 25 cm high. Leaves petiolate, 1.9 - 3.0 x 0.3 - 0.6 cm, linear - oblanceolate, entire, acute. Flowers small, white, in dense terminal racemes. Fruits orbicular ellipsoid, cells 1 seeded, 3 - 4 x 2 cm.

Fls. : Jan. Feb. ; *Frts.* : Feb. Mar. ; AKS 667, Taj nursery.

Found as an escape in Taj nursery.

2. COCHLEARIA L.

Cochlearia cochlearioides (Roth) Santapau & Mahesh. in J. Bombay Nat. Hist. Soc. 54 : 804. 1957. *Alyssum cochlearioides* Roth, Nov. Pl. Sp. 322. 1821. *Cochlearia flava* Buch. - Ham. ex Roxb. Hort. Beng. 48. 1814, nom. nud. ; Hook. f., Fl. Brit. Ind. 1 : 145. 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 4t. Repr. ed. 1960.

An erect, glabrous, diffusely branched, annual herb. Leaves shortly petiolate, 8 - 12.5 x 2 - 2.5 cm, pinnatifid ; lobes sinuate toothed. Flowers yellow, small, in elongated racemes. Sepals spreading. Fruits globose, smooth. Seeds rugose, compressed.

Fls. : Nov. Dec. ; *Frts.* : Dec. Jan. ; AKS 894, Fatehpur Sikri.

Found near the ponds, canals and in moist places.

3. *CORONOPUS* L. nom. cons.

Coronopus didymus (L.) Sm. Fl. Brit. 2 : 691. 1800. *Lepidium didymum* L. Syst. 2 : 433 & Mant. 92. 1767. *Senebiera pinnatifida* DC. in Mem. Soc. Hist. Nat. Par. 144, t. 9. 1799 ; Duthie, Fl. U. Gang. Pl. 1 : 46. Repr. ed. 1960.

A prostrate or diffuse, branched, annual herb often forming a rosette. Leaves finely 1 to 2 - pinnatised. Flowers minute, white, in leaf - opposed racemes. Fruits didymous, 2 - 2.5 mm broad consisting of two reticulate, indehiscent lobes which separate on falling. Seed one in each lobe, reniform, brown.

Fls. : Nov. - Mar. ; *Frt.s.* : Mar. - Apr. ; *Vern.* : *Jengli hala*; AKS 274, Shahjahan garden.

Abundant in moist places of the gardens, fields and along roadsides.

4. *FARSETIA* Turra.

Farsetia hamiltonii Royle, Ill. 71. 1839 ; Hook. f. Fl. Brit. Ind. 1 : 140. 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 40. Repr. ed. 1960.

An erect, much branched herb, 30 - 75 cm high, covered with dense appressed hairs. Leaves alternate, 2.5 - 7.5 x 0.2 - 0.5 cm, linear, very narrow, acute. Flowers whitish, small in spicate racemes. Fruits 1.2 - 2 x 0.4 - 0.5 cm, sessile, linear oblong, pointed, much compressed. Seeds orbicular, broadly winged, deep brown.

Fls. : May Aug. ; *Frt.s.* : Aug. Sept. ; AKS 162, Poiya ghat.

Common in sandy soil of cultivated fields and unused grounds.

5. *LEPIDIUM* L.

Lepidium sativum L. Sp. Pl. 644. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 159. 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 46. Repr. ed. 1960.

An erect, glabrous, annual herb, 20 - 45 cm high. Radical leaves petiolate, 2 - pinnatisect ; caudine ones sessile, often entire. Flowers small, white or pinkish in elongating racemes. Fruits oblong - orbicular, laterally compressed, notched at the tips, 2 - seeded, 5 - 6 mm long ; valves winged.

Fls. : Feb. Mar. ; *Frt.s.* : Mar. Apr. ; *Vern.* : *Hala* ; AKS 95, Poiya ghat.

Occurs in moist places of gardens and fields.

6. Rorippa Scop.

Rorippa indica (L.) Hiern, Cat. Afr. Pl. Welw. Pl. 1, 26, Addit. & Corr. 1896.
Sisymbrium indicum L. Mant. 1 : 93, 1767. *Nasturtium indicum* DC. Prodr. 1 : 139, 1824 ; Hook. f. Fl. Brit. Ind. 1 : 134, 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 39. Repr. ed. 1960.

An erect, branching herb, 30–60 cm high. Leaves sinuately pinnatifid ; lobes entire. Flowers small, yellow, in many flowered, long racemes. Petals as long as the sepals. Fruits 2–4 x 0.1 cm, narrow, cylindrical.

Fls. : Jan. Feb. ; *Frt.s.* : Feb. Mar. ; AKS 669, Shahjahan garden.

Found in moist places of gardens and open waste fields.

7. SISYMBRIUM L.

Sisymbrium irio L. Sp. Pl. 659, 1753; Hook f. Fl. Brit. Ind. 1 : 150, 1872; Duthie, Fl. U. Gang. Pl. 1 : 42. Repr. ed. 1960.

An erect, annual herb, 15–60 cm high. Leaves shortly petiolate, pinnatifid, lobes distant, spreading, toothed. Flowers small, yellow in lax racemes. Fruits erect, subtorulose, glabrous, 2–4.5 x 0.1–0.15 cm.

Fls. : Jan. Feb. ; *Frt.s.* : Feb. Mar. ; AKS 353, Rambagh ; 645, Poiya ghat.

Common in moist places of cultivated fields, gardens and along roadsides.

List of cultivated Taxa:

Brassica rapa L. Sp. Pl. 666, 1753 ; Bailey, Man. Cult. pl. 436, 1949. *Vern.* : *Shalgam*.

Brassica oleracea L. var. *capitata* L. Sp. Pl. 667, 1753; Blatt. in J. Bombay Nat. Hist. Soc. 34 : 297, 1930. *Vern.* : *Bandhagobhi*.

Brassica oleracea L. var. *botrytis* L. Sp. Pl. 667, 1753, Bailey, Man. Cult. Pl. 436, 1949. *Vern.* : *Phoolgobhi*.

Brassica campestris L. var. *sarson* Prain in Dept. Land Rec. & Agric. Bengal, Bull. No. 4 : 24, II. 5–7, 1898 ; Duthie, Fl. U. Gang. Pl. 1 : 44. Repr. ed. 1960.

Brassica juncea (L.) Czern. & Coss.; Czern. Conspl. Pl. Chark. 8, n.5, 1859 ; Coss. in Bull. Soc. Bot. France 6 : 609, 1859 ; Hook. f. & T. Anders. in Fl. Brit.

Ind. 1 : 157. (in part). *Sinapis juncea* L. Sp. Pl. 668. 1753, excl. Synt. Herm. *Brassica juncea* Hook. f. & Thoms. in J. Linn. Soc. 5 : 170. 1861, in part; Duthie, Fl. U. Gang. Pl. 1 : 43. Repr. ed. 1960.

Brassica nigra Kock in Roehl. Deutschl. Fl. 4 : 713. 1833; Hook. f. Fl. Brit. Ind. 1 : 156. 1872; Duthie, Fl. U. Gang. Pl. 1 : 43. Repr. ed. 1960., Vern. : Poorbirai.

Raphanus sativus L. Sp. Pl. 669. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 166. 1872; Duthie, Fl. U. Gang. Pl. 1 : 47. Repr. ed. 1960. Vern. : Muli.

7. CAPPARACEAE

(Capparidaceae)

1a. Herbs ; fruits capsular 3. *Cleome*

1b. Shrubs or trees ; fruit a berry 4. *Crataeva*

2a. Leaves trifoliate 4. *Crataeva*

2b. Leaves simple : 5. *Maerua*

3a. Petals clawed ; stamens 4 - 6 1. *Cadaba*

3b. Petals not clawed ; stamens numerous : 2. *Capparis*

4a. Armed shrub or small tree; berry not moniliform 2. *Capparis*

4b. Unarmed woody climber; berry moniliform 5. *Maerua*

1. CADABA L.

Cadaba fruticosa (L.) Druce in Rep. Bot. Exch. Cl. Brit. Isles 1913, 3 : 415. 1914 ; Raizada in Ind. For. 5 : 303. 1966. *Cleome fruticosa* L. Sp. Pl. 671. 1753. *Cadaba farinosa* Forsk. Fl. Aegypt. - Arab. 68. 1775. ; Raizada in Ind. For. 8 : 469. 1958. *Cadaba indica* Lamk. Encycl. 1 : 544. 1785. Hook. f. Fl. Brit. Ind. 1 : 172. 1872 ; Haines, Bot. Bih. & Or. 317. Repr. ed. 1961.

A straggling, much branched shrub, 2 - 2.5 m high. Leaves shortly petiolate, 2.2 - 5.3 x 0.9 - 2.1 cm, elliptic or oblong, retuse, glaucous, glabrous. Flowers pale white, in terminal corymbs. Sepals 4, 1.2 cm. long, subequal, ovate-oblong. Petals 4, 1.3 cm long, spatulate. Fruits subterete or slightly torulose seated on a gynophore.

Fls. : Oct. - Dec. ; *Frt.* : Dec. - Jan. ; AKS 575, Niyamatpur.

First record from the area ; found on the ridge in ravine tract.

2. CAPPARIS L.

1a. Older branches leafless ; flowers red 1. *C. decidua*

1b. All the branches leafy ; flowers white 2. *C. sepiaria*

1. ***Capparis decidua*** (Forsk.) Edgew. in J. Linn. Soc. 6 : 184. 1862; Pax in Engl. & Prantl, Pflanzenf. 3 (2) : 230, 231, f. 139. 1891. *Sodada decidua* Forsk. Fl. Aegypt. - Arab. 81. 1775. *Capparis aphylla* Roth, Nov. Pl. Sp. 238. 1821; Hook. f. Fl. Brit. Ind. 1 : 174. 1872; Duthie, Fl. U. Gang. Pl. 1 : 51. Repr. ed. 1960.

A leafless, much branched, straggling shrub or small tree. Thorns in pairs, short, straight or recurved. Leaves on young shoots only, linear, oblong, acute, caducous. Flowers red or scarlet, in many flowered corymbs on short lateral branches. Sepals unequal, pubescent. Petals narrow oblong, longer than the sepals. Ovary stipitate. Fruits 1.5 - 2 cm in diam., globose or ovoid, red when ripe.

Fls. : Mar. - June ; *Frt.s.* : June - July ; *Vern.* : *Karit* ; AKS 748, Bypass Road.

Common in open waste places, along roadsides and on the ridge.

2. ***Capparis sepiaria*** L. Syst. Nat. ed. 10, 2 : 1017. 1759; Hook. f. Fl. Brit. Ind. 1 : 177. 1872; Duthie, Fl. U. Gang. Pl. 1 : 52. Repr. ed. 1960.

An evergreen, branched, climbing shrub. Thorns paired, recurved. Leaves shortly petiolate, 2 - 5.5 x 1.2 - 3 cm, ovate - elliptic or elliptic-lanceolate, subacute or retuse. Flowers 1.2 - 1.5 cm across, white, in many flowered, terminal umbels. Petals oblong, unequal. Ovary stipitate. Berries 0.8 - 1 cm in diam., globose, deep purple when ripe.

Fls. : Apr. - June ; *Frt.s.* : June - July ; *Vern.* : *Heens* ; AKS 409, Delhi gate.

Common on the ridge and along roadsides, also planted for hedges.

3. CLEOME L.

1a. Gynophore present 2. *C. gynandra*

1b. Gynophore absent

2a. Stamens 6 ; capsules less than 1.5 cm long 1. *C. brachycarpa*

2b. Stamens 12 or more ; capsules more than 2.5 cm long 3. *C. viscosa*

1. *Cleome brachycarpa* Vahl ex DC. Prodr. 1 : 240. 1824; Hook. f. Fl. Brit. Ind. 1 : 169. 1872; Duthie, Fl. U. Gang. Pl. 1 : 48. Repr. ed. 1960.

A strongly scented, glandular, scabrous herb, 15 cm high branching from the base. Leaves 3-foliate; leaflets obovate or oblong. Flowers yellow. Stamens 6. Capsules about 1 cm long, oblong, rough. Seeds minute, smooth.

This plant is included on the authority of Jacquemont (in Duthie, Fl. U. Gang. Pl. 1 : 48).

2. *Cleome gynandra* L. Sp. Pl. 671. 1753; Jacobs in Fl. Males. 6 : 101. 1960. *Gynandropsis pentaphylla* (L.) DC. Prodr. 1 : 238. 1824; Hook. f. Fl. Brit. Ind. 1 : 171. 1872; Duthie, Fl. U. Gang. Pl. 1 : 49. Repr. ed. 1960. *C. gynandra* (L.) Briq. Ann. Cons. Jard. Bot. Geneve 17 : 382. 1914. *Cleome pentaphylla* L. Sp. Pl. ed. 2.983. 1762.

An erect, branched, glandular pubescent, annual herb, 30-60 cm high. Leaves digitately 5-foliate; leaflets sessile, 3.5-6 x 1.5-2.5 cm, broadly obovate, acute or obtuse. Flowers white, cream-coloured or pinkish, in corymbose racemes. Capsules elongate, viscid pubescent, striate, 3.5-8.5 cm long.

Fls. : July - Aug.; *Frt.* : Aug. - Sept.; *Vern.* : *Hulhul*; AKS 139, Bichpuri campus.

Common along the roadsides and in cultivated and waste fields.

3. *Cleome viscosa* L. Sp. Pl. 672. 1753; Hook. f. Fl. Brit. Ind. 1 : 170. 1872; Duthie, Fl. U. Gang. Pl. 1 : 48. Repr. ed. 1960.

An erect, branched annual herb, 30-60 cm high, viscid and stinking. Leaves 3-5-foliate; leaflets 2-5 x 1-2.5 cm, ovate or oblanceolate. Flowers yellow, solitary, axillary or in leaf-bearing terminal racemes. Capsules linear, cylindric, short-beaked, 3-10 cm long, glandular-pubescent, longitudinally striate. Seeds reniform, bark brown.

Fls. : July - Sept.; *Frt.* : Sept. - Oct.; *Vern.* : *Hulhul*; AKS 127, Paliwal Park; 134, 140, Bichpuri campus.

Common in cultivated and fallow fields and along the roadsides.

4. CRATAEVA L.

Crataeva adansonii DC. subsp. *odora* (Buch. Ham.) Jacobs in Blumea 12: 198. 1964. *Odora* Buch. Ham. in Trans. Linn. Soc. 15 : 118. 1827.

A moderate sized, erect, unarmed, deciduous tree. Bark ash coloured. Leaves long petiolate, 3 foliolate; leaflets 5-12 x 2.5-4 cm, ovate or ovate lanceolate, acuminate. Flowers 5-6 cm across, greenish yellow, in terminal corymbs. Stamens longer than the petals; gynophore short. Berries many seeded, globose, foetid smelling.

Fls. : Apr. - May ; *Frt.* : May - June ; *Vern.* : *Barna* ; AKS 406, College campus.

Planted in the gardens and roadsides.

5. MAERUA Forsk.

Maerua oblongifolia (Forsk.) A. Rich in Guill & Perr. Fl. Seneg. Test. 1 : 32. t. 5. 1831; Keay in Hutch & Dalz. Fl. West Trop. Afr. ed. 2.1.89. 1974. *Capparis oblongifolia* Forsk. Fl. Aegypt. Arab. 99. 1775. *Maerua arenaria* (DC.) Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 171. 1872. *Niebuhvia arenaria* DC. Prodr. 1 : 244. 1824.

A large, pubescent, woody climber or liana. Leaves shortly petiolate, 2-4 x 1.4-2.3 cm, broadly ovate-elliptic, retuse. Flowers greenish-yellow, in corymbs on terminal or lateral shoots. Calyx tube dilated above, softly pubescent. Stamens many. Berries moniliform, and deeply constricted between the seeds.

Fls. : Mar. - Apr. ; *Frt.* : Apr. - May ; AKS 375, St. John's College campus.

Found climbing on *Capparis sepiaria* L.

8. VIOLACEAE

HYBANTHUS Jacq.

Hybanthus enneaspermus (L.) F. v. Muell. Fragm. Phyt. Austr. 10 : 81. 1876. *Viola enneasperma* L. sp. Pl. 937. 1753. *Ionidium suffruticosum* (L.) Ging. in DC. Prodr. 1 : 311. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 185. 1872. *V. suffruticosa* L. Sp. Pl. 937. 1753. *I. heterophyllum* Vent. Jard. Malm. 27. 1803; Duthie, Fl. U. Gang. Pl. 1 : 54. Repr. ed. 1960.

A diffuse or ascending, glabrous or pubescent herb, 20-45 cm long. Leaves subsessile, 1.2-4.5 x 0.3-0.6 cm, linear or lanceolate, serrate, acute; stipules subulate. Flowers red, solitary, axillary, irregular. Petals 5, spreading, the lowest

one largest with a long claw and a large oval or orbicular limb. Stigma globose. Capsules subglobose, 3-valved. Seeds striate.

Fls. : Sept. - Dec.; *Frt.* : Dec. - Jan.; *Vern.* : Ratanpur ; AKS 385, 766, Poiya ghat ; 860, Kitham.

Occurs in sandy soil of cultivated and fallow fields and in unused grounds.

9. FLACOURTIACEAE

FLACOURTIA Commers.

Flacourtia indica (Burm.f.) Merr. Interpret. Herb. Amb. 377, 1917. *Gmelina indica* Burm. f. Fl. Ind. 132, t. 39, f. 5. 1768. *F. sepiaria* Roxb. Pl. Cor. 1 : 48, t. 68. 1795 ; Duthie, Fl. U. Gang. Pl. 1 : 57. Repr. ed. 1960; Hook. f. Fl. Brit. Ind. 1 : 194. 1872.

A much branched, thorny shrub or small tree. Leaves alternate, petiolate, 2-6.5 x 1.5-4.5 cm, ovate or suborbicular, crenate-serrate, often cuneate at the base, glabrous, coriaceous, pubescent especially on the veins. Flowers small, greenish-yellow, dioecious, solitary or few, in axillary racemose clusters. Sepals 5, rusty. Petals none. Stamens numerous. Styles 4-5, short. Drupes globose, 7-9 mm in diam., purple.

Fls. : Feb. - Apr.; *Frt.* : Apr. - May; *Vern.* : Khatai ; AKS 877, Tantpur; 883, Niyamalpur.

Found on the slopes of the ridge and hilly tracts on gravelly soil.

10. POLYGALACEAE

POLYGALA L.

- | | |
|--|------------------------|
| 1a. Flowers pink ; caruncle 3-lobed | 1. <i>P. chinensis</i> |
| 1b. Flowers yellow or mauve ; caruncle appendages absent | 2. <i>P. erioptera</i> |

1. *Polygala chinensis* L. Sp. Pl. 104. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 204. 1872; Duthie, Fl. U. Gang. Pl. 1 : 60. Repr. ed. 1960. *P. glomerata* Lour. Fl. Cochinch. 426. 1790 ; Hook. f. Fl. Brit. Ind. 1 : 206. 1872.

A sub-erect or diffuse, branched herb, 10 - 30 cm long. Leaves 0.8 - 2.2 x 0.3 - 0.6 cm, oblong to narrow linear. Flowers pink, in dense flowered, axillary or extra-axillary racemes. Wings petaloid. Capsules oblong, notched, ciliate on the margins. Seeds oblong, silky ; strophiole 3 lobed.

Fls. & frts. : Aug. - Oct. ; AKS 922, Chhalesar.

Common on the ridge and in waste places.

2. *Polygala erioptera* DC. Prodr. 1 : 326. 1824; Hook. f. Fl. Brit. Ind. 1 : 203. 1872 ; Duthie, Fl. U. Gang. Pl. 1 : 60. Repr. ed. 1960.

An erect or diffuse, annual herb, 10 - 30 cm high. Leaves 1.1 - 2.5 x 0.3 - 0.7 cm, obovate or almost orbiculate to narrow-linear. Flowers yellow or pinky-mauve, in few-flowered, axillary or extra-axillary racemes. Bracts minute, persistent. Wings petaloid, membranous in fruit. Capsules ovate, pubescent, notched at the apex. Strophiole without appendages.

Fls. : Aug. - Oct. ; *Frts.* : Oct. - Nov. ; AKS 73, 223, Chhalesar; 495, Khander.

Common on sandy soil of Jamuna bank, in open waste fields and on the ridge.

11. CARYOPHYLLACEAE

1a. Sepals united in a 5-toothed calyx :

2a. Glabrous herbs; styles 2 7. *Vaccaria*

2b. Pubescent or viscid herbs; styles 3 4. *Silene*

1b. Sepals free :

3a. Styles 3 free :

4a. Stipules scarious

4b. Stipules absent :

5a. Petals deeply lobed

6. *Stellaria*

5b. Petals entire

1. *Arenaria*

3b. Styles 3 connate :

6a. Prostrate or diffuse herbs ; sepals keeled

3. *Polycarpon*

6b. (usually erect herbs; sepals not keeled

2. *Polycarpaea*

1. ARENARIA L.

Arenaria serpyllifolia L. Sp. Pl. 423. 1753; Hook. f. Fl. Brit. Ind. 1 : 239. 1874; Duthie, Fl. U. Gang. Pl. 1 : 63. Repr. ed. 1960.

An ascending, more or less viscid, annual herb, 10-20 cm. long. Leaves opposite, sessile, 5-10 x 2-5 mm, ovate or elliptic-ovate, acute, entire. Flowers in many flowered cymes. Sepals 5 free, 3 mm long lanceolate. Petals white, not 2-partite. Stamens 10, anthers pinkish. Styles 3. Capsules ovoid. Seeds tubercled, black.

Fls. : Feb. Mar.; *Frtts.* : Mar. Apr.; AKS 657, Rambagh.

Occurs in moist places of the gardens and open grounds.

2. POLYCARPaea LAMK. nom. cons.

Polycarpaea corymbosa (L.) Lamk. Tabl. Encycl. 2 : 129. 1797; Hook. f. Fl. Brit. Ind. 1 : 245. 1874; Duthie, Fl. U. Gang. Pl. 1 : 65. Repr. ed. 1960. *Achyranthes corymbosa* L. Sp. Pl. 205. 1753.

An erect, much-branched, annual herb, 15-30 cm. high. Leaves appearing whorled, sessile, 0.8-2.5 cm. long, narrowly linear, mucronate. Flowers white with a pinkish tinge, numerous, crowded on the branched cymes forming large, silvery heads. Sepals linear-lanceolate, chaffy, much exceeding the capsules. Petals much shorter than the sepals. Capsules very small, shining, 3-valved.

Fls. : Aug. Oct.; *Frtts.* : Oct. Nov.; *Vern.* : *Dholphuli*; AKS 166, Poiga ghat.

Common in sandy soil of cultivated fields and waste grounds.

3. POLYCARPON L.

Polycarpon prostratum (Forsk.) Asch. & Schweinf. in Oesterr. Bot. Z. 39: 128. 1889. *Alpine prostrata* Forsk. Fl. Aegypt. Arab. 207. 1775. *Polycarpon loeflingiae* (Wall. ex. Wt. & Arn.) Edgew. & Hook. f. in Fl. Brit. Ind. 1 : 245. 1874; Duthie, Fl. U. Gang. Pl. 1 : 65. Repr. ed. 1960. *Hapaloxa loeflingiae* Wall. ex. Wt. & Arn. Prodr. 359. 1834.

A prostrate or diffuse, glabrous or pubescent, much-branched herb. Leaves appearing whorled, sessile, 1.2-3 x 0.3-0.7 cm, spatulate or cuneate, entire. Flowers small, 3-4 mm across, in many flowered, crowded cymes. Sepals 5, fleshy,

keeled, persistent. Petals 5, small, hyaline, shorter than the sepals. Stamens 5. Capsules subglobose, enclosed in the persistent calyx.

Fls. : Sept. Nov. ; *Frt.s.* : Nov. Dec. ; AKS 865, Salempur.

Found near the drying fields and puddles.

4. SILENE L.

Silene conoides L. Sp. Pl. 418, 1753 ; Hook. f. Fl. Brit. Ind. 1 : 218, 1874; Duthie, Fl. U. Gang. Pl. 1 : 62, Repr. ed. 1960.

An erect, annual glandular-pubescent herb, 15-45 cm high. Leaves sessile, 4.5-7.5 x 0.4-0.8 cm, narrowly lanceolate, acute. Flowers few in terminal panicles. Calyx tubular, 2-2.5 cm long, narrowed upwards, finely grooved, glandular pubescent. Petals 5, pink, clawed. Styles 3. Capsules ovoid.

Fls. : Jan. Mar. ; *Frt.s.* : Mar. Apr. ; AKS 631, Poya ghat.

Common in cultivated fields and open unused grounds.

5. SPERGULA L.

Spergula arvensis L. Sp. Pl. 440, 1753 ; Hook. f. Fl. Brit. Ind. 1 : 243, 1874; Duthie, Fl. U. Gang. Pl. 1 : 63, Repr. ed. 1960.

A suberect or diffuse, glabrous, annual herb, branching from the base. Leaves in false whorls, linear-subulate, somewhat fleshy ; stipules scarious. Flowers white, 4-5 mm across, in terminal, subumbellate cymes. Sepals 5, ovate, obtuse. Stamens 10, in two whorls. Styles 3, free to the base. Capsules ovoid, glabrous. Seeds many, black, shining.

Fls. : Dec. Mar. ; *Frt.s.* : Mar. Apr. ; Vern. : Mumuna ; AKS 48, Bichpuri campus.

Common in open waste places, cultivated fields and in the gardens.

6. STELLARIA L.

Stellaria media (L.) Vill. Cyr. Ess. Pl. Char. 36, 1784; Hook. f. Fl. Brit. Ind. 1 : 230, 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 62, Repr. ed. 1960. *Alsine media* L. Sp. Pl. 272, 1753.

A procumbent or suberect, much-branched, annual herb. Leaves petiolate or the upper ones sessile, $1.5 - 2.5 \times 0.8 - 1.3$ cm, ovate or cordate. Flowers in axillary or terminal cymes. Petals white, shorter than the sepals, 2-partite. Styles 3. Capsules ovoid.

Fls. : Jan. - Mar. ; *Frt.* : Mar. - Apr. ; *Vern.* : *Buchbucha* ; AKS 325, College garden.

Common in moist places of the gardens, waste places and cultivated fields.

7. VACCARIA Medik.

Vaccaria pyramidata Medik. Phil. Bot. 1 : 96. 1789; *Saponaria vaccaria* L. Sp. Pl. 407. 1753; Hook. f. Fl. Brit. Ind. 1 : 217. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 62. Repr. ed. 1960.

An erect, annual, glabrous herb, 30 - 60 cm high. Leaves sessile, somewhat connate at the base, linear-oblong, entire, acute. Flowers in terminal forked cymes. Calyx tubular with 5, broad green nerves. Petals 5, pink, clawed, limb obovate. Capsules included, ovoid.

Fls. : Feb. - Apr. ; *Frt.* : Apr. - May ; AKS 884, Taj Nursery.

Grown in the gardens as ornamental herb and also found as an escape.

12. PORTULACACEAE

PORTULACA L.

Ia. Nodes without appendages ; flowers in terminal clusters ; petals 5 1. *P. oleracea*

Ib. Nodes with a ring of hairs ; flowers solitary, terminal ; petals 4 2. *P. quadrifida*

1. *Portulaca oleracea* L. Sp. Pl. 445. 1753; Hook. f. Fl. Brit. Ind. 1 : 246. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 66. Repr. ed. 1960.

A prostrate or diffuse, glabrous, succulent herb. Leaves sessile, $1 - 3.2 \times 0.5 - 1.6$ cm, cuneate-oblong or spatulate, rounded, succulent. Stipular appendages minute or 0. Flowers sessile, in terminal heads. Sepals fleshy. Petals 5, yellow, notched at the apex, soon falling off. Seeds muriculate, dark brown.

Fls. & *Frt.* : May - Jan. ; *Vern.* : *Kulfa* ; AKS 418, Shahjahan Garden.

Common in waste places and in cultivated and fallow fields.

2. *Portulaca quadrifida* L. Syst. Nat. ed. 12.328. 1766 ; Hook. f. Fl. Brit. Ind. 1 : 247. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 66. Repr. ed. 1960.

A prostrate, much-branched, annual herb, rooting at nodes. Leaves sessile, flat, 5–8 × 2–4 cm, ovate to ovate-lanceolate, obtuse, succulent. Stipular appendages with a ring of white hairs. Flowers yellow, solitary, terminal. Petals 4, soon falling off. Seeds tubercled.

Fls. : Aug. Sept. ; *Frt.s.* : Sept. Oct. ; AKS 27, Salempur ; 135, Bichpuri campus ; 277, Midhakur.

Common near the drying fields and puddles and also in the gardens.

13. TAMARICACEAE

TAMARIX L.

- | | |
|--|-----------------------|
| 1a. Leaf sheaths absent ; flowers bisexual in slender spikes | 3. <i>T. troupili</i> |
| 1b. Leaf sheaths present ; flowers bisexual or unisexual : | |
| 2a. Shrubs ; flowers unisexual, in dense cylindrical spikes | 2. <i>T. dioica</i> |
| 2b. Trees ; flowers bisexual or unisexual, in lax, racemose panicles | 1. <i>T. aphylla</i> |

1. *Tamarix aphylla* (L.) Karsten, Deutsch. Fl. 641. 1880. *Thuja aphylla* L. Cent. Pl. 1 : 32. 1755. *Tamarix articulata* Vahl, Symb. Bot. 2 : 48, t. 32. 1791 ; Hook. f. Fl. Brit. Ind. 1 : 249. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 68. Repr. ed. 1960.

A moderate - sized, coniferous - looking tree, with erect trunk and rough bark. Branches articulated at the base of the sheath. Leaves sheathing, the free portion consisting of a minute triangular tooth ; both sheath and tooth with impressed glands. Flowers pink, loosely scattered on long, slender spikes arranged in loose panicles. Bracts sheathing, shorter than the flowers. Stamens 5. Capsules sessile, broadly ovate.

Fls. : July - Oct. ; *Frt.s.* : Oct. - Nov. ; *Vern.* : Farash ; AKS 761, Near Kailash.

Planted along the roadsides and near the cultivated fields.

2. *Tamarix dioica* Roxb. Hort. Beng. 22. 1814, (nom. nud.) & Fl. Ind. 2 : 101. 1832; Hook. f. Fl. Brit. Ind. 1 : 249. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 68. Repr. ed. 1960.

A gregarious shrub with spreading and drooping branches. Leaves minute, closely appressed, apex acuminate. Flowers purple or rosy, dioecious, in compact, cylindrical, loosely panicled spikes. Bracts nearly as long as the flowers, triangular. Stamens 5. Capsules oblong.

Fls. : July Sept.; *Frts.* : Sept. Oct.; *Vern.* : Jhau; AKS 432, Bichpuri campus; 768, Pojya ghat.

Common in sandy soil near the bank of Jamuna and Utangan rivers and also found in saline tract.

3. Tamarix troupili Hole in Ind. For. 45 : 248, 1914 *T. gallica* acut non L. 1753 ; Dyer in Hook. f. Fl. Brit. Ind. 1 : 248, 1874; Duthie, Fl. U. Gang. Pl. 1 : 67, Repr. ed. 1960.

An erect, bushy shrub. Branches slender, articulated. Leaves not sheathing, minute, subulate, acute. Flowers pink, bisexual, numerous, shortly pedicelled, crowded in long, slender, spike-like racemes of terminal panicles. Bracts shorter than the flowers, semi-amplexicaul. Sepals persistent. Stamens 5. Seeds plumose - hairy.

Fls. : July - Aug.; *Frtts.* : Aug., Sept.; *Vern.* : Jhau; AKS 772, Niyamatpur.

Common in sandy soil near the banks of Jamuna river.

14. ELATINACEAE

BERGIA L.

An erect or decumbent, pubescent, annual herb, 10-30 cm high. Leaves sessile, 8-18 x 2-4 mm, linear-lanceolate or oblanceolate, acute, sharply serrate. Flowers red, small, in dense, axillary fascicles. Sepals 5, 2 mm long, lanceolate. Petals 5, 1.5 mm long. Stamens 5. Capsules 5-celled. Seeds many, ovoid.

Fts. : Dec. - Mar.; *Frts.* : Mar. - Apr.; AKS 337, Patchpur Sikri; 384, Polya ghat; 606, Armeta.

Common in moist, sandy soil near the banks of Jamuna and Utangan rivers and near the drying fields.

2. *Bergia verticillata* Willd. Sp. Pl. 2 : 770. 1799 ; Hook. f. Fl. Brit. Ind. 1 : 252. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 70. Repr. ed. 1960.

A glabrous rather succulent, aquatic herb. Leaves spreading, elliptic lanceolate, acute, faintly crenate-serrate. Stipules 5, narrowly deltoid, acute. Sepals 5, narrowly lanceolate. Petals 5. Capsules globose, ovoid. Seeds minute, ribbed and transversely rugose.

Monro (in Duthie, Fl. U. Gang. Pl. 1 : 70) is the only authority for this species from Agra.

15. MALVACEAE

1a. Styles connate upto apex, consequently the flowers seemingly monostylous
Calyx entire or minutely 5-toothed :

2a. Shrubs; epicalyx segments 3, large, foliaceous, cordate, persistent. Seeds densely woolly. 3. *Gossypium*

2b. Trees; epicalyx segments 3-8, small, narrow, caducous. Seeds glabrous or short hairy 9. *Theespisia*

1b. Styles not connate upto apex or free. Calyx distinctly divided :

3a. Carpels not separating at maturity 4. *Hibiscus*

3b. Carpels separating at maturity :

4a. Involure bracts present :

5a. Involure bracts 3 :

6a. Leaves orbicular, palmately veined and lobed ; stigmas linear 5. *Malva*

6b. Leaves ovate-lanceolate, pinnately veined; stigmas capitate 6. *Malvastrum*

5b. Involure bracts 5 or more :

7a. Styles as many as the carpels 2. *Athaen*

7b. Styles twice as many as the carpels :

1. *Anthonia Gacita*

- Ia. Carpels less than 15 *A. nanosum*

Ib. Carpels 15 or more :

 - 2a. Leaves not velvety ; carpels with short sharp spreading beaks *A. indicum*
 - 2b. Leaves velvety on both surfaces ; carpels without beaks *A. graveolens*

L. Abutilon graveolens (Roxb.) Wt. & Arn. Prod. 56, 1834; Hook. f. Fl. Brit. Ind. 1 : 327, 1874; Duthie, Fl. U. Gaug. Pl. 1 : 78, Repr. ed. 1960. **Sida graveolens** Roxb. Fl. Ind. 3 : 179, 1832.

As erect, densely pubescent, shrub or undershrub, 60–100 cm high. Leaves petiolate, 5–10 x 4.1–10.2 cm, cordate - orbicular, acute, crenate-serrate, velvety on both surfaces. Flowers orange-yellow with a dark centre, solitary, axillary. Peduncles jointed above the middle. Calyx 1.8 cm long, densely pubescent. Ripe carpels 15-20, rounded, hairy, unawned, about as long as the enlarged calyx.

Fls. : Sept. Oct. ; Frts. Oct. Nov. ; AKS 542, Chiknipur.

Common on the slopes of the ridge growing in gravelly soil.

2. ***Abutilon indicum*** (L.) Sweet, Hort. Brit. ed. 1.54. 1826; Hook. f. Fl. Brit. Ind. 1 : 326. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 78. Repr. ed. 1960. *Sida indica* L. Cent. Pl. 2 : 26. 1756.

A suffruticose, robust shrub, 90 - 120 cm high. Leaves petiolate, 7.5 - 11 x 9 - 14.5 cm cordate, ovate, acute, irregular toothed. Flowers orange-yellow, solitary, axillary on long pedicels. Calyx 1.5 cm long, lobes ovate, acute, pubescent. Staminal tube hairy at the base. Ripe carpels 15 - 20, longer than the calyx, reniform, short-beaked, tomentose, black at maturity. Seeds tubercled, black.

Fls. : Aug. - Jan. ; *Frtts.* : Jan. - Mar. ; *Vern.* : Kanghi ; AKS 269, Bichpuri campus.

Common in waste open grounds and in gardens.

3. **Ahutilon ramosum** (Cav.) Guill. & Perr. Fl. Seneg. Tent. 1 : 68. 1831 ; Hook. f. Fl. Brit. Ind. 1 : 328. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 79. Repr. ed. 1960. *Sida ramosa* Cav. Diss. 1 : 28 : t. 6. f. 1. 1785.

An erect, pubescent, small shrub, 1.2 - 1.5 m high. Leaves petiolate, 6.5 - 12 x 5.5 - 11 cm ovate, cordate, acuminate, crenate-serrate, clothed on both surfaces with minute pubescence. Flowers yellow, many. Peduncles solitary or 2 - 3 together, usually branched above the middle. Calyx 1.5 cm long, hairy, tube cup-shaped. Ripe carpels about 10, hairy, with spreading awns.

Fls. : Nov. - Jan. ; *Frtts.* : Jan. - Feb. ; AKS 289, R. B. S. College garden.

Occurs in the gardens and Parks.

2. ALTHAEA L.

Althaea ludwigii L. Mant. 98. 1767; Hook. f. Fl. Brit. Ind. 1 : 319. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 73. Repr. ed. 1960.

A prostrate or ascending, branched, hispid annual herb. Leaves long petiolate, orbicular, deeply 5-7 lobed, lobes wedge-shaped, 3-fid. Bracteoles 7 - 9, as long as the calyx. Flowers shortly peduncled, in small axillary clusters, whitish. Carpels wrinkled at the sides, glabrous.

Munro (in Duthie, Fl. U. Gang. Pl. 1 : 73) has reported the occurrence of this plant from Agra.

3. Gossypium L.

- | | |
|--------------------------------------|-----------------------|
| 1a. Bracteoles united, not pectinate | 1. <i>G. arboreum</i> |
| 1b. Bracteoles quite free, pectinate | 2. <i>G. hirsutum</i> |

1. **Gossypium arboreum** L. sp. Pl. 693. 1753; Hook. f. Fl. Brit. Ind. 1 : 347. 1874; Duthie, Fl. U. Gang. Pl. 1 : 90. Repr. ed. 1960.

An erect, pilose shrub. Leaves 5-7 lobed, more shining above. Flowers purple or yellow with a crimson centre, solitary, axillary. Bracteoles united, shortly toothed. Capsules oblong, pointed.

Fls. & frts. : Jan. - Mar. ; AKS 377, R.B.S. College garden.

Grown in the gardens and fields.

2. *Gossypium hirsutum* L. Sp. Pl. ed. 2. 975. 1963; Haines, Bot. Bibl. & Or. 75. Repr. ed. 1961. *G. herbaceum* L. var. *hirsutum* (L.) Mast. in Hook. f. Fl. Brit. Ind. 1 : 347. 1874.

An erect, much-branched shrub, clothed with woolly hairs. Leaves simple to 5 lobed, thick ; lobes short triangular, base cordate. Flowers yellow turning to pink - purple, without a dark centre. Bracteoles quite free. Capsules spherical. Seeds with a greyish or green fuzz.

Fls. & frts. : Oct. - Feb. ; Vern. : *Bari* ; AKS 421, R.B.S. College garden.

Cultivated in the area.

4. *Hibiscus* L.

1a. Leaves palmately lobed ; flowers yellow
with a crimson centre

1. *H. gibsonii*

1b. Leaves not palmately lobed ; flowers
white fading to rosy purple,

2. *H. ovalifolius*

1. *Hibiscus gibsonii* Stocks ex Harv. & Sond. Fl. Cap. 2 : 587 ; Hook. f. Fl. Brit. Ind. 1 : 339. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 86. Repr. ed. 1960.

An erect shrub, 1-1.5 m tall. Leaves deeply palmately lobed, lobes serrate. Bracteoles free, linear, prickly. Flowers yellow with a purple centre, solitary, axillary. Sepals 5, connate at the base. Capsules ovoid, pointed.

Fls. & frts. : Sept.-Oct. ; *Frts.* : Oct. - Nov. ; AKS 145, Bichipuri campus;
822, Chiknipur.

Found near the cultivated fields and in unused grounds.

2. *Hibiscus ovalifolius* (Forsk.) Vahl, Symb. Bot. 1 : 50. 1790. *Urena ovalifolia* Forsk. Fl Aegypt-Arab. 124. 1775. *Hibiscus micranthus* L. L. Suppl. Pl. 308. 1781 ; Hook. f. Fl. Brit. Ind. 1 : 335. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 84. Repr. ed. 1960.

A shrubby, erect plant, branching from the base or often unbranched, 1 - 2.5 m high. Branches scabrid with stellate hairs. Leaves 1.5 - 3 x 0.7 - 1.5 cm, ovate or oblong, acute - obtuse, serrate, scabrid on both sides. Bracteoles 7-8, filiform,

shorter than the calyx. Flowers white fading to rosy-purple, solitary, axillary. Calyx persistent, hairy. Capsules globose, slightly tomentose.

Fls. : Aug. - Nov. ; *Frt.s.* : Nov. - Dec. ; *Vern.* : *Okda* ; AKS 71, 218, Chhalesar.

Common on the ridge and hilly tracts in gravelly soil.

5. MALVA L.

- | | |
|---|-------------------------|
| 1a. Flowers white ; corolla scarcely longer than the calyx. | 1. <i>M. parviflora</i> |
| 1b. Flowers dark purple or violet; corolla 3 to 4 times the length of the calyx | 2. <i>M. sylvestris</i> |

1. *Malva parviflora* L. in Hojer, Demonstr. Pl. Hort. Ups. 18, 1753 ; Hook. f. Fl. Brit. Ind. 1 : 321, 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 74, Repr. ed. 1960.

A decumbent or prostrate, spreading herb, 30-60 cm high. Leaves suborbicular or roundish, more or less 5 to 7 lobed. Flowers white or with pinkish tinge, small, in axillary clusters; bracteoles linear, caducous. Calyx accrescent, glabrous. Corolla 6-8 mm long, hardly exceeding the sepals. Ripe carpels 10, glabrous, reticulated on the back, 1-seeded.

Fls. & *frts.* : Dec. Jan. ; AKS 299, Salempur.

Common in moist, shady places hidden amongst grasses.

2. *Malva sylvestris* L. Sp. Pl. 689, 1753 ; Hook. f. Fl. Brit. Ind. 1 : 320, 1874; Duthie, Fl. U. Gang. Pl. 1 : 74, Repr. ed. 1960.

An erect, glabrous herb. Leaves orbicular-lobed ; petioles as long as or longer than the leaves. Flowers dark purple or violet, on pedicels shorter than the petiole. Petals notched; claw bearded.

Duthie (in Duthie, Fl. U. Gang. Pl. 1:74) mentions the occurrence of this plant from Agra.

6. MALVASTRUM Gray nom. cons.

Malvastrum coromandelianum (L.) Garecke in Bonplandia 5 : 297, 1857. *Malva coromandeliana* L. Sp. Pl. 687, 1753. *Malvastrum tricuspidatum* (R. Br.) A. Gray, Pl. Wright, 1 : 16, 1852 ; Hook. f. Fl. Brit. Ind. 1 : 321, 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 75, Repr. ed. 1960. *Malva tricuspidatum* R. Br. in Ait. Hort. Kew. ed. 2.4 : 210, 1812.

A prostrate, decumbent or erect, branching herb, 30-60 cm high. Leaves, 3-8 x 1 - 3.5 cm, ovate to ovate-lanceolate, crenate-serrate. Flowers yellow, solitary, axillary. Bracteoles 3, linear. Calyx lobes triangular, acute. Carpels 8-12, reniform, hispid on the top and with 3 projecting points.

Fls. & frts. : Aug. - Apr. ; *Vern.* : *Khareni* ; AKS 64, 266, Bichpuri campus.

Common in open unused fields, waste places and in the gardens.

7. PAVONIA Cav. nom. cons.

Pavonia zeylanica (L.) Cav. Diss. 3 : 134. 1787 ; Hook. f. Fl. Brit. Ind. 1: 331. 1874. *Hibiscus zeylanicus* L. Sp. Pl. 697. 1753.

An erect, sticky, branched herb, 30-100 cm high. Leaves long petiolate, 0.8-2.5 x 1-3 cm, ovate-oblong, undivided or 3-lobed, dentate, stellately hairy. Flowers pink or rosy, erect on solitary, axillary long pedicels. Bracts 8-10, linear, ciliolate. Calyx 3.5 mm long, lobes lanceolate. Ripe carpels unarmed, slightly winged, pale brown, enclosed in the persistent involucre.

Fls. : Aug. - Nov. ; *Frts.* : Nov. - Dec. ; AKS 579, 774, Niyamatpur.

Found on the slopes of the ridge.

8. SIDA L.

1a. Prostrate or trailing herbs	3. <i>S. cordata</i>
1b. Sub-erect or erect herbs or undershrubs:	
2a. Petioles with two recurved spines at the base	2. <i>S. ulba</i>
2b. Petioles not spiny :	
3a. Awns as long as the carpels; leaves downy on both surfaces	4. <i>S. cordifolia</i>
3b. Awns shorter than the carpels; leaves glabrous on both surfaces	1. <i>S. acuta</i>

1. *Sida acuta* Burn. f., Fl. Ind. 147. 1768; Duthie, Fl. U. Gang. Pl. I : 76. Repr. ed. 1960. *S. carpinifolia* sensu Mast. Hook. f. Fl. Brit. Ind. 1: 323. 1874 ; non. L. L. 1785.

An erect, much-branched undershrub, 20-60 cm high. Leaves petiolate, 3-6 x 1-2.5 cm, lanceolate, acute, serrate, glabrous. Bracteoles 0. Flowers yellow, solitary, axillary. Peduncles jointed near the middle. Calyx 8 mm long, glabrous. Carpels 5-10, rugose, puberulous, 2-awned.

Fls. : Aug. - Oct. ; *Frt.s.* : Oct. - Nov. ; *Vern.* : *Gangam* ; AKS 202, Paliwal Park.

Common in waste places near gardens, open fields and along roadsides.

2. *Sida alba* L. Sp. Pl. (ed. 2) 960. 1763 ; Excell in Fl. Zambees. 1 : 477. 1961. *Sida spinosa* L. Sp. Pl. 683. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 323. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 76. Repr. ed. 1960.

An erect, much-branched, herb or undershrub, 0.6-1 m high. Stems and branches stellately hairy, with spiny tubercles at the nodes below the petioles. Leaves 2-6.5 x 1.3-3.3 cm, ovate to ovate-lanceolate, acute, crenate-serrate, glabrous above, hairy beneath. Bracteoles 0. Flowers pale white, solitary, axillary. Calyx 6 mm long, hairy. Ripe carpels 5, topped by 2 erect, rough beaks, equalling the calyx.

Fls. & *ftrs.* : Oct. - Nov. ; AKS 861, Kitham.

Occurs in the cultivated and unused fields.

3. *Sida cordata* (Burm. f.) Borss. in Blumea 14 : 182. 1966. *Melochia cordata* Burm. f. Fl. Ind. 143. 1768. *Sida veronicaefolia* Lamk. Encycl. 1 : 5. 1785; Duthie, Fl. U. Gang. Pl. 1 : 75. Repr. ed. 1960. *S. humilis* Cav. Dis. S : 277 ; Hook. f. Fl. Brit. Ind. 1 : 322. 1874.

A trailing, perennial, much-branched herb; hairs on the stem straight, scattered. Leaves 3.5-5 x 2-5.5 cm, broad ovate to suborbicular, cordate, crenate-serrate, acute or acuminate. Bracteoles 0. Flowers pale orange, 1.1 cm in diam., usually solitary, axillary on long pedicels. Ripe carpels 5, smooth, mucilous.

Fls. : Aug. - Nov. ; *Frt.s.* : Nov. - Dec. ; AKS 50, bichpuri campus; 118, Kitham; 580, Niyamalpur.

Common in open waste grounds and in moist shady places.

4. *Sida cordifolia* L. Sp. Pl. 684. 1753; Hook. f. Fl. Brit. Ind. 1 : 324. 1874; Duthie, Fl. U. Gang. Pl. 1 : 77. Repr. Ed. 1960.

A subfrusticose undershrub, 30-45 (-100) cm high. Leaves petiolate, 1.5-3 x 1-3 cm, ovate, cordate, crenate-serrate, stellate-hirsute on both surfaces. Bracteoles 0. Flowers yellow, solitary or fasciculate. Peduncles joined near the

flower. Calyx 8 mm long, pubescent. Fruit of 10 biseriate carpels, awns 3–4 mm long, exceeding the calyx, covered with stiff reflexed hairs.

Fls. : Sept. – Oct. ; *Frt.s.* : Oct. – Nov. ; *Vern.* : *Kharenti* ; AKS 164, Poiyaghat.

Common in sandy soil of cultivated and fallow fields.

9. THESPIA Soland.ex Corr. nom. cons.

Thespisia populnea (L.) Soland. ex Corr. in Ann. Mus. Nat. Hist. 9 : 290, t. 8, f. 1. 1807 ; Hook. f. Fl. Brit. Ind. 1 : 345. 1874. *Hibiscus populneus* L. Sp. Pl. 694. 1753.

A small tree. Leaves long petiolate, cordate, entire, acuminate, pale green. Flowers yellow turning mauve. Calyx cupular. Corolla 5–7 cm across. Staminal tube toothed at the top. Capsules globose, surrounded at the base by the persistent calyx.

Fls. & *frts.* : Mar. – June ; AKS 415, Paliwal Park.

Planted in the Gardens and Parks.

10. URENA L.

Urena lobata L. Sp. Pl. 692. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 329. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 80, Repr. ed. 1960.

A low twiggy shrub, 1 m high. Stem and branches covered with spreading stellate hairs. Leaves variable, 5–9 x 6–10 cm, the basal usually broader than long, suborbicular, cordate ; the upper ones rhomboid, ovate, all finely and irregularly serrate, entire or slightly lobed, nerves prominent beneath ; 3 glands present at the base of lamina. Flowers light pink with a darker centre, 1.5–2 cm across, solitary, axillary. Ripe carpels 1 cm in diam, stellate-pubescent, armed with hooked bristles.

Fls. : Aug. – Oct. ; *Frt.s.* : Oct. – Nov. ; *Vern.* : *Vilayti san* ; AKS 138, Bichpuri campus ; 840, Salempur.

Found in unused open fields and near the cultivated fields.

List of Cultivated Taxa :

Abelmoschus esculentus (L.) Moench, Meth. Pl. 617. 1794. *Hibiscus esculentus* L. Sp. Pl. 696. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 343. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 87. Repr. ed. 1960. Vern. : *Bhendi*.

Hibiscus cannabinus L. Syst. Nat. ed. 10 : 1149. 1759 ; Hook. f. Fl. Brit. Ind. 1 : 339. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 85. Repr. ed. 1960.

Hibiscus rosa-sinensis L. Sp. Pl. 694. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 344. 1874 ; Bailey, Man. Cult. Pl. 665. 1949. Vern. : *Gurhal*.

16. BOMBACACEAE

BOMBAX L.

Bombax ceiba L. Sp. Pl. 511. 1753. *B. malabaricum* DC. Prodr. 1 : 479. 1824; Hook. f. Fl. Brit. Ind. 1 : 349. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 92. Repr. ed. 1960. *Salmalia malabarica* (DC.) Schott. & Endl. Melet. Bot. 35. 1832 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 24. 1953.

A large deciduous tree with straight trunk and wide-spreading branches in whorls. Leaves petiolate, 5–7 foliolate ; leaflets petiolulate, entire, glabrous. Flowers 10–12 cm in diam., bright red on short thick pedicels. Calyx very fleshy, cup-shaped, bright silky-hairy within. Petals oblong, tomentose outside. Capsules oblong, woody. Seeds packed in copious floss.

Fls. : Feb. Mar. ; *Frts.* : Mar. Apr. ; *Vern.* : *Semal* ; AKS 680, Paliwal Park.

Planted in gardens and along roadsides, the cotton of the fruit is collected for stuffing pillows and mattresses.

17. STERCULIACEAE

1a. Herbs or undershrubs

3. *Melochia*

1b. Trees :

2a. Leaves palmately 5–7 lobed ; flowers unisexual ; petals absent

5. *Sterculia*

2b. Leaves simple ; flowers bisexual ; petals present :

3a. Fruit of spirally twisted follicles	1. <i>Helicteres</i>
3b. Fruit a capsule :	
4a. Trees or shrubs ; flowers white	4. <i>Pterospermum</i>
4b. Shrubs ; flowers yellow	2. <i>Melhania</i>

1. HELICTERES L.

***Helicteres isora* L.** Sp. Pl. 963. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 365. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 96. Repr. ed. 1960.

A shrub or small tree. Leaves shortly petiolate, 8–14 × 6–10 cm, obovate or suborbicular, irregularly serrate, acuminate, rough. Flowers 2.5–3.5 cm long, distinctly bilabiate, and turning to lead colour, solitary, axillary. Calyx narrowly campanulate, curved, stellately pubescent outside. Fruits 3.5–6 cm long, cylindrical, composed of 5 spirally twisted, tomentose follicles. Seeds numerous, tubercled.

Fls. & frts. : July Sept. ; AKS 913, Tanipur.

Occurs in hilly tracts among rock crevices.

2. MELHANIA FORSK.

***Melhania futteyporensis* Munro ex Mast.** in Hook. f. Fl. Brit. Ind. 1 : 373. 1874 ; Blatt. in J. Bombay Nat. Hist. Soc. 34 : 883. 1931 ; Duthie, Fl. U. Gang. Pl. 1 : 100. Repr. ed. 1960. *M. tomentosa* Stocks ex Mast. in Hook. f. Fl. Brit. Ind. 1 : 373. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 100. Repr. ed. 1960.

A coarse, pubescent or hoary-tomentose shrub. Leaves oblong, cordate, crenate-serrate. Flowers in terminal cymes. Capsules villosus. Seeds muricate.

Parker has united *M. tomentosa* Stocks, ex. Mast. with *M. futteyporensis* Munro ex Mast., because the distinction between the two is based on bracteoles alone, which, however, vary considerably and cannot, therefore, form a reliable basis for classification. Munro (in Duthie, Fl. U. Gang. Pl. 1 : 100) is the only authority who collected this species from Agra.

3. MELOCHIA L.

***Melochia corchorifolia* L.** Sp. Pl. 675. 1753 ; Hook f. Fl. Brit. Ind. 1 : 374. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 100. Repr. ed. 1960.

A prostrate or ascending, much - branched herb or undershrub, 30-60 cm tall. Leaves alternate, long petiolate, 1.3 - 4 x 0.9 - 3 cm, ovate-oblong, obtuse, serrate, base 5-nerved. Flowers pinkish, in dense, terminal or axillary clusters ; intermixed with several bracteoles. Sepals 5, connate below, 3 mm long. Stamens 5, united below into a tube. Capsules globose, hispid. Seeds angular.

Fls. : Sept. Oct. ; *Frt.s.* : Oct. Nov. ; AKS 850, Salempur.

Common on the edge of cultivated fields.

4. PTEROSPERMUM Schreb. nom. cons.

Pterospermum acerifolium (L.) Willd. Sp. Pl. 3 : 729. 1800 ; Hook. I. Fl. Brit. Ind. I : 368. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 97. Repr. ed. 1960. *Pentapetes acerifolia* L. Sp. Pl. 698. 1753.

A medium-sized tree. Bark ash-coloured. Young branches and calyx covered with thick, ferruginous indumentum. Leaves large, peltate or obovate oblong, sinuately lobed. Flowers white, fragrant, axillary on short pedicels. Calyx 5-cleft, very fleshy, brown, tomentose outside and villous within. Capsules woody, 5-angled. Seeds many with membranous wings.

Fls. : Mar. May ; *Frt.s.* : May - June ; AKS 724, M.D. Jain Inter College.

Planted in the gardens and private places.

5. STERCULIA L.

Sterculia foetida L. Sp. Pl. 1008. 1753 ; DC. Prodr. 1 : 483. 1824 ; Hook. f. Fl. Brit. Ind. I : 354. 1874.

A large tree. Bark whitish. Leaves crowded at the ends of the branches, deeply divided into 5-9 digitate lobes with acuminate tips. Flowers reddish, in erect, racemose panicles. Calyx deeply divided, woody inside. Stamens 10 - 15, united into a column. Follicles 3-5, woody, bright red when ripe. Seeds ovoid-oblong, black.

Fls. : Mar. Apr. ; *Frt.s.* : Apr. May ; AKS 678, Paliwal Park.

Planted in the gardens.

18. TILIACEAE

- 1a. Trees or shrubs ; fruits drupaceous 2. *Grewia*
- 1b. Herbs or undershrubs ; fruits capsular :
 2a. Capsules smooth, elongate or sub-globose 1. *Corchorus*
 2b. Capsules spiny, globose or oblong 3. *Triumfetta*

1. CORCHORUS L.

- 1a. Prostrate woody herbs 3. *C. depressus*
- 1b. Erect annual herbs :
 2a. Capsules spherical, beak absent 2. *C. capsularis*
 2b. Capsules elongate ; beaked :
 3a. Capsules ending in a single beak :
 4a. Stamens many ; capsule long 5. *C. olitorius*
 4b. Stamens 5-10 ; capsule short 4. *C. fascicularis*
 3b. Capsules ending in a trifid beak:
 5a. Capsules 6-angled, 3 of the angles winged 1. *C. aestuans*
 5b. Capsules elongate, not winged 6. *C. tridens*

1. *Corchorus aestuans* L. Syst. Nat. ed. 10, 1079, 1759; Santapau in Rec. Bot. Surv. Ind. 16(1) : 31, 1953. *C. acutangulus* Lamk. Encycl. 2 : 104, 1786; Hook. f. Fl. Brit. Ind. 1 : 398, 1874; Duthie, Fl. U. Gang. Pl. 1 : 114. Repr. ed. 1960.

An erect or ascending, annual, pubescent herb, 15 - 60 cm high. Leaves petiolate, 2.5 - 5.5 x 1.6 - 3.5 cm, ovate or ovate-oblong, serrate. Flowers yellow, 1-3 on short, axillary or leaf-opposed stalks. Capsules 1.5 - 3.5 cm long, 6-angled, 3 of the angles winged ; beak 3-fid, the divisions spreading.

Fks. : July - Aug. ; *Frt.s.* : Aug. - Sept. ; *Vern.* : *Chanch* : AKS 133, Bichpuri campus ; 259, Poiya ghat.

Common in moist waste places, cultivated and fallow fields.

2. *Corchorus capsularis* L. Sp. Pl. 529, 1753; Hook. f. Fl. Brit. Ind. 1 : 397, 1874; Duthie, Fl. U. Gang. Pl. 1 : 113. Repr. ed. 1960.

An erect, glabrous, annual herb, 50-80 cm high. Leaves shortly petiolate, 4.5-9.5 x 1.1-1.6 cm, ovate-lanceolate, acuminate, serrate, the two lowest serratures produced into filiform appendages. Flowers yellow, in short cymes. Capsules subglobose, depressed at the apex, ridged and muricated, 5-valved.

Fls. & frts. : Aug. Oct. ; *Vern.* : *Kharenii* ; AKS 838, Salempur.

Found near the temporary ponds, canals and cultivated fields.

3. *Corchorus depressus* (L.) Stocks in Proc. Linn. Soc. 1 : 367. 1848 ; *Antichorus depressus* L. Mant. 64. 1767. *Corchorus antichorus* Rausch. Nom. Bot. 158. 1797 ; Hook. f. Fl. Brit. Ind. 1 : 398. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 114. Repr. ed. 1960.

A prostrate, woody, much-branched, deep-rooted, perennial herb. Leaves shortly petiolate, 0.7-2 x 0.6-1.6 cm, roundish or elliptic, crenate-serrate, plicate. Flowers 4 mm across, yellow, in small leaf opposed cymes. Capsules cylindric, straight or curved, 4-valved, 0.7-1.5 cm long.

Fls. : Aug. Sept. ; *Frts.* : Sept. - Oct. ; *Vern.* : *Boophali* ; AKS 859, Kitham.

Found in sandy soil of fallow fields and unused grounds.

4. *Corchorus fascicularis* Lamk. Encycl. 2 : 104. 1786; Hook. f. Fl. Brit. Ind. 1 : 398. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 114, Repr. ed. 1960.

A procumbent or ascending annual. Leaves petiolate, 3-5 x 0.5-1.2 cm, elliptic-oblong, serrate. Peduncles 2-5 flowered. Inflorescence extra axillary cymes. Stamens 5-10. Capsules 1.2-1.5 cm long, fascicled, subcylindric, shortly beaked.

Fls. & frts. : Sept. Nov. ; AKS 855, Amota.

Found in fallow fields and unused grounds.

5. *Corchorus olitorius* L. Sp. Pl. 529. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 397. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 113, Repr. ed. 1960.

An erect, glabrous undershrub, 60-100 cm high. Leaves petiolate, 8.5-16 x 3-5.5 cm, lanceolate or ovate-lanceolate, serrate, the two lowest serratures produced into filiform deflexed tails. Flowers yellow, 1-3 on short axillary or leaf-opposed stalks. Capsules cylindric, 4.5-7 cm long, 10-ribbed, 5-valved, the valves having transverse partitions between the seeds ; beak entire.

Fls. : Aug. Sept. ; *Frts.* : Sept. Oct. ; AKS 265, Bichpuri campus ; 855, Salempur.

Common in moist places of cultivated fields and unused grounds. Jute fibre is obtained from the bark of this plant.

6. *Corchorus tridens* L. Mant. Pl. 566. 1771; Hook. f. Fl. Brit. Ind. 1 : 398. 1874; Duthie, Fl. U. Gang. Pl. 1 : 114. Repr. ed. 1960.

An erect, branched, annual herb. Leaves petiolate, 3.5 - 7.5 x 0.8 - 2 cm, lanceolate or linear-oblong, crenate-serrate, the lowest serratures produced into filiform appendages. Flowers yellow, 1-4 on short, leaf-opposed stalks. Capsules 2-4 cm long, slender, 3-valved, terminating in 3 stellately spreading or deflexed points.

Fls. : Aug. - Sept. ; *Frs.* : Sept. - Oct. ; AKS 168, 258, Polya ghat ; 829, Arnata,

Common in moist waste places and in sandy soil of cultivated fields.

2. GREWIA L.

1a. Flowers yellow, axillary

1. *G. flavescentis*

1b. Flowers white, solitary, opposite the leaves

2. *G. tenax*

1. *Grewia flavescentis* Juss. in Ann. Mus. Natl. Hist. Nat. 4 : 91. 1804; Blatt. & McC. in J. Bombay Nat. Hist. Soc. 34 : 888. 1931. *G. carpinifolia* sensu Mast. Hook. f. Fl. Brit. Ind. 1 : 381. 1874.

A shrub or undershrub, clothed with dense, light brown, stellate hairs. Leaves 4.7 - 8.5 x 2.8 - 4 cm, oblong or ovate, crenulate, acute, stipules subulate. Peduncles 3-flowered. Flower buds oblong, hirsute, dilated at the base. Sepals linear-oblong, stellate hairy outside. Petals yellow, shorter than the sepals. Ovaries hirsute; stigmas 4, spreading. Drupes 2-4 lobed, closely covered with short stellate hairs.

Fls. : Sept. - Oct. ; *Frs.* : Oct. - Nov. ; AKS 489, Khander.

Common on the ridge and hilly tracts.

2. *Grewia tenax* (Forsk.) Fiori, Bos. Piante legn. Eritrea 246. 1909; F. W. Andr. Fl. Pl. Anglo-Egypt. Sud. 1 : 222. 1950 - 1956. *Chandara tenax* Forsk. Fl. Aegypt. - Arab. 105 & 114. 1775. *Grewia populifolia* Vahl. Symb. Bot. 1 : 33. 1790; Hook. f. Fl. Brit. Ind. 1 : 385. 1874; Duthie, Fl. U. Gang. Pl. 1 : 104. Repr. ed. 1960.

An erect, much-branched shrub. Leaves 1.5 - 3.5 x 1 - 2 cm, variable in shape, ovate, suborbicular or obovate, obtuse, subcoriaceous; stipules linear-subulate.

Peduncles solitary, 1 or rarely 2-flowered. Buds oblong, densely pubescent. Petals white, shorter than the sepals. Drupes 2-4 lobed, orange-red.

Fls. : Aug. - Sept. ; *Frt.* : Sept. - Oct. ; *Vern.* : *Gondni* ; AKS 540, Chiknipur.

Common on the slopes of the ridge and among the rock crevices.

Cultivated Taxa :

Grewia subinaequalis DC. Prodr. 1 : 511. 1824 ; Narayanas. & Rao in J. Ind. Bot. Soc. 29 : 183 t. 3C. 1950 ; Santapau. Fl. Saurashtra 68. 1962. *G. asiatica* Master in Hook. f. Fl. Brit. Ind. 1 : 389. 1874 (non L.) ; Duthie, Fl. U.Gang. pl. 1 : 107. Repr. ed. 1960.

Fls. : Mar.-Apr. ; *Frt.* : Apr. June ; *Vern.* : *Phalsa* ; AKS 351, Rambagh.

Grown in gardens for its edible fruits.

3. TRIUMFETTA L.

Triumfetta thomholdea Jacq. Environ. Pl. Carib. 22. 1760 ; Hook. f. Fl. Brit. Ind. 1 : 395. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 111. Repr. ed. 1960.

A perennial, much-branched herb or undershrub, 30-60 cm high. Leaves broadly ovate to rhomboid-ovate, obscurely or distinctly 3-lobed, irregularly serrate. Flowers yellow, in dense axillary and leaf-opposed cymes, solitary or fascicled and forming a long terminal spike-like inflorescence. Fruits globular, 5-7 mm in diam., clothed with smooth, hooked spines.

Fls. : Aug. Sept. ; *Frt.* : Sept. Oct. ; *Vern.* : *Kasni*; AKS 184, Bichuri campus; 494, Khander ; 816, Chiknipur,

Common in the waste places, unused grounds and on the ridge.

19. LINACEAE

LINUM L.

Linum usitatissimum L. Sp. Pl. 277. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 410. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 115. Repr. ed. 1960.

An erect annual, 30 - 60 cm high. Leaves linear or lanceolate. Flowers blue,

about 2.5 cm across, in a terminal, leafy panicle. Styles free. Stigmas clavate. Capsules 5-celled, spherical.

Fls. : Jan. - Feb. ; *Frt.* : Feb. - Mar. ; *Vern.* : Alsi ; AKS 322, Bichpuri campus.

The well known 'flax plant' (Alsi) is occasionally found as an escape also cultivated on small scale.

20. ZYGOPHYLLACEAE

1a. Leaves 1 to 3-foliate ; fruits unarmed ; thorny plant 1. *Fagonia*

1b. Leaves paripinnate ; fruits armed ; not thorny plant 2. *Tribulus*

1. *Fagonia cretica* L. Sp. Pl. 386. 1753 ; Duthie, Fl. U. Gang. Pl. I : 120. Repr. ed. 1960. *F. arabica* L. Sp. Pl. 386. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 425. 1874.

An erect, diffusely-branched spiny herb or undershrub, 30 - 60 cm high. Leaves 1 to 3-foliate ; leaflets linear or elliptic, acute. Stipular spines 3-4 at each node, exceeding the leaflets. Flowers pink or sometimes whitish, solitary from between the stipules. Sepals 5, deciduous. Stamens 10. Fruits of 5, 1-seeded cocci. Seeds brown.

Fls. & frts. : Aug. - Oct. ; *Vern.* : Dhuansa ; AKS 461, Near JALMA.

Found on the ridge in dry sandy soil.

2. TRIBULUS L.

Tribulus terrestris L. Sp. Pl. 387. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 423. 1874; Duthie, Fl. U. Gang. Pl. I : 120. Repr. ed. 1960.

A prostrate or procumbent herb, 30 - 60 cm long. Leaves paripinnate ; leaflets 10 - 14, subequal, oblong, mucronate. Flowers yellow, solitary, on pseudo-axillary peduncles. Sepals 5, 6-7 mm long. Stamens 10. Fruits schizocarpic, breaking into 4-6 cocci, each coccus with two, sharp, divaricate spines.

Fls. : July - Sept. ; *Frt.* : Sept. - Nov. ; *Vern.* : Gokhru ; AKS 123, Paliwal Park.

Abundant in waste places, gardens, cultivated and fallow fields.

21. GERANIACEAE

MONSONIA L.

Monsonia senegalensis Guill. & Perr. Fl. Seneg. Tent. 1 : 131. 1830; Hook. f. Fl. Brit. Ind. 1 : 427. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 121. Repr. ed. 1960.

A viscid, diffuse herb or undershrub. Leaves long petiolate, ovate or cordate, obtuse or mucronate, repand-toothed. Flowers violet or pink, solitary on long peduncle, rarely 2-flowered. Sepals obovate, awned, densely pubescent. Carpels stipitate, wrinkled near the top, roughly hairy.

This plant is included on the authority of Munro (in Duthie, Fl. U. Gang. Pl. 1 : 121) from Agra.

22. OXALIDACEAE

1a. Trees ; leaves pinnate ; fruit a berry

1. *Averrhoa*

1b. Herbs ; leaves 3-foliate; fruit a capsule

2. *Oxalis*

1. AVERRHOA L.

Averrhoa carambola L. Sp. Pl. 428. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 439. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 124. Repr. ed. 1960.

A moderate-sized tree. Leaves imparipinnate ; leaflets 5-11, ovate to elliptic, acute. Flowers pinkish or purplish, in the leaf axils. Fruits yellow, ovoid or ellipsoid, acutely angled, 10-12 x 6-7 cm; seeds arillate.

Fls. : Aug. - Oct. ; *Frt.* : Oct. - Dec. ; *Vern.* : Kamrakh (AKS 591), Rambagh

Cultivated for its fruits which are used as edible product.

2. OXALIS L.

1a. Flowers purple-violet

3. *O. corymbosa*

1b. Flowers yellow :

2a. Plants producing bulbs

1. *O. cernua*

2b. Plants with fibrous roots

2. *O. corniculata*

1. *Oxalis cernua* Thunb. Diss. Oxal. 14, t. 2, f. 2. 1781. *O. pes-caprae* Savign. in Linn. Encycl. 4 : 685. 1798 (non L. 1753); Calder in Rec. Bot. Surv. Ind. 6 : 329. t. 4. 1919 : Fyson in Fl. South. Ind. Hill. St. 1 : 75, 2 : 1. 52. 1932.

An ascending herb with a thickened or tuberous tap root and scaly bulbs. Leaves 3-foliate, very long petiolate; leaflets deeply obcordate. flowers bright yellow, showy, several on very long peduncles.

Fls. : Jan. - Mar. ; AKS 620, Taj Nursery.

Grown in the gardens and nurseries.

2. *Oxalis corniculata* L. Sp. Pl. 435. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 436. 1874 ; Duthie, Fl. U. Gang. Pl. 1 : 122. Repr. ed. 1960.

A small, procumbent or more or less erect, pubescent herb. Leaves 3-foliate, long-petiolate ; leaflets broader than long, obcordate. Flowers pedicelled, solitary or 2-few umbellate on axillary peduncles. Petals 5, yellow, about twice the length of the sepals. Capsules subcylindric, angular, 1.5 - 2.5 cm long. Seeds deep brown, rugose.

Fls. : Dec. - Feb. ; *Frls.* : Feb. - Apr. ; *Vern.* : Khat-mithi, AKS 49, Bichpuri campus.

Common in moist places of cultivated fields, gardens and unused grounds. The leaves are sometimes eaten by local people, they are pleasantly acidic and refreshing.

3. *Oxalis corymbosa* DC. Prodr. 1 : 696. 1824. *O. martiana* Zucc. in Denkschr. Akad. Muench. 9 : 144, n. 6. 1823 - 24 & in Abb. Akad. Muench. 1 : 203. 1824 - 1830.

A pubescent, stemless, perennial herb. Leaves radical, 3-foliate. Leaflets obcordate, divided at the top. Peduncles axillary, radical. Flowers pale rose, veined with purple, in cymes. Stamens 10. Ovaries angular ; styles 5.

Fls. : Apr. - June ; AKS 112, R. B. S. College garden.

Common in moist places of gardens and nurseries.

23. RUTACEAE

1a. Ovary deeply 2 - 5 lobed ; fruits capsular

4. *Ruta*

1b. Ovary entire or slightly 2 - 5 lobed ; fruits drupaceous usually indehiscent :

- 2a. Unarmed trees or shrubs 3. *Murraya*
- 3b. Armed trees :
- 3a. Leaflets 3 ; rachis not winged ; stamens numerous 1. *Aegle*
- 3b. Leaflets more than 3 ; rachis winged ; stamens 10 - 12 2. *Limonia*

1. AEGLE CORREA

Aegle marmelos (L.) Correa in Trans. Linn. Soc. 5 : 223. 1800 ; Hook. f. Fl. Brit. Ind. 1 : 516. 1875 ; Duthie, Fl. U. Gang. Pl. 1 : 135. Repr. ed. 1960. *Crataeva marmelos* L. Sp. Pl. 444. 1753.

A medium-sized, deciduous tree with ascending branches. Leaves 3-foliate; leaflets 3 - 8 x 1.5 - 3.5 cm, ovate-lanceolate, glabrous. Flowers greenish-white in axillary panicles. Calyx deciduous. Stamens many. Fruits large, globose ; pulp sweet.

Fls. : Apr. - May ; *Frt.s.* : May - July ; AKS 944, Paliwal Park.

Planted in the gardens and along roadsides.

2. LIMONIA CORREA

Limonia acidissima L. Sp. Pl. ed. 2. 554. 1762. *Feronia elephantum* Correa in Trans. Linn. Soc. London 5 : 224. 1800 ; Hook. f. Fl. Brit. Ind. 1 : 516. 1875 ; Duthie, Fl. U. Gang. Pl. 1 : 134. Repr. ed. 1960.

A small or rather large tree. Branches spreading horizontally. Leaves 3 to 7 foliolate ; leaflets 2 - 6 x 0.7 - 2.5 cm, obovate - elliptic, sweet-smelling ; petioles and rachis often winged. Flowers pale green, in racemes panicles on short lateral branches. Sepals 5, 1 mm long. Stamens 10, anthers dark red. Fruits large, globose; thin woody.

Fls. : May - June ; *Frt.s.* : Aug. - Sept. ; Vern. : Kaith ; AKS 416, R.B.S. College garden.

Planted in the gardens and on roadsides.

3. MURRAYA L. Corr. Murr. nom. cons

- 3a. Leaves aromatic ; berries black 1. *M. koenigii*
- 3b. Leaves not aromatic ; berries red 2. *M. paniculata*

1. *Murraya koenigii* (L.) Spreng. Syst. Veg. 2 : 315. 1826 ; Hook. f. Fl. Brit. Ind. 1 : 503. 1875 ; Duthie, Fl. U. Gang. Pl. 1 : 129. Repr. ed. 1960. *Bergera koenigii* L. Mant. 563. 1771.

A large, deciduous shrub or small tree. bark grey. Leaves imparipinnate ; leaflets 20-25, ovate-lanceolate, crenulate, acuminate. Flowers 6-8 mm long, in terminal corymbose umbels. Calyx very small. Young berries shining, pale yellow, later turning black, ovoid, rugose.

Fls. : Apr. - May ; *Frt.s.* : May - June ; *Vern.* : *Mitha-neem* ; AKS 410, P.W.D. office near Watertank Hariparwat.

Planted in private gardens for the leaves which are used as flavouring material.

2. *Murraya paniculata* (L.) Jack in Mal-Misc. 1 (5) : 31. 1820 ; Santapau in Rec. Surv. Ind. 16 (1) : 39. 1953. *Chaleas paniculata* L. Mant Pl. 68. 1767. *Murraya exotica* L. Mant. Pl. 563. 1771 ; Hook. f. Fl. Brit. Ind. 1 : 502. 1875 ; Duthie, Fl. U. Gang. Pl. 1 : 129. Repr. ed. 1960.

An evergreen shrub or small tree. Bark ash-coloured. Leaves imparipinnate; leaflets 3-9, ovate, obovate or rhomboid, obtuse, shining. Flowers white, very fragrant, in short terminal and axillary corymbs. Sepals minute. Berries ovoid, bright red or orange coloured.

Fls. & frts. : May Oct., *Vern.* : *Kamini* ; AKS 892, Paliwal Park.

Grown in gardens as ornamental plant and also planted as a hedge plant.

4. RUTA L.

Ruta chalepensis L. Mant. Pl. 1 : 69. 1767. *R. graveolens* L. var. *angustifolia* sensu Hook. f. in Fl. Brit. Ind. 1 : 485. 1875.

An erect or ascending, strong-smelling herb, 30-60 cm tall. Leaves 2-3 pinnate; leaflets 0.8 - 1.5 x 0.3 - 0.4 cm, spatulate-oblong or linear-oblong. Flowers yellow, in divaricately spreading corymbs. Calyx small and persistent. Petals usually 4, toothed or fringed. Stamens 8 or 10. Capsules 4-5 lobed, obtuse.

Fls. & frts. : Mar. - Apr. ; AKS 379, R. B. S. College garden.

Found in gardens.

24. SIMAROUBACEAE

- 1a. Large trees ; leaves pinnate ; fruit a samara 1. *Ailanthus*
 1b. Small spiny trees ; leaves 2-foliolate ; fruit a drupe 2. *Balanites*

1. AILANTHUS Desf. nom. cons.

Ailanthus excelsa Roxb. Pl. Cor. 1 : t. 23. 1795 ; Hook. f. Fl. Brit. Ind. 1 : 518. 1875 ; Duthie, Fl. U. Gang. Pl. 1 : 136. Repr. ed. 1960.

A large tree. Wood soft, white. Leaves imparipinnate ; leaflets very many, ovate or lanceolate-lanceolate, coarsely toothed, unequal at the base. Flowers pendulous, greenish-yellow, in large, lax, often much-branched panicles. Calyx 5-partite. Samaras copper red, once or twice twisted at the base.

Fls. : Feb. - Apr. ; *Frt.* Apr. - June ; *Vern.* ; *Ulloo* ; AKS 648, R. B. S. College garden.

Planted in gardens and along roadsides.

2. BALANITES Delile nom. cons.

Balanites aegyptiacu (L.) Delile, Deser. Egypt. Hist. Nat. 2 : 221, t. 28. f. 1. 1813. *Ximenia aegyptiaca* L. Sp. Pl. 1194. 1753. *Balanites roxburghii* Planch. in Ann. Sc. Nat. (Ser. 4) 4 : 258, t. 2. 1854 ; Hook. f. Fl. Brit. Ind. 1 : 522. 1875.

A shrub or small evergreen tree. Stems pale brown or whitish. Branches ending in sharp, straight thorns. Leaves 2-foliolate ; leaflets elliptic or obovate, entire, puberulous, coriaceous. Flowers white or greenish-white, fragrant, in close cymes. Sepals and petals 5, velvety-pubescent. Fruits woody, ovoid; pulp bitter.

Fls. & *frits.* : Apr. - Aug. ; *Vern.* ; *Hingota* ; AKS 783, Niyamatpur.

Common on the ridge in gravelly soil ; the fruits are used for washing clothes.

25. MELIACEAE

- 1a. Fruit a capsule 3. *Tearoa*
 1b. Fruit a indehiscent drupe :

- 2a. Leaves once pinnate ; ovary 3-celled 1. *Azadirachta*
 2b. Leaves bipinnate; ovary 5-celled 2. *Melia*

1. AZADIRACHTA A. Juss.

Azadirachta indica A. Juss. in Mem. Mus. Natl. Hist. Nat. 19 : 221, t. 2, f. 5. 1830 ; Gamble, Fl. Press. Mad. 127. Repr. ed. 1957. *Melia azadirachta* L. Sp. Pl. 385. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 544. 1875 ; Duthie, Fl. U. Gang. Pl. 1 : 141. Repr. ed. 1960.

A large, glabrous, deciduous tree. Leaves pinnate, 20-30 cm long, crowded near the ends of the branches. Leaflets 10 - 15, subopposite, lanceolate, 5-8 cm long, acuminate, serrate. Flowers white, scented, in branched, axillary panicles. Petals shortly ciliolate. Anthers 10. Ovary 3-celled. Drupes oblong ovoid, glabrous, yellow when ripe.

Fls. : Mar. May ; *Frt.s.* : May June ; *Vern.* : Neem ; AKS 405, College campus.

Commonly planted along the roadsides and in gardens. The bark is a bitter tonic, astringent and antiperiodic. That is useful in fevers, it breaks the periodic sequence of fevers and is useful in skin diseases.

2. MELIA L.

Melia azedarach L. Sp. Pl. 384. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 544. 1875; Duthie, Fl. U. Gang. Pl. 1 : 141. Repr. ed. 1960.

A moderate-sized tree. Leaves bipinnate, sometimes 3-pinnate, 20 - 30 cm long. Leaflets ovate or lanceolate, 2.5 - 6 cm. long, acuminate, serrate. Flowers lilac-blue, fragrant, in long peduncled, axillary panicles. Ovary 5-celled. Drupes globose, more or less dry, yellow and wrinkled at maturity.

Fls. : Mar. Apr. ; *Frt.s.* : Apr. June ; *Vern.* : Bakain ; AKS 661, Paliwal Park.

Planted in gardens and along roadsides. The fruits and leaves are applied as poultice to relieve nervous headaches, the seeds are used in rheumatism.

3. TOONA Roem.

Toona ciliata Roem. Syn. Hesp. 139. 1846; Santapau in Rec. Bot. Surv. Ind. 16(1) : 45. 1953. *Cedrela toona* Roxb. ex. Rottl. & Willd. in Ges. Naturf. Fr. Neue Schr. 2 : 198. 1803; Hook. f. Fl. Brit. Ind. 1 : 568. 1875; Duthie, Fl. U. Gang. Pl. 1 : 143. Repr. ed. 1960.

A large deciduous tree. Bark dull black. Leaves paripinnate, 30 - 60 cm long; leaflets 8 - 30, lanceolate or ovate-lanceolate, acuminate, entire or undulate. Flowers white, fragrant, in drooping or suberect panicles. Stamens 5. Capsules oblong, smooth.

Fls. & frts. : Mar. - May ; *Vern.* : *Toon* ; AKS 734, Shahjahan garden.

Planted in gardens. The wood is used as timber and the leaves are used as cattle fodder.

26. CELASTRACEAE

MAYTENUS H. B. & K. nom. cons.

Maytenus emarginata (Willd.) Ding-Hou in Fl. Males. ser. 1, 6(2): 241. 1962. *Celastrus emarginatus* Willd. Sp. Pl. 1 : 2. 1798. *C. senegalensis* Lamk. Encycl. 1 : 661. 1785; Duthie, Fl. U. Gang. Pl. 1 : 149. Repr. ed. 1960. *C. montanus* Roth in Roem. & Schult. Syst. 5 : 427. 1819. *Gymnosporia montana* (Roth.) Benth. Fl. Austr. 1 : 400. 1863; Hook. f. Fl. Brit. Ind. 1 : 621. 1875.

An erect, scandent shrub. Young branches spinescent at the extremities and bearing leaves and flowers. Leaves 2 - 5, in axillary clusters, variable in form and size, obovate to linear-spathulate, coriaceous. Flowers small, white, in axillary cymes. Calyx lobes and petals fimbriate. Stamens 5. Capsules globose or ovoid, black.

Fls. & frts. : July - Dec. ; *Vern.* : *Kakera* ; AKS 874, Taulput :

Found in sandy or gravelly soil of hilly tracts.

27. RHAMNACEAE

ZIZYPHUS MILL.

1. *Zizyphus mauritiana* Lamk. Encycl. 3 : 319. 1789 ; Santapau in J. Bombay Nat. Hist. Soc. 51 : 802. 1953. *Z. jujuba* (L.) Gaertn. Fruct. 1 : 203. 1788 (non Hill. 1768); Hook. f. Fl. Brit. Ind. 1 : 632. 1875 ; Duthie, Fl. U. Gang. Pl. 1 : 152. Repr. ed. 1960. *Rhamnus jujuba* L. Sp. Pl. 194. 1753.

A medium-sized, evergreen tree with spreading, drooping branches. Bark grey or dull black. Leaves variable, ovate-oblong or suborbicular, entire or serrulate, green and glabrous above, white or buff-tomentose beneath. Prickles solitary or paired. Flowers greenish yellow, in short axillary tomentose cymes. Drupes oblong-globose or ovoid, orange, yellowish or red when ripe.

Fls. : Sept. Nov.; *Frts.* : Nov. Feb.; *Vern.* : Ber; AKS 708, Poiga ghat.

Cultivated for its edible fruits.

2. Zizyphus nummularia (Burm. f.) Wt. & Arn. Prodr. 162. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 633. 1875. *Rhamnus nummularia* Burm. f. Fl. Ind. 61. 1768. *Zizyphus rotundifolia* Lamk. Encycl. 3 : 319. 1789 ; Duthie, Fl. U. Gang. Pl. 1 : 153. Repr. ed. 1960.

A tomentose, thorny, bushy shrub. Stipular prickles in pairs. Leaves shortly petiolate, ovate to orbicular, serrate densely tomentose beneath. Flowers pale-yellow in dense axillary cymes. Petals conuate, longer than the stamens. Stamens 5. Drupes globose, red or black when ripe.

Fls. : July Sept.; *Frt.s.* : Sept. Dec.; *Vern.* : Jharber; AKS 519, Bichipuri
canopus

Abundant on the ridge and in waste places by the sides of Railway lines

28. VITACEAE

СОВЕТСКАЯ РУССКАЯ ГИДРОГЕОЛОГИЧЕСКАЯ

Cayratia trifolia (L.) Domin. Biblioth. Bot. 89, 371, 1927; Suesseng. Pflanzenfam. ed. 20 d : 280, 1953; Babu, Herb. Fl. Dehra Dun 107, 1977. *Vitis*

trifolia L. Sp. Pl. 203, 1753; Duthie, Fl. U. Gang. Pl. I : 163, Repr. ed. 1960; *Cissus carnososa* Lamk. Encycl. I : 31, 1783. *Cayratia carnososa* (Lamk.) Gagnep. Not. Syst. 1 : 347, 1911.

An extensive climber with angular branches. Leaves 3-foliolate; leaflets 3-7.5 x 2.2-5 cm, broadly ovate or ovate-lanceolate or obovate, obtuse or acute, crenate-serrate. Tendrils branched, ending in adhesive disks. Flowers greenish-white, in umbellate cymes. Petals 4, distinct. Berries globose, 2-4-seeded, black.

Fls. : July-Aug.; *Frt.s.* : Aug.-Sept.; AKS 429, Rambagh; 435, Kitham; 787, Fatehpur Sikri.

Commonly found twining upon the bushes and trees and also occurs in hilly tracts.

29. SAPINDACEAE

1a. Herbs climbing by circinate tendrils; leaves biternate, leaflets pinnatifid-pinnatilobed; flowers petalous

1. *Cardiospermum*

1b. Erect shrubs; leaves simple; flowers apetalous

2. *Dodonaea*

1. CARDIOSPERMUM L.

Cardiospermum halicacabum L. Sp. Pl. 366, 1753; Hook. f. Fl. Brit. Ind. I : 670, 1875; Duthie, Fl. U. Gang. Pl. I : 166, Repr. ed. 1960.

A climbing, tendril-bearing herb. Leaves alternate bipinnate; leaflets 2.2-5.5 x 1.2-2 cm, pinnately lobed, glabrous. Flowers white, in few-flowered umbellate cymes. Sepals 4, the 2 outer ones smaller. Petals 4, in pairs. Stamens 8. Ovary 3-celled. Capsules trigonous, bladder-like, winged at the three angles. Seeds black, smooth.

Fls. : Aug.-Sept.; *Frt.s.* : Sept.-Oct.; AKS 236, Kitham; 333, Shahjahan Garden.

Found on the ridge and in shady open places, climbing on shrubs.

2. DODONAEA L.

Dodonaea viscosa (L.) Jacq. Enum. Pl. Carib. 19. 1760; Hook. f. Fl. Brit. Ind. 1 : 697. 1875; Duthie, Fl. U. Gang. Pl. 1 : 166. Repr. ed. 1960. *Ptelea viscosa* L. Sp. Pl. 118. 1753.

An evergreen shrub or a small tree. Leaves subsessile, 4-7.5 x 0.9-1.5 cm, oblanceolate, sub-apiculate, entire, bright green, shining. Flowers greenish-yellow, dioecious, in short terminal panicles with racemose branches. Sepals 5, oblong. Petals 0. Stamens 8. Capsules compressed, winged, yellowish brown. Seeds black.

Fls. : Sept. Dec.; *Frt.s.* : Dec. Feb.; *Vern.* : *Vilayti mehndi*; AKS 324, Sikandra.

Planted as a hedge plant.

30. ANACARDIACEAE

MANGIFERA L.

Mangifera indica L. Sp. Pl 200. 1753; Hook. f. Fl. Brit. Ind. 2 : 13. 1876; Duthie, Fl. U. Gang. Pl. 1 : 176. Repr. ed. 1960.

A large evergreen tree. Leaves crowded at the ends of branches, oblong or obovate-lanceolate, shining. Flowers yellowish-green, small, polygamous, in terminal panicles. Drupes 7-14 cm long, with a succulent mesocarp and thin epicarp, greenish or yellowish.

Fls. : Feb. Apr.; *Frt.s.* : May July; *Vern.* : *Aam*; AKS 355, Rambagh.

Cultivated for its edible fruits. The wood is used as timber.

31. MORINGACEAE

MORINGA Adams

Moringa pterygosperma Gaertn. Fruct. 2 : 314. 1791; Hook. f. Fl. Brit. Ind. 2 : 45. 1876; Duthie, Fl. U. Gang. Pl. 1 : 179. Repr. ed. 1960.

A small or large deciduous tree. Bark grey-white. Leaves polypinnate; leaflets obovate or elliptic, entire. Flowers pale white, fragrant, irregular, 2-sexual, in large axillary panicles. Pods long, pendulous, 9-ribbed, slightly constricted between the seeds.

Fls. : Mar. May ; *Frt.s.* : May July ; *Vern.* : *Senjna* ; AKS 396, R. B. S. College garden.

Planted in the gardens and along roadsides.

32. FABACEAE

1a. Stamens free	22. <i>Sophora</i>
1b. Stamens mono or diadelphous :	
2a. Stamens monoadelphous :	
3a. Trees :	
4a. Leaflets 3-5	8. <i>Dalbergia</i>
4b. Leaflets 5-9 :	
5a. Leaflets glaucous ; pods 2-3 seeded	16. <i>Millettia</i>
5b. Leaflets not glaucous ; pods 1-seeded	19. <i>Pongamia</i>
3b. Herbs, shrubs or twiners :	
6a. Twiners	24. <i>Terranopsis</i>
6b. Herbs or shrubs :	
7a. Leaves bifoliate	28. <i>Zornia</i>
7b. Leaves simple or 3-foliate	7. <i>Crotalaria</i>
2b. Stamens diadelphous :	
8a. Thorny herbs or undershrubs	3. <i>Alhagi</i>
8b. Unarmed herbs, shrubs or trees :	
9a. Trees :	

- | | |
|--|------------------------|
| 10a. Trunk armed with conical prickles ; flowers red | 11. <i>Erythrina</i> |
| 10b. Trunk unarmed ; flowers red tinged with orange | 5. <i>Butea</i> |
| 9b. Herbs or shrubs : | |
| 11a. Stamens 10, in bundles of 5 each | 2. <i>Aeschynomene</i> |
| 11b. Stamens 10, but not united in bundles of 5 each : | |
| 12a. Pods articulated | 4. <i>Alysicarpus</i> |
| 12b. Pods not articulated : | |
| 13a. Leaves simple : | |
| 14a. Anthers apiculate | 12. <i>Indigofera</i> |
| 14b. Anthers not apiculate : | |
| 15a. Pods jointed | 9. <i>Desmodium</i> |
| 15b. Pods not jointed | 23. <i>Tephrosia</i> |
| 13b. Leaves not simple : | |
| 16a. Leaves or leaflets modified into tendrils | |
| 17a. Leaflets two | 13. <i>Lathyrus</i> |
| 17b. Leaflets many | 26. <i>Vicia</i> |
| 16b. Leaves or leaflets not ending in tendrils : | |
| 18a. Leaves trifoliate : | |
| 19a. Leaves gland dotted beneath | 20. <i>Rhynchosia</i> |
| 19b. Leaves not gland dotted : | |
| 20a. Leaflets dentate or toothed : | |
| 21a. Flowers in long racemes, 2-10 cm long | 15. <i>Melilotus</i> |

21b. Flowers in small clusters or heads :

22a. Pods straight or recurved, not spinous 25. *Trigonella*

22b. Pods spinous, spirally twisted 14. *Medicago*

20b. Leaflets entire :

23a. Pods clothed with brown, irritating bristles 17. *Mucuna*

23b. Pods not clothed with irritating bristles :

24a. Stigma terminal 10. *Dolichos*

24b. Stigma oblique :

25a. Petal keel spirally twisted 18. *Phaseolus*

25b. Petal keel not spirally twisted 27. *Vigna*

18b. Leaves not trifoliolate :

26a. Leaves imparipinnate :

27a. Anthers apiculate 12. *Indigofera*

27b. Anthers not apiculate :

28a. Climbing shrubs ; flowers blue 6. *Clitoria*

28b. Erect or procumbent herb or shrubs ;
flowers red, pink or
purple

23. *Tephrosia*

26b. Leaves paripinnate :

29a. Woody climbers ; pods
not torulose 1. *Abrus*

29b. Shrubs ; pods torulose 21. *Sesbania*

1. ABRUS L.

Abrus precatorius L. Syst. Nat. ed. 12(2) : 472. 1767 ; Hook. f. Fl. Brit. Ind. 2 : 175. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 241. Repr. ed. 1960.

A woody climber. Leaves paripinnate, leaflets 10–20 pairs, opposite, 0.8–2 × 0.5–0.7 cm, oblong, entire, rounded at both ends, very deciduous, flowers 1–1.2 cm long, pink or white with a pink tinge, in dense axillary racemes. Calyx 3 mm long, thinly silvery. Pods 2.5–3.7 × 1.1–1.4 cm, oblong, turgid, 3–6 seeded. Seeds ovoid, scarlet with a black spot at the hilum.

Fls. : Aug. Sept.; *Frt.s.* : Sept. Oct.; *Vern.* : *Ghumchi, Ratti, Chongachi*; AKS 701, Agra College garden; 839, Salempur; 890, Tantpur.

Found in gardens, fruit orchards and also on the ridge climbing on the shrubs.

2. AESCHYNOMENE L.

Aeschynomene indica L. Sp. Pl. 713. 1753; Hook. f. Fl. Brit. Ind. 2 : 151. 1876; Duthie, Fl. U. Gang. Pl. 1 : 249. Repr. ed. 1960.

A tall erect shrub-like annual, 0.6–1 m high. Leaf rachis 4–7 cm long, leaflets 15–35 pairs, 4–10 × 1–3 mm, linear, entire, obtuse. Stipules linear-lanceolate, 5–6 mm long. Flowers in lax 1–4-flowered axillary racemes. Calyx 2-lipped, 6 mm long. Corolla 1.2 cm, long, yellow with purple veins. Pods 2.6–4.5 × 0.3–0.5 cm, 5–10 jointed, linear-oblong.

Fls. : Aug. Sept.; *Frt.s.* : Sept. Oct.; *Vern.* : *Didhen*; AKS 241, Kitham; 517, Bichpuri campus; 851, Salampur.

Found growing along the margins of water reservoirs and canals.

3. ALHAGI Desv.

Alhagi pseudalhagi (Bieb.) Desv. Jour. de Bot. 1 : 120. 1823. *Hedysarum pseudalhagi* Bieb. Fl. Taur. Cauc. 2 : 174. 1808. *Alhagi camelorum* Fisch. Cat. Jard. Pl. Gorenki 72. 1812, nom. illegit; Duthie, Fl. U. Gang. Pl. 1 : 257. Repr. ed. 1960.

An erect undershrub, 30–60 cm high; branches woody, terete, armed with sharp spines. Leaves simple, 0.5–1.5 × 1.3–0.6 cm, obovate-oblong, entire, obtuse. Flowers 1–5 on the spines; pedicels very short. Calyx 3 mm long. Corolla 6–8 mm. long, red. Pods 2–4 cm long, usually falcate, irregularly constricted between the seeds.

Fls. : Apr. May; *Frt.s.* : May–June; *Vern.* : *Jawasa*; AKS 413, Bichpuri campus.

Commonly found in fallow fields and sandy places.

4. *ALYSICARPUS* DESV. nom. cons.

- 1a. Calyx equal or slightly longer than the first joint of the pod : joints of pods reticulately veined :
- | | |
|-------------------------|------------------------|
| 2a. Pods moniliform | 2. <i>A. monilifer</i> |
| 2b. Pods not moniliform | 4. <i>A. vaginalis</i> |
- 1b. Calyx much longer than the first joint of the pod : joints of pods not reticulately veined :
- | | |
|--|-----------------------------|
| 3a. Pods moniliform, the joints strongly and closely transversely ribbed | 3. <i>A. styracifolius</i> |
| 3b. Pods slightly moniliform, joints as above, glabrous | 1. <i>A. bupleurifolius</i> |

1. *Alysicarpus bupleurifolius* (L.) DC. Prodr. 2 : 352. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 158. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 255. Repr. ed. 1960. *Hedysarum bupleurifolium* L. Sp. Pl. 745. 1753.

A diffuse or ascending herb, 30–50 cm high. Leaves 3.5–9.5 × 0.5–1 cm, linear-lanceolate or oblong, entire, obtuse-acute. Stipules 1–2 cm long, subulate. Flowers in pairs on rigid spike like lax racemes, each pair of flowers enclosed by a single bract. Calyx 6.5 mm long, much longer than the lowest joint of the pod. Corolla 7.5 mm long, pink. Pods 1–1.6 × 0.2–0.3 cm, 3–6 jointed, moniliform, stalked.

Fls. : Sept. – Oct. ; *Frt.s.* : Oct. – Nov. ; AKS 800, Chiknipur.

Found on the ridge hidden among grasses.

2. *Alysicarpus monilifer* (L.) DC. Prodr. 2 : 353. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 157. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 254. Repr. ed. 1960. *Hedysarum moniliferum* L. Mant. 1 : 102. 1771.

A prostrate, much-branched herb, 20–50 cm long. Leaves simple, 0.6–1.6 × 0.4–1.2 cm, oblong-elliptic, entire, obtuse, slightly pubescent. Flowers small, in erect racemes. Calyx 4 mm long, persistent, as long as the first joint of pod. Corolla 5.5 mm long, red. Pods 1.2–2 × 0.2 cm, distinctly 2–6 jointed, moniliform, hooked hairy.

Fls. : Aug. – Sept. ; *Frt.s.* : Sept. – Oct.; *Vern.* : Jhughas ; AKS 453, near JALMA.

Very common in dry places and associated with other leguminous plants.

3. *Alysicarpus styracifolius* DC. Prodr. 2 : 353, 1825 ; Schindler in Fedde, Rep. Beih. 49 : 257, 1925. *A. rugosus* var. *styracifolius* Barker in Hook. f. Fl. Brit. Ind. 2 : 159, 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 257. Repr. ed. 1960.

An erect or diffuse, nearly glabrous herb, 30 - 60 cm high. Leaves 1.5 - 3.8 x 0.7 - 1.3 cm, elliptic or oblong-lanceolate, entire, obtuse or acute, glabrous above, slightly hairy beneath. Flowers in long lax racemes. Calyx 7 - 9 mm long, ciliate on the edges, much longer than the lowest jointed of the pod, 4-lobed nearly to the base. Corolla reddish, shorter than the calyx. Pods moniliform, composed of 3-5, 1-seeded, indehiscent joints, transversely ribbed, often exserted.

Fls. & *frts.* : Oct. - Nov. ; AKS 535, Chiknipur.

Found occasionally on the ridge amongst grasses.

4. *Alysicarpus vaginalis* (L.) DC. Prodr. 2 : 353, 1825 ; Hook. f. Fl. Brit. Ind. 2 : 158, 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 255. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 69, 1953. *Hedysarum vaginalis* L. Sp. Pl. 746, 1753.

A diffuse or ascending herb, 30 - 60 cm high. Leaves 0.8 - 2.8 x 0.7 - 1.7 cm, very variable in shape, oblong-lanceolate, linear or suborbicular, entire, obtuse-retuse. Flowers in lax racemes. Calyx 5 mm long. Corolla 6.5 mm long, light purple. Pods 1.5 - 2 cm long, subterete, 6-8 jointed.

Fls. : Aug. - Sept. ; *Frts.* : Sept. - Oct. ; AKS 170, Poiya ghat ; 512, Bichpuri campus ; 719, College campus.

Found in fallow fields, lawns and amongst grasses.

5. *Butea Roxb.* Ex Willd. nom. cons.

Butea monosperma (Lamk.) Taub. in Engl. & Prantl, Pflanzenf. 3(3) : 366, 1894. *Erythrina monosperma* Lamk. Encycl. 1 : 391, 1786. *Butea frondosa* Roxb. in Asiatic Res. 3 : 369, 1792 cf Pl. Cor. 1 : 21, 1795 ; Hook. f. Fl. Brit. Ind. 2 : 194, 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 221. Repr. ed. 1960.

A small or medium-sized, deciduous tree with crooked trunk. Bark light brown. Latex red. Leaves pinnately 3-foliolate ; leaflets broadly obovate from a cuneate base or rhomboid, obtuse or retuse, coriaceous, finely silky. Flowers 5 - 8 cm long, bright red tinged with orange, appearing when the tree is nearly leafless. Corolla clothed outside with silvery silky hairs. Pods 10 - 15 x 3 - 4 cm, flat, silky-tomentose. Seed 1.

Fls. : Mar. - May ; *Vern.* : *Dhak* ; AKS 682, Paliwal Park.

Commonly found in forests, gardens and also found on the ridges ; the dye obtained from the flowers is used for colouring clothes.

6. CLITORIA L.

Clitoria ternatea L. Sp. Pl. 753. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 208. 1876; Duthie, Fl. U. Gang. Pl. 1 : 212. Repr. ed. 1960.

A beautiful, slender climber. Leaves entire, truncate. Stipules persistent, lanceolate, 4 - 5 mm long. Flowers bright blue or white, solitary on axillary peduncles. Calyx 2.2 cm long. Corolla 3.5 - 5 cm long, much exserted ; standard spoon shaped. Pods linear, flat, 5 - 10 cm long.

Fls. : Dec. - Jan. ; *Frtts.* : Jan. - Feb. ; *Vern.* : *Gokarni* ; AKS 537, Chiknipur.

Common in cultivated fields, also cultivated in gardens.

7. CROTALARIA L.

- | | |
|--|--------------------------|
| 1a. Leaves 3-foliate | 3. <i>C. medicaginea</i> |
| 1b. Leaves simple : | |
| 2a. Shrubs; pods silky hairy | 2. <i>C. juncea</i> |
| 2b. Undershrubs; pods glabrous or villous : | |
| 3a. Stipules absent; pods villous | 5. <i>C. burhia</i> |
| 3b. Stipules present; pods glabrous : | |
| 4a. Stipules and bracts minute, subulate; leaves obtuse or retuse, | 5. <i>C. retusa</i> |
| 4b. Stipules and bracts large foliaceous; leaves acute | 4. <i>C. spectabilis</i> |

1. *Crotalaria burhia* Buch. Ham-Ham. ex Benth. in Hook. Lond. Jour. Bot. 2: 474. 1850, cum descript.; Hook. f. Fl. Brit. Ind. 2: 66. 1876; Duthie, Fl. U. Gang. Pl. 1 : 186. Repr. ed. 1960.

An erect or decumbent undershrub, 30-60cm high. Branches many, slender, tomentose. Leaves simple, petiolate, 0.7 - 2.5 x 0.4 - 1 cm, oblong-lanceolate, acute,

silky. Flowers in elongated terminal racemes. Calyx 9 mm long. Corolla 1.1 cm long, yellow, veined with reddish colour. Pods oblong, slightly longer than the calyx, villous.

Fls. : Feb. - Sept. ; *Vern.* : *Khip* ; AKS 67, Chalesar ; 181, Poiya ghat.

Common in sandy and rocky places.

2. *Crotalaria juncea* L. Sp. Pl. 714. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 79. 1876; Duthie, Fl. U. Gang. Pl. 1 : 190. Repr. ed. 1960.

A shrub, 1.2 - 1.5 m high with terete, grooved stems and branches. Leaves petiolate, 5 - 12 x 0.8 - 1.8 cm, linear - oblong, obtuse-mucronate. Flowers in lax lateral and terminal racemes, 15-30 cm long. Calyx 1.8 cm long. Corolla 2.5 cm long, bright yellow with red veins. Pods 2 - 4 cm long, silky hairy.

Fls. : Sept. - Oct. ; *Frtis.* : Oct. - Nov. ; *Vern.* : *San* ; AKS 189, R.B.S. College garden.

Cultivated for the sake of fibre.

3. *Crotalaria medicaginea* Lamk. Encyc. 2 : 201. 1790 ; Duthie, Fl. U. Gang. Pl. 1 : 189. Repr. ed. 1960 ; Munk in Reinwardtia 6 : 208. 1962. *C. luxurians* Benth. in Hook. Lond. Jour. Bot. 2 : 578. 1843. *C. medicaginea* var. *luxurians* Baker in Hook. f. Fl. Brit. Ind. 2 : 81. 1876.

A diffuse herb, 20 - 50 cm high with several erect branches. Leaves 3-foliate; leaflets 1 - 2.5 x 0.4 - 0.9 cm, oblanceolate-obovate, obtuse-truncate. Flowers in terminal racemes and leaf-opposed racemes, 2-5 cm long. Calyx 2.5 mm long. Corolla 5 mm long, yellow. Pods small, obliquely globose, 4 x 4 mm, hairy, 2 - collled.

Fls. : Aug. - Sept. ; *Frtis.* : Sept. - Oct. ; *Vern.* : *Gulali* ; AKS 147, Bichpuri campus; 663, Agra College garden.

Common in cultivated fields and along roadsides.

4. *Crotalaria spectabilis* Roth. Nov. Pl. Sp. 341. 1821 ; Ali in Biologia 12 : 26. 1966. *C. sericea* Retz. Obs. 5 : 26. 1788; Hook. f. Fl. Brit. Ind. 2 : 75. 1876; Duthie, Fl. U. Gang. Pl. 1 : 189. Repr. ed. 1960.

A tall, bright green undershrub, 1 - 1.5 m high with striated stem. Leaves petiolate, 5 - 15 x 2.4 - 5 cm, oblong-lanceolate, sub-acute, finely silky beneath. Stipules leafy, persistent. Flowers in lax, terminal racemes. Calyx 1.7 cm. long. Corolla 2.5 cm long, yellow tinged with purple. Pods 2.5 - 4 cm long, oblong, exserted, glabrous.

Fls. : Sept. - Nov.; *Frt.s.* : Nov. - Dec.; *Vern.* : *Sanni*; AKS 188, 586, R.B.S. College garden.

Cultivated for fibre and fodder.

5. *Crotalaria retusa* L. Sp. Pl. 715. 1753; Hook. f. Fl. Brit. Ind. 2 : 75. 1876; Duthie, Fl. U. Gang. Pl. 1 : 189. Repr. ed. 1960.

An erect robust undershrub, 0.6 - 1.2 m high. Leaves petiolate, oblong-lanceolate, usually retuse at the apex, rarely subacute. Stipules small, subulate. Flowers yellow tinged with purple, in lax terminal racemes. Pods exserted, oblong, glabrous.

Duthie (in Duthie, Fl. U. Gang. Pl. 1 : 189) mentions the occurrence of this plant from Agra.

8. DALBERGIA L. L. nom. cons.

Dalbergia sissoo Roxb. Fl. Ind. 3 : 223. 1832; Hook. f. Fl. Brit. Ind. 2 : 237. 1876; Duthie, Fl. U. Gang. Pl. 1 : 243. Repr. ed. 1960.

A moderate - sized, deciduous tree. Bark grey. Leaves imparipinnate; leaflets 3 - 5, alternate, 2 - 5.5 x 1.7 - 4.5 cm, broadly ovate or suborbicular, acuminate, glabrescent. Flowers in axillary panicles. Calyx 5 mm long. Corolla 1.1 cm long, pale yellowish - white. Stamens 9, united in a tube. Pods 4 - 9 x 0.8 - 1.2 cm, strap-shaped, glabrous. Seeds 1 - 3, flattened.

Fls. : Mar. - June; *Frt.s.* : June - July; *Vern.* : *Shisham*; AKS 673. Bichpuri campus.

Planted along roadsides and in the gardens.

9. DESMODIUM Desv. nom. Cons.

1a. Stem erect; leaves simple 1. *D. gangeticum*

1b. Stem prostrate or slightly ascending; leaves 3-foliate 2. *D. triflorum*

1. *Desmodium gangeticum* (L.) DC. Prodr. 2 : 327. 1825; Hook. f. Fl. Brit. Ind. 2 : 168. 1876; Duthie, Fl. U. Gang. Pl. 1 : 264. Repr. ed. 1960. *Hedysarum gangeticum* L. Sp. Pl. 746. 1753.

A suberect undershrub, 60-130 cm high. Leaves simple, 3 - 7.5 x 1.5 - 4 cm, ovate, elliptic, oblong or lanceolate, entire, acute, glabrescent above, glaucous

and appressed silky beneath. Stipules linear, erect, persistent. Flowers in long terminal or axillary racemes. Calyx 3 mm long. Corolla 4 - 5 mm long, white or tinged with purple. Pods 1.3 - 2.2 x 0.2 - 0.3 cm, indehiscent, 6 - 8 jointed, deeply indented on lower suture, hooked hairy.

Fls. & frts. : Aug. Sept. ; *Vern.* : *Salpalni*; AKS 364, Shahjahan Garden.

Met with very occasionally in the gardens. The root is tonic and useful in chronic fever, cough, etc.

2. **Desmodium triflorum** (L.) DC. Prodr. 2 : 334, 1825 ; Hook. f. Fl. Brit. Ind. 2 : 173, 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 263. Repr. ed. 1960. *Hedysarum triflorum* L. Sp. Pl. 749, 1753.

A small, prostrate or diffuse herb often rooting at the nodes, 8-15 cm long. Leaves 3-foliolate ; leaflets 4 - 9 x 3 - 10 mm, obovate - obdeltoid, entire, retuse. Flowers 1 - 3 together in the axils of leaves. Calyx 4 mm long. Corolla 5.5 mm long, pink. Pods 0.8 - 1.5 x 0.3 cm, 3-5 jointed, slightly curved.

Fls. : Aug. Oct. ; *Frts.* : Oct. Nov. ; AKS 148, Bichpuri campus ; 543, Chiknipur ; 566, Kiraoli.

Found in grazing fields and lawns. It is a good soil binder on account of its peculiar habit of growth. The fresh leaves are used for healing the wounds.

10. LABLAB Adans.

Lablab purpureus (L.) Sweet, Hort. Brit. ed. 1 : 481, 1827; Ali in Fl. W. Pak. 100 : 251, 1977. *Dolichos purpureus* L. Sp. Pl. ed. 2 : 1021, 1763. *Dolichos lablab* L. Sp. Pl. 725, 1753; Hook. f. Fl. Brit. Ind. 2 : 209, 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 210. Repr. ed. 1960.

A tall, glabrous, twining perennial or annual. Stipules basifixed, lanceolate. Leaves 3-foliolate ; leaflets 5.5 - 9 x 4 - 7 cm, broadly ovate or deltoid, entire, acute, slightly pubescent. Flowers white or pink in axillary or terminal lax racemes. Pods flat, beaked, 4 - 5 x 1.2 - 1.5 cm.

Fls. : Oct. Nov. ; *Frts.* : Nov. Dec ; *Vern.* : *Sem*; AKS 39, Salempur.

Cultivated for the sake of the pods, which are cooked as vegetable.

11. ERYTHRINA L.

Erythrina variegata L. var. *orientalis* (L.) Merr. Interpret. Herb. amb. 276, 1917 & Enum. 2 : 306 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 75, 1953. *E. corallodendron* L. var. *orientalis* L. Sp. Pl. 706, 1753.

A moderate-sized or large tree. Bark grey, armed with small conical prickles. Leaves pinnately 3-foliate ; leaflets broadly rhomboid-ovate, acute or acuminate, nearly as long as broad. Flowers bright scarlet, appearing before the leaves, in dense racemes. Calyx 2.5–3 cm long, spathaceous. Pods 10–20 cm long, stalked, subcylindric, distinctly torulose.

Fls. : Mar. – Apr. ; *Frts.* : Apr. – May ; *Vern.* : *Rakta-madar* ; AKS 743, Shahjahan garden.

Planted in gardens; the flowers appear on leafless branches.

12. INDIGOFERA L.

1a. Leaves compound:

2a. Leaves 1 to 3-foliate; pods torulose 5. *I. oblongifolia*

2b. Leaves imparipinnate ; pods not torulose :

3a. Flowers in axillary racemes, not heads:

4a. Pods turgid:

5a. Leaflets 3 ; pods deflexed,
4-gonous, pointed 7. *I. trita*

5b. Leaflets 5 to 13; pods cylindric,
glabrous 6. *I. tinctoria*

4b. Pods flat, reflexed

2. *I. hochstetteri*

3b. Flowers in axillary, sessile or
shortly peduncled heads

4. *I. linnaei*

1b. Leaves simple :

6a. Leaves linear to ovate; pods globose, one seeded 3. *I. linifolia*

6b. Leaves ovate-cordate; pods oblong,
two seeded 1. *I. cordifolia*

1. *Indigofera cordifolia* Heyne ex Roth, Nov. Pl. Sp. 357, 1821; Hook. f. Fl. Brit. Ind. 2 : 93, 1876; Duthie, Fl. U. Gang. Pl. 1 : 230, Repr. 1960; Gillett in Kew Bull. Add. Ser. 1 : 35, 1958.

A spreading, prostrate herb with dense white pubescence, 10 - 25 cm long. Leaves subsessile, 0.7 - 1.6 x 0.6 - 4 cm, oblong - ovate, entire, acute, villous. Flowers 3.5 - 5 mm long, in sessile heads. Calyx 3 mm long, villous. Corolla 3.5 - 5 mm long, not exserted, bright red. Pods 5-6 mm long, oblong, terete, two seeded.

Fls. : July - Sept.; *Frt.s.* : Sept. - Oct.; AKS 169, Poiya ghat; 224, Chhalesar; 775, Niyamatpur.

Found on the ridges and waste places.

2. *Indigofera hochstetteri* Baker in Oliver, Fl. Trop. Africa 2 : 101, 1871; Gillett in Kew Bull. Add. Ser. 1 : 13, 1958. *I. anabaptista* Steud. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 102, 1876; Duthie, Fl. U. Gang. Pl. 1 : 231, Repr. ed. 1960.

A diffuse annual, 30-60 cm long with appressed hairs. Leaves 3-7-foliate; leaflets 1 - 3 x 0.4 - 0.9 cm, elliptic, oblanceolate, appressed hairy. Flowers in dense axillary racemes. Calyx 3.5 mm long, pubescent. Corolla 4 mm long, orange or vermillion. Pods 1.5 - 2.2 x 0.2 - 0.4 cm, reflexed, linear, flat, 6 - 8 seeded.

Fls. : July - Aug.; *Frt.s.* : Aug., Sept.; *Vern.* : Kandidat; AKS 171, Poiya ghat.

Found on the sandy soil on the bank of river Jamuna.

3. *Indigofera linifolia* (L.f.) Retz. Obs. Bot. 4 : 29, 1786 & 6 : 33, t. 2, 1791; Hook. f. Fl. Brit. Ind. 2 : 92, 1876; Duthie, Fl. U. Gang. Pl. 1 : 229, Repr. ed. 1960; Gillett in Kew Bull. Add. Ser. 1 : 35, 1958. *Hedysarum linifolium* L.f. Suppl. Pl. 331, 1781.

A prostrate, pubescent, much-branched herb, 20 - 45 cm long. Leaves shortly petiolate, 1.3 - 3 x 0.3 - 0.5 cm, linear, entire, acute, pubescent. Stipules setaceous. Flowers bright red in axillary racemes. pods globose, silvery silky, 1.5 - 2 x 1.5 - 2 mm, 1-seeded.

Fls. : Apr. - Aug.; *Frt.s.* : Aug., Sept.; *Vern.* : Leel; AKS 598, Chhalesar; 698, Salempur; 798, Kiraoli.

Common in waste and dry places.

4. *Indigofera linnaei* Ag in Bot. Not. 111 : 549, 1958. *I. emarginata* L. Mant. Pl. 2 : 272, App. 571, 1771, nom. illegit.; Hook. f. Fl. Brit. Ind. 2 : 94, 1876; Duthie, Fl. U. Gang. Pl. 1 : 230, Repr. ed. 1960.

A herb with trailing and much-branched, appressed hairy stem. Leaves 7-9 foliolate; leaflets $0.4 - 1 \times 0.2 - 0.5$ cm, linear, oblanceolate, entire, appressed hairy. Flowers bright red, small, in spike-like dense heads. Pods oblong, appressed hairy, $4 - 5 \times 2.5$ mm.

Fls. : July - Sept. ; *Frtts.* : Sept. - Oct. ; *Vern.* : *Leel* ; AKS 172, Poiya ghat; 441, Kitham ; 825, Umretha.

Found growing on the ridge and in dry places.

5. **Indigofera oblongifolia** Forsk. Fl. Aegypt. Arab. 137. 1775; Duthie, Fl. U. Gang. Pl. 1 : 233. Repr. ed. 1960. *I. paucifolia* Delile, Deser. Egypt. Hist. Nat. 251. 1812 ; Hook. f. Fl. Brit. Ind. 2 : 97. 1876.

A woody, diffuse undershrub, 60 - 100 cm high. Branches many, stout, silvery canescent. Leaves 1 to 3-foliate, reduced to one leaflet on the lower branches, glabrous, oblanceolate or oblong-elliptic, $1.1 - 2 \times 0.5 - 1$ cm. Stipules lanceolate, acuminate. Flowers vermilion-red, in many flowered, dense racemes. Calyx 2.5 mm long, silvery outside. Corolla 6.5 mm long. Pods $1.5 - 1.8$ cm long, deflexed and curved outwards, torulose, 6-8 seeded, hoary pubescent.

Fls. : Sept. - Oct. ; *Frtts.* : Oct. - Nov. ; *Vern.* : *Jhungi* ; AKS 530, Chiknipur.

Found on the slopes of ridge.

6. **Indigofera tinctoria** L. Sp. Pl. 751. 1753; Hook. f. Fl. Brit. Ind. 2 : 99. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 235. Repr. ed. 1960 ; Gillett in Kew Bull. Add. Ser. 1 : 106. 1958.

An undershrub or shrub, 0.6 - 1 m high, appressed silky hairy. Leaflets 5-13, each leaflet opposite, $0.9 - 2.3 \times 0.6 - 1.4$ cm, obovate-concave, entire, pubescent. Flowers 6 mm long, pink, in spike like racemes. Calyx 2 mm long. Pods cylindric, $2.5 - 3.2 \times 0.2$ cm, pubescent, straight or slightly curved, pointed, 12 - 14 seeded.

Fls. : July - Sept. ; *Frtts.* : Sept. - Oct. ; *Vern.* : *Leel* ; AKS 431, Bichpuri campus; 799, Kiraoli.

Found growing as a weed in waste places.

7. **Indigofera trita** L. f. Suppl. Pl. 335. 1781 ; Hook. f. Fl. Brit. Ind. 2 : 96. 1876; Duthie, Fl. U. Gang. Pl. 1 : 232. Repr. ed. 1960.

An erect, suffruticose herb or undershrub, 60-90 cm tall. Leaves 3-foliate; leaflets $0.9 - 2.5 \times 0.5 - 1$ cm, elliptic-oblong, entire, pubescent. Flowers 5 mm long, in spike-like racemes. Calyx 1.5 mm long, funnel shaped. Corolla 5 mm long, reddish. Pods $2.6 - 2.9$ cm long, turgid, 4-gonous, deflexed, appressed hairy, 6-8-seeded.

Fls. : Sept. Oct. ; *Frtis.* : Oct. Nov. ; AKS 532, Chiknipur.

Found on the ridges amongst bushes.

13. LATHYRUS L.

- | | |
|--|----------------------|
| 1a. Leaflets 0; stipules leafy; flowers yellow; pods wingless | 1. <i>L. aphaca</i> |
| 1b. Leaflets 2 ; flowers blue tinged with purplish ; pods winged | 2. <i>L. sativus</i> |

1. *Lathyrus aphaca* L. Sp. Pl. 729. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 179. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 239 Repr. ed. 1960.

A slender, branched herb, 20-45 cm high. Leaves reduced to tendril. Stipules modified into leaves $1.3 - 2.5 \times 0.8 - 1.7$ cm, appressed to the stem, hastate, entire, truncate. Flowers 1 or 2 axillary. Calyx 7 mm long. Corolla yellow, 1.3 cm long. Pods $2.5 - 3 \times 0.3 - 0.4$ cm, linear oblong, 4-7 seeded.

Fls. : Dec. Feb. ; *Frtis.* : Jan. Mar. ; *Vern.* : *Matri* ; AKS 203, Fatehpur Sikri.

A common weed found in cultivated fields and waste places.

2. *Lathyrus sativus* L. Sp. Pl. 730. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 179. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 240. Repr. ed. 1960.

A much-branched, trailing herb, 30 - 60 cm long with winged stem. Leaflets $2.5 - 7.5 \times 0.5 - 1$ cm, linear-lanceolate, entire, acute. Leaves ending in 3-partite tendrils. Stipules $\frac{1}{2} - 1.6$ cm long, subulate. Flowers solitary on a long peduncle. Calyx 9 mm long. Corolla 1.4 cm long, blue tinged with purplish. Pods $2.5 - 3 \times 1 - 1.2$ cm, compressed, winged.

Fls. : Dec. Feb. ; *Frtis.* : Feb. Mar. ; *Vern.* : *Khesari* ; AKS 83, Dabar ; 370, Bichpuri campus ; 604, Arnota.

A common weed of cultivation also found abundantly in fields of Sarson, used as fodder.

14. MEDICAGO L.

- | | |
|---|---------------------|
| 1a. Flowers racemose, purple ; cultivated | 3. <i>M. sativa</i> |
| 1b. Flowers in very short racemes or subcapitile, yellow ; wild : | |

- 2a. Pods reniform, unarmed, 1-seeded 1. *M. lupulina*
 2b. Pods spiral, bordered with spines;
 2 more seeded 2. *M. polymorpha*

1. **Medicago lupulina** L. Sp. Pl. 779. 1753; Hook. f. Fl. Brit. Ind. 2 : 90. 1876; Duthie, Fl. U. Gang. Pl. 1 : 194. Repr. ed. 1960; Mansfeld in Die Kulturpflanze Beih. 2 : 163. 1959.

A trailing, biennial herb, 10-35 cm long. Leaves 3-foliolate ; leaflets 5 - 9 x 3.6 mm, obovate, acute, faintly incise - crenate. Flowers very small, yellow, in heads, peduncles exceeding the leaves. Calyx 1.5 mm long. Corolla 1.5 mm long, slightly exserted. Pods 2 x 3 mm, minute, linear, sickle-shaped, indehiscent, 1-seeded, pubescent, turning black.

Fls. : Jan. Feb. ; Frts. : Feb. Mar. ; AKS 646, Kitham ; 685, Salempur.

A cold season weed found near the moist places.

2. **Medicago polymorpha** L. Sp. Pl. 779. 1753; Steenis in Blumea 12 : 15. 1963. *M. denticulata* Willd. Sp. Pl. 3 : 1414. 1802 ; Hook. f. Fl. Brit. Ind. 2 : 90. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 194. Repr. ed. 1960.

A glabrous, prostrate herb, 15-25 cm long. Leaves 3-foliolate ; leaflets 0.7 - 1.5 x 0.5 - 1 cm, obovate - cuneate, slightly toothed, emarginate. Flowers 3 - 4 mm long, umbelled on a peduncle much shorter than the petioles. Corolla 5 mm long, yellow. Pods 6 x 6 mm, sub-globose, spirally twisted in 2 - 3 coils, muricate, several seeded.

Fls. : Dec. Feb. ; Frts. : Feb. Mar. ; Vern. : *Jangli rijkha, Miana* ; AKS 643, Poiya ghat; 697, Salempur.

A very common weed in the cold season, found along with *Melilotus indica* All. and *Trigonella polcerata* L.

3. **Medicago sativa** L. Sp. Pl. 778. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 90. 1876.

An erect, annual herb, 30-75 cm high. Leaves 3-foliolate ; leaflets 1 - 2.4 x 0.4 - 1.3 cm, obovate-ob lanceolate, denticulate, pubescent. Flowers in stout racemes. Calyx 5 mm long. Corolla 8 mm long, purplish. pods silky, unarmed.

Fls. : Jan. Mar. ; Frts. : Mar. Apr. ; Vern. : *Rijka* ; AKS 320, Bichpuri campus ; 348, Salyan.

Cultivated as a valuable fodder plant.

15. MELILOTUS Juss.

1a. Flowers white 1. *M. alba*

1b. Flowers yellow 2. *M. indica*

1. *Melilotus alba* Desv. in Lamk. Encycl. 4 : 63. 1796 ; Hook. f. Fl. Brit. Ind. 2 : 89. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 192. Repr. ed. 1960.

An erect herb, 20 - 45 cm high. Leaves 3 - foliolate ; leaflets 1.2 - 2.1 x 0.5 - 1.2 cm, obovate, serrate, emarginate, glabrous. Flowers white, in racemes 6 - 10 cm long. Calyx 2 mm long. Corolla 4 mm long. Pods 3 - 4 mm long, oblong.

Fls. : Jan. Mar. ; *Frt.* Mar. Apr. ; *Vern.* : *Senji safed* ; AKS 376, R. B. S. College garden.

Common weed in fields and waste grounds.

2. *Melilotus indica* (L.) All. Fl. Pedem. 1 : 308. 1875 ; Duthie, Fl. I. U. Gang. Pl. 1 : 191. Repr. ed. 1960 ; Spaniapani in Rec. Bot. Surv. Ind. 16 (1) : 63. 1953. *Trifolium indicum* L. Sp. Pl. 765. 1753.

A slender herb, 20 - 40 cm high. Leaves 3 - foliolate : leaflets 0.6 - 1.5 x 0.4 - 0.8 cm, obovate, distantly serrulate. Flowers about 3 - 4 mm long, yellow, in dense racemes 2 - 6 cm long. Calyx about 1.5 mm long. Pods 2 - 3 mm long, ovoid - oblong, usually 1 - seeded, glabrous.

Fls. : Dec. Feb. ; *Frt.* Mar. Apr. ; *Vern.* : *Senji pili* ; AKS 47, Bichpuri campus.

A very common weed in fields during the cold season.

16. MILLETTIA Wl. & Am.

Millettia peguensis All. in Kew Bull. 21 : 489 - 490. 1967. *M. ovalifolia* Kurz in J. Asiatic Soc. Beng. 42 (2) : 68. 1873 (excl. syn. Wl. & Am.) ; Hook. f. Fl. Brit. Ind. 2 : 107. 1876.

A small deciduous tree. Leaflets 7, 8-14 x 5.5 - 8 cm, ovate, elliptic. Flowers purple or lilac, in pendulous racemes or fascicled. Pods 5 - 8 cm. long, linear oblong, flat, 2 - 3 seeded.

Fls. : Apr. June ; *Frt.* June July ; AKS 399 Bichpuri Campus.

Planted in gardens and along roadsides.

17. MUCUNA Adans. nom. cons.

Mucuna pruriens (L.) DC. Prodr. 2 : 405. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 187. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 218. Repr. ed. 1960 ; Backer & Bakh. Fl. Java 1 : 629. 1963. *Dolichos pruriens* L. in Stockm. Herb. Amb. 23. 1954 et Amoen. Acad. 4: 132. 1759. *M. prurita* Hook. Bot. Misc. 2: 348. 1831 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 74. 1953.

A slender, wide-spreading climber. Leaves 3-foliate ; leaflets 3-8.8 x 2.7-8.8 cm, rhomboid-ovate, entire, acute, villous, glaucous. Flowers in drooping axillary racemes. Calyx 7 mm long, silky hairy. Corolla 1.5 cm long, dark purple. Pods 3-10 x 1.1-1.6 cm, 3-6 seeded, S-shaped, densely clothed with persistent irritating bristles.

Fls. : Aug. - Oct. ; *Frt.s.* : Oct. - Nov. ; *Vern.* : *Kouch* ; AKS 578, Niyamalpur.

Found on the ridges climbing on *Acacia catechu* Willd., the bristles cause an intense irritation.

18. PHASEOLUS L.

Phaseolus trilobus Ait. Hort. Kew. 3 : 30. 1789 ; Hook. f. Fl. Brit. Ind. 2 : 201. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 224. Repr. ed. 1960.

A trailing, hairy herb, 30-50 cm long. Leaves pinnately 3-foliate ; leaflets 2-3.5 x 1.7-3.6 cm, deeply 3-lobed, hirsute. Stipules 4-6 mm long, ovate-oblong, acute, attached above their base. Flowers in capitate racemes. Calyx 3 mm long. Corolla 5-6 mm long, yellow. Pods 3.5-5 x 0.3 cm, cylindric, slightly pubescent.

Fls. : Aug. - Sept. ; *Frt.s.* : Sept. - Oct. ; *Vern.* : *Chawla* ; AKS 801, Chiknipur.

Found on the slopes of ridges.

19. PONGAMIA Vent. nom. cons.

Pongamia pinnata (L.) Pierre, Fl. For. Cochinch. 1. 385. 1899, in Obs. ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 86. 1953. *Cytisus pinnatus* L. Sp. Pl. 741. 1753. *Pongamia glabra* Vent. Jard. Malm. 28, t. 28. 1803 ; Hook. f. Fl. Brit. Ind. 2 : 240. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 246. Repr. ed. 1960.

A medium-sized, glabrous tree. Bark greyish. Leaves imparipinnate, rachis swollen at the base ; leaflets 5-9, opposite, 4-10 x 3-7 cm, ovate-oblong or elliptic, subcoriaceous, glabrous, bright green and glossy above. Flowers in

peduncled axillary racemes. Calyx 5 mm long. Corolla 1.5 cm long, white tinged with violet or pink. Pods 5-7 x 2 cm, hard, obliquely oblong, indehiscent.

Fls. : Mar. - May ; *Frls.* : May - June ; *Vern.* : *Papri* ; AKS 741, R. B. S. College gardens.

Occasional, planted along roadsides and in the gardens.

20. RHYNCHOSIA LOUR. nom. cons.

- | | |
|---|-----------------------|
| 1a. Pods orbicular, slightly compressed; seeds strophiolate | 1. <i>R. capitata</i> |
| 1b. Pods oblong, slightly recurved; seeds non-strophiolate | 2. <i>R. minima</i> |

1. **Rhynchosia capitata** DC. Prodr. 2 : 386. 1825 ; Duthie, Fl. U. Gang. Pl. 1 : 204. Repr. ed. 1960. *R. aurea* sensu Baker in Hook. f. Fl. Brit. Ind. 2 : 221. 1876.

A slender, wide-trailing, hairy herb. Leaves 3-foliolate; leaflets 2.4-4 x 2.2-4 cm, variable in shape, minutely gland-dotted beneath. Stipules 3-4 mm long, subulate. Flowers in many flowered racemes which become twisted and form heads of flowers. Calyx 1 cm long. Corolla 1.2 cm long, yellow tinged with reddish, pods orbicular, sub-compressed with transverse wrinkles, 2-seeded, clothed with long, spreading hairs, seeds strophiolate.

Fls. & *frls.* : Sept. - Oct. ; *Vern.* : *Papra* ; AKS 529, Chiknipur.

Found on the ridge, trailing on the shrubs.

2. **Rhynchosia minima** (L.) DC. Prodr. 2 : 385. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 223. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 204. Repr. ed. 1960. *Dolichos minimus* L. Sp. Pl. 726. 1753.

A wide spreading or twining, glabrous herb. Leaves 3-foliolate; leaflets 0.9-3.7 x 0.7-3.3 cm, deltoid, entire, acute, gland-dotted beneath. Stipules minute, 1-2 mm long, linear. Flowers in lax racemes. Calyx 6 mm long. Corolla 8 mm long, yellow. Pods 0.8-1.6 x 0.4-0.5 cm, slightly curved, usually 2-seeded.

Fls. : May - Aug. ; *Frls.* : Aug. - Oct. : AKS 742, Shahjahan Garden; 780, Niyamatpur ; 813, Chiknipur.

A very common twining around herbs and shrubs.

21. SESBANIA Scop. nom. cons.

1a. Prickly plant; pod not twisted, not torulose 1. *S. bispinosa*

1b. Unarmed plant; pod twistd, torulose 2. *S. sesban*

1. *Sesbania bispinosa* (Jacq.) W.F. Wright in U.S. Dept. Agr. Bur. Pl. Ind. Bull. No. 137 : 15. 1909; Fawcett & Rendle, Fl. Jam. 4 : 24. 1920. *Aeschynomene bispinosa* Jacq. Ic. Pl. Rar. 3 : 13, t. 564. 1792. *S. aculeata* (Willd.) Poir. in Lamk. Encycl. 7 : 128. 1806, p. p.; Hook. f. Fl. Brit. Ind. 2 : 114. 1876; Duthie, Fl. U. Gang. Pl. 1 : 224. Repr. ed. 1960. *Coronilla aculeata* Willd. Sp. Pl. 3 : 1147. 1802.

A large, erect, annual shrub, 1.5 - 2 m high. Branches and leaf rachis prickly. Leaflets 25-45 pairs, 6 - 17 x 1 - 2 mm, opposite, linear, obtuse. Flowers 0.6 - 1 cm long, yellow in loose racemes. Pods 15 - 22 cm long, slightly falcate, subtorulose, glabrous.

Fls. & frts. : Sept. Oct. ; AKS 843, Salempur.

Occurs in cultivated and fallow fields.

2. *Sesbania sesban* (L.) Merr. in Philip. J. Sci. (Bot.) 7 : 235. 1912. *Aeschynomene sesban* L. Sp. Pl. 714. 1753. *S. aegyptiaca* Poir. in Lamk. Encycl. 7 : 128. 1806; Hook. f. Fl. Brit. Ind. 2 : 114. 1876; Duthie, Fl. U. Gang. Pl. 1 : 223. Repr. ed. 1960.

A large, soft-wooded shrub or small tree. Leaflets 12-20 pairs, 1.5 - 2.5 cm long, linear, oblong. Flowers 1.3 - 1.9 cm long, yellow or variegated with orange, red and deep purple, in lax axillary racemes. Pods 16-22 cm long, twisted, slender, torulose.

Fls. & frts. : Sept. Oct. ; Vern. : *Jait* ; AKS 858, Kitham.

Commonly grown as a hedge along road-sides and in fields on account of its remarkably rapid growth.

22. SOPHORA L.

Sophora tomentosa L. Sp. Pl. 373. 1753 ; Bor & Raizada 50, Pl. 16., 1954.

An erect, evergreen shrub, 1.5 - 2 m high. Leaflets 9 - 13, alternate, broadly elliptic, obtuse or emarginate, shining above, 2.2 - 3.5 x 1.5 - 2.6 cm. Flowers

sulphur-yellow, in terminal racemes. Calyx 6 mm long. Corolla about 2 cm long. Pods hairy, 3-8 jointed, the seeds separate by long seedless parts.

Fls. : Nov. Dec. ; AKS 271, Shahjahan garden.

Grown in gardens for hedges.

23. TEPHROSIA Pers. nom. cons.

1a. Leaves simple	3. <i>T. strigosa</i>
1b. Leaves imparipinnate :	
2a. Pods densely persistently villous	4. <i>T. villosa</i>
2b. Pods glabrescent or finely hairy:	
3a. Stem ascending, glabrescent; flowers bluish purple	2. <i>T. purpurea</i>
3b. Stem erect, branches zigzag, angled, hairy; flowers rose coloured or scarlet	1. <i>T. hamiltonii</i>

1. ***Tephrosia hamiltonii* Drumm.** in Gamble Fl. Pres. Madras 320. 1918,
Repr. ed. 1 : 226. 1957 ; Raizada in J. Ind. Bot. Soc. 15 : 149. 1936 ; Fl. Saur. 1:
138. 1962.

An erect, bushy undershrub, 0.6 - 1 m high. Leaflets 9 - 17, 1.2 - 2.5 x 0.6 -
1.2 cm, obovate-ob lanceolate, obtuse. Flowers in elongate, terminal racemes. Calyx
0.5 cm long. Corolla 1.2 cm long, rose coloured or scarlet, pubescent outside. Pods
3.4 x 0.4 - 0.5 cm, slightly recurved above, appressed-hairy, 5-7 seeded.

Fls. : July Sept. ; *Frt.* : Sept. Nov. ; AKS 191, 467, Chhalesar ; 817,
Chiknipur.

Common on gravelly, sandy and dry soils, also on waste places.

2. ***Tephrosia purpurea* (L.) Pers.** Syn. 2: 329. 1807; Hook. f. Fl. Brit. Ind.
2: 112. 1876, p. p., Duthie, Fl. U. Gang. Pl. 1 : 225. Repr. ed. 1960. *Cracca purpurea*
L. Sp. Pl. 752. 1753.

A sub-erect, much-branched herb or undershrub, 0.45-1 m high. Leaflets 9 -
17, 1.3 - 2.4 x 0.5 - 1.3 cm, obovate-ob lanceolate, entire, obtuse. Flowers in leaf
opposed lax racemes. Calyx 5 mm long. Corolla 1.1 cm long, red or purplish. Pods
2.8 - 4 x 0.4 - 0.6 cm, slightly curved, glabrescent, 6 - 8 seeded.

Fls. : Apr. - Aug. ; *Frt.s.* : Aug. - Sept. ; *Vern.* : Jhojhra ; AKS 675, near Jauhina bridge Station.

Found very commonly on sandy, dry and waste places.

3. *Tephrosia strigosa* (Dalz.) Santapau & Mahesh. in J. Bombay Nat. Hist. Soc. 54: 804. 1957. *Macronyx strigosus* Dalz. in Hook, Kew Jour. 2 : 35. 1850. *Tephrosia tenuis* Wall. ex Baker, in Hook. f. Fl. Brit. Ind. 2 : 111. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 225. Repr. ed. 1960.

A grass like, branched, appressed hairy herb, 12-30 cm long. Leaves simple, 2-5 x 0.2 - 0.5 cm, linear, entire, subacute. Flowers axillary on filiform pedicel. Calyx 3 mm long. Corolla 5 mm long, pale violet. Pods 1.3 - 2 x 0.2 - 0.4 cm, linear, appressed hairy, 5 - 8 seeded.

Fls. : Aug. - Sept. ; *Frt.s.* : Sept. - Oct. ; AKS 150, Bichpuri campus ; 497, Khander.

Very common on the ridges and grassy lands.

4. *Tephrosia villosa* (L.) Pers. Syn. 2 : 329. 1807 ; Hook. f. Fl. Brit. Ind. 2 : 113. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 226. Repr. ed. 1960. *Cracca villosa* L. Sp. Pl. 752. 1753.

An erect or spreading, branched herb or undershrub clothed with white appressed hairs. Leaflets 9-13, 1.1 - 2 x 0.3 - 0.6 cm, narrowly ob lanceolate, emarginate-incurved, silky beneath. Flowers few in lax elongated racemes. Calyx 1 cm long, densely hairy. Corolla 1.5 cm long, pale pink, standard sub-orbicular, silky on the back. Pods 3 - 3.5 x 0.5 - 0.6 cm, deflexed, persistently velvety with densely white silvery hairs, 7-8 seeded.

Fls. : July - Sept. ; *Frt.s.* : Sept. - Nov. ; AKS 911, Tantpur.

Found on the slopes of mks, in crevices.

24. TERAMNUS Sw.

Teramnus labialis (L.f.) Spreng. Syst. Veg. 3 : 235. 1826; Duthie, Fl. U. Gang. Pl. 1 : 214. Repr. ed. 1960. *Glycine labialis* L. f. Suppl. Pl. 325. 1781.

A slender, spreading, twining, hairy herb. Leaves 3-foliolate ; leaflets 2.5 - 7 x 1.5 - 3.9 cm, sub-membranous, ovate-oblong or elliptic, entire, acute, dorsal surface pubescent. Stipules 3-4 mm long, subulate. Flowers small in loose axillary racemes. Calyx 4 mm long. Corolla 6 mm long, purplish. Pods 5 - 6 x 0.3 - 0.4 cm, slightly curved, linear, 8 - 12 seeded.

Fls. & Frts. : Oct. - Nov. : AKS 514, Bichipuri campus; 533 Chiknipur ; 842 Salempur.

Common along hedges in cultivated fields, gardens and waste places.

25. TRIGONELLA L.

1a. Erect ; pod with a long beak

1. *T. foenum-graecum*

1b. Diffuse; pod not beaked

2. *T. polycerata*

1. *Trigonella foenum-graecum* L. Sp. Pl. 777. 1753; Hook. f. Fl. Brit. Ind. 2 : 87. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 192. Repr. ed. 1960.

An erect herb, 20-30 cm high. Leaves 3-foliate ; leaflets 2 - 3.5 x 1.5 - 2.7 cm, oblong - oblanceolate, denticulate. Flowers 6 mm long, yellow, axillary, subsessile. Pods 4-6.5 cm long, with a long beak, falcate.

Fls. : Jan. - Mar. ; *Frts.* : Feb. - Mar. ; *Vern.* : *Methi* ; AKS 306, Salempur; 654. R.B.S. College garden.

Cultivated as a cold season crop.

2. *Trigonella polycerata* L. Sp. pl. 777. 753 ; Hook. f. Fl. Brit. Ind. 2 : 87. 1876 : Duthie, Fl. U. Gang. Pl. 1 : 193. Repr. ed. 1960.

A slender, prostrate, suberect or diffuse annual. Leaves 3 - foliolate ; leaflets 2 - 3.5 x 1 - 2.5 cm, obovate, sharply incise-dentate towards the apex. Flowers yellow, 2 - 6, sessile or on short axillary peduncles. Calyx 4 mm long. Corolla 4.5 mm long, slightly exserted. Pods 3-5.5 cm long, falcate, 10 - 20 seeded, transversely wrinkled.

Fls. : Jan. - Mar. ; *Frts.* : Mar. - Apr. ; *Vern.* : *Maini*; AKS 388, R.B.S. College garden ; 644, 706, Polya ghat.

Common in cultivated places in association of *Medicago denticulata* Willd.

26. Vicia L.

1a. Flowers 6-7 mm long, whitish ;
pods 2 seeded

1. *V. hirsuta*

1b. Flowers 1.5 - 1.8 cm long, purplish ;
pods 8-10 seeded

2. *V. sativa*

1. *Vicia hirsuta* (L.) S.F. Gray, Nat. Arr. Brit. Pl. 2 : 614. 1821; Hook. f. Fl. Brit. Ind. 2 : 177. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 238. Repr. ed. 1960. *Ervum hirsutum* L. Sp. Pl. 739. 1753.

A hairy, twining herb, 30 - 60 cm high. Leaflets 6 - 8 pairs, alternately arranged, 8 - 15 x 2.5 mm, linear-oblong, entire, retuse, villous ; leaves ending in branched tendrils. Stipules semi-sagittate, 4-6 mm long. Flowers pale blue, 2 - 4 flowered at the end of slender peduncle. Calyx 5 - 6 mm long. Corolla 6 mm long, scarcely exserted. Pods 1 - 1.2 x 0.6 cm, 2-seeded, oblong-rhomboid.

Fls. : Dec. - Feb. ; *Frt.s.* : Feb. - Mar. ; *Vern.* : *Chatri* ; AKS 88, Dabar ; 296, Poiya ghat ; 634, Jhirna nala.

A very common weed in fields in winter season.

2. *Vicia sativa* L. Sp. Pl. 736. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 176. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 238. Repr. ed. 1960.

A diffuse, sub-erect herb, 30 - 50 cm high. Leaflets 4 - 6 pairs, alternate, 1.4 - 3.2 x 0.2 - 0.6 cm, linear-lanceolate or oblong, entire, emarginate. Leaves ending in 3-partite tendrils. Stipules obliquely lanceolate, toothed. Flowers solitary or paired. Calyx 9 mm long. Corolla 1.5 - 1.8 cm long, purplish. Pods linear, 4 - 4.2 x 0.6 cm, 8 - 10 seeded. Seeds sub-globose.

Fls. : Dec. - Feb. ; *Frt.s.* : Feb.-Mar. ; *Vern.* *Akri* ; AKS 86, Dabar ; 635, Jhirna nala.

A very common weed of cultivation in the cold season, used as fodder.

27. VIGNA Savi

Vigna unguiculata (L.) Walp. Report. 1 : 779. 1842 ; *Dolichos unguiculatus* L. Sp. Pl. 725. 1753. *D. biflorus* L. Sp. Pl. 727. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 210, 1876.

A sub-erect or twining, glabrous herb, 20-45 cm long. Leaves 3-foliolate ; leaflets entire or the terminal leaflet slightly 3-lobed, ovate, entire, acute. Stipules 1.4 - 1.6 cm long, attached above the base. Flowers 1.5 cm long, yellow or reddish, in subcapitate racemes. Calyx 0.9 cm long, campanulate. Pods linear, subtorulose.

Fls. : July - Aug. ; *Frt.s.* : Aug. - Oct. ; *Vern.* : *Rawas*; AKS 209, Poiya ghat.

Cultivated as a rainy season crop.

28. ZORNIA J.F. Gmel.

Zornia gibbosa Span. in Linnaea 15 : 192. 1841 ; Mohlenbrock in Webbia 16 : 112, ff. 44 & 46, 1961. *Z. diphylla* acut. plur., non (L.) Pers. 1807 ; Hook. f. Fl. Brit. Ind. 2 : 147. 1876, p. p. ; Duthie, Fl. U. Gang. Pl. 1 : 247. Repr. ed. 1960.

An erect or diffuse, tufted herb, 10-30 cm high. Leaves bifoliolate. Leaflets 1.5 - 3.5 x 0.3 - 0.8 cm, lanceolate, entire, acute, punctate. Flowers yellow, nearly sessile, 3 - 4 mm long, in erect axillary racemes ; each pair almost hidden in a pair of leaf-like bracts. Pods protruding from between the bracts, densely prickly, 0.8 - 1.4 x 0.2 cm, 2 - 5 jointed.

Fls. : Aug. Sept. : *Frt.* : Sept. - Oct. ; AKS 165, Poiya ghat; 823, Umretha.

Found on the ridge in association of *Alysicarpus monilifer* DC.

NOTE: This taxon has been described under the name *Zornia diphylla* Pers. or *Z. angustifolia* Sm. in the Indian Floras. Mohlenbrock [in Webbia 16 (1) : 112, ff. 44 & 76, 1961] points out that the plant growing in India is actually *Z. gibbosa* Span. and not *Z. diphylla* Pers., the latter being a perennial herb with a limited range of distribution.

List of cultivated Taxa:

Arachis hypogaea L. Sp. Pl. 741. 1753 ; Bailey, Man. Cult. Pl. 554. 1949. Vern. : *Mungphali*.

Cajanus cajan (L.) Millsp. in Field Columb. Mus. Bot. 2 : 53. 1900; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 88. 1953. *Cytisus cajan* L. Sp. Pl. 739. 1753. *Cajanus indicus* Spreng. Syst. Veg. 3 : 248. 1826 ; Hook. f. Fl. Brit. Ind. 2 : 217. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 197. Repr. ed. 1960. Vern. : *Arhar*.

Cicer arietinum L. Sp. Pl. 738. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 176. 1876; Duthie, Fl. U. Gang. Pl. 1 : 236. Repr. ed. 1960. Vern. : *Chana*.

Lens culinaris Medik. in Vorles. Chrupf. Phys. Ges. 2 : 361. 1787 ; Bailey, Man. Cult. Pl. 553. 1949. *L. esculenta* Moench, Meth. 136. 1794 ; Duthie, Fl. U. Gang. Pl. 1 : 237. Repr. ed. 1960. Vern. : *Masur*.

Vigna aconitifolia (Jacq.) Marechal in Bull. Jard. Bot. Nat. Belge. 39 : 160. 1969. *Phaseolus aconitifolius* Jacq. Obs. 3 : 2, t. 52. 1786 ; Hook. f. Fl. Brit. Ind. 2 : 202. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 207. Repr. ed. 1960. Vern. : *Moth*.

Phaseolus aureus Roxb. Hort. Reng. 55. 1814, nom. nud. & Fl. Ind. 3 : 297. 1832 ; Bailey, Man. Cult. Pl. 575. 1949. *P. mungo* auct. (non, L.) *P. radiatus* auct. (non, L.) Vern. : *Mung*.

Vigna mungo (L.) Hepper in Kew Bull. 11 : 129. 1956. *Phasenolus mungo* L. Mant. 101. 1767 ; Hook. f. Fl. Brit. Ind. 2 : 203. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 208. Repr. ed. 1960. Vern. : *Urd*.

Phaseolus lunatus L. Sp. Pl. 724. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 200. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 206. Repr. ed. 1960. Vern. : *Lima bean*.

Phaseolus vulgaris L. Sp. Pl. 723. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 200. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 206. Repr. ed. 1960.

Pisum arvense L. Sp. Pl. 727. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 181. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 241. Repr. ed. 1960.

Pisum sativum L. Sp. Pl. 727. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 281. 1876 ; Duthie, Fl. U. Gang. Pl. 1 : 241. Repr. ed. 1960. Vern. : *Mattar*.

33. CAESALPINIACEAE

1a. Leaves simple, shallowly or deeply lobed 1. *Bauhinia*

1b. Leaves compound :

2a. Leaf rachis ending in spine; rachis flat bearing numerous leaflets 5. *Parkinsonia*

2b. Rachis not as above:

3a. Leaves unipinnate :

4a. Petals present; calyx tube very short or turbinated:

5a. Petals 5

3. *Cassia*

5b. Petals 3

8. *Tamarindus*

4b. Petals absent; calyx tube elongate

7. *Narcaca*

3b. Leaves bipinnate:

6a. Sepals valvate :
stamens inculped

4. *Delonix*

6b. Sepals imbricate ; stamens exserted:	
7a. Straggling or scandent shrubs	2. <i>Caesalpinia</i>
7b. Erect shrubs	6. <i>Poinciana</i>

1. BAUHINIA L.

Bauhinia purpurea L. Sp. Pl. 375, 1753; Hook. f. Fl. Brit. Ind. 2:284, 1878; Duthie, Fl. U. Gang. Pl. 1: Repr. ed. 1960; Blatt. & Mill. Beauf. Ind. Tr. 8, 1954.

A medium-sized, deciduous tree. Young parts brown-pubescent. Leaves longer than broad, cleft about half way down into two acute or rounded lobes, base cordate, 9-11 nerved. Flowers large, rose-coloured, in terminal and axillary short peduncled corymbose racemes. Calyx limb usually splitting into 2 reflexed parts, one emarginate, the other 3-toothed. Pods 15-30 cm long, linear, flat, rather decurved.

Fls. : Nov. Feb.; *Frt.s.* : Mar. Apr.; *Vern.* : Kachnar; AKS 316, Bichpuri campus.

Planted in gardens and along roadsides.

2. CAESALPINIA L.

1a. Stipules foliaceous, pinnate, persistent; pods prickly	1. <i>C. crista</i>
1b. Stipules simple, deciduous; pods simple	2. <i>C. decapetala</i>

1. **Caesalpinia crista** L. Sp. Pl. 380, 1753; Gamble, Fl. Pres. Madras 393 (278), 1919.

A scandent, evergreen climber. Branches armed with straight prickles. Leaves abruptly bipinnate, pinnae 5 - 8 pairs; stipules foliaceous, deeply lobed or divided into several segments. Leaflets 6-12 pairs, oblong-ovate, mucronate. Flowers yellow, sometimes spotted with red, in terminal or axillary racemes, simple or panicles. Pods 5-8 cm long, obovoid, densely covered with wiry prickles, 1-2 seeded.

Fls. & frts. : Aug. Dec.; AKS 938, Pachokhara

Found in open waste places.

2. *Caesalpinia decapetala* (Roth) Alston in Trimen, Handb. Fl. Ceylon 6, Suppl. 89, 1931 ; Gandhi and Sald. & Nicol. Fl. Hassan 218, 1976. *Richardia decapetala* Roth, Nov. Pl. Sp. 212, 1821 ; *Caesalpinia sepiaria* Roxb. Fl. Ind. 2: 360, 1832 ; Hook. f. Fl. Brit. Ind. 2 : 256, 1878.

A scandent or climbing shrub. Stem stout, woody ; branches armed with sharp prickles. Leaves bipinnate ; pinnae 5-10 pairs. Leaflets subsessile, 8-12 pairs, oblong. Bracts caducous. Flowers bright yellow, in simple, terminal and axillary racemes. Pods 6-7 cm long, straight or slightly recurved, linear-oblong, with a long beak.

Fls. : Aug. Oct. ; *Frts.* : Nov. Jan. ; Aks 732, Shahjahan garden.

Found growing in garden.

3. CASSIA L.

1a. Herbs, undershrubs or shrubs :

2a. Leaflets 4

1. *C. absus*

2b. Leaflets very, many :

3a. Gland present between the lowest pair of leaflets:

4a. Leaf rachis with one gland between the lowest pair of leaflets

5. *C. obtusifolia*

4b. Leaf rachis with two glands, one between each of the lower pair of leaflets

9. *C. tora*

3b. Gland present at the base of petiole or rachis :

5a. Prostrate herbs ; leaflets small, narrow upto 1 cm long ; gland stalked ; fertile stamens 5

7. *C. pumila*

5b. Erect undershrubs ; leaflets more than 2.5 cm long ; gland sessile ; fertile stamens 7

6. *C. occidentalis*

1b. Trees:

6a. Bracts conspicuous, persistent ; three anther filaments with a globose swelling :

- 7a Leaflets acute,
glabrous 4. *C. nodosa*
- 7b. Leaflets mucronate,
hairy beneath 3. *C. javanica*
- 6b. Bracts small, falling off before
flowers ; anther filaments without
globose/swelling :
 8a. Lower 2 or 3 stamens with longer filaments and
larger anthers ; pods very long, terete indehiscent 2. *C. fistula*
- 8b. Stamens nearly equal in length : pods
flat, dehiscent 8. *C. surattensis*
1. ***Cassia absus* L.** Sp. Pl. 376. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 265. 1878;
Duthie, Fl. U. Gang. Pl. 1 : 271. Repr. ed. 1960.

An erect, annual herb, 30-60 cm high. Leaflets 4, membranous, 2.5 - 5 cm long, oblong, obtuse or subacute. Flowers reddish yellow, in few flowered racemes. Stamens 5, all fertile. Pods ligulate, oblique, 5-seeded.

This plant has been included on the authority of Duthie (in Duthie, Fl. U. Gang. Pl. 1 : 271).

2. ***Cassia fistula* L.** Sp. Pl. 377. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 261. 1878;
Duthie, Fl. U. Gang. Pl. 1 : 268, Repr. ed. 1960 ; Blatt. & Mill. Beauf. Ind. Tr. 19,
t. 3, 1954.

A small or medium-sized, deciduous tree. Leaves paripinnate ; leaflets 4 - 8 pairs, ovate or ovate oblong, acute or acuminate, 10 - 15 x 4 - 5 cm, rachis glandless. Flowers bright yellow, in long, drooping, lax racemes. Lower 2 or 3 stamens with longer filaments and larger anthers. Pods 30-60 cm long, cylindrical, pendulous among leafless branches, dark brownish black when ripe. Seeds flat, embedded in sweetish pulp.

Fls. : Apr. June ; *Frt.s.* : Aug. Sept. ; *Vern.* : *Amaltas* ; AKS 893, R.B.S.
College campus.

Planted along the roadsides, in gardens and also found on the ridge.

3. ***Cassia javanica* L.** Sp. Pl. 379. 1753 ; Blatt. & Mill. Beauf. Ind. Tr. 27,
t. 4, 1954.

A medium-sized tree. Leaflets 12-20, elliptic, mucronate, hairy beneath. Flowers pink fading to white. Sepals red. Stamens 10, three with swelling.

Fls. : June - July ; AKS 423, Paliwal Park.

Planted in gardens for its ornamental flowers.

4. *Cassia nodosa* Buch.-Ham. ex Roxb. Fl. Ind. 2 : 336. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 261. 1878 ; Blatt. & Mill. Beaut. Ind. Tr. 29. 1954.

An evergreen, small or medium-sized tree. Bark reddish-brown or ash-coloured. Flowers and leaves contemporary. Leaflets 10-14, oblong, acute, glabrous. Flowers pink fading to dull white, showy, in racemes. Bracts pinkish-green, acuminate.

Fls. : Apr. - July ; AKS 831, Shahjahan garden.

Planted in the gardens and lawns.

5. *Cassia obtusifolia* L. Sp. Pl. 377. 1753. *Cassia tora* sensu Baker in Hook. f. Fl. Brit. Ind. 2 : 263. 1878, p. p.

An erect herb or undershrub, 30-60 cm high. Leaves paripinnate ; leaflets 3 pairs, obovate-oblong ; rachis with one gland between the lowest pair of leaflets. Flowers yellow, in axillary subsessile pairs. Pods tetragonal, beaked, many seeded.

Fls. : Aug. - Oct. ; *Frts.* : Oct. - Nov. ; AKS 945, Bypass Road.

Common in unused grounds, open waste places and along the roadsides.

6. *Cassia occidentalis* L. Sp. Pl. 377. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 262. 1878 ; Duthie, Fl. U. Gang. Pl. 1 : 269. Repr. ed. 1960.

An erect undershrub, 60 - 100 cm high. Leaves paripinnate ; leaflets 3 - 5 pairs, ovate-oblong or oblanceolate, entire, acute or acuminate ; petiole with an ovoid gland at the base. Flowers yellow, in corymbiform, axillary clusters. Fertile stamens 7. Pods slightly falcate, transversely septate, 8-12 cm long. Seeds 20 - 30, pale brown.

Fls. : July - Sept. ; *Frts.* : Sept. - Oct. ; *Vern.* : Kasudi ; AKS 205, Paliwal Park.

Common in open waste places, gardens and along roadsides.

7. *Cassia pumila* Linn. Encycl. 1 : 651. 1785 ; Hook. f. Fl. Brit. Ind. 2 : 266. 1878 ; Duthie, Fl. U. Gang. Pl. 1 : 271. Repr. ed. 1960.

A decumbent or suberect, deep-rooted herb. Stems and branches often purplish. Leaflets 10-20 pairs, linear-oblong, 5-10 x 1-2.5 mm, petiole with a stalked gland below the lowest pair of leaflets. Flowers yellow, usually solitary in the axils of the leaves. Stamens 5. Pods straight, flat, torulose, 1.5-3 cm long.

Fls. & frts. : Sept. Oct.; AKS 862, Kitham.

Found in sandy or gravelly soils of the ridge and also in hilly tracts.

8. *Cassia surattensis* Burm. f. Fl. Ind. 97. 1768. *C. glauca* Lamk. Encycl. 1: 647. 1785; Hook. f. Fl. Brit. Ind. 2: 265. 1878; Duthie, Fl. U. Gang. Pl. 1: 268. Repr. ed. 1960.

A small tree. Leaves paripinnate; leaflets 4-6 pairs, ovate, acute, 2-4.5 x 1.2-2 cm; rachis with long conical gland between each 2-3 lowest pairs of leaflets. Flowers yellow, in axillary corymbs. Stamens 10, nearly equal. Pods linear, straight, flat, dehiscent, 12-15 cm long.

Fls. : Mar. May; *Frts.* : May Aug.; AKS 716, Agra College garden.

Planted in public and private gardens.

9. *Cassia tora* L. Sp. Pl. 376. 1753; Hook. f. Fl. Brit. Ind. 2: 263. 1878; Santapau in Rec. Bot. Surv. Ind. 16 (1): 90. 1953.

An erect herb or undershrub 30-60 cm high. Leaves paripinnate; leaflets 3 pairs, obovate-oblong, broadly deltoid at the apex; rachis with one gland each between the two lower pairs of leaflets. Flowers yellow, in pairs on short axillary peduncles. Fertile stamens 7. Pods linear, subterete, obliquely septate, 15-25 cm long.

Fls. : Aug. Oct.; *Frts.* Oct. Nov.; *Vern.* : Panwar; AKS 204, Paliwal Park.

Abundant in open waste places, unused grounds and along the roadsides.

4. DELONIX Raf.

Delonix regia (Boj. ex. Hook.) Rafin. Fl. Tellur. 2: 92. 1837; Blatt & Mill. Beauf. Ind. Tr. 52. t. 10. 1954. *Poinciana regia* Boj. ex Hook. in Bot. Mag. t. 2884. 1829; Hook. f. Fl. Brit. Ind. 2: 260. 1878.

A beautiful, much branched, rapid-growing tree. Leaves bipinnate, feathery, 30-60 cm long; leaflets 1.2 x 0.4 cm, oblong. Flowers red or orange-red, in terminal or axillary corymbose racemes. Stamens 10. Pods broadly linear, flat, 30-60 cm long. Seeds numerous, oblong.

Fls. : Apr. - July ; *Frt.s.* : Sept. - Dec. ; *Vern.* : *Gul-mohor* ; AKS 722, College Campus.

Planted in gardens and in private and public places.

5. PARKINSONIA L.

Parkinsonia aculeata L. Sp. Pl. 375. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 260. 1878 ; Duthie, Fl. U. Gang. Pl. 1 : 280. Repr. ed. 1960.

A small, evergreen tree armed with sharp, woody spines. Rachis flattened ending in a spine ; leaflets minute, oblanceolate. Flowers yellow, in lax, axillary racemes. Pods 8 - 10 cm long, turgid dry, moniliform, attenuated at both ends.

Fls. : Oct. - Jan. ; *Frt.s.* : Jan. - Mar. ; *Vern.* : *Vilayti Kikar* ; AKS 564, Kiraoli.

Planted in gardens and lawns.

6. POINCIANA L.

Poinciana pulcherrima L. Sp. Pl. 380. 1753 ; Bailey, Man. Cult. Pl. 589. 1949. *Caesalpinia pulcherrima* Sw. Obs. 166. 1791.

A glabrous, handsome shrub, 2 - 3 m high with prickly branches. Leaves evenly bipinnate ; pinnae 1-8 pairs. Leaflets 6-10 pairs, oblong-ovate. Bracts caducous. Flowers yellow, spotted with red colour or not, in large, loose, terminal or axillary racemes. Pods short oblong, thickly armed with sharp, wiry prickles, 6-8 cm long. Seeds 2, polished, lead-coloured.

Fls. : Mar. - June ; *Frt.s.* : July - Oct. ; *Vern.* : *Gulmohor* AKS 725, Lajpat Kunj.

Grown for hedges in public and private gardens and lawns.

7. SARACA L.

Saraca asoca (Roxb.) Willd. in Blumea 75 : 393. 1968. *Jonesia asoca* Roxb. Asiat. Res. 4 : 365. 1799. *S. Indica* acut. non L. 1.1769 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 271. 1878.

An evergreen tree, forming a dense crown. Leaves pinnate ; leaflets 6 - 12, oblong or oblong-lanceolate, obtuse or acute, 12 - 17 x 4 - 5 cm. Flowers fragrant, orange or orange-yellow, changing to vermillion, in dense axillary corymbs. Calyx tubular, petaloid. Petals absent. Stamens 7 or 8, much exserted. Pods linear-oblong, tapering to both ends, compressed, black.

Fls. : Mar. Apr. ; *Vern.* : *Sita Ashok* ; AKS 655, Rambagh.

Planted in Rambagh. It is used as an astringent in treatment of excessive menstruation as a uterine sedative, seeds are reported to be useful in urinary discharges.

8. TAMARINDUS L.

Tamarindus indica L. Sp. Pl. 34. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 273. 1878; Duthie, Fl. U. Gang. Pl. 1 : 277. Repr. ed. 1960.

A large tree. Leaves paripinnate ; leaflets 10–20 pairs, opposite, linear oblong, 10–17 x 3–5 mm. Flowers yellow with red stripes. Petals 3. Pods indehiscent, usually falcate, pulpy inside. Seeds dark brown, shining.

Fls. : July Sept. ; *Frts.* : Sept. Nov. ; *Vern.* : *Imli* ; AKS 424, Bharatpur House.

Planted along the roadsides and in gardens for its edible fruits.

34. MIMOSACEAE

1a. Stamens indefinite :

2a. Stamens free 1. *Acacia*

2b. Stamens monodelphous :

3a. Armed tree : pods curved or twisted 6. *Pithecellobium*

3b. Unarmed tree ; pods straight 2. *Albizia*

1b. Stamens 10 :

4a. Flowers in globose heads:

5a. Aquatic herb 5. *Neptunia*

5b. Terrestrial shrub or small tree 4. *Leucaena*

4b. Flowers in elongate spikes:

6a. Flowers all bisexual 7. *Prosopis*

6b. Upper flowers of spikes bisexual, the lower neuter 3. *Dichrostachys*

1. ACACIA Willd.

1a. Flowers in cylindric spikes	1. <i>A. catechu</i>
1b. Flowers not in cylindric spikes :	
2a. Flowers in globose heads forming a terminal large panicle	3. <i>A. leucophloea</i>
2b. Flowers in globose heads, not forming a panicle as above:	
3a. Pods flat, moniliform	4. <i>A. nilotica</i>
3b. Pods flat, straight, not moniliform	2. <i>A. jacquemontii</i>

1. *Acacia catechu* (L. f.) Willd. Sp. Pl. 4 : 1079, 1806 ; Hook. f. Fl. Brit. Ind. 2 : 295, 1878 ; Duthie, Fl. U. Gang. Pl. 1 : 290. Repr. ed. 1960. *Mimosa catechu* L. f. Suppl. Pl. 439. 1781.

A small or medium-sized, deciduous tree with paired, hooked spines below the petioles. Bark dark grey, rough with long narrow-rectangular plates. Leaves bipinnate ; rachis often prickly ; pinnae 10 - 30 pairs. Leaflets 30 - 50 pairs, linear, about 4 - 5 mm long. Flowers creamy - white, fragrant, in cylindric, axillary spikes. Pods 5 - 7.5 cm long, long stalked, flat, torulose, dehiscent, dark brown.

Fls. : July Aug. ; *Frt.s.* : Sept. Oct. ; AKS 577, 784, Niyamatpur.

Common on the ridges of Niyamatpur.

2. *Acacia jacquemontii* Benth. in Hook. Lond. Jour. Bot. 1 : 499. 1842 ; Hook. f. Fl. Brit. Ind. 2 : 293. 1878 ; Duthie, Fl. U. Gang. Pl. 1 : 289. Repr. ed. 1960.

A shrub or small tree. Spines straight. Pinnae 3 - 4 pairs. Leaflets 6 - 10 pairs, linear oblong. Flowers pale yellow, in axillary, fascicled heads. Pods flat, thin, straight.

This plant is included on the authority of Duthie (in Duthie, Fl. U. Gang. Pl. 1 : 289).

3. *Acacia leucophloea* (Roxb.) Willd. Sp. Pl. 4 : 1083. 1806 ; Hook. f. Fl. Brit. Ind. 2 : 294. 1878 ; Duthie, Fl. U. Gang. Pl. 1 : 290. Rept. ed. 1960. *Mimosa leucophloea* Roxb. Pl. Cor. 2 : 27, t. 150. 1800.

A moderate-sized, deciduous tree. Bark pale grey. Spines stipular, in pairs, short straight. Leaves bipinnate ; pinnae 6 - 12 pairs. Leaflets 12 - 30 pairs, 4 - 5 mm long, linear, obtuse, crowded. Flower heads small pale yellow, fragrant, in

large, terminal leafless, densely tomentose panicles. Pods 10 - 15 cm long, linear, flat, narrowly ligulate, with persistent, pale brown tomentum.

Fls. : Sept. - Oct. ; *Frt.s.* : Nov. - Dec. ; *Vern.* : *Ronj* ; AKS 515, Bichpuri campus.

Common along the roadsides and on the ridge.

4. *Acacia nilotica* (L.) Del. subsp. *Indica* (Benth.) Brenan in Kew Bull. 12: 84, 1957 & in Fl. E. Trop. Afr. 109, 1959. *Acacia arabica* auct. non '(Lamk.) Willd.' sensu str. Baker in Hook. f. Fl. Brit. Ind. 2 : 293. 1878 ; Duthie, Fl. U. Gang. Pl. I : 288. Repr. ed. 1960.

A moderate-sized, evergreen tree. Bark dark brown or blackish. Spines stipular, in pairs below the petioles, white, straight. Leaves bipinnate ; pinnae 3-6 pairs. Leaflets 10-20 pairs, 5-6 mm long, linear, glabrous or downy. Flowers yellow, fragrant, in axillary, fascicled, globose heads. Pods 8-15 cm long, stipitate, flat, moniliform with deep sutures between the seeds.

Fls. : July - Oct. ; *Frt.s.* : Nov. - Feb. ; *Vern.* : *Babul* ; AKS 425, Kalc Ka Tal.

Commonly planted in the fields and along the roadsides.

2. *Albizia* Durazz.

Albizia lebbeck (L.) Willd. Sp. Pl. 4 : 1066. 1806 ; Hook. f. Fl. Brit. Ind. 2 : 298. 1878 ; Duthie, Fl. U. Gang. Pl. I : 295. Repr. ed. 1960. *Mimosa lebbeck* L. Sp. Pl. 516. 1753.

A tall, erect, deciduous tree. Bark dark grey. Leaves bipinnate with a large gland at the base. Pinnac 2-3 pairs. Leaflets 5-10 pairs, obliquely oblong, obtuse. Flowers yellowish-white, fragrant, in peduncled heads. Pods 16-20 cm long, thin, flexible, reddish-brown.

Fls. : Apr. - June ; *Frt.s.* : July - Oct. ; *Vern.* : *Siras* ; AKS 408, Shahjahan garden.

Planted in gardens and along roadsides.

3. DICHROSTACHYS (DC.) Wt. & Arn. nom. cons.

Dichrostachys cinerea (L.) Wt. & Arn. Prodri. 271. 1834; Hook. f. Fl. Brit. Ind. 2 : 288. 1878; Duthie, Fl. U. Gang. Pl. 1 : 285. Repr. ed. 1960. *Mimosa cinerea* L. Sp. Pl. 520, 1753 (non L. 517, 1753).

A large, much-branched shrub or tree with the branchlets ending in spines. Bark white, gray or light brown. Leaves bipinnate; pinnae 8 - 10 pairs, with stipitate glands at the base of each pair. Leaflets 12 - 15 pairs, minute, coriaceous. Flowers minute, in beautiful spikes; upper ones fertile and yellow; lower ones sterile, with rose-coloured staminodes. Pods coriaceous, curled, twisted, irregularly dehiscent.

Fls. : Sept. Oct.; *Frt.s.* : Oct. Nov.; AKS 541, Chiknipur; 714, Agra College garden.

Common on the ridges of Chiknipur.

4. LEUCAENA Benth.

Leucaena litisiliqua (L.) Gillis in Taxon 23 : 190. 1974. *Mimosa litisiliqua* L. Sp. Pl. 519. 1753. *L. leucocephala* (Lamk.) De Wit in Taxon 10 : 53. 1961, in Obs. *Mimosa leucocephala* Lamk. Encycl. 1 : 12. 1783. *Leucaena glauca* auct. non Benth. in Hook. Lond. Jour. Bot. 4 : 416. 1842; Hook. f. Fl. Brit. Ind. 2 : 290. 1878; Duthie, Fl. U. Gang. Pl. 1 : 286. Repr. ed. 1960.

An unarmed shrub or small tree. Leaves bipinnate; pinnae 4 - 8 pairs. Leaflets 10-15 pairs, linear, acute. Flowers sessile, whitish in dense, globular heads. Stamens 10. Pods 12 - 16 cm long, clustered in umbels, linear, flat, shining. Seeds many, oval, brown, polished.

Fls. : Apr. June; *Frt.s.* : July Sept.; AKS 395, R.B.S. College garden.

Grown in hedges along the boundaries of gardens and fields.

5. NEPTUNIA Lour.

Neptunia prostrata (Lamk.) Baill. in Bui. Soc. Linn. Paris 1 : 356. 1883; Shah in J. Bombay Nat. Hist. Soc. 60 (1) : 297. 1963. *Mimosa prostrata* Lamk. Encycl. 1 : 10. 1783. *Neptunia oleracea* Lour. Fl. Cochinch. 654. 1790; Hook. f. Fl. Brit. Ind. 2 : 285. 1878 Duthie, Fl. U. Gang. Pl. 1 : 282. Repr. ed. 1960.

An aquatic herb with prostrates or floating stems, rooting at the nodes and bearing spongy, bladder like swellings or floats on the internodes. Leaves bipinnate; pinnae 4 - 6. Leaflets 8 - 15 pairs, narrowly oblong, obtuse. Flowers yellow, small, arranged in globose, peduncled, axillary heads. Pods 1.2 - 2.5 cm long, obliquely oblong, beaked.

Fls. : Sept. - Oct. ; *Frtts.* : Nov. - Dec. ; AKS 832, Kotaki, Pachokbara.

Found floating in temporary ponds and puddles and along the drying up ponds.

6. *Pithecellobium* Mart. nom. cons.

***Pithecellobium dulce* (Roxb.) Benth.** in Hook. Lond. Jour. Bot. 3 : 199, 1844 ; Hook. f. Fl. Brit. Ind. 2 : 302, 1878; Duthie, Fl. U. Gang. pl. 1 : 297. Repr. ed. 1960. *Mimosa dulce* Roxb. Pl. Cor. 1 : 67, t. 99, 1798.

A medium - sized, evergreen tree, armed, with pairs of straight, stipular spines. Leaves bipinnate, pinnae 2. Leaflets 2, obovate or elliptic-oblong. Flowers white in small, globose, axillary heads. Pods turgid, spirally twisted, reddish brown.

Fls. : Mar. - June ; *Frtts.* : July - Aug. ; *Vern.* : *Jangalzalebi* ; AKS 357, College campus.

Planted in gardens, along roadsides and also found in the hilly tracts.

7. *Prosopis* L.

1a. Armed with thorns or unarmed ; pods compressed

1. *P. chilensis*

1b. Prickles small, conical ; pods cylindric

2. *P. cineraria*

1. *Prosopis chilensis* (Molina) Stenzl in U.S. Dept. Agric. Bur. Pl. Invent. Seeds and Pl. Import. 31, 85, 1914. *Ceratonia chilensis* Molina Sagg. Chil. 172, 1782. *P. juliflora* (Sw.) DC. Prodr. 2 : 447, 1825 ; Duthie, Fl. U. Gang. Pl. 1 : 285. Repr. ed. 1960. *Mimosa juliflora* Sw. Prodr. 85, 1788.

A small evergreen tree with drooping branches. Leaves bipinnate; pinnae 2 - 4 pairs. Leaflets 10-20 pairs, obliquely oblong, minutely mucronate. Flowers cream-coloured, in axillary, hanging spikes. Pods curved and torulose, pendulous; pulp sweetish. Seeds brown.

Fls. : Feb. - May ; *Frtts.* : Aug. - Sept. ; AKS 710, College campus.

Gregariously growing in waste and fallow fields and along roadsides.

2. *Prosopis cineraria* (L.) Druce in Repr. Bot. Epch. Cl. Brit. Isles 1913. 3. 422. 1914. *Mimosa cineraria* L. Sp. Pl. 517. 1753. *P. spicigera* L. Mant. Pl. 68. 1767; Hook. f. Fl. Brit. Ind. 2 : 288. 1878; Duthie, Fl. U. Gang. Fl. 1 : 284. Repr. ed. 1960.

A small or medium-sized tree. Prickles short, straight. Leaves bipinnate; pinnae usually 2 pairs with a gland between each pair. Leaflets 5-10 pairs, obliquely oblong, usually acute. Flowers creamy-yellow, in axillary spikes. Pods pendulous, subtomlose, turgid, 12-20 cm long.

Fls. : Mar. - May ; *Frt.s.* : May - June ; *Vern.* : *Chhenkur* ; AKS 879, Tantpur.

Common along the roadsides and on the ridge.

35. ROSACEAE

POTENTILLA L.

- Potentilla supina* L. Sp. Pl. 947. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 359 1878; Duthie, Fl. U. Gang. Pl. 1 : 301. Repr. ed. 1960.

An annual, prostrate or ascending, much-branched herb. Leaves pinnately 3 to 9-foliolate; leaflets variable in size and form, obovate, oblong or lobulate. Flowers solitary, axillary, 7-8 mm across. Sepals 5, persistent. Petals yellow, oblong, smaller than the calyx. Stamens many. Achenes numerous, minute ; receptacle globose.

Fls. : Jan. - Apr. ; *Frt.s.* : Apr. - May ; *Vern.* : *Dodi* ; AKS 340, Fatehpur Sikri; 383, Poiya ghat.

Common in sandy soil on the banks of Jamuna river and near the drying up ponds.

36. COMBRETACEAE

- | | |
|--------------------------------|----------------------|
| 1a. Climbing shrubs ; petals 5 | 2. <i>Quisqualis</i> |
| 1b. Trees ; petals absent : | |
| 2a. Flowers in spikes | 3. <i>Terminalia</i> |
| 2b. Flowers in heads | 1. <i>Anogeissus</i> |

1. ANOGEISSUS Wall.

Anogeissus pendula Edgew. in J. Asiatic Soc. Beng. 21 : 171. 1853; Hook. f. Fl. Brit. Ind. 2 : 451. 1878 ; Duthie, Fl. U. Gang. Pl. 1 : 312. Repr. ed. 1960.

A small tree ; twigs slender, pendulous. Bark ash-coloured or grey white. Leaves alternate or sub-opposite, elliptic or obovate, obtuse or acute, usually mucronate. Flowers greenish-yellow, in axillary and terminal, globose heads. Calyx tube campanulate, 5-lobed, subsessile. Petals 0. Stamens 10. Fruits nearly orbicular, 2-winged.

Fls. : Apr. June ; Frts. : July Aug. ; Vern. : *Dhoy* ; AKS 737, Shahjahan garden.

Common in hilly tracts and also planted in gardens.

2. QUISQUALIS L.

Quisqualis indica L. Sp. Pl. ed. 2. 556. 1762 ; Hook. f. Fl. Brit. Ind. 2 : 459. 1878 ; Bailey, Man. Cult. Pl. 724. 1949 ; Bor & Raiz. 178, Pl. 66. 1954.

A climbing or scandent, deciduous shrub. Leaves petiolate, 4.5–10 × 2.8–5.5 cm, elliptic or ovate-oblong, acuminate. Flowers deep pink to red, fragrant, in terminal drooping spikes. Petals 5. Stamens 10.

Fls. : Most part of the year ; AKS 885, Shahjahan garden.

Grown in the gardens as ornamental plant.

3. TERMINALIA L. nom. cons.

Terminalia arjuna (Roxb. ex DC.) Wt. & Arn. Prodr. 314. 1834 ; Hook. f. Fl. Brit. Ind. 2 : 447. 1878. *Pentaptera arjuna* Roxb. ex DC. Prodr. 3 : 14. 1828. *Terminalia glabra* Wt. & Arn. Prodr. 314. 1834 ; Duthie, Fl. U. Gang. Pl. 1 : 309. Repr. ed. 1960.

A large tree with smooth, pale greenish-grey bark. Leaves usually subopposite, oblong or elliptic-oblong, obtuse or subacute, with 1 or 2 prominent glands at the base. Flowers pale yellow, in pendulous, terminal and axillary spikes. Calyx tube broadly campanulate, 5-lobed. Petals 0. Stamens 10. Fruits ovoid or oblong, 4 to 5 winged or more.

Fls. : May - June ; *Frtis.* : July - Aug. ; *Vern.* : Arjun ; AKS 414, Paliwal Park.

Planted along roadsides and in garden.

37. MYRTACEAE

SYZYGIUM Gaertn. nom. cons.

Syzygium cumini (L.) Skeels in U.S. Dept. Agric. Bur. Pl. Ind. Bull. 248 : 2. 1912. *Myrtus cumini* L. Sp. Pl. 471. 1753. *Eugenia jambolana* Lamk. Encycl. 3 : 198. 1789 ; Hook. f. Fl. Brit. Ind. 2 : 499. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 314. Repr. ed. 1960. *Syzygium jambolanum* DC. Prodr. 3 : 259. 1828 ; Gamble, Fl. Pres. Mad. 338. Repr. ed. 1957.

A medium-sized or large tree. Bark smooth, grey. Leaves opposite, petiolate, 6.5 - 15 x 4 - 6 cm, round-ovate to oblong-ovate, subacute or obtuse, coriaceous. Panicles lateral, from the scars of fallen leaves. Flowers many, sessile, greenish-white. Berries ovoid or ovoid-oblong, 1 seeded, juicy, dark purple.

Fls. : Apr. - June ; *Frtis.* : June - July ; *Vern.* : Jamun ; AKS 923, Shahjahan garden.

Commonly cultivated in the area and also found wild on the ridges.

List of cultivated Taxa :

Callistemon lanceolatus DC. Prodr. 3 : 223. 1828 ; Bentall, Trees Calc. 249.
Vern. : Bottle-brush.

Eucalyptus citriodora Hook. in Mitch. Exped. Trop. Austral. 235. 1848 ; Bentall, Trees Calc. 246.

Eucalyptus globulus Labill. Voy. 1 : 153, t. 153, t. 13. 1800 ; Bailey, Man. Cult. Pl. 727. 1949.

Eucalyptus tereticornis Sm. Spec. Bot. N. Holl. 41. 1795 ; Bailey Man. Cult. Pl. 728. 1949.

Psidium cattleianum Sabine in Trans. Hort. Soc. Lond. 4 : 317, t. 11. 1821 ; Bailey, Man. Cult. Pl. 729. 1949. *Vern.* : Amrood.

Psidium guajava L. Sp. Pl. 470. 1753 ; Benthall, Trees Calcutta 244. Vern. : Amrood.

38. LYTHRACEAE

- 1a. Herbs 1. *Antennaria*

1b. Shrubs or trees :

2a. Flowers 4-merous ; stamens 8 3. *Lawsonia*

2b. Flowers 6-9-merous ; stamens indefinite 2. *Lagerstroemia*

1. AMMANNIA L.

I. *Ammannia baccifera* L. Sp. Pl. 120, 1753; Hook. f. Fl. Brit. Ind. 2 : 569, 1879; Duthie, Fl. U. Gang. Pl. 1 : 321. Repr. ed. 1960.

An erect, glabrous herb, 10–30 cm high. Leaves opposite, 1.2–3.5 × 0.3–1 cm, oblong or lanceolate, narrowed at the base. Flowers greenish-pink, in condensed, axillary racemes or clusters; flowers pedicelled or subsessile. Calyx campanulate, teeth 4, minute. Petals 0 or minute. Capsules globose, 1–2 mm in diam., glabrous, circumciss above the middle.

Fls. : Aug. - Oct.; *Frtts.* : Oct. - Dec.; AKS 647, Kitham; 688, Salempur; 820, Chiknipur.

Common in sandy soil of the banks of Jamuna and Utangan rivers and near the ponds and canals.

2. *Ammannia senegalensis* Lamk. Tabl. Encycl. 1 : 312, n. 155, t. 77, f. 2. 1791; Hook. f. Fl. Brit. Ind. 2 : 570. 1879; Duthie, Fl. U. Gang. Pl. 1 : 332. Repr. ed. 1960.

An erect, glabrous herb, 20-60 cm high. Leaves opposite, sessile, 2.5 - 7.5 x 0.4 - 1.7 cm, oblong, subauriculate at the base. Flowers bright pink, in whorled, compound cymes. Calyx campanulate, teeth 4. Petals 4, caducous. Stamens 8. Capsules small, globose.

Fls. : Sept. Oct. ; AKS 210, Poiya ghat ; 242, Kitham ; 849, Salempur.

Common on moist sandy soil of Jamuna river, cultivated fields and near the ponds and lake.

3. *Anmannia tenuis* Clarke in Hook. f. Fl. Brit. Ind. 2 : 567. 1879; Duthie, Fl. U. Gang. Pl. 1 : 321. Repr. ed. 1960.

A sub-erect or procumbent herb. Leaves opposite, sessile, 0.7 - 1.2 cm, long, ovate or elliptic, often acute. Flowers sessile, closely packed in terminal spikes, dimorphic. Calyx campanulate, teeth 4, acute. Petals 4, obovate. Capsules 2-valved, ellipsoid, much longer than broad.

This plant is included on the authority of Duthie (Duthie, Fl. U. Gang. Pl. 1: 321).

2. LAGERSTROEMIA L.

1a. Shrubs with white, pink or purple flowers 1. *L. indica*

1b. Trees with mauve coloured flowers 2. *L. speciosa*

1. *Lagerstroemia indica* L. Syst. Nat. ed. 10 : 1076. 1759 ; Hook. f. Fl. Brit. Ind. 2 : 576. 1879.

A deciduous, glabrous shrub. Bark smooth, brown. Leaves shortly petiolate or sessile, 3 - 7 x 2 - 3.5 cm, elliptic or oblong, acute. Flowers pink, white or purple, in axillary or terminal panicles. Petals 6, fringed, the claw very long and slender. Capsules woody.

Fls. : Apr. June ; AKS 441, R. B. S. College garden.

Grown in gardens as ornamental plant.

2. *Lagerstroemia speciosa* (L.) Pers. Syn. 2 : 72. 1806 ; Kochne in Pfeich. 17 : 261. 1903 ; Blatt. & Mill. Beauf. Ind. Tr. 100, t. 21. 1954. *Munchausia speciosa* L. in Muench. Hausv. 1 : 357, t. 2. 1770.

A moderate-sized, deciduous tree. Leaves shortly petiolate, oblong or ovate-elliptic, obtuse or acute. Flowers large, varying from mauve or pink to purple, in large terminal panicles. Calyx-tube prominently ribbed, petals 6, erose-wavy, with a short claw. Capsules globose.

Fls. : Apr. June ; *Frt.s.* : Aug. Oct. ; AKS 736, Shahjahan garden.

Planted in gardens and lawns.

3. LAWSONIA L.

Lawsonia inermis L. Sp. Pl. 349, 1753. *L. alba* Lamk. Encycl. 3 : 106, 1789; Hook. f. Fl. Brit. Ind. 2 : 573, 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 323. Repr. ed. 1960.

A shrub or small tree with greyish-brown bark. Leaves opposite, nearly sessile, 1.5–4.5 x 0.7–1.2 cm, elliptic or broadly lanceolate, acute or obtuse, coriaceous. Flowers whitish, sweet-scented, in large corymbosely branched, terminal panicles. Calyx broadly campanulate, lobes 4, ovate. Petals 4, oblong. Stamens 8. Capsules globose. Seeds angular, brown.

Fls. & frts. : July Oct. ; *Vern.* : Mehndi ; AKS 119, Bichpuri campus.

Planted as a hedge plant on the boundaries of gardens and lawns. The leaves are used to dye the skin and nails.

39. ONAGRACEAE

LUDWIGIA L.

- | | |
|---|--|
| 1a. Plants free-floating aquatics, with spongy floats | 1. <i>L. adscendens</i> |
| 1b. Plants without spongy floats : | |
| 2a. Bracteoles large, mostly persistent,
placed near the middle of ovary | 2. <i>L. octovalvis</i> , ssp. <i>sessiliflora</i> |
| 2b. Bracteoles very small, deciduous, placed
near the base of ovary | 3. <i>L. perennis</i> |

1. *Ludwigia adscendens* (L.) Hara in J. Jap. Bot. 28 : 290. 1953. *Jussiaea adscendens* L. Mant. Pl. 1 : 69. 1767. *J. repens* L. Sp. Pl. 1 : 388. 1755, (non *L. repens* Forst. 1771); Hook. f. Fl. Brit. Ind. 2 : 587. 1879; Duthie, Fl. U. Gang. Pl. 1 : 326. Repr. ed. 1960.

A creeping or floating aquatic herb. Stems rooting at the nodes and floating on the water by means of number of white spongy vesicles at the nodes. Leaves alternate, petiolate, obovate to oblanceolate, obtuse. Flowers white, solitary, axillary, aerial. Calyx persistent. Petals 5, obovate. Stamens 10. Capsules cylindric.

Fls. : Sept. - Oct.; *Vern.* : *Pani Ki ghas*; AKS 45, Pachokhara; 844, Salempur.

Common floating on ponds and puddles and on the banks of drying up ponds.

2. *Ludwigia octovalvis* ssp. *sessiliflora* (Micheli) Raven in Kew Bull. 15 : 476. 1962. *Jussiaea octonervia* var. *sessiliflora* Micheli in Martius, Fl. Bras. 13 : 180. 1875. *J. suffruticosa* L. Sp. Pl. 388. 1753; Hook. f. Fl. Brit. Ind. 2 : 587. 1879; Duthie, Fl. U. Gang. Pl. 1 : 327. Repr. ed. 1960.

An erect, branching, perennial herb. Leaves sessile or subsessile 3 - 6.5 x 0.5 - 1.5 cm, elliptic-lanceolate, acute. Flowers yellow, solitary, 4-merous. Calyx lobes ovate, acute. Petals broadly obovate. Capsules 4 - 6 cm long, cylindric, 8 - ribbed, many seeded.

Fls. : Sept. - Oct.; *Frt.* : Oct. - Dec.; AKS 939, Salempur.

Found in wet places and bank of canals.

3. *Ludwigia perennis* L. Sp. Pl. 119. 1753 excl. *verba falsa* "follis oppositis"; Raven, Reinwardtia 6 : 367. 1963. *Ludwigia parviflora* Roxb. Fl. Ind. 1 : 440. 1820; Hook. fl. Fl. Brit. Ind. 2 : 588. 1879; Duthie, Fl. U. Gang. Pl. 1 : 327. Repr. ed. 1960.

An erect, glabrous herb, 20 - 50 cm high. Stems angular, greenish tinged with purple. Leaves alternate, petiolate, 1 - 4 x 0.4 - 1 cm, lanceolate to linear-lanceolate, entire, tapering at ends. Flowers yellow, solitary, axillary, 4-merous. Sepals 4, ovate, acute. Petals 4, elliptic - oblong. Stamens 4. Capsules 6 - 8 mm long, oblong, obscurely 4 angled, many seeded.

Fls. : Sept. - Oct.; *Frt.* : Oct. - Nov.; AKS 846, Salempur.

Found in moist places of cultivated fields.

40. TRAPACEAE

TRAPA L.

Trapa natans L. var. *bispinosa* (Roxb.) Makino in Linuma, Somuko Dzusetsu (ed. 3) 1 : 137, 1907 ; Santapau & Wagh in Bull. Bot. Surv. Ind. 5 (2): 109, 1965. *Trapa bispinosa* Roxb. Pl. Cor. t. 234, 1815 ; Hook. f. Fl. Brit. Ind. 2: 590, 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 329. Repr. ed. 1960.

An aquatic herb. Stems long, flexuous, ascending in the water. Floating leaves arranged in rosette, rhomboidal with a triangular apex ; submerged ones dissected. Petioles divided near the apex into a large fusiform, spongy float. Flowers white, solitary, axillary and open above the surface of water in the afternoon. Calyx limb 4-partite, pubescent. Petals 4, obovate. Nuts angled, shortly beaked at the apex and with a sharp, spiny horn on either side.

Fls. : Sept. ; Frts. : Sept. - Nov. ; Vern. : *Singhara* ; AKS 584, Budhiya Ka Tal.

Cultivated in ponds and lakes for its edible fruits.

41. CUCURBITACEAE

1a. Flowers white :

2a. Petals fimbriate 9. *Trichosanthes*

2b. Petals not fimbriate :

3a. Fruits dry and fibrous 6. *Luffa*

3b. Fruits fleshy and non-fibrous 3. *Coccinia*

1b. Flowers yellow :

4a. Flowers with a conspicuous bract on the peduncle 7. *Momordica*

4b. Flowers without bracts :

5a. Connectives of the anthers produced at apex :

6a. Leaves not dissected ; male flowers
fascicled ; fruit ellipsoid or obtusely 4-angled 4. *Cucumis*

6b. Leaves much dissected ; male flowers
solitary ; fruit globose 2. *Citrullus*

5b. Connectives of anthers not produced :

7a. Anther cells flexuous or conduplicate

5. *Diplacyclos*

7b. Anther cells never flexuous :

8a. Style with an annular disc at the base

8. *Mukia*

8b. Style without a disc at the base ; petiolate with a stipule like ciliate bract

1. *Blastania*

1. BLASTANIA Hook. f.

1a. Fruits globous or ellipsoid

1. *B. fibriflora*

1b. Fruits obovate

2. *B. garcinii*

1. *Blastania fibriflora* (Fenzl.) Kotschy & Poir. Pl. Tinn. 15, t. 7. (1865-1866). *Bryonia fibriflora* Fenzl. Kotschy in Iter Nub. 205, 231. 1841, et in Flora, 313. 1844. *Ctenolepis cerasiformis* Clarke in Hook. f. Fl. Brit. Ind. 2 : 630. 1879.

A tendril climber. Leaves petiolate, 3-partite, lateral lobes often more or less bi-lobed, middle lobe entire, membranous. Tendrils simple. Stipuliform bracts orbicular reniform, long ciliated. Flowers whitish - yellow, very small, monoecious. Male flowers in racemes. Females solitary. Fruits globous, glabrous, 2-seeded, red, 1.5 x 1.5 cm.

Fls. : July Aug. ; *Frt*s. : Aug. Sept. ; AKS 830, Bichpuri campus.

This is first report from the area. found spreading upon the tree, *Dalbergia sissoo* Roxb.

2. *Blastania garcinii* (Burm. f.) Cogn. in DC. Mon. Phan. 3 : 629. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 348. Repr. ed. 1960 ; Meense in Bothalia 8 : 11. 1962. *Sicyos garcinii* Burm. f. Fl. Ind. 211. 1768. *Ctenolepis garcinii* (Burm. f.) Clarke in Hook. f. Fl. Brit. Ind. 2 : 629. 1879.

An annual, climbing herb. Leaves petiolate, deeply 5-lobed, membranous. Tendrils simple. Stipuliform bracts ovate or round, long ciliate. Flowers small, pale green, monoecious. Male flowers in racemes. Females solitary. Fruits inversely subreniform, 9-10 x 5-6 mm, glabrous, red when ripe.

Fls. : Aug. Oct. ; *Frt*s. : Oct. Nov. ; AKS 235, Kitham.

Found spreading or climbing upon the trees and shrubs.

2. *CITRULLUS* Schrad. nom. cons.

Citrullus colocynthis (L.) Schrad. in Linnaea 12 : 414. 1838 ; Hook. f. Fl. Brit. Ind. 2 : 620. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 344. Repr. ed. 1960. *Cucumis colocynthis* L. Sp. Pl. 1011. 1753.

A perennial, scabrous, trailing herb. Leaves petiolate, ovate or triangular, base cordate, deeply 3-lobed ; lobes sinuately pinnatifid. Tendrils 2 - lid. Flowers yellow, monoecious, all solitary. Fruits globose, variegated with dark green and white; pulp spongy, very bitter.

Fls. : May - June ; Frts. : July - Aug. ; Vern. : *Gadumba Ki bet*, Indrayan ; AKS 102, Poiya ghat.

Common on dry sandy soil of Jamuna river and cultivated fields.

3. *COCCINIA* Wt. & Arn.

Coccinia grandis (L.) Voigt, Hort. Suburb. Calc. 59. 1845. *Bryonia grandis* L. Mant. Pl. 1 : 126. 1767. *Coccinia indica* Wt. & Arn. Prodr. 347. 1834 ; Duthie, Fl. U. Gang. Pl. 1 : 345. Repr. ed. 1960. *Cephalandra indica* (Wt. & Arn.) Naud. in Ann. Sci. Nat. (Ser. 5) 5 : 16. 1866 ; Hook. f. Fl. Brit. Ind. 2 : 621. 1879.

A perennial, tendril climber. Leaves petiolate, 3 to 5-lobed or angled, cordate, shining ; margins distantly glandular tipped. Tendrils simple. Flowers white, dioecious. Male flowers solitary or racemose and subcorymbose ; females solitary. Fruits fleshy, ovoid or oblong, bright red when ripe. Seeds embeded in red, juicy pulp.

Fls. : June - Oct. ; Frts. : Oct. - Nov. ; Vern. : *Kundru*, *Gul kankri* ; AKS 187, Shahjahan garden.

Abundant, climbing or spreading upon trees and shrubs.

4. *CUCUMIS* L.

1a. Perennial ; leaves 5-7 lobed ; male flowers usually solitary

1. *C. callosus*

1b. Annuals ; leaves 3 - lobed ; male flowers in clusters

2. *C. melo var. agrestis*

1. *Cucumis callosus* (Rottler) Cogn. in Engl. Pflanzenr. 88 : 129. 1924 ; Chakravarty in Rec. Bot. Surv. Ind. 17 : 100. 1959. *Bryonia callosa* Rottler, Ges. Naturf. Freunde Berlin Nene schriften 4 : 210. 1803. *Cucumis trigonus* Roxb. Fl. Ind. 3 : 722. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 619. 1879.

A much-branched, prostrate, perennial herb. Stem angular, hispid ; tendrils simple. Leaves long-petiolate, deeply or shallowly 5-7 lobed, scabrid. Flowers yellow, monoecious. Male flowers solitary. Fruits ellipsoid-globose, obscurely trigonous, longitudinally variegated with green stripes.

Fls. : July Aug. ; *Frt.s.* : Aug. Sept. ; AKS 930, Tantput.

Found spreading on sandy soil.

2. *Cucumis melo* var. *agrestis* Naud. in Ann. Sci. Nat. Bot. (4) 11 : 73. 1859 & 12 : 110. 1859. *C. pubescens* Willd. Sp. Pl. 4 : 614. 1805 ; Duthie, Fl. U. Gang. Pl. 1 : 341. Repr. ed. 1960.

An annual, hirsute, trailing herb. Leaves long-petiolate, reniform, base cordate, often 3-angled. Tendrils simple. Flowers yellow, monoecious. Male flowers fasciculate. Females solitary. Fruits oval, spotted when ripe.

Fls. : July Aug. ; *Frt.s.* : Aug. Sept. ; *Vern.* : Saind ; AKS 143, Bichpuri campus ; 828, Arnotta.

Common spreading on sandy soil of Jamuna and Utangan rivers and also in cultivated fields.

5. DIPLOCYCLOS (Endl.) von Post & Kuntze

Diplocyclos palmatus (L.) Jeffrey in Kew Bull. 15(3) : 352. 1962. *Bryonia palmata* L. Sp. Pl. 1012. 1753, excl. syn. *B. laciniosa* auct non L. 1773, sensu Clarke in Hook. f. Fl. Brit. Ind. 2 : 622. 1879. *Bryonopsis laciniosa* sensu Naud. in Ann. Sci. Nat. Bot. ser. 4, 12 : 141. 1859. [pro majore parte, excl. typ., et sensu auct. mult. non. (L.) Naud., 1859] Duthie, Fl. U. Gang. Pl. 1 : 349. Repr. ed. 1960.

A tendril climber. Leaves petiolate, deeply palmately 5-lobed, margins denticulate or sinuate-toothed, upper surface scabrous, lower smooth. Tendrils bifid. Flowers greenish-yellow, monoecious, fascicled in leaf axils. Fruits yellowish, blotched with green, globose, 1.5-2.2 cm in diam.

Fls. : July Aug. ; *Frt.s.* : Aug. Oct. ; AKS 522, Shahjahan garden.

This is a first report from the area. Found climbing or spreading on the trees.

6. LUFFA Adans.

Luffa echinata Roxb. Hort. Beng. 104, 1814 et Fl. Ind. 3 : 716, 1882 ; Hook. f. Fl. Brit. Ind. 2 : 615, 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 7, 1959.

An extensive, climbing annual. Tendrils bifid. Leaves petiolate, 5-angled or 5-lobed, sub-orbicular reniform, flowers white, dioecious. Male flowers solitary or in pairs. Female flowers solitary on a short peduncle. Fruits broadly ellipsoid, densely covered with stiff ciliate bristles except at the operculum.

Fls. & frts. : July Sept. ; AKS 924, Tantpur.

Found climbing and spreading upon trees and shrubs.

7. MOMORDICA L.

1a. Flowers monoecious ; leaves deeply 5-7 lobed ; fruits tubercled

1. *M. charantia*

1b. Flowers dioecious ; leaves slightly lobed ; fruits spinose

2. *M. dioica*

1. **Momordica charantia** L. Sp. Pl. 1009, 1753 ; Hook. f. Fl. Brit. Ind. 2 : 616, 1879 ; Duthie & Fuller, Field & Gard. Crops. 2 : 62, t. 64, 1883; Duthie, Fl. U. Gang. Pl. 1 : 338. Repr. ed. 1960.

A tendril climber. Leaves petiolate, reniform or suborbicular, 3.5-10 cm in diam., often pedately 5 to 7-lobed, lobes mucronate-dentate or lobulate. Tendrils simple. Flowers yellow, monoecious, solitary, axillary. Fruits oval or fusiform, deeply tubercled, orange-coloured when ripe.

Fls. : July Sept. ; Frts. : Sept. Oct. ; Vern. : Karel ; AKS 232, Near Shahjahan garden.

Cultivated in the area, also found in the wild state spreading upon shrubs.

Note : There is variation in cultivated and wild specimens regarding the fruit size.

2. **Momordica dioica** Roxb. ex Willd. Sp. Pl. 4:605, 1805; Hook. f. Fl. Brit. Ind. 2: 617, 1879; Duthie, Fl. U. Gang. Pl. 1 : 339. Repr. ed. 1960.

A large - perennial, tendril climber. Leaves petiolate, 4 - 10 x 3 - 8.5 cm, ovate, acute, or 3 to 5-lobed. Tendrils simple. Flowers yellow, dioecious. Male flowers with a conspicuous, cowl-like, inflated bract which encloses half of the male

flower. Female flower minutely bracteate. Fruits ovoid, clothed with blunt spines yellow at maturity. Seeds many, compressed, embedded in a red pulp.

Fls. : July - Sept. ; *Frt.* : Sept. - Oct. ; *Vern.* : *Ben Karels* ; AKS 520, Near St. Johns College ; 778, Niyamatpur.

Found climbing or spreading upon hedges and shrubs.

8. MUKIA Arn.

Mukia maderaspatana (L.) M. Roem. Syn. Monog. 247. 1846. *Cucumis maderaspatanus* L. Sp. Pl. 1012. 1753. *Mukia scabrella* (L.f.) Arn. in Hook. J. Bot. 3 : 276. 1841 ; Hook. f. Fl. Brit. Ind. 2 : 623. 1879. *Bryonia scabrella* L. f. suppl. Pl. 424. 1781. *Melothria maderaspatana* (L.) Cogn. in DC. Mon. Phan. 3 : 623. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 347. Repr. ed. 1960.

A scandent, scabrous, annual climber. Leaves petiolate, 3.5 - 7.5 x 4.5 - 8 cm, undivided (ovate or subdeltoid) or 3 to 5 lobed. Tendrils simple, slender. Flowers yellow, monoecious. Male flowers in clusters. Females solitary or sub fasciculate. Fruits small, globose, bright red when ripe.

Fls. : July - Sept. ; *Frt.* : Sept. - Oct. ; *Vern.* : *Ankh phod ki bel* ; AKS 128, Paliwal Park.

Common climbing upon trees and shrubs.

9. TRICHOSANTHES L.

Trichosanthes cucumerina L. Sp. Pl. 1008. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 609. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 333. Repr. ed. 1960.

An annual, extensive climbing herb. Leaves petiolate, 4 - 15 x 4.5 - 14 cm, orbicular-reniform or broadly ovate, distantly denticulate, more or less deeply 5 to 7 - lobed. Tendrils 2 - 3 - fid. Flowers white, dioecious. Male peduncles in pairs. Corolla with fimbriate petals. Female peduncle 3 - 12 mm long, solitary. Fruits ovoid-conical, pointed, 5 - 6 cm long, yellow.

Fls. : July - Aug. ; *Frt.* : Aug. - Oct. ; *Vern.* : *Jangli chachinda* ; AKS 233, near Shahjahan garden ; R.B.S. Collge garden ; 521, Shahjahan garden.

Common climbing or spreading upon the hedges, and trees.

List of cultivated Taxa :

***Benincasa hispida* (Thunb.) Cogn. in DC. Mon. Phan. 3 : 513. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 338. Repr. ed. 1960. *Cucurbita hispida* Thunb. Fl. Jap. 322. 1784. *Benincasa cerifera* Savi in Bibl. Ital. 9 : 158. 1818 & Mem. Sopra Piant. Cucurb. 1 : 6. 1818 ; Hook. f. Fl. Brit. Ind. 2 : 616. 1879 ; Duthie & Fuller, Field & Gard. Crops 2 : 43, t. 45. 1883. Vern. : *Petha*.**

***Citrullus lanatus* (Thunb.) Matsumura & Naki in Cat. Sem. Spor. Hort. Bot. Univ. Imp. Tokyo 1916 : 30. 1916. *Momordica lanata* Thunb. Prod. Pl. Cap. 13. 1794. *C. vulgaris* Schrad. ex Eckl. & Zeyh. Enum. 2 : 279. 1836 ; Hook. f. Fl. Brit. Ind. 2 : 621. 1879 ; Duthie & Fuller, Field & Gard. Crops. 2 : 56, tt. 55, 56. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 344. Repr. ed. 1960. Vern. : *Tarbooz*.**

***Citrullus vulgaris* Schrad. var. *fistulosus* Duthie & Fuller, Field & Gard. Crops. 2 : 46, t. 47. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 344. Repr. ed. 1960. Vern. : *Tinda*.**

***Cucumis melo* L. Sp. Pl. 1011. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 620. 1879 ; Duthie & Fuller, Field & Gard. Crops 2 : 51, t. 50. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 340. Repr. ed. 1960. Vern. : *Kharbuza*.**

***Cucumis melo* L. var. *momordica* Duthie & Fuller, Field & Gard. Crops 2 : 50, t. 49. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 342. Repr. ed. 1960. Vern. : *Phunt*.**

***Cucumis melo* var. *utilissimus* Duthie & Fuller, Field & Gard. Crops. 2 : 55, tt. 53, 54. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 341. Repr. ed. 1960. *C. utilissimus* Roxb. Hort. Beng. 70. 1814, nom. nud. & Fl. Ind. 3 : 721. 1832. Vern. *Kakri* ; AKS 381, Polya ghat.**

***Cucumis sativus* L. Sp. Pl. 1012. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 620. 1879 ; Duthie & Fuller, Field & Gard. Crops. 2 : 53, t. 51. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 343. Repr. ed. 1960. Vern. : *Khira*.**

***Cucurbita maxima* Duch. ex Lamk. Encycl. 2 : 151. 1786 ; Hook. f. Fl. Brit. Ind. 2 : 622. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 346. Repr. ed. 1960. Vern. : *Kaddu*.**

***Cucurbita moschata* Duch. ex Poir. in Dict. Sc. Nat. 11 : 234. 1818 ; Hook. f. Fl. Brit. Ind. 2 : 622. 1879 ; Duthie & Fuller, Field & Gard. Crops. 2 : 58, t. 58. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 346. Repr. ed. 1960. Vern. : *Mitha Kaddu*.**

***Cucurbita pepo* L. Sp. Pl 1010. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 622. 1879 ; Bailey, Man. Cult. Pl. 952. 1949 ; Duthie, Fl. U. Gang. Pl. 1 : 346. Repr. ed. 1960. Vern. : *Vilaiti Kaddu*.**

***Lagenaria siceraria* (Molina) Standley in Publ. Field Mus. Nat. Hist. Chicago Bot. Ser. 1, 3 : 435. 1930. *Cucurbita siceraria* Molina, Sagg. Chi. 133 : 335. 1782. *L. vulgaris* Ser. In Mem. Soc. Phys. Geneve 3 (1) : 25. 1825 ; Hook. f. Fl. Brit.**

Ind. 2 : 613. 1879 ; Duthie & Fuller, Field & Gard. Crops 2 : 48, t. 48. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 335. Repr. ed. 1960. Vern. : *Lauki*.

***Luffa acutangula* (L.) Roxb.** Fl. Ind. 3 : 713. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 615. 1879 ; Duthie & Fuller, Field & Gard. Crops 2 : 60, t. 62. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 337. Repr. ed. 1960. *Cucumis acutangulus* L. Sp. Pl. 4011. 1753. Vern. : *Tori*.

***Luffa cylindrica* (L.) Roem.** Syn. Monogr. 2 : 63. 1846 ; Duthie & Fuller, Field & Gard. Crops 2 : 61, t. 63. 1883. *Momordica cylindrica* L. Sp. Pl. 1009. 1753. Vern. : *Tori*.

***Luffa aegyptiaca* Mill.** Gard. Dict. 1768 ; Hook. f. Fl. Brit. Ind. 2 : 614. 1879. Vern. : *Ghia-turai*.

***Trichosanthes anguina* L.** Sp. Pl. 1008. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 610. 1879 ; Duthie & Fuller, Field & Gard. Crops. 2 : 45, t. 46. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 334. Repr. ed. 1960. Vern. : *Chichinda*.

***Trichosanthes dioica* Roxb.** Fl. Ind. 2 : 701. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 609. 1879 ; Duthie & Fuller, Field & Gard. Crops 3 : 23. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 334. Repr. ed. 1960. Vern. : *Parwal*.

42. CACTACEAE

OPUNTIA Mill.

***Opuntia dilleni* (Ker. - Gawl.) Haw.** Suppl. Pl. Succ. 79. 1819 ; Hook. f. Fl. Brit. Ind. 2 : 657. 1879 ; Burkill in Rec. Bot. Surv. Ind. 4 (6) : 314. 1911. *Cactus dillenii* Ker. - Gawl. in Bot. Reg. 3 : 6. 255. 1818.

A thorny, much-branched cactus, 1-2 m high. Branches jointed ; joints more or less obovate. Spines pale yellow. Flowers yellow or tinged with red colour. Berries purple, pear-shaped, truncate.

Fls. : Mar. - Apr. ; *Vern.* : *Nagphani*.

Found in waste open fields and on the ridge forming dense thickets.

43. AIZOACEAE

Some botanists prefer to split this family into Molluginaceae (with perianth free) and Ficoidaceae (with perianth united). In this work, I have followed Backer's

treatment in Flora Malesiana Ser. 1, 4(3) : 267 - 70, 1951, keeping them both under Aizoaceae.

J. GUSTAFSSON

Gisekia pharnaceoides L. Mant. Pl. 562, 1771; Hook. f. Fl. Brit. Ind. 2 : 664, 1879; Duthie, Fl. U. Gang. Pl. 1 : 356. Repr. ed. 1960.

A prostrate or ascending, glabrous, branched herb, 10–20 cm long. Leaves opposite, shortly petiolate, 1–2.5 × 0.2–0.4 cm, linear-oblong, obtuse or subacute, subfleshy. Flowers purplish, small, numerous, in lax terminal and axillary cymes. Sepals 5, elliptic-oblong with membranous margins. Petals none. Fruits of 5, distinct, indehiscent, 1-seeded carpels.

Fls. : Aug., Sept.; *Frt.s.* : Sept., Nov.; AKS 163, 293, Poiga ghat.

Found in dry sandy soil of cultivated fields near Pooya ghat.

2. GLINUS L.

- 1a.** Plant densely stellate hairy **1. *G. lotoides***
1b. Plant glabrous **2. *G. oppositifolius***

1. *Glinus lotoides* L. Sp. Pl. 463. 1753. *Mullugo lotoides* (L.) Kuntze, Rev. Gen. 214. 1891. *M. hirta* Thunb. Prodr. Pl. Cap. 24. 1794; Hook. f. Fl. Brit. Ind. 2 : 662. 1879; Duthie, Fl. U. Gang. Pl. 1 : 354. Repr. ed. 1960.

A prostrate, spreading or sometimes ascending, stellately hairy, annual herb, 20–50 cm long. Leaves opposite or several at a node, petiolate, 0.9–1.9 × 0.8–1.7 cm, suborbicular, obovate or elliptic obtuse. Flowers pinkish-white, in axillary fascicles, 1–6 together. Sepals 5, elliptic or oblong, acute, stellate hairy outside. Petals none. Styles 5. Capsules oblong, 3.5–4 mm long. Seeds many, dark, tubercled, with a scaly, white appendage.

Fls. : Dec. – Apr. ; *Frt.s.* : Apr. – May ; *Vern.* : Akh Jau ; AKS 300, Salempur ; 336, Fatehpur Sikri

Abundant near the drying up ponds, puddles, ditches and in waste fields and found in association of *Grangea maderaspatana* Poir. and *Polygonum plebeium* R. Br.

2. *Glinus oppositifolius* (L.) A. DC. in Bull. Herb. Boiss. II, 1 : 552. 1901. *Mollugo oppositifolia* L. Sp. Pl. 89. 1753 ; Duthie, Fl. U. Gang. Pl. 1 : 355. Repr. ed. 1960. *M. spargula* L. Syst. Nat. 881. 1759 ; Hook. f. Fl. Brit. Ind. 2 : 662. 1879.

A trailing or diffuse, much-branched, glabrous herb. Leaves usually in whorls, sessile or shortly stalked, spatulate, obovate or elliptic. Flowers white, on slender pedicels, clustered at the nodes. Stigmas 3. Capsules 3-celled. Seeds deep brown, tuberculate, with a small, white scale curved around them.

This plant is included on the authority of Munro (in Duthie, Fl. U. Gang. Pl. 1 : 355).

3. MOLLUGO L.

1a. Leaves all radical

2. *M. nudicaulis*

1b. Leaves in whorls at the nodes :

2a. Flowers in axillary clusters ; seeds smooth

1. *M. cerviana*

2b. Flowers in racemes ; seeds tuberculate

3. *M. pentaphylla*

1. *Mullugo cerviana* (L.) Ser. in DC. Prodr. 1 : 392. 1824 ; Hook. f. Fl. Brit. Ind. 2 : 663. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 355. Repr. ed. 1960. *Pharnaceum cervianum* L. Sp. Pl. 272. 1753.

An annual, erect, slender, glabrous herb, 10–20 cm high. Branches umbellate, the nodes thickened. Leaves in whorls of 4–8 at each node, 10–20 x 1 mm, narrow-linear. Flowers pale purplish, numerous, in umbellate or trichotomous cymes. Sepals 5, oval-oblong, with membranous margins. Petals absent. Styles 3, very short. Capsules globose, many seeded, pale brown. Seeds reticulate, bluntly ridged on the back, not appendaged.

Fls. : July Aug. ; *Frt.s.* : Aug. Sept. ; AKS 759, Poiya ghat.

Occurs in dry sandy soil of cultivated fields, near Poiya ghat and also found in hilly tracts among rock crevices.

2. *Mollugo nudicaulis* Lamk. Encycl. 4 : 234. 1797 ; Hook. f. Fl. Brit. Ind. 2 : 664. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 356. Repr. ed. 1960.

An erect, glabrous, annual herb. Stems many, leafless. Leaves radical, forming a rosette on the ground, 2–4.5 x 0.8–1.5 cm, elliptic or oblong-spathulate, entire, obtuse-rounded. Flowers 4 mm across, dull white, in di-or tri-chotomous cymes. Sepals 3 mm long, oblong or oval with membranous margins. Petals absent. Stigmas 3, very small. Capsules globose or ellipsoid, many seeded. Seeds closely reticulate, minutely appendaged at the hilum, black, shining.

Fls. : July Aug. ; *Frt.s.* : Aug. Sept. ; Vern. : Gobi ; AKS 914, Tantpur.

Found in hilly tracts amongst rock crevices.

3. *Mollugo pentaphylla* L. Sp. Pl. 89. 1753 ; Duthie, Fl. U. Gang. Pl. 1 : 356. Repr. ed. 1960. *M. striata* L. Sp. Pl. 2 : 131. 1762 ; Hook. f. Fl. Brit. Ind. 2 : 663. 1879.

An erect or prostrate, much-branched, annual herb. Leaves opposite or in whorls of 3–5, 1–4.5 x 0.4–1 cm, lanceolate-ovovate, acute or obtuse. Flowers greenish white in terminal cymes. Tepals obovate-oblong, white margined. Stamens 3. Styles 3. Capsules ellipsoid, many seeded. Seeds tuberculate, strophiolate.

Fls. & *frits.* : July Oct.; AKS 931, Kotaki.

Found in dry sandy soil of agricultural fields.

4. TRIANTHEMA L.

Trianthemum portulacastrum L. Sp. Pl. 223. 1753; Jeffrey, Fl. Trop. E. Afr. Aizoaceae 23. 1961. *T. monogyna* L. Mant. Pl. 69. 1767; Hook. f. Fl. Brit. Ind. 2 : 660; Duthie, Fl. U. Gang. Pl. 353. Repr. ed. 1960.

A prostrate, glabrous or pubescent, much-branched herb. Leaves opposite, unequal, petiolate, 1.5 - 4.2 x 1.2 - 3.3 cm, obovate, rounded at the apex. Flowers pinkish, solitary, sessile, in pouch-like petiolar sheaths. Calyx 5-lobed, lobes ovate, acute. Stamens 10-20. Style 1. Capsules with a lower membranous portion and an upper coriaceous portion, circumsciss. Seeds reniform, dull black.

Fls. : July - Sept.; Frts. Sept. - Oct.; Vern. : Patarchata, Biskhupura; AKS 108, R.B. S. College garden; 126, Paliwal Park; 486, 487, College campus.

Abundant in moist places of cultivated fields, unused grounds and waste places.

5. ZALEYA Burm. f.

Zaleya govindia (Buch.-Ham. ex G. Don) N.C. Nair in Rec. Bot. Surv. Ind. 8 : 86. 1966. *Trianthemum govindia* Buch.-Ham. ex G. Don. Gen. Syst. 3 : 92. 1834; Melville in Kew Bull. 1952 ; 264. 1952. *T. decandra* L. Mant. 1 : 70. 1767; Roxb. Fl. Ind. 2 : 444. 1832; Hook. f. Fl. Brit. Ind. 2 : 661. 1879.

A prostrate or diffuse, much-branched herb. Leaves opposite, petiolate, 1.6 - 3.5 x 0.8 - 2 cm, elliptic-oblong, rounded at the apex, subsucculent. Flowers rosy-pink, in subsessile, few or many flowered, axillary clusters. Calyx deeply 5-lobed; lobes ovate-oblong. Petals none. Stamens 5. Styles 2. Capsules 3-4 mm long. Seeds rugose, dull-black.

Fls. : June - Sept.; Frts. : Sept. - Oct.; Vern. : Santhi; AKS 282, Fatehpur Sikri; 305, Salempur; 763, College campus.

Common in cultivated and fallow fields and in waste places.

44. APIACEAE (Umbelliferae)

1a. Leaves simple; flowers red, in simple umbellate cymes

1. *Centella*

1b. Leaves decompound; flowers pink, in compound umbels

2. *Psinnogeton*

1. CENTELLA L.

Centella asiatica (L.) Urban in Mart. Fl. Bras. 11 : 287, t. 78, f. 1. 1879 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 124. 1953. *Hydrocotyle asiatica* L. Sp. Pl. 234. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 669. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 358. Repr. ed. 1960.

A slender, creeping herb with long stolons. Leaves 1 - 3 from each node, long-petiolate, 1 - 2 x 1.4 - 3 cm, orbicular-reniform crenate. Flowers in umbellate cymes, each cyme consisting of 3 - 4 pink, sessile flowers. Bracts ovate, acute, 2 beneath each umbel. Calyx teeth 0. Petals minute, ovate, acute. Fruits ovoid, laterally compressed, indehiscent, 2 seeded. Seeds oblong, dull brown.

Fls. Feb. - Apr. ; *Frts.* : Apr. - May ; *Vern.* : *Brahmi* ; AKS 344, Fatehpur Sikri.

Common on the banks of canals and irrigation channels. The plant is considered useful as tonic for brain.

2. PSAMMOGETON Edgew.

Psammogeton canescens (DC.) Vatke, App. Ind. Sem. Hort. Berol. 3. 1876 ; Hiroe, Umbel. Asia 1 : 37. 1958 ; Kitamura, Fl. Afgh. 290. 1960 ; Babu, Herb. Fl. Dehra Dun 217. 1977. *Athmantha canescens* DC. Prodr. 4 : 155. 1830. *Psammogeton binternatum* Edgew. in Trans. Linn. Soc. Lond. 20 : 57. 1841 ; Hook. f. Fl. Brit. Ind. 2 : 719. 1879.

A small, annual, pubescent herb. Leaves 1 - 2 pinnate ; segments of the lower leaves ovate, pinnatifid into narrow lobes, of the upper ones narrowly cuneate, laciniate. Flowers pink, in compound umbels. Calyx teeth obsolete. Petals obovate, emarginate. Fruits small, lanceolate, primary and secondary ridges hairy. Seeds somewhat dorsally compressed.

Fls. : Mar. - Apr. ; *Frts.* : Apr. - May ; AKS 870, Near Jamuna bridge Power Station.

First report from the area. Rare plant, found in sandy soil of cultivated fields.

List of cultivated Taxa :

Anethum graveolens L. Sp. Pl. 263. 1753. *Picecedanum graveolens* (L.) Hiern in Oliver, Fl. Trop. Africa 3 : 19. 1871 ; Hook. f. Fl. Brit. Ind. 2 : 709. 1879 ; Duthie & Fuller, Field & Gard. Crops. 3 : 45, t. 90. 1883. *Vern.* : *Sowa*.

Coriandrum sativum L. Sp. Pl. 256. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 717. 1879 ; Duthie, & Fuller, Field & Gard. Crops. 3 : 40, t. 76. 1883. Vern. : *Dhania*.

Cuminum cyminum L. Sp. Pl. 254. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 718. 1879 ; Duthie & Fuller, Field & Gard. Crops. 3 : 40. 1883. Vern. : *Zira*.

Daucus carota L. Sp. Pl. 242. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 718. 1879 ; Duthie & Fuller, Field & Crops. 3 : 9, t. 78. 1883. Vern. : *Gajar*.

Foeniculum vulgare Mill. Gard. Dict. ed. 8.n. 1. 1768 ; Hook. f. Fl. Brit. Ind. 2 : 695. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 361. Repr. ed. 1960. Vern. : *Sonf.*

Trachyspermum ammi (L.) Sprague in Kew Bull. 1929 : 228. 1929. *Sison ammi* L. Sp. Pl. 252. 1753. *Carum copticum* Hiern in Oliver, Fl. Trop. Africa 3 : 12. 1871 ; Hook. f. Fl. Brit. Ind. 2 : 682. 1879 ; Duthie, Fl. U. Gang. Pl. 1 : 361. Repr. ed. 1960.

45. RUBIACEAE

1a. Erect or prostrate herbs :

2a. Flowers solitary, axillary and in the forks of stem, sessile or shortly pedicelled 3. *Dentella*

2b. Flowers in axillary and terminal corymbs, cymes or panicles :

3a. Flowers in axillary or terminal fascicles, heads or corymbs ; seed one in each cell 2. *Borreria*

3b. Flowers in dichotomous, axillary or terminal paniculate cymes, rarely solitary ; seeds numerous in each cell 5. *Oldenlandia*

1b. Shrubs or Trees :

4a. Shrubs ; flowers arranged in corymbose cymes 6. *Pavetta*

4b. Trees ; flowers collected in dense, globose or ovoid heads :

5a. Calyx limb 5 lobed, stigma clavate 1. *Adina*

5b. Calyx limb entire, stigma mitriform 4. *Mitragyna*

1. *ADINA* Salisb.

Adina cordifolia Hook. f. Gen. Pl. 2. 1873 ; Hook. f. Fl. Brit. Ind. 3 : 24. 1880 ; Duthie, Fl. U. Gang. Pl. 1 : 375. Repr. ed. 1960.

A large tree. Leaves opposite, petiolate, orbicular, cordate, abruptly acuminate, coriaceous. Flower heads 2 - 2.5 cm in diam., yellow, many-flowered, solitary, axillary. Coccii 2, dehiscent.

Fls. & frts. : June Oct. ; AKS 920, Sikandra.

Planted along roadsides and in the gardens.

2. *BORRERIA* G.F.W. Mey. nom. cons.

1a. Stem procumbent, hispid ; flowers pale blue or violet

1. *B. articulata*

1b. Stem erect, scabrid ; flowers white

2. *B. stricta*

1. *Borreria articulata* (L.f.). F.N. Will. in Bull. Herb. Boiss. II, 5 : 956. 1905. *Spermacoce articulata* L. I. Suppl. 119. 1781 (excl. syn. Rumph.). *Spermacoce hispida* L. Sp. Pl. 102. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 200. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 395. Repr. ed. 1960.

A procumbent herb, 15 - 35 cm long. Leaves decussate, sessile, 2 - 5.5 x 0.8 - 1.5 cm, ovate, ovate-oblong or elliptic - oblong, acute, leathery. Flowers 4 - 6 in nodal whorls, sessile or shortly stalked. Corolla pale blue or pale violet, funnel-shaped, 4-lobed, about 7 mm long. Ovary 2 - celled, cells 1 - seeded. Stigma 2 - lobed. Capsules oblong, hairy, about 4 mm long ; both carpels dehiscing ventrally. Seeds ovate, grooved ventrally, granulate, dark brown.

Fls. : Aug. Sept. ; Sept. Oct. ; Vern. : *Satgathiya* ; AKS 216, Chhalesar ; 248, Khander ; 776, Niyamatpur.

Common in sandy soil of cultivated and fallow fields and also found on the ridges.

2. *Borreria brachystema* (R. Br. ex Benth.) Valet. in Lorentz, Nova Guinea 8 : 516. 1911 ; Backer & Bakhu. f. Fl. Java 2 : 354. 1965 ; Babu, Herb. Fl. Dehra Dun 221: 1977. *Spermacoce brachystema* R. Br. ex Benth. Fl. Austr. 3 : 439. 1867. *Spermacoce stricta* L.f. Suppl. Pl. 120. 1781 ; Hook. f. Fl. Brit. Ind. 3 : 200. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 394. Repr. ed. 1960.

An erect herb, 10 - 20 cm high. Stems more or less seahrid on the angles with recurved hairs. Leaves whorled, sessile, $1.5 - 3.5 \times 0.5 - 0.9$ cm, ovate-oblong or linear, margins often recurved, acute. Stipules connate to the leaf bases into a tube, filiform-bristly. Flowers many, in dense, axillary and terminal clusters. Corolla white, funnel-shaped, 3 mm long. Ovary 2-celled, each with solitary ovule. Stigma capitate. Capsules about 3 mm long, narrowed at the base, both carpels dehiscing ventrally. Seeds polished.

Fls. : Sept. Oct. ; *Frt.s.* : Oct. Nov. ; AKS 499, Khander.

Found in gravelly soil of the ridge and in hilly tracts amongst the rock crevices.

3. DENTELLA Forst.

Dentella repens (L.) Forst. Charact. 25, t. 13. 1776; Hook. f. Fl. Brit. Ind. 3 : 42. 1880 ; Duthie, Fl. U. Gang. Pl. 1 : 378. Repr. ed. 1980. *Oldelandia repens* L. Mant. Pl. 1 : 40. 1767, (non. Burm. f.).

A prostrate, straggling herb, 10 - 30 cm long, rooting at the nodes. Leaves opposite, sessile, $3 - 8 \times 1-3$ mm, obovate, spatulate or elliptic. Stipules connate, scarious. Flowers minute, solitary, axillary in the forks of the branches. Corolla white, funnel-shaped, 7 mm long, 5-lobed, each lobe 3-toothed. Capsules globose, villous, many seeded.

Fls. : July Aug. ; *Frt.s.* : Aug. Sept. ; AKS 437, Kitham.

Found on the banks of lakes and canals.

4. MITRAGYNA Korth. nom. cons.

Mitragyna parvifolia (Roxb.) Korth. Obs. Naucl. Ind. 19. 1939 ; Duthie, Fl. U. Gang. Pl. 1 : 376. Repr. ed. 1960. *Nauclea parvifolia* Roxb. Pl. Cor. 1 : 40, t. 52. 1796. *Stephegyna parvifolia* Korth. in Verh. Nat. Ges. 161. 1840 ; Hook. f. Fl. Brit. Ind. 3 : 25. 1880.

A large or medium-sized, deciduous, sweet-scented tree. Bark grey, smooth. Leaves opposite, variable in shape and size, orbicular, oval or obovate. Flower heads 2.5 cm across, white or light yellow, many flowered, solitary, terminal or in cymes of 3. Calyx limb entire. Stigma mitriform, white. Coccii 2, dehiscent. Seeds numerous, minute, winged.

Fls. : May Aug. ; *Frt.s.* : Sept. Nov. ; Vern. : *Kadam* ; AKS 729, Paliwal Park.

Planted along roadsides and in the gardens.

S. OLDENLANDIA L.

- 1a. Corolla-tube long, pale blue 2. *O. aspera*

1b. Corolla-tube short, white :

 - 2a. Peduncles axillary, 2-3 flowered 3. *O. corymbosa*
 - 2b. Peduncles axillary and in open terminal panicled cymes 4. *O. affinis*

1. *Oldenlandia affinis* (Roem. & Schult.) DC. Prodr. 4 : 428. 1830 ; Gandhi in Sald. & Nicol. Fl. Hassan 585. 1976. *Hedyotis dichotoma* Heyne ex Roth. Nov. Pl. Sp. 93. 1821. *Oldenlandia dichotoma* Hook. f. in Fl. Brit. Ind. 3.67. 1880; Duthie, Fl. U. Gang. Pl. 1 : 381. Repr. ed. 1960.

An erect, annual, glabrous herb, 20-30 cm high. Leaves opposite or fasciculate, sessile, 1.5 - 3.5 x 0.1 - 0.3 cm, linear-lanceolate, acute. Flowers solitary on long filiform pedicels and in open, terminal panicles. Corolla white, 4-lobed. Capsule 1.5 - 2 mm in diam., globose, crown not produced.

Fls. & frts.: Aug.-Oct.; AKS 916, Salempur.

Occurs in cultivated and grazed fields.

2. *Oldenlandia aspera* DC. Prodr. 4 : 428. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 68. 1880 ; Duthie, Fl. U. Gang. Pl. 1 : 382. Repr. ed. 1960.

An erect, stout herb, 10-25 cm high. Leaves opposite or fascicled, subsessile, 1.6-3.5 x 0.1-0.4 cm, linear-lanceolate, acute. Flowers solitary or in pairs, in terminal cymes. Corolla pale blue, 4-lobed. Capsules about 2.5 mm in diam., globose somewhat didymous, crowned by 4 distant calyx-teeth. Seeds minute, angular.

Fls. : Aug., Sept.; *Frt.* : Sept., Oct.; *Vern.* : Gobi; AKS 918, Salempur.

Common in moist places of gardens, cultivated and fallow fields.

3. *Oldenlandia corymbosa* L. Sp. Pl. 119. 1753; Hook. f. Fl. Brit. Ind. 3 : 64, 1880 ; Duthie, Fl. U. Gang, Pl. 1 : 380. Repr. ed. 1960.

A prostrate or ascending herb, 5 - 20 cm long. Leaves opposite, sessile, 1.5-3.5 x 0.2-0.5 cm, linear or linear-lanceolate. Flowers pedicelled, 1-3 on axillary

peduncles. Corolla white, usually 4-lobed. Capsules glabrous, didymous, about 3 mm long. Seeds angular.

Fls. : Sept. - Nov.; *Frt.* : Nov. - Dec.; AKS 29, 917, Salempur; 263, Bichpuri campus; 670, Shahjahan garden.

Common in open waste places, cultivated fields, gardens and lawns.

6. PAVETTA L.

Pavetta indica L. Sp. Pl. 110. 1753; Hook. f. Fl. Brit. Ind. 3 : 150. 1880; Duthie, Fl. U. Gang. Pl. 1 : 390. Repr. ed. 1960.

A stout shrub, 0.6 - 1.2 m high. Leaves shortly petiolate, lanceolate, elliptic or oblong, obtuse or acute. Flowers white, fragrant, arranged in terminal corymbose cymes.

This plant is included on the authority of Munro (in Duthie, Fl. U. Gang. Pl. 1 : 390).

List of cultivated Taxa :

Anthocephalus indicus A. Rich. in Mem. Sec. Hist. Nat. Par. 5 : 238. 1834; Duthie, Fl. U. Gang. Pl. 1 : 397. Repr. ed. 1960. *A. cadamba* Miq. Fl. Ind. Bot. 2: 135. 1856; Hook. f. Fl. Brit. Ind. 3 : 23. 1880. Vern.: *Kadumb*; AKS 751, Shahjahan garden.

Gardenia latifolia Ait. Hort. Kew 1 : 294. 1789; Hook. f. Fl. Brit. Ind. 3: 116. 1880; Duthie, Fl. U. Gang. Pl. 1 : 388. Repr. ed. 1960. AKS 735, Shahjahan garden.

Hamelia patens Jacq. Enum. Pl. Carib. 16. 1760 & Select. Am. 72; Bor & Raizada 96, F. 61, Pl. 32, 33. 1954; Duthie, Fl. U. Gang. Pl. 1 : 397. Repr. ed. 1960. AKS 524, Shahjahan garden.

Ixora coccinea L. Sp. Pl. 110. 1753; Bor & Raizada 86, Pl. 28, 1954. AKS 589, R.B.S. College garden.

46. ASTERACEAE (Compositae)

1a. Florets all ligulate :

2a. Flowers blue

8. *Cichorium*

2b. Flowers yellow :

3a. Achenes columnar, truncate 20. *Lauraea*

3b. Achenes compressed; ribs smooth or rugose 25. *Sonchus*

1b. Florets all tubular or the outer only ligulate, not all florets ligulate :

4a. Flowers greyish green 24. *Soliva*

4b. Flowers not greyish green :

5a. Flowers yellow or orange-yellow:

6a. Achenes with a pair of horn-like spines 1. *Acanthospermum*

6b. Achenes without spines :

7a. Leaf margins and involucre spinose 7. *Carthamus*

7b. Leaf margins and involucre without spines :

8a. Leaves compound or deeply pinnatisect :

9a. Pappus awned :

10a. Leaves 3-foliolate or 1-2 pinnatifid ;
pappus of 2-4 spreading awns 3. *Bidens*

10b. Leaves deeply pinnatisect; pappus
of 2 spreading awns 16. *Glossocardia*

9b. Pappus not awned :

11a. Pappus cupular with fimbriate
mouth 18. *Grangea*

11b. Pappus scarce or ear shaped 11. *Cotula*

8b. Leaves simple :

12a. Receptacle elongate 26. *Spilanthes*

12b. Receptacle not elongate :

13a. Inner florets tubular,
outer florets ligulate :

14a. Ray florets whitish,
disc florets yellow 15. *Erigeron*

- 14b. Ray and disc florets yellow :
- 15a. Pappus in single row 29. *Vicia*
- 15b. Pappus double-rowed, outer scaly 22. *Pulicaria*
- 13b. All florets tubular :
- 16a. Hoary or white woolly herb 17. *Gnaphalium*
- 16b. Glabrous or pubescent herbs and shrubs :
- 17a. Heads numerous in long unilateral racemes forming a panicle 23. *Solidago*
- 17b. Heads, not as above :
- 18a. Aromatic herbs; heads solitary or fascicled or panicled; achenes angled or terete 5. *Blumea*
- 18b. Herbs not aromatic ; heads corymbose or panicled; achenes compressed 10. *Conyza*
- 5b. Flowers not yellow or orange-yellow :
- 19a. Flowers pink, rosy-pink or faintly pinkish-purple :
- 20a. Leaf margins and involucral bracts spinescent :
- 21a. Erect herbs ; spine of involucral bracts 1 mm long; pappus hairs feathery connate into a ring at base 9. *Cirsium*
- 21b. Straggling herbs ; spine of involucral bracts 5 mm long ; pappus of unequal scaberulous hairs not connate into a ring 30. *Volvarella*
- 20b. Leaf margins and involucral bracts not spinescent:
- 22a. Heads homogamous :

- 23a. Awfully smelling plant; pappus usually of 3-5 paleaceous scales 2. *Ageratum*
- 23b. Not smelling ; pappus long copious 28. *Vernonia*
- 22b. Heads heterogamous :
- 24a. Undershrubs, not aromatic ; involucral bracts broad 21. *Pluchea*
- 24b. Herbs often aromatic ; involucral bracts narrow :
- 25a. Anthers tailed 5. *Blumea*
- 25b. Anthers not tailed 19. *Laggera*
- 19b. Flowers white, creamy or pale blue :
- 26a. Heads compound :
- 27a. Heads 1-flowered, crowded in spinous globose clusters; not marshy herbs 13. *Echinops*
- 27b. Heads with two large bracts, not spinous; marshy herbs 6. *Caesulia*
- 26b. Heads simple :
- 28a. Heads 1-sexual ; involucre of female heads hard and covered with hooked bristles and terminating in two strong hooked beaks 31. *Xanthium*
- 28b. Heads 2-sexual ; involucre not as above :
- 29a. Involucral bracts spinescent ; heads subsessile 12. *Dicoma*
- 29b. Involucral bracts not spinescent ; heads short or long peduncled :
- 30a. Pappus absent or of a few minute teeth 14. *Eclipta*
- 30b. Pappus of bristles or scales :
- 31a. Pappus of 2 - 5 bristles connate at base 4. *Blainvillea*

31b. Pappus of scales :

32a. Pappus of 5 scales

2. *Ageratum*

32b. Pappus of many feathery
scales

27. *Tridax*

1. ACANTHOSPERMUM Schrank

***Acanthospermum hispidum* DC.** Prodr. 5 : 522. 1836 ; Gamble, Fl. Pres. Madras 704 (495). 1921 ; Santapau in J. Bombay Nat. Hist. Soc. 54 : 445. 1957.

An erect, hispid, pilose, herb 30-40 cm high. Leaves opposite, 2.5-8 x 1.5-4.5 cm, obovate or spatulate, acute, crenate, cuneate at base. Heads sessile, solitary at the dichotomy of branches, yellow. Invol-bracts linear, very acute, ribbed on the back, ciliolate and with scarious margins. Style arms longer in female florets. Pappus of 5 scales, aristate, dilated at the base. Achenes 2.5 mm long, sharply angled, black.

Fls. & frts : Aug. Dec. ; AKS 935, Dabar.

Found in fallow and cultivated fields.

2. AGERATUM L.

1a. Hairy herb ; leaves ovate-rhomboïd-ovate or deltoid ovate ; involucle glabrous ; corolla 1-1.5 mm long

1. *A. conyzoides*

1b. Densely hirsute herb ; leaves deltoid ; involucle hirsute ; corolla 2-3 mm long ; style branches long exserting the corolla

2. *A. houstonianum*

1. ***Ageratum conyzoides* L.** Sp. Pl. 839. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 243. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 405. Repr. ed. 1960.

An erect, smelling, annual, hairy herb, 25-60 cm high. Leaves opposite or the upper alternate, petiolate, 2.6-8 x 1.5-4.5 cm, broadly ovate, crenate. Heads pale blue or faintly pinkish-purple or white, homogamous, in dense terminal corymbs. Invol-bracts 2-3 seriate, glabrous or with few hairs along the edges. Style arms exceeding the corolla. Pappus scales 5. Achenes 2 mm long, sharply angled, black.

Fls. : Jan. Mar. ; *Frts.* : Mar. Apr. ; *Vern.* : Sarhand, Mahakana ; AKS 332, Shabjahan garden ; 668, Taj nursery.

A very common winter weed found in moist places, gardens and along the banks of canals.

2. *Ageratum houstonianum* Mill. *Dict.* (ed. 8) p. 2, 1768; Koster in Blumea 1 : 490, 1935. *A. mexicanum* Sims. *Bot. Mag.* t. 2524, 1825; Hoffm. in Pfam. 4: 137, 1894. *A. conyzoides* L. var. *mexicanum* DC. *Prodri.* 5 : 108, 1836.

A densely hirsute herb, 20 - 60 cm high. Leaves opposite, petiolate, 2 - 10 x 1.5 - 5.5 cm, deltoid (upper ones ovate), crenate-serrate. Heads discoid, homogamous, in terminal and axillary dense corymbbs. Invol-bracts biseriate, glandular, greyish - hirsute. Corolla infundibulariform, 2.5 - 3 mm long, pale blue or white. Style branches long exerting the corolla.

Fls. : Jan. - Mar. ; *Frtts.* : Mar. - Apr. ; AKS 31, Salempur ; 59, Bichpuri campus.

Common along the water channels of gardens and in moist places of cultivated fields.

3. BIDENS L.

Bidens biternata (Lour.) Merr. & Sherff. in *Bot. Gaz.* 88 : 293, 1929; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 151, 1953. *Coreopsis biternata* Lour. Fl. Cochinch. 508, 1790.

An erect annual, 30-100 cm tall. Stem quadrangular, grooved, glabrescent. Leaves opposite, petiolate, variable, 3-foliolate or 1-2 pinnaeifid ; leaflets ovate, serrate, acute, glabrous. Heads about 1 - 1.5 cm in diam., yellow, rayed, heterogamous, corymbosely panicled. Invol bracts 4 - 5 seriate, linear, ciliate. Pappus 2 - 4 awned. Achenes 6 - 20 x 1 - 2 mm, quadrangular, glabrous, ribbed, black.

Fls. : July - Nov. ; *Frtts.* : Nov. - Dec. ; *Vern.* : Chirchitta ; AKS 618, Shahjahan garden ; 788, Fatehpur Sikri ; 811, Chiknipur.

Occurs in moist places of gardens and also found on the ridge. The achenes with bristly awns easily stick to clothes.

4. BLAINVILLEA Cass.

Blainvillea acmella (L.f.) Philipson in Blumea 6 : 350, 1950. *Verbesina acmella* L. F. Suppl. 378, 1781. *Blainvillea latifolia* DC. ex Wight, Contrib. 17,

1834; Hook. f. Fl. Brit. Ind. 3 : 305. 1881. *B. rhomboidea* Cass. In Dict. Sc. Nat. 29 : 494. 1823 ; Duthie, Fl. U. Gang. Pl. 1 : 428. Repr. ed. 1960.

An erect, scabrous - hairy, dichotomously - branched herb, 30 - 100 cm high. Leaves opposite, petiolate, 4 - 9 x 0.9 - 4 cm, ovate lanceolate or ovate, acute, crenate - serrate, base cuneate. Heads 8 - 10 mm in diam., heterogamous, arranged in dichotomous terminal cymes. Invol bracts 3 - 4 seriate, ovale lanceolate. Flowers white. Ray florets ligulate, female, 1 - 2 seriate. Disk florets hermaphrodite, fertile, tubular. Pappus of 2 - 5 short scales or bristles. Achenes 5 mm long, triquetrous, nearly straight.

Fls. : Aug. Sept. ; *Frt.s.* Sept. Oct ; AKS 488, Khander ; 806, Chiknipur.

Occurs on the ridges of Khander and Chiknipur

5. BLUMEA DC. nom. cons.

1a. Heads few in axillary and terminal corymbs 1. *B. eriantha*

1b. Heads many :

2a. Heads arranged in peduncled open corymbs or panicles 3. *B. laciniata*

2b. Heads arranged in spiciform cymes or panicles :

3a. Flowers purple ; achenes hairy 4. *B. mollis*

3b. Flowers yellow : achenes glabrous 2. *B. lacera*

1. *Blumea eriantha* DC. in Wight, Contrib. 15. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 26. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 413. Repr. ed. 1960.

An erect, pubescent, dichotomously branched herb, 30 - 100 cm high. Leaves alternate, petiolate, 5.5 - 15.5 x 3 - 8 cm, obovate - ovate or oblanceolate, acute, dentate. Heads 6 - 8 mm in diam., heterogamous, discoid, on long silky peduncles of dichotomous cymes. Flowers yellow. Invol-bracts 3 - 4 seriate, subulate-linear, villous. Pappus of 8 - 10 bristles. Anther cells tailed. Achenes very minute, obtusely angled.

Fls. : Jan. Mar. ; *Frt.s.* : Mar. Apr. ; AKS 52, Bichpuri campus ; 616. Shahjahan garden.

Common in moist waste places, fallow fields and along water channels.

2. *Blumea lacera* (Burm. f.) DC. Prodr. 5 : 436. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 263. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 414. Repr. ed. 1960. *Conyza lacera* Bunn. f. Fl. Ind. 180. 1768.

An erect, leafy herb, 60–110 cm high with a strong odour of turpentine. Leaves alternate, lower petiolate, upper subsessile, 5.5–15.5 x 3–8 cm, oval or obovate, dentate, obtuse, villous. Heads 5–6 mm in diam., discoid, heterogamous, in short axillary cymes or terminal, spiciform panicles. Flowers yellow. Invol-bracts 3–4 seriate, linear, villous. Anther cells tailed. Pappus of 8–10 bristles, white. Achenes 0.25 mm long, not ribbed, glabrate.

Fls. : Nov. Apr.; *Frt.s.* : Apr. May; AKS 346, Saiyan; 570, Kiraoli.

A very common weed found on roadsides and waste places gives a strong smell of turpentine.

3. *Blumea laciniata* (Roxb.) DC. Prodr. 5 : 436. 1834; Hook. f. Fl. Brit Ind. 3 : 264. 1881; Duthie, Fl. U. Gang. Pl. 1 : 415. Repr. ed. 1960. *Conyza laciniata* Roxb. Fl. Ind. 3 : 1832.

A tall erect, pubescent herb, 60–100 cm high. Stem stout, corymbosely branched above. Leaves alternate, petiolate, 7–22.5 x 2.5–11 cm, the lower usually large; upper ones runcinate-lyrate or pinnatifid. Heads 6–8 mm in diam., heterogamous, discoid, many, in open corymbs or panicles. Flowers yellow. Invol-bracts 5–6 seriate, linear-subulate, villous. Anther cells tailed. Pappus of 8–12 bristles. Achenes ribbed, silky.

Fls. : Jan. Mar.; *Frt.s.* : Mar. Apr.; AKS 615, Shahjahan garden.

Occurs in moist places of the gardens and in waste places.

4. *Blumea mollis* (D. Don) Merr. in Philip. Jour. Sci. (Bot.) 5 : 395. 1910. *Erigeron molle* D. Don, Prodr. Fl. Nepal. 172. 1825. *Blumea wightiana* DC. in Wt. Contrib. 14. 1834; Hook. f. Fl. Brit. Ind. 3 : 261. 1881; Duthie, Fl. U. Gang. Pl. 1 : 413. Repr. ed. 1960.

A leafy, erect villous herb, 30–60 cm high. Leaves alternate, shortly petiolate, 1.8–5 x 0.7–1.5 cm, ovate, obovate or lanceolate, serrate or dentate. Heads 4–6 mm in diam., heterogamous, discoid, many, in spiciform cymes or panicles. Flowers purplish. Invol-bracts 2–3 seriate, linear-lanceolate, gland pubescent. Anther cells tailed. Pappus of 6–8 bristles. Achenes terete or angular, sparsely hairy.

Fls. : Nov. Mar.; *Frt.s.* : Mar. Apr.; AKS 574, Kiraoli; 686, Salempur.

Commonly found in cultivated and fallow fields.

6. CAESULIA Roxb.

Caesulia axillaris Roxb. Pl. Cor. 1 : 64, t. 93. 1795 ; Hook. f. Fl. Brit. Ind. 3 : 291. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 422. Repr. ed. 1960.

A glabrous, prostrate or suberect, marshy herb, 15-30 cm long. Leaves alternate, sessile, 8-17 x 0.8 - 1.6 cm, narrowly lanceolate, acuminate, distantly serrulate ; base auricled. Heads 6 - 8 mm in diam., homogamous, discoid, axillary, sessile. Bracts 2, orbicular or broadly ovate. Flowers all hermaphrodite, fertile, whitish, tubular. Anther cells tailed. Pappus of 2 ovate scales. Achenes 2 mm long, flat, one-ribbed on each side.

Fls. : Oct. Feb. ; *Frt.s.* : Feb. Mar. ; AKS 19, Salempur ; 910, Tantpur.

Found near the temporary ponds and in rice fields.

7. CARTHAMUS L.

- | | |
|---|-------------------------|
| 1a. Upper leaves very spinous ; flowers yellow | 1. <i>C. oxyantha</i> |
| 1b. Upper leaves unarmed or spinulose-toothed ;
flowers orange-red | 2. <i>C. tinctorius</i> |

1. **Carthamus oxyantha** Bieb. Fl. Taur. Cauc. 2 : 283. 1808 ; Hook. f. Fl. Brit. Ind. 3 : 386. 1881.

An erect, spiny, much branched undershrub, 30 - 70 cm high. Leaves alternate, sessile, oblong or oblong-lanceolate, margins spinose. Heads 2 - 2.5 cm in diam., homogamous, yellow. Invol-bracts many seriate, outer ones exceeding the head. Pappus 0. Achenes compressed, polished, smooth.

Fls. : Apr. May ; *Frt.s.* : May June ; *Vern.* : *Pohli* ; AKS 886, Salempur.

Very common in fields after the winter crops have been harvested.

2. **Carthamus tinctorius** L. Sp. Pl. 830. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 386. 1881.

An erect, branching, glabrous undershrub, 60 - 100 cm high. Leaves alternate, broadly lanceolate, spinescent. Heads 3 cm. in diam., homogamous, terminal, orange - red. Outer invol-bracts large, foliaceous, oblong, spinous, inner lanceolate, acute. Pappus 0. Achenes 4-angled, white, shining.

Fls. : Mar. Apr. ; *Frt.s.* : Apr. May ; *Vern.* : *Kusum* ; AKS 371, Bichpuri campus.

Cultivated as a winter season crop. The flowers are used for dyeing the clothes and the seeds yield oil.

8. CICHORIUM L.

Cichorium intybus L. Sp. Pl. 813. 1753 ; Bailey, Man. Cult. Pl. 983. 1949.

An erect or decumbent, hispid, perennial herb, 30 - 100 cm high. Latex white. Leaves 3.5 - 7 x 0.8 - 1.5 cm, oblaeulate or broad lanceolate, stem-clasping, basal leaves usually pinnately divided ; upper ones undivided or lobed. Heads 2.5 - 3 cm in diam., ligulate, heterogamous, sessile, bright blue, solitary and terminal or in axillary clusters. Invol-bracts 2-seriate, gland-hispid. Pappus of 1 - 2 seriate, erect scales. Achenes angular, glabrous.

Fls. : Jan. - Apr. : AKS 349, Saiyan ; 393, Bichpuri campus ; 666, Near Jalma.

Cultivated as fodder for the animals.

9. CIRSIUM Adans.

Chrsium arvense (L.) Scop. Fl. Carn. 2 : 126. 1772. *Serratula arvensis* L. Sp. Pl. 820. 1753. *Cnicus arvensis* Hoffm. Deutschl. Fl. 1 (2) : 130. 1804 ; Hook. f. Fl. Brit. Ind. 3 : 362. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 438. Repr. ed. 1960.

An erect herb, 45 - 100 cm high. Leaves alternate, sessile, 9 - 18 x 2.5 - 4.5 cm, oblong or obovate, sinuate or pinnatifid, margin tipped with spines, woolly beneath. Heads 1.2 - 1.6 cm in diam., homogamous, dioecious, solitary fascicled or corymbose ; female heads much longer than males. Outer invol-bracts ovate, ending in short spine, inner longer, linear-lanceolate. Flowers deep pink to pale purple. Anther bases sagittate with slender tails. Pappus copious with many-seriate feathery hairs united in a deciduous basal ring. Achenes 3 mm long, oblong compressed.

Fls. : Feb. Mar. ; Frts. : Mar. Apr. ; Vern. : Kateli ; AKS 402, Bichpuri campus.

Abundant in moist waste places, gardens and cultivated fields.

10. CONYZA Less. nom. cons.

Conyzza aegyptiaca Dryand. in Ait. Hort. Kew. 3 : 183. 1789 ; Hook. f. Fl. Brit. Ind. 3 : 258. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 409. Repr. ed. 1960.

An erect, hirsute herb, 30–60 cm high. Leaves alternate, 1.7–4.5 x 0.6–0.7 cm, obovate-lanceolate or spatulate, pinnatifidly lobed, pubescent. Heads 1 x 1 cm, yellow, heterogamous, discoid, in corymbs or panicles. Invol-bracts 3–6 seriate, linear, pubescent. Pappus pale pinkish. Achenes 8 mm long, compressed, oblong.

Fls. : Dec. – Apr.; *Frt.s.* : Apr. – May; AKS 24, Salempur; 54, Bichpuri campus; 97, Poiya ghat.

Found in fallow fields, in moist soil and along Jamuna banks.

11. COTULA L.

Cotula anthemoides L. Sp. Pl. 891, 1753; Hook. f. Fl. Brit. Ind. 3 : 316, 1881; Duthie, Fl. U. Gang. Pl. 1 : 434. Repr. ed. 1960.

A sub-erect, prostrate or diffuse herb, 10–20 cm long. Leaves alternate, pinnatisect; segments 3–10 x 1–2 mm, linear, entire, obtuse, slightly hairy. Heads 6–7 mm in diam., yellow, discoid, heterogamous, solitary peduncled. Invol-bracts 2–3 seriate, elliptic glabrous. Pappus 0. Achenes 1 mm long, of disk flowers with thick narrow wings.

Fls. : Dec. – Feb.; *Frt.s.* : Feb. – Mar.; AKS 23, 307, 627, Salempur.

Found along the irrigation channels and in moist places.

12 DICOMA Cass

Dicoma tomentosa Cass. in Bull Soc. Philom. 12, 1818; Hook. f. Fl. Brit. Ind. 3 : 387, 1881; Duthie, Fl. U. Gang. Pl. 1 : 443. Repr. ed. 1960.

An erect, much branched herb. Stems white-woolly or finally glabrous. Leaves sessile, linear or linear-obovate, obtuse or acute, densely white-tomentose. Heads white or pale yellow, homogamous, discoid, solitary, sub-axillary and terminal. Invol-bracts many seriate, linear-lanceolate, spinescent. Pappus-hairs many seriate. Achenes turbinate, truncate, densely silky.

Fls. : Dec. – Feb.; *Frt.s.* : Feb. – Mar.; AKS 876, Tantpur.

Found on the slopes of the ridge.

13. ECHINOPS L.

Echinops echinatus Roxb. Fl. Ind. 3 : 447. 1832 ; Hook. f. Fl. Brit. Ind. 3: 358. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 437. Repr. ed. 1960.

An erect, much-branched, white-woolly herb, 20–60 cm high. Leaves alternate, sessile, 5–12 x 1.5–3 cm, oblong, pinnatifid; the lobes ending in long rigid spines, cottony-woolly beneath. Heads 1-flowered, arranged in a compact, globose capitulum 2.5–3.5 cm in diam. Invol-bracts of each head surrounded by white pappus-like bristles; outer invol-bracts 6–8, oblanceolate, glabrous, one or two bracts produced into sharp spines, exceeding the compound heads. Flowers pale blue. Achenes 4 mm long, oboconic, silky, crowded with a ring of short bristles (pappus).

Fls. : Dec. Apr. ; Frts. : Apr. May ; Vern. : *Oonikateta* ; AKS 89, Dabar; 412, Poiya ghat.

Common along roadsides and in waste places.

14. ECLIPTA L. nom. cons.

Eclipta prostrata (L.) L. Mant. 286. 1771 ; Santapan, Fl. Purbandhar. 68. 1957. *Verbesina prostrata* L. Sp. Pl. 902. 1753. *Eclipta erecta* L. Mant. 286. 1771; Duthie, Fl. U. Gang. Pl. 1 : 427. Repr. ed. 1960. *E. alba* Hassk. Pl. Jav. Rar. 528. 1848 ; Hook. f. Fl. Brit. Ind. 3 : 304. 1881.

An erect, occasionally prostrate, rough annual. Leaves opposite, sessile, 1.5–6 x 0.6–1.5 cm, lanceolate or oblong-lanceolate, subentire, strigose with bulbous based hairs on both surfaces. Heads 6–9 mm in diam., white, rayed, heterogamous, solitary or 2–3 together. Pappus 0 or of 2–3 minute teeth. Achenes 2.5 mm long, oblong, winged on the margin, with warty excrescences.

Fls. & frts. : Throughout the year ; Vern. : *Kala bhangra* ; AKS 26, Salempur 62, Bichpuri campus.

Common in waste places and on roadsides, also occurs along the water channels of gardens. Leaves are useful in scorpion sting and the roots are applied externally as antiseptic to ulcers and wound in cattle.

15. ERIGERON L.

Erigeron bonariensis L. Sp. Pl. 863. 1753 ; Burt in Kew Bull. 371. 1948. *E. linifolius* Willd. Sp. Pl. 3 : 1955. 1803.

An erect, branched, hirsute herb, 30-100 cm high. Stems and branches with crowded, ascending leaves. Leaves alternate, 6-11 x 0.5-1.3 cm, linear, entire. Heads 6 x 6-8 mm, heterogamous, discoid, numerous, arranged in corymbose panicles. Invol-bracts 3-4 seriate, oblong, obtuse, shining. Ray florets whitish. Corolla of disc florets pale yellow. Pappus very slender, in double row. Achenes 1.5-2 mm long, oblong, slightly curved, hairy, brown.

Fls. : Apr. Oct.; *Frt.s.* : Oct. Nov.; *Vern.* : Phubui; AKS 30. Salenpur; 63, 401, Bichpuri campus.

Abundant in moist waste grounds and along roadsides.

16. GLOSSOCARDIA Cass.

Glossocardia bosvallea (L.f.) DC. in Wt. Contrib. 19, 1834; Gamble Fl. Pres. Madras 499, Repr. ed. 1957. *Verbesina bosvallea* L. f. Suppl. 379, 1781. *Glossocardia linearifolia* Cass. in Dict. Sc. Nat. 19 : 62, 1821; Hook. f. Fl. Brit. Ind. 3 : 308, 1881; Duthie, Fl. U. Gang. Pl. 1 : 430. Repr. ed. 1960.

A prostrate or suberect, much branched, annual herb. Leaves alternate, bipinnatisect; segments 4-10 x 1-1.5 mm, narrowly linear, apiculate. Heads 10 x 7 mm, yellow, heterogamous. Outer invol-bracts small, usually 3; inner ones larger, oblong. Pappus of 2 stiff slightly divaricate awns. Achenes 7-8 mm long, brown, narrowly oblong, much flattened, densely hairy on the edges.

Fls. Aug. Sept.; *Frt.s.* : Sept. Oct.; AKS 901, Tantpur.

Occurs in gravelly soil of hilly tracts.

17. GNAPHALIUM L.

- | | |
|---|--------------------------|
| 1a. Leaves less than 2 cm long | 3. <i>G. pubinatum</i> |
| 1b. Leaves more than 2 cm long : | |
| 2a. Heads in corymbose leafless clusters | 2. <i>G. luteo-album</i> |
| 2b. Heads in leafy spikes: | |
| 3a. Pappus hairs not coherent at the base | 1. <i>G. indicum</i> |
| 3b. Pappus hairs coherent at the base | 4. <i>G. purpureum</i> |

1. *Gnaphalium indicum* L. Sp. Pl. 852, 1753; Hook. f. Fl. Brit. Ind. 3 : 289, 1881; Duthie, Fl. U. Gang. Pl. 1 : 421. Repr. ed. 1960.

An erect or spreading, white-woolly, polymorphic herb, 10-30 cm long. Leaves alternate, 1.4 - 5.2 x 0.2 - 0.6 cm, linear-ovate or spatulate, entire, obtuse, woolly. Heads 4 mm in diam., pale brown, discoid, heterogamous, in simple or branched leafy spikes or ovoid clusters. Invol-bracts 3 - 4 seriate, linear - oblong, shining. Anther cells tailed. Pappus hairs distinctly united at the base. Achenes 5 mm long, minutely papillose.

Fls. : Jan. - Mar. ; *Frt.s.* : Mar. - Apr. ; *Vern.* : *Buchbucha*; AKS 339, Fatehpur sikri ; 622, Near Taj, bank of Jamuna.

Occurs along the banks of Jamuna and in waste places.

2. *Gnaphalium luteo-album* L.

1a. Heads golden yellow

2a. *G. luteo-album*
sub. sp. affine

1b. Heads pale brown

2b. *G. luteo-album*
var. pallidum

2a. *Gnaphalium luteo-album* L. subsp. *affine* (D. Don) Koster in Blumea 4: 484, 1941. *G. affine* D. Don, Prod. Fl. Nepal. 173, 1825. *G. luteo-album* var. *multiceps* Hook. f. in Fl. Brit. Ind. 3 : 288. 1881; Duthie, Fl. U. Gang. Pl. 1 : 421. Repr. ed. 1960.

An ascending or decumbent, white-woolly herb, 20 - 45 cm long. Leaves alternate, sessile, 2.5 - 5 x 0.5 - 1.3 cm, oblong, spatulate, entire, obtuse, woolly, upper linear, lanceolate, acute, half amplexicaul. Heads 4 mm in diam., golden yellow, discoid, heterogamous, leafless in dense corymbose, shining clusters. Invol-bracts 4 - 5 seriate, ovate - oblong, obtuse, innermost linear. Anther cells tailed. Achenes 0.25 mm long, brown, papillose. Pappus hairs shorter than the involucre.

Fls. : Jan. - Mar. ; *Frt.s.* : Mar. - Apr. ; AKS 386, Poiya ghat ; 696, Salempur.

Common along the banks of Jamuna and near drying up ponds.

2b. *Gnaphalium luteo-album* var. *pallidum* Hook. f. in Fl. Brit. Ind. 3 : 288. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 421. Repr. ed. 1960.

It differs from the above variety only with regard to the colour of heads i.e. pale brown. Leaves alternate, sessile, 1.3 - 3 x 0.2 - 0.4 cm, oblong-spatulate, entire, obtuse, woolly.

Fls. : Dec. - Mar. ; *Frt.s.* : Mar. - Apr. ; AKS 304, Salempur ; 607 Arnala; 621, Near Taj, bank of Jamuna.

Found on the banks of Utangai and Jamuna rivers and near the temporary ponds.

3. **Gnaphalium pulvinatum** Delile, Fl. Aegypte 266, t. 44, f. 1. 1812; Hook. f. Fl. Brit. Ind. 3 : 289. 1881 ; Duthie, Fl. U. Gang. Pl. I : 422. Repr. ed. 1960.

A small, spreading, woolly herb, 5 - 10 cm long. Leaves alternate, shortly petiolate, 0.7 - 2 x 0.2 - 0.4 cm, spatulate, entire, obtuse, woolly. Heads 2 - 3 mm in diam., yellow, discoid, heterogamous, immersed in wool in the axils of the crowded terminal leaves. Invol-bracts 2 - 3 seriate. Achenes 4 mm long, minutely papillose.

Fls. : Jan. Mar. ; *Frt.s.* : Mar. Apr. ; AKS 338, Fatehpur Sikri ; 693, Salempur.

Found in drying up ponds and in other damp localities.

4. **Gnaphalium purpureum** L. Sp. Pl. 854. 1753 ; Hook. f. Fl. Brit. Ind. 3: 289. 1881 ; Duthie, Fl. U. Gang. Pl. I : 421. Repr. ed. 1960.

An annual, ascending, woolly herb, 30 - 60 cm high. Leaves alternate, sessile, 2.5 - 8 x 0.8 - 1.8 cm, spatulate, entire, apex rounded, woolly. Heads 7 mm in diam., yellow, discoid, heterogamous, in spicate globose clusters. Invol-bracts 3-4 seriate, linear-oblong, shining. Anther cells tailed. Pappus hairs distinctly united at the base. Achenes 0.5 mm long, minutely papillose.

Fls. : Dec. Mar. ; *Frt.s.* : Mar. Apr. ; AKS 80, Chhalesar.

Occurs in fallow fields and unused ground

18. GRANGEA Forst.

Grangea maderaspatana (L.) Poir. Encycl. Suppl. 2 : 825. 1812 ; Hook. f. Fl. Brit. Ind. 3 : 247. 1881 ; Duthie, Fl. U. Gang. Pl. I : 407. Repr. ed. 1960. *Artemisia maderaspatana* L. Sp. Pl. 849. 1753.

A prostrate, spreading, villous herb forming circular patches, 30 - 60 cm long. Leaves alternate, 1.5 - 4.5 x 1 - 2.8 cm, sinuately pinnatifid, villous. Heads 9 x 10 mm, discoid, heterogamous, yellow, solitary or 2 - nate on short leaves opposed peduncles. Invol-bracts 5 - 6 seriate, densely hairy. Pappus cupular. Achenes 2-3 mm long, compressed.

Fls. & frts. : May Feb. ; AKS 93, Poiya ghat ; 335. Fatehpur Sikri : 571, Kiraoli.

Found on roadsides, in moist places and along Jamuna banks on sandy moist soil.

19. LAGGERA Sch-Bip.

Laggera aurita Sch. Bip. ex Cl. Comp. Ind. 92, 1876; Hook. f. Fl. Brit. Ind. 3 : 271, 1881; Duthie, Fl. U. Gang. Pl. 1 : 417, Repr. ed. 1960.

An erect, villous, branched, perennial herb, 20-60 cm high. Leaves alternate, sessile, shortly decurrent, 3-6 x 0.8-1 cm, oblong-ob lanceolate, dentate or subpinnatifid, acute, subvillous. Heads 9-11 mm in diam., discoid, heterogamous, in terminal paniculate corymbs. Flowers pink. Invol-bracts 6-7 seriate, subulate-linear, villous. Pappus of 15-20 bristles, persistent. Achenes 1 mm long, hairy.

Fls. : Jan. - Apr.; Frts. : Apr. - May; AKS 82, Dabar; 373, Roman Catholic Cemetery; 658, Rambagh.

Found in waste places and along roadsides.

20. LAUNAEA Cases

Launaea procumbens (Roxb.) Ramayya & Rajagopal in Kew Bull. 23 : 465, 1969; Babu, Herb. Fl. Dehra Dun 275, 1977. *Prenanthes procumbens* Roxb. Fl. Ind. ed. Carey 3 : 404, 1832. *Launaea nudicaulis* (L.) Hook. f. Fl. Brit. Ind. 3 : 416, 1881; Duthie, Fl. U. Gang. Pl. 1 : 450 Repr. ed. 1960.

A perennial, glabrous herb. Latex yellow. Flowering shoots simple or branched, 30-45 cm long, spreading, usually naked. Leaves sessile, 5-18 x 1.6-4.5 cm, sinuately lobed or pinnatifid; lobes sharply toothed; teeth white. Heads 1.3-1.6 cm in diam., homogamous, yellow, more or less subracemose. Invol-bracts many - seriate, with white membranous margins. Florets all ligulate. Pappus many seriate, white, all connate at the base into a deciduous ring. Achenes 3-4 mm long, columnar, ribbed, much shorter than the pappus.

Fls. & frts. : Aug. - Apr.; Vern. : Ghobi; AKS 57, Bichpuri campus; 599, Chhalesar; 704, Poiya ghat.

Very common in waste places, unused grounds and in gardens.

21. PLUCHEA Cass.

Plucheia lanceolata (DC.) Cl. Comp. Ind. 94, 1876 ; Hook. f. Fl. Brit. Ind. 3 : 272, 1881 ; Duthie, Fl. U. Gang. Pt. 1 : 418, Repr. ed. 1960. *Berthelotia lanceolata* DC. Prodri. 5 : 376, 1836.

An erect, hoary-pubescent, robust herb or undershrub, 30 - 100 cm high. Leaves alternate, sessile, 3 - 8 x 0.8 - 1.5 cm, thick, coriaceous, ascending, oblanceolate or oblong, entire, acute, slightly pubescent beneath. Heads 8 x 5 mm, purplish, discoid, heterogamous, in many headed compound corymbs. Invol-bracts 4 - 5 seriate, densely pubescent, outer tinged with purplish. Anther cells tailed. Pappus hairs distinctly cohering at the base. Achenes 0.7 mm long, minute.

Fls. : Mar. - May ; *Frt.s.* : May - June ; *Vern.* : *Hansari* ; AKS 397, Bichpuri campus.

Occurs in fallow fields and unused grounds and also on the ridge.

22. POLICARIA Gaertn.

1a. Entire plant and leaves pubescent not white-woolly ; leaf margins entire or serrulate 1. *P. angustifolia*

1b. Entire plant and leaves white-woolly beneath ; leaf margins recurved toothed and crisped 2. *P. crispa*

1. **Policaria angustifolia** DC. Prodri. 5 : 497, 1834 ; Hook. f. Fl. Brit. Ind. 3 : 299, 1881 ; Duthie, Fl. U. Gang. Pt. 1 : 425, Repr. ed. 1960.

A glaucous, diffuse or suberect herb, 10 - 25 cm long. Leaves alternate, sessile, 1 - 1.8 x 3 - 0.7 cm, linear, oblong or obovate, entire or serrulate, obtuse, villous. Heads 9 - 11 mm in diam., yellow, rayed, heterogamous. Invol-bracts one seriate, lanceolate, hairy. Ray florets ligulate, ligule 3-toothed, 8 mm long. Outer row of pappus a lacinate cup ; inner row of barbellate hairs. Achenes 1.5 mm long, ribbed, pubescent.

Fls. & *frt.s.* : Sept. - Mar. ; AKS 74, Chhalesar ; 456, near JALMA ; 676, near Jamuna bridge station.

Commonly found in sandy soil of dry v. s.

2. **Policaria crispa** Sch. Bip. in Webb & Berth. Phyt. Canar. 2 : 223, 1836-1847 ; Hook. f. Fl. Brit. Ind. 3 : 299, 1881 ; Duthie, Fl. U. Gang. Pt. 1 : 425, Repr. ed. 1960.

A stout, diffuse, white-woolly herb, 20 - 60 cm high. Leaves alternate, 1.6 - 2.7 x 0.2 - 0.6 cm, half - amplexicaul, linear - oblong or spatulate, crisped, obtuse, woolly. Heads 8 - 10 mm in diam, rayed heterogamous, yellow, solitary. Invol-bracts 3 - 4 seriate, linear, pubescent. Anther cells tailed. Outer row of pappus of short teeth ; inner of .. - 12 bristles forming a ring at the base. Achenes oblong, terete glabrous.

Fls. : Jan. - May ; *Frt.s.* : May - June ; *Vern.* : Haldwa ; AKS 76, Chhalesar; 662, Agra College garden ; 705, Poiya ghat.

Commonly found on sandy soil of Jamuna river and in waste places.

23. SOLIDAGO L.

Solidago canadensis L. Sp. Pl. 878, 1753 ; Bailey, Mau. Cult. Pl. 1005, 1949.

A woody shrub, 60 - 150 cm high. Leaves alternate, 4 - 10 x 1 - 2 cm, linear-lanceolate, 3 - nerved, scabrous-hairy. Heads 4 - 5 x 4 mm, bright yellow, in dense, unilateral, recurved, axillary racemes forming a pyramidal panicle. Invol-bracts many seriate, coriaceous. Pappus of 1 - 2 seriate hairs.

Fls. : Sept. - Nov. ; *Frt.s.* : Nov. - Dec. ; AKS 552, Shahjahan garden.

Grown as a hedge in lawns and in the gardens.

24. SOLIVA Ruiz & Pav.

Soliva anthemifolia (Juss.) R. Br. in Trans. Linn. Soc. 12 : 102, 1817 ; Bhattacharya in Bull. Bot. Surv. Ind. 5 : 375 - 376, 1963. *Gymnostylis anthemifolia* A. Juss. in Ann. Mus. Par. 4 : 262, 1804.

A diffuse, flat, annual herb. Leaves radical, petiolate, oblong to oblong-lanceolate, finely dissected into minute, linear, 1-multifid segments stimulating a decompound condition ; ultimate segments 1 - 3 x 5 - 8 mm, covered with long strigose hairs. Heads sessile, several together, greyish green, 2 - 3 mm in diam., fruiting heads much enlarged, becoming almost spherical, 1 - 1.2 cm in diam. Invol-bracts 2 - seriate, several, 2 mm long, ovate to ovate-lanceolate. Receptacle flat, without any scales, extremely villous within. Anthers obtuse at base. Achenes in mature spherical heads compactly arranged, 2.5 - 3 mm long with persistent rigid style, dark brown, lenticular, bordered by a thick transversely rugose pale brown wing. Pappus 0.

Fls. : Jan. - Feb. ; *Frt.s.* : Feb. - Apr. ; AKS 689, Salempur.

First report from the area. Found along the water channels of cultivated fields and near the drying up ponds.

25. SONCHUS L.

- 1a. Leaves with small spinous teeth ; auricles of the caulin leaves obtuse, appressed 1. *S. brachyotus*
 1b. Leaves sharply dentate or spinous-dentate ; auricles of the caulin leaves acute, spreading 2. *S. oleraceus*

1. *Sonchus brachyotus* DC. Prod. 7 : 186. 1838 ; Boulos in Bot. Notiser 114 : 61. 62. t. 2, 4. 1961. *Sonchus arvensis* L. Sp. Pl. 793. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 414. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 449. Repr. ed. 1960.

A tall perennial, 30–100 cm high. Stems hollow, angular, umbellately branched and glandular hairy above. Leaves 5–12 × 2–6 cm, lower leaves oblanceolate, runcinate pinnatifid, spinous toothed; middle and upper caudine leaves lanceolate or the upper-most linear, amplexicaul with rounded appressed auricles. Heads 2–5 cm in diam., homogeneous, umbellately corymbose. Florets all ligulate, yellow. Peduncles and invol-bracts glandular hairy. Pappus white silky. Achenes 3–4 mm long, compressed, ribbed, transversely rugose.

Fls. : Jan. Feb. ; *Frtts.* : Feb. Mar. ; *Vern.* : *Sandhi* : AKS 617, Shahjahan garden ; 639, R.B.S. College garden ; 681, Paliwal Park.

Commonly found in fields, gardens and waste places.

2. *Sonchus oleraceus* L. Sp. Pl. 794. 1753; Hook I. Fl. Brit. Ind. 3 : 414. 1881; Duthie, Fl. U. Gang. Pl. 1 : 488. Repr. ed. 1960.

An erect annual, 45–100 cm high. Stems and branches striate. Leaves 6.5–15 × 3.5–7 cm, oblong or obovate, entire or pinnatifid dentate, half-amplexicaul, with spreading acute auricles. Heads 1.5–2 cm in diam., homogamous, in umbellate cymes; pedicels often sparsely glandular-hairy. Florets all ligulate, yellow. Invol-bracts glabrous or nearly so; outer bracts shorter than the inner. Achenes 3–4 mm long, compressed, 3-ribbed on each side, muriculate.

Fls. : Dec. - Feb.; *Frtts.* : Feb. - Mar.; *Vern.* : *Pili dudhi*; AKS 32, Salempur; 347, Saian : 553, R.B.S. College garden.

Found on roadsides, in waste places and gardens.

26. SPILANTHES L.

Spilanthes paniculata Wall. ex. DC. Prodr. 5 : 625. 1836. *Spilanthes acmella* auct. plur. non (L.) Murr. 1774; sensu Clarke in Hook. f. Fl. Brit. Ind. 3 : 307. 1881; Duthie, Fl. U. Gang. Pl. 1 : 429. Repr. ed. 1960. *S. pseudo-acmella* auct. non (L.) Murray.

An erect or ascending, more or less hairy, annual herb, 20 - 45 cm high. Leaves opposite, petiolate, 2 - 3.6 x 1.1 - 2.4 cm, ovate-lanceolate, acute, irregularly crenate-serrate. Heads 1 - 1.2 cm in diam., yellow with reddish centre, homogamous; discoid, usually long-peduncled, solitary or panicled. Invol-bracts 2 - seriate, oblong-lanceolate, ciliate. Receptacle convex, elongate. Flowers all hermaphrodite, fertile, tubular, limb 5-toothed. Pappus of 2 - 3 bristles. Achenes 2.5 mm long, compressed, hairy.

Fls. : Jan. Mar.; *Frt.s.* : Mar. Apr. AKS 664, Agra College garden.

Found near moist places in the gardens.

Note : *Spilanthes paniculata* is often referred to in the floras as *S. acmella* (L.) Murray or *S. pseudo-acmella* (L.) Murray. The specific epithets "acmella" and "pseudo-acmella" are from *Verbesina acmella* L. and *V. pseudo-acmella* L., the type specimens of which are available in Hermann's Herbarium. Koster & Philipson [Blumea 6 (2) : 395 - 54, 1950] remark that a critical examination of these specimens reveals that *Verbesina pseudo-acmella* is *Eclipta prostrata* (L.) L. and *V. acmella* is *Blainvillea latifolia* (L.) DC. As such the specific epithets "acmella" or "pseudo-acmella" can not be retained under *Spilanthes*. The next available valid name is only *S. paniculata* Wall. ex. DC.

27. TRIDAX L.

Tridax procumbens L. Sp. Pl. 900. 1753; Hook. f. Fl. Brit. Ind. 3 : 311. 1881; Duthie, Fl. U. Gang. Pl. 1 : 432. Repr. ed. 1960.

A procumbent or erect, hispid herb, 30 - 60 cm high. Leaves opposite, petiolate, 2 - 5 x 1.5 - 2 cm, ovate or lanceolate, dentate or pinnatisect, acute, bulbous-based hairy, scabrous. Head 1 - 1.5 cm in diam., whitish or pale yellow, rayed, heterogamous, very long peduncled. Invol-bracts 3 - 4 seriate, elliptic-oblong, pubescent. Pappus of numerous shining, feathery bristles. Achenes 2 mm long, oblong, silky hairy, brown.

Fls. : Dec. Mar.; *Frt.s.* : Mar. Apr.; AKS 9, Dayalbagh, 38, Salempur.

Common on roadsides, in cultivated fields and waste places.

28. VERNONIA Schreb. nom. cons.

Vernonia cinerea (L.) Less. in Linnaea 4 : 291, 1829, & 6 : 673, 1831 ; Hook. f. Fl. Brit. Ind. 3 : 233, 1881 ; Duthie, Fl. U. Gang. Pl. I : 404, Repr. ed. 1960. *Conyza cinerea* L. Sp. Pl. 862, 1753.

An erect herb, 15 - 80 cm high. Leaves alternate, 1 - 5 x 0.5 - 2.2 cm, ovate-elliptic or lanceolate, subentire or slightly crenate. Heads discoid, homogamous, 6 - 7 mm in diam., corymbose, pink or lilac. Invol-bracts 4 - seriate, 3 - 5 mm long. Pappus biseriate, white. Achenes 2 mm long, terete, hairy.

Fls. : Sept. - Feb. ; *Frt.s.* : Feb. - Mar. ; *Vern.* : Phulni; AKS 56, 330, Bichpuri campus ; 85, Dabar.

A very common weed found on roadsides and in waste places ; very variable especially in size and leaves.

29. VICOA Cass.

Vicoa indica (L.) DC. in Wt. Contrib. 10, 1834 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 149, 1953. *Inula indica* L. Sp. Pl. 2, 1236; Duthie, Fl. U. Gang. Pl. I : 423, Repr. ed. 1960. *Vicoa auriculata* Cass. in Ann. Sc. Nat. (Ser. 1) 17 : 418, 1829 ; Hook. f. Fl. Brit. Ind. 3 : 297, 1881.

An erect, rigid, much-branched herb, 30 - 60 cm high. Leaves alternate, sessile, stem clasping, 2.5 - 6 x 0.7 - 1.5 cm, lanceolate or oblong-lanceolate, serrulate, acuminate, pubsecent. Heads 1.1 - 1.7 cm in diam., heterogamous, rayed, yellow, solitary in corymbose loose panicles. Invol-bracts 4 - 5 seriate, outer short subulate, inner linear, all glandular, margins membranous. Anther cells tailed. Pappus none in ray-florets, of a few hairs in disk florets.

Fls. : Oct. - Jan. ; *Frt.s.* : Jan - Mar. ; AKS 18, Salempur : 132, Chhalesar.

Occurs in fallow fields and waste grounds.

30. VOLUTARELLA Cass.

Volutarella ramosa (Roxb.) Santapau, Fl. Saur. 22, 1962. *Carduus ramosus* Roxb. Fl. Ind. 3 : 407, 1832. *Volutarella divaricata* Benth. & Hook. F. Gen. Pl. 2: 476, 1873 ; Hook. f. Fl. Brit. Ind. 3 : 383, 1881 ; Duthie, Fl. U. Gang. Pl. I : 422, Repr. ed. 1960.

A suberect or straggling, stiff, dichotomously branched annual, 30–60 cm long. Leaves alternate, sessile, 2–4.5 × 0.8–1.6 cm, obovate to oblanceolate, usually pinnatifid-lobed. Heads 1–2.2 × 0.5–1.3 cm ovoid, homogamous, spinescent at tip. Flowers purplish. Pappus of many seriate, brown, silvery bristles. Achenes 3 mm long, acutely angled, dull brown.

Fls. : Mar. June ; *Frls.* : June - July ; *Vern.* : Rissa ; AKS 207 Poiya ghat

Commonly found in the sandy soil and waste places.

31. XANTHIUM L.

Xanthium strumarium L. Sp. Pl. 987. 1753; Hook. f. Brit. Ind. 3 : 303. 1881; Duthie, Fl. U. Gang. Pl. 1 : 426. Repr. ed. 1960.

A scabrous, annual herb, 0.3–1 m high. Leaves alternate, long petiolate, 4.5–10.5 × 2.5–10 cm, triangular cordate, irregularly toothed and incised. Heads discoid, 1 sexual (monoecious), combined in axillary and terminal clusters. Bisexual heads in the upper axils, globose, many flowered; florets sterile, tubular. Male heads uppermost, globose. Invol-bracts few, short, in one series. Flowers white or green. Filaments monadelphous; anthers free, bases obtuse. Pappus none. Female heads ovoid. Involucre hard and covered with hooked bristles and terminating in two strong beaks; flowers 2. Pappus and corolla none. Style branches long, thread like, protruding from between the beaks. Achenes enclosed in the hardened invol-bracts.

Fls. & *frls.* : May Mar. ; *Vern.* : Bichhu, Bhangra ; AKS 105, Poiya ghat.

Abundant along roadsides and in moist waste places. The plant is considered useful in long-standing cases of Malaria and the root is bitter, tonic, useful in strumous diseases and cancer.

47. CAMPANULACEAE

1a. Corolla regular ; anthers free

1. *Campanula*

1b. Corolla irregular, 2-lipped ; anthers united

2. *Lobelia*

1. CAMPANULA L.

Campanula benthamii Wall. ex Kitamura, Fl. Afghan. 377. 1960; Thaker and Sabinis in J. Bomb. Nat. Hist. Soc. 69 (1) : 228. 1972. *C. canescens* Wall. ex DC. Prodr. 7 : 473. 1838 (non Roth. 1827); Hook. f. & Thoms. in J. Linn. Soc. 2: 23. 1857 ; Boiss. Fl. Or. 3 : 934. 1875 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 439. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 454. Repr. ed. 1960. *C. wallichii* C.R. Babu in J. Bomb. Nat. Hist. Soc. 65 (3) : 808. 1968.

An erect, hispid herb, 20 - 50 cm high. Leaves alternate, sessile, 2 - 5.5 x 0.3-0.8 cm, lanceolate or oblong, crenate, acute. Flowers many, in panicled clusters, dimorphic; one complete and the other imperfect smaller (without corolla or stamens). Calyx-limb deeply 5-lobed. Corolla 8 mm long, broadly campanulate, greyish purple. Stamens 5, free. Stigma 3-lobed. Capsules obovoid, 4-5 mm across. Seeds many, very minute.

Fls. : Mar. - Apr. ; Frts. : Apr. - May ; AKS 387, Poya ghat ; 656, Rambagh.

Found in sandy soil of cultivated fields and in moist places of the gardens.

2. LOBELIA L.

Lobelia heyneana Roem. & Schult. Syst. 5 : 50. 1819 (non Spreng. 1825); Moeljono & Tuyan in Fl. Males. 1, 6 : 129, t. 16 d. 1960 ; Santapau & Wagh in Bull. Bot. Surv. Ind. 5 (2) : 107. 1963. *Lobelia trialata* Buch.-Ham. in Don. Prodr. 157. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 425. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 453. Repr. ed. 1960.

An erect, glabrous herb, 20-30 cm high, often branching from the base. Leaves alternate, sessile, 3-5 x 0.6-1.6 cm, lower ones subrhomboid to broad-ovate, upwards, elliptic to linear-lanceolate, crenate or denticulate. Flowers solitary, axillary. Calyx-limb 5-partite. Corolla pale blue, 1.3 cm long, oblique, 2-lipped, upper lip 2-partite, lower 3-lobed. Stamens 5; filaments upto half way free ; two anterior anthers with an apical hair tuft. Capsules oboconical or oboconical-campanulate. Seeds semi-ellipsoid.

Fls. & frts. : Mar. - Apr. ; AKS 367. Taj Nursery.

First report from the area. Rare, found in moist shady place of the garden.

48. SPHENOCLEACEAE

SPHENOCLEA Gaertn.

Sphenoclea zeylanica Gaertn. Fruct. 1 : 113, t. 24. 1788 Hook. f. Fl. Brit. Ind. 3 : 438. 1881 ; Duthie, Fl. U. Gang. Pl. 1 : 454. Rept. ed. 1996 D.

An erect, annual herb, 0.3 - 1 m high. Stems fistular, glabrous, branched. Leaves alternate, shortly petiolate, $3.5 - 10 \times 0.8 - 2.4$ cm, lanceolate-oblong, acute. Flowers greenish-yellow in dense, $3 - 4.5$ cm long, cylindric spikes. Calyx 5-lobed, lobes triangular. Corolla 2 mm long, broadly campanulate, 5-lobed, white. Capsules 4-5 mm across, wedge-shaped, enclosed by the persistent calyx. Seeds minute, brown.

Fls. & frts. : Sept. - Oct. ; *Vern.* : *Phulanghas* : AKS 912, Tantpur.

Found in muddy soil on the bank of ponds.

49. PLUMBAGINACEAE

1a. Calyx densely clothed with stalked glands

1. *Plumbago*

1b. Calyx eglandular

2. *Vogelia*

1. PLUMBAGO L.

Plumbago zeylanica L. Sp. Pl. 151. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 480. 1882 ; Duthie, Fl. U. Gang. Pl. Rept. ed. 1960.

A suberect or straggling undershrub. Leaves alternate, shortly petiolate, ovate, entire ; petiole often aricled. Flowers in long, glandular, spike like racemes. Calyx narrow tubular, 5-ribbed, 5-toothed, densely glandular. Corolla white, salver-shaped, tube 1.5-2 cm long, lobes 5. Capsules oblong, pointed, as long as the persistent calyx.

Fls. : Oct. - Jan. ; *Frt.* : Jan. - Feb. ; *Vern.* : *Chirchitta* : AKS 231, near Shahjahan garden.

Common on the borders of cultivated and fallow fields straggling amongst *Capparis decidua* Edgew. and *Capparis sepiaria* L.

2. VOGELIA Lamk.

Vogelia indica Gibbs. ex Wight in Calc. J. Nat. Hist. 7 : 17. 1847 ; Hook. f. Fl. Brit. Ind. 3 : 481. 1882.

An erect, glaucous shrub. Stems striate, more or less scurfy. Leaves alternate, perfoliate, 1 - 5.2 x 1.7 - 4.2 cm, lower ovate, obtuse ; upper orbicular, thick, coriaceous. Flowers crowded in panicled spikes, shortly pedicelled. Calyx tubular, 8 mm long, deeply 5 fid, strongly 5 ribbed, not glandular. Corolla tube 1.5 cm long, yellow, lobes 5. Stamens 5. Style filiform, its 5 branches stigmatose throughout.

Fls. : Mar. - Apr. ; AKS 715, Agra College garden.

Grown in the gardens.

50. PRIMULACEAE

ANAGALLIS L.

Anagallis arvensis L. Sp. Pl. 148. 1753 ; Hook. f. Fl. Brit. Ind., 3 : 506. 1882; Duthie, Fl. U. Gang. Pl. 1 : 461. Repr. ed. 1960.

An erect or ascending, annual herb, 10 - 30 cm high, often branching from the base. Leaves opposite, sessile, 1 - 1.8 x 0.6 - 1.2 cm, ovate or lanceolate, cordate, entire. Flowers solitary, axillary ; pedicels longer than the leaves. Corolla bright blue, rotate, 5-lobed nearly to the base. Stamens 5, inserted at the base of the corolla, filaments hairy. Capsules globose, opening by a circular fissure round the middle, many-seeded.

Fls. : Dec. - Feb. ; Frts. : Feb. - Mar. ; Vern. : *Buchbucha, Krishnanil* ; AKS 8, Dayalbagh ; 84, Dahar; 295, Poiya ghat.

Abundant during the cold season in the cultivated fields and waste places.

51. SAPOTACEAE

1a. Calyx lobes 4 to 5 ; staminodes none

1. *Madhuca*

1b. Calyx lobes 6 to 8 ; staminodes present

2. *Mimusops*

1. MADHUCA J.F. Gmel.

Madhuca longifolia (Koen.) Mac Bride var. *latifolia* (Roxb.) Chevalier, Rev. Bot. App. 23 : 149. 1943. *Bassia latifolia* Roxb. Pl. Cor. 1 : 20, t. 19. 1795 ; Hook. f. Fl. Brit. Ind. 3 : 544. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 465. Repr. ed. 1960. *Madhuca indica* Gmel Syst. Nat. 2 : 799. 1791.

A large, deciduous tree. Bark grey or blackish. Leaves clustered at the end of branches, 10 - 16 - 6.5 - 9 cm, elliptic, obovate or broadly lanceolate, obtuse or shortly acuminate, coriaceous. Flowers sweet-scented, drooping, rusty-tomentose, in dense fascicles at the ends of the branches. Calyx-segments 4-5, divided nearly to the base. Corolla cream coloured, campanulate, fleshy. Stamens 24 - 26. Berries ovoid, greenish, fleshy.

Fls. : Mar. - Apr. ; *Vern.* : *Mahua* ; AKS 718, Paliwal Park.

Planted in gardens and along the roadsides on way to Taulpur.

2. MIMUSOPS L.

Mimusops elengi L. Sp. Pl. 349. 1753; Hook. f. Fl. Brit. Ind. 3 : 548. 1882; Duthie, Fl. U. Gang. Pl. 1 : 467. Repr. ed. 1960.

A large or moderate-sized, evergreen tree. Bark dark grey. Leaves alternate, petiolate, 5.5 - 10.5 - 2 - 4.5 cm, elliptic or oblong-ob lanceolate, shortly acuminate, coriaceous. Flowers dirty white, fragrant, solitary or clustered. Calyx segments 8, 1 cm long. Corolla 1 cm long; lobes 24 in 2 series. Stamens 8. Berries ovoid, yellow when ripe.

Fts. : May - July ; *Frt.s.* ; Dec. - Jan. ; *Vern.* : *Maulsari* ; AKS 422, Paliwal Park.

Planted along the roadsides and in the gardens.

52. EBENACEAE

DIOSPYROS L.

Diospyros montana Roxb. Pl. Cor. 1 : 37, t. 48, 1795 & Fl. Ind. 2 : 538, 1832 ; Duthie, Fl. U. Gang. Pl. 1 : 469. Repr. ed. 1960.

A large shrub or small tree. Leaves alternate, petiolate, ovate-oblong or elliptic, cordate or rounded at base, subacuminate. Male flowers in small, few flowered panicles. Corolla pale yellow, campanulate, shortly 4 lobed. Stamens 16, in opposite pairs, united at the base. Female flowers solitary, axillary. Calyx accrescent in fruit, lobes oblong, obtuse, reflexed. Fruits 2.4 - 2.7 cm in diam., globose, reddish brown.

Fls. : Apr. June; *Frt.* : July Aug.; *Vern.* : *Tendu*; AKS 721, College campus.

Grown on the waysides and in the gardens.

53. OLEACEAE

JASMINUM L.

- | | |
|---|--------------------------|
| 1a. Leaves 3-foliate | 1. <i>J. auriculatum</i> |
| 1b. Leaves simple : | |
| 2a. Flowers in many flowered, dense cymes | 2. <i>J. multiflorum</i> |
| 2b. Flowers in 3-1 flowered cymes | 3. <i>J. rigidum</i> |

1. ***Jasminum auriculatum*** Vahl, Symb. Bot. 3 : 1, 1794; Hook. f. Fl. Brit. Ind. 3 : 600, 1882.

A bushy or climbing shrub. Leaves 3-foliate, two lateral leaflets very small, often wanting; the central leaflet broadly ovate, acute. Flowers white, in many flowered lax, corymbose cymes. Calyx teeth minute, pubescent. Corolla glabrous, lobes 5-7. Fruits 5-6 mm in diam., globose, black.

Fls. : Aug. Sept.; *Frt.* : Sept. Oct.; AKS 576, Niyamapur.

Found wild on the ridge, climbing upon shrubs and trees.

2. **Jasminum multiflorum** (Burm. f.) Andr. Bot. Rep. 8, t. 496. 1807; Brink in Blumea 6 : 383. 1950. *Nyctanthes multiflora* Burm. f. Fl. Ind. 5, t. 3, f. 1. 1768. *Jasminum pubescens* Willd. Sp. Pl. 1 : 37. 1797 ; Hook. f. Fl. Brit. Ind. 3 : 592. 1882 ; Bor. & Raizada 219, f. 129, Pl. 78. 1954 ; Duthie, Fl. U. Gang. Pl. 1 : 475. Repr. ed. 1960.

A scandent shrub with velvety - pubescent branches and young parts. Leaves opposite, ovate, entire, cordate at the base. Flowers fragrant, in many - flowered umbels. Calyx teeth usually 7 - 9, linear, hairy. Corolla white, salver - shaped, tube narrow, about 1.5 - 1.7 cm long, lobes 6 - 10.

Fls. : Jan. Mar. ; Vern. : *Bela* ; AKS 352, Rambagh.

Grown in private and public gardens as ornamental plant.

3. **Jasminum rigidum** Zenker, Pl. Ind. 5, t. 1835 ; Hook. f. Fl. Brit. Ind. 3: 598. 1882.

An erect, rigid shrub. Leaves opposite, petiolate, 2.5 - 6 x 1.6 - 3.5 cm, ovate or elliptic, narrowed at the ends. Flowers in 3 - 1 flowered cymes. Calyx 3 mm long, teeth very short linear, rigid, erect. Corolla white, tube elongate longer than the lobes.

Fls. : Aug. Sept. ; AKS 773, Niyamatpur.

Occurs on the ridges in gravelly soil of the ravine tract.

54. SALVADORACEAE

SALVADORA L.

- | | |
|--|-----------------------|
| 1a. Leaves linear lanceolate ; flowers sessile ;
ripe fruits yellow | 1. <i>S. oleoides</i> |
| 1b. Leaves ovate to ovate lanceolate ; flowers pedicelled ;
ripe fruits red | 2. <i>S. persica</i> |

1. **Salvadora oleoides** Deenc. in Jacq. Voy. Bot. 140, t. 144. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 620. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 481. Repr. ed. 1960.

A large shrub or small tree. Bark grey, slightly rough. Leaves opposite, petiolate, 2.5 - 7.5 x 0.8 - 1.4 cm, linear lanceolate or ovate lanceolate, acute or subobtuse, dull green, coriaceous. Flowers greenish white, in erect, axillary

panicked spikes. Corolla campanulate, lobes 4, obovate - oblong, reflexed. Drupes globose, 4 mm in diam., yellow when ripe.

Fls. : Apr. - May ; *Frt.s.* : May - June; *Vern.* : *Pilu* ; AKS 544, Chiknipur ; 878, Tantpur.

Occurs on the ridge and hilly tracts and also found in saline soils.

2. ***Salvadora persica* L.** Sp. Pl. 122. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 619. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 481, Repr. ed. 1960.

A large, much branched, evergreen shrub or small tree. Bark dull grey or grey white. Branches numerous, drooping. Leaves opposite, petiolate, 2-5.5 × 1.2-3 cm, ovate or elliptic-lanceolate, obtuse, often mucronate, glossy, fleshy. Flowers greenish-yellow, in axillary and terminal, lax panicles. Calyx campanulate, 4-fid, glabrous. Corolla 4 mm long, campanulate, lobes 4, oblong, reflexed. Drupes globose, 3 mm in diam., fleshy, red when ripe.

Fls. : Nov. - Feb. ; *Frt.s.* : Feb. - Mar. ; *Vern.* : *Pilu* ; AKS 281, Fatehpur Sikri.

Found along the roadsides, on the ridge and also planted.

55. APOCYNACEAE

- 1a. Undershrubs; leaves in whorls of 3 ; anthers included, free from the stigma 1. *Rauvolfia*
- 1b. Small trees ; leaves opposite ; anthers exserted conniving around and adhering to the stigma 2. *Wrightia*

1. RAUVOLIA L.

***Rauvolfia serpentina* (L.) Benth. ex Kurz, For. Fl. Burma 2 : 171. 1877 ; Hook. f. Fl. Brit. Ind. 3 : 632. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 484. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 166. 1953. *Ophioxylon serpentinum* L. Sp. Pl. 1043. 1753.**

An erect, small, glabrous undershrub, 30-60 cm high. Leaves in whorls of 3, 6-13.5 × 3-6.5 cm, elliptic-lanceolate or obovate to oblanceolate, narrowed at both ends. Flowers white or pink, in terminal or lateral, peduncled, many flowered cymes. Calyx red, 5-partite. Corolla inflated near the middle, lobes 5, spreading. Drupes 6-8 mm in diam., single or didymous, dark purple.

Fls. : Mar. - Apr. ; *Frt.s.* : Apr. - May ; *Vern.* : *Chotachand* ; AKS 369, Bichpuri campus.

Rare, gradually disappearing due to biotic factor. Found in the shady places of fruits orchards. The drug prepared from root extracts which contain alkaloids, is used as a sedative and hypnotic and for reducing blood pressure.

2. WRIGHTIA R. Br.

Wrightia tinctoria R. Br. in Mem. Wern. Soc. 1 : 73. 1809 ; Hook. f. Fl. Brit. Ind. 3 : 653. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 490. Repr. ed. 1960.

A small, deciduous tree with light grey smooth bark. Leaves opposite, 5 -12 x 2.5 - 5 cm, elliptic-lanceolate or oblong-lanceolate, acuminate. Flowers white, fragrant, in lax, terminal cymes. Calyx glandular inside, margins membranous. Corolla tube twice the length of calyx ; corona of numerous linear scales. Fruits of 2 distinct pendulous, slender follicles cohering at the top only.

Fls. & *frts.* : Apr. - Dec. ; AKS 940, Jagtner.

Occurs in hilly tracts among rock crevices.

List of cultivated Taxa :

Alstonia scholaris (L.) R. Br. in Mem. Wern. Soc. 1 : 75. 1810 ; Hook. f. Fl. Brit. Ind. 3 : 542. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 486. Repr. ed. 1960. *Echites scholaris* L. Mant. 55. 1767. AKS 462, Taj Nursery ; 591, Paliwal Park.

Carissa spinarum L. Mant. 52. 1767 ; Hook. f. Fl. Brit. Ind. 3 : 640. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 483. Repr. ed. 1960. *Vern.* : *Karaunda*.

Carissa spinarum L. Mant. 559. 1771 ; Hook. f. Fl. Brit. Ind. 3 : 631. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 483. Repr. ed. 1960. *Vern.* : *Karaunda*.

Nerium indicum Mill. Gard. Dict. n. 2. 1768 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 170. 1953. *N. odoratum* Soland. in Ait. Hort. Kew. 1 : 297. 1789 ; Hook. f. Fl. Brit. Ind. 3 : 655. 1882 ; Duthie, Fl. U. Gang. Pl. 1 : 491. Repr. ed. 1960. *Vern.* : *Kamer*. AKS 720, College campus.

Plumeria rubra L. Sp. Pl. 209. 1753 ; Bailey, Man. Cult. Pl. 810. 1949. *Vern.* : *Champa*.

Tabernaemontana divaricata (L.) R. Br. in Roem. & Schult. Syst. 4 : 427. 1819 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 167. 1953. *Nerium divaricatum*

L. Sp. Pl. 209, 1753. *Tabernaemontana coronaria* Willd. Enum. Hort. Berol. 275, 1809; Hook. f. Fl. Brit. Ind. 3 : 646. 1882. Vern. : *Chandni*.

Thevetia peruviana (Pers.) Merr. in Philip. J. Sci. (Bot.) 9 : 130. 1914 & Enum. 3 : 331; Benthall, Trees Calc. 302. *Cebera peruviana* Pers. Syn. 1 : 267. 1805. *C. thevetia* L. Sp. 209, 1753. *Thevetia nerifolia* Juss. ex Steud. Nom. 2 : 680. 1841; Bor & Raiz. (93, f. 1954. Vern. : *Peelaka-ier*.

56. ASCLEPIADACEAE

- 1a. Filaments free; pollinia granular 2. *Cryptostegia*
- 1b. Filaments united into a tube; pollinia waxy :
 - 2a. Anthers without membranous appendages, incumbent on style apex 3. *Leptadenia*
 - 2b. Anthers with membranous appendages :
 - 3a. Erect plants 1. *Calotropis*
 - 3b. Twining or climbing plants :
 - 4a. Follicles covered with soft spines 7. *Pergularia*
 - 4b. Follicles not spiny :
 - 5a. Leaves linear, under 1 cm broad 5. *Oxystelma*
 - 5b. Leaves broad, 2.5–10 cm broad :
 - 6a. Corolla salver-shaped 8. *Telosma*
 - 6b. Corolla rotate :
 - 7a. Leaf base deeply cordate ; flowers in umbellate cymes ; pollinia pendulous from the corpuscle 6. *Pentatropis*
 - 7b. Leaf base rounded ; flowers many in compound cymes ; pollinia erect on the corpuscle 4. *Marsdenia*

1. CALOTROPIS R. Br.

Calotropis procera (Ait.) R. Br. in Ait. f. Hort. Kew. 2 : 78. 1811 ; Hook. f. Fl. Brit. Ind. 4 : 18. 1883; Duthie, Fl. U. Gang. Pl. 1 : 498. Repr. ed. 1960. *Asclepias procera* Ait. Hort. Kew. 1 : 305. 1789.

An erect shrub with white latex; young parts clothed with white tomentum. Leaves 7.5 - 15 x 4.5 - 11.5 cm, broadly ovate - oblong or elliptic, acute, subamplexicaule. Flowers in terminal and axillary umbellate cymes. Corolla purplish - red, pale silvery outside, campanulate, 2.2 - 2.5 cm across. Follicles recurved, smooth, turgid. Seeds flat, with a silky white coma.

Fls. : Dec. - Apr. ; *Frt.* : May - June ; *Vern.* : Ak ; AKS 869, Bypass road.

Common on the roadsides, along the railway lines and in open waste places.

2. CRYPTOSTEGIA R. Br.

Cryptostegia grandiflora R. Br. Bot. Reg. t. 435. 1819 ; Hook. f. Fl. Brit. Ind. 4 : 6. 1883.

A large evergreen, glabrous, woody climber with white latex. Leaves 5 - 9 x 3 - 4.5 cm, elliptic or oblong, glossy above, green beneath. Flowers large, showy, pale purple or rosy, in terminal, di- or trichotomous, few flowered cymes. Corolla pale purple or rosy, funnel-shaped, about 6 - 6.5 cm across. Follicles woody, 2 winged, divaricate.

Fls. : July - Dec. ; *Vern.* : Aaksan ; AKS 198, near Central Jail.

Found growing along the roadsides and in open gardens.

3. LEPTADAENIA R. Br.

Leptadaenia pyrotechnica (Forsk.) Decne. in Ann. Sc. Nat. (ser. 2) 9 : 269. 1838 ; Blatt & McC. in J. Bombay Nat. Hist. Soc. 36 : 533. 1933. *Cynanchum pyrotechnicum* Forsk. Fl. Aegypt. Arab. 53. 1775. *Leptadaenia spartium* Wt. Contrib. 48. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 64. 1833 ; Duthie, Fl. U. Gang. Pl. 1 : 511. Repr. ed. 1960.

An erect, much-branched, almost leafless shrub, 1 - 1.5 m high. Leaves few, usually on young shoots only. Flowers in lateral umbellate cymes. Calyx divided half-way down, pubescent. Corolla yellow, funnel-shaped ; corona of 5 short hair-tipped lobes. Follicles terete, smooth; beak long, slender.

Fls. & frts. : June - Oct. ; AKS 831, Poiya ghat.

Occurs in sandy or gravelly soil of open fields and hilly tracts.

4. MARSDENIA R. Br.

Marsdenia roylei Wl. & Arn. in Wight Contrib. 40. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 35. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 505. Repr. ed. 1960.

A twining shrub with milky latex ; young parts softly tomentose. Leaves 5-8.5 x 3.5-6.5 cm, ovate, deeply cordate, acute. Flowers in compact, many flowered, compound cymes, arising singly at the nodes, from a little to the side of leaf axils. Corolla greenish yellow, campanulate, about 6 mm across. Follicles solitary, about 6-7.5 cm long, deeply wrinkled.

Fls. & frts. : Mar. - July ; AKS 872, Tanipur.

Found spreading or twining upon *Acacia* sps. and other shrubs.

5. OXYSTELMA R. Br.

Oxystelma secamone (L.) K. Schum. in Engl. & Prantl, Pflanzenf. 4 (2) : 229. 1895. *Periptoca secamone* L. Mant. 216. 1771. *Oxystelma esculentum* R. Br. in Mem. Wern. Soc. 1 : 40. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 17. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 500 Repr. ed. 1960.

A glabrous, perennial, twining herb. Leaves 4-9.5 x 0.3-0.6 cm, thin, narrowly lanceolate or linear, acuminate. Flowers drooping in umbellate cymes. Corolla whitish with purple, rotate, 2-2.5 cm across. Follicles 5-6 cm long, glabrous, ovoid-lanceolate, pointed.

Fls. : July - Aug. ; *Frts.* : Aug. - Sept. ; AKS 434, Kitham ; 781, Niyamatpur.

Found in sandy soil twining on bushes and shrubs.

6. PENTATROPIS R. Br.

1a. Corolla lobes lanceolate - deltoid (not tailed)

1. *P. microphylla*

1b. Corolla lobes with long tails

2. *P. spiralis*

1. *Pentatropis microphylla* Wt. & Arn. in Wight Contrib. 52. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 19. 1883.

A slender, glabrous, twining shrub. Leaves broadly oblong or ovate - elliptic, obtuse, cordate. Flowers purplish, in lateral few flowered cymes. Follicles glabrous, tapering to a long point.

This species is included here on the authority of N.A. Rau who recorded its occurrence from Agra (Rau N.A., 17215, 23 March, 1961).

Critical note : The author examined this specimen at B.S.D. (B.S.I. Dehra Dun) and found the flowers in bud condition. It may not be possible to confirm the identity as the specimen is in bud condition. The distinction is only possible when the corolla is in full open condition.

2. *Pentatropis spiralis* (Forsk.) Decne, in Ann. Sc. Nat. (ser. 2) 9 : 328. 1838; Hook. f. Fl. Brit. Ind. 4 : 19. 1883. *Asclepias spiralis* Forsk. Fl. Aegypt. - Arab. 49. 1775. *Pentatropis cynanchoides* R. Br. in Salt, Voy. Abyss. Append. 64. 1814; Duthie, Fl. U. Gang. Pl. 1 : 501. Repr. ed. 1960.

A twining shrub. Leaves 2 - 4.5 x 1 - 2 cm, ovate lanceolate, acute, cordate at base, glabrous. Flowers pendent, in umbellate cymes arising singly at the nodes from between the petioles. Calyx 5 partite, minute. Corolla greenish yellow or pale yellow, rotate, 1.2 - 1.5 cm across; coronal scales 5, erect, compressed. Filaments connate. Follicles glabrous, lanceolate.

Fls. : July Sept. ; Frts. : Sept. Oct. ; AKS 137, Bichpuri campus.

Occurs spreading or twining upon shrubs and bushes particularly on *Capparis sepiaria* L.

7. PERGULARIA L.

Pergularia daenia (Forsk.) Chiov. Result. Sc. Miss. Stefan Paoli Somal. Ital. 1 : 115. 1916. *Asclepias daenia* Forsk. Fl. Aegypt. - Arab. 51. 1775. *Pergularia extensa* N.E. Br. in Dyer, Fl. Cap. 4 (1) : 758. 1908. *Daemia extensa* R. Br. in Mem. Wern. Soc. 1 : 50. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 20. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 501. Repr. ed. 1960.

A bad smelling, hispid, twining shrub with white milky juice. Leaves 4 - 9 x 3.5 - 6.5 cm, membranous, broadly ovate, acuminate, deeply cordate, entire. Flowers long stalked in axillary umbellate cymes. Corolla yellowish green or greenish - white, tinged with pink at base, campanulate, 1 - 1.2 cm across. Filaments

united into a tube. Follicles reflexed, parallel, lanceolate, 4 - 6.5 cm long, covered with long, soft prickles.

Fls. : July - Sept. ; *Frt.s.* : Sept. - Oct. ; *Vern.* : *Aaksan* ; AKS 115, Paliwal Park ; 129, Bichpuri campus.

Abundant in gardens and open waste places, twining on shrubs and trees, particularly on *Prosopis juliflora* DC.

8. TELOSMA Coville

Telosma pallida (Roxb.) Craib in Kew Bull. 418, 1911 ; Blatt. in J. Bombay Nat. Hist. Soc. 36 (3) : 531, 1933. *Asclepias pallida* Roxb. Fl. Ind. 2 : 48; 1933. *Pergularia pallida* Wt. & Arn. in Wt. Contrib. 42, 1834 ; Hook. f. Fl. Brit. Ind. 4 : 38, 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 508. Repr. ed. 1960.

A large twining shrub. Leaves 4 - 10 x 3 - 6.5 cm, ovate, acute, cordate, entire. Flowers in umbellate cymes, arising singly at the nodes from the side of the leaf-axils. Corolla yellowish white, salver-shaped, 1.5 - 2 cm across, tube swollen at the base ; coronal scales 5, erect, flattened, membranous. Filaments united. Follicles solitary, 7 - 10 cm long, longitudinally wrinkled.

Fls. : July - Sept. ; *Frt.s.* : Sept. - Oct. ; AKS 430, Bichpuri campus.

Occurs in the gardens and along Railway lines twining and spreading on shrubs and bushes.

57. LOGANIACEAE

BUDDLEJA L.

Buddleja asiatica Lour. Fl. Cochinch. 72, 1790 ; Bailey, Man. Cult. Pl. 804, 1949; Duthie, Fl. U. Gang. Pl. 1 : 516. Repr. ed. 1960.

A large, softly white-tomentose shrub. Leaves opposite, 6 - 18 x 1.5 - 4 cm, lanceolate, serrulate, acuminate, glabrous and dark green above, white-tomentose beneath. Flowers fragrant, in dense terminal or axillary panicled spikes. Calyx campanulate, 4 - lobed. Corolla white, tube 8 mm long, lobes 4, spreading. Stamens 4, inserted in the middle portion of corolla.

Fls. : Jan. - Apr. ; *Frt.s.* : Apr. - May ; AKS 55, Bichpuri campus.

Grown in gardens as hedges and ornamental plant and also found as an escape.

58. GENTIANACEAE

- 1a. Aquatic herbs; leaves alternate, orbicular 3. *Nymphoides*
- 1b. Terrestrial herbs ; leaves opposite, not orbicular :
 - 2a. Flowers white, in sessile, axillary clusters 2. *Enicostema*
 - 2b. Flowers usually rosy or dull white, in dichotomous cymes 1. *Centaurium*

1. CENTAURIUM Hill

Centaureum pulchellum (Sw.) Druce, Fl. Berks. 342, 1897; Robyns in Bull. Jard. Bot. Brux. 24 : 375 - 384, 1954; Taylor in Hutch. & Dalz. Fl. West Trop. Afr. ed. 2.2 : 300, 1963; Babu, Herb. Fl. Dehra Dun 312, 1977. *Gentiana pulchellum* Sw. Vet. - AK. Handl. Stockh. 86 Pl. 3. f. 8-9, 1783. *Erythraea ramosissima* Pers. Syn. Pl. 1 : 283, 1805; Hook. f. Fl. Brit. Ind. 4 : 101, 1883; Duthie, Fl. U. Gang. Pl. 1 : 520. Repr. ed. 1960.

An erect, glabrous herb, 5 - 15 cm high. Leaves opposite, sessile, 1 - 2.2 x 0.3 - 0.6 cm, lanceolate or elliptic, acute or obtuse. Flowers in bracteate axillary and terminal, dichotomous cymes forming a lax head. Calyx tubular, 5 - lid. Corolla funnel - shaped, 1.3 cm long, rosy or dull white, 5 - lobed. Stamens 5, inserted near the summit of corolla tube. Capsules 8 - 10 mm long, many seeded. Seeds ovoid, minute, reticulate, black.

Fls. : Mar. - Apr.; *Frt.* : Apr. - May; AKS 382, Poya ghat; 683, Salempur.

Occurs on moist sandy soil of Jamuna river and near the cultivated fields.

2. ENICOSTEMA Bl. nom. cons.

Enicostema hyssopifolium (Willd.) Verdoorn in Bothalia 7 : 462 - 463, 1961; Backer & Bakh. f. Fl. Java. 2 : 439, 1965. *Exacum hyssopifolium* Willd. Sp. Pl. 3 : 640, 1798. *E. verticillatum* (L.) Engl. Pflanzenw. Ost. - Afr. C. 313, 1895. *Gentiana verticillata* L. Syst. 952, 1759.

An erect or procumbent, glabrous herb, 10 - 30 cm high. Leaves decussate, sessile, 3 - 6 x 0.3 - 0.8 cm, elliptic-lanceolate to linear, obtuse or acute. Flowers sessile, in whorled clusters, usually 3 in the axil. Calyx campanulate, lobes 5. Stigmas large, bilobed. Capsules subglobose, 5 - 6 mm long.

Fls. : July - Sept. ; *Frt.* : Sept. - Oct. ; AKS 221, Chhalesar ; 436, Kitham; 605, Arnotta.

Common in dry gravelly soil of the ridge and hilly tracts.

3. NYMPHOIDES Hill

1a. Corolla lobes entire, with a longitudinal fold down the middle, white ; seeds few, large, with a slightly glochidiate tubercles

1. *N. cristatum*

1b. Corolla lobes fimbriate, not folded down the middle, white with yellow centre ; seeds many, small, smooth or minutely tubercled

2. *N. indicum*

1. *Nymphoides cristatum* (Roxb.) O. Kuntze, Rev. Gen. Pl. 429. 1891. *Menyanthes cristata* Roxb. Pl. Cot. 2 : 3, t. 105. 1799. *Limnanthemum cristatum* Griseb. Gen. & Sp. Genl. 342. 1839 ; Hook. f. Fl. Brit. Ind. 4 : 131. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 525. Repr. ed. 1960.

An aquatic, floating herb. Leaves 3 - 8 x 3.5 - 10 cm, orbicular, deeply cordate, purplish beneath. Flowers many, in clusters at the base of petiole. Calyx 7-partite, segments oblong-lanceolate, obtuse. Corolla white, 1.5 cm long, lobes within a median crest down the middle and a tuft of white hairs round the throat. Capsules broadly ovoid or subglobose, 7 mm in diam. Seeds strongly muriculate.

Fls. : Sept. - Dec. ; *Frt.* : Dec. - Jan. ; AKS 629, Salempur ; 713, Agra College garden.

Abundantly growing on the margins of water reservoirs of low lying area of Salempur.

2. *Nymphoides indicum* (L.) O. Kuntze, Rev. Gen. Pl. 429. 1891. *Menyanthes indica* L. Sp. Pl. 145. 1753. *Limnanthemum indicum* (L.) Griseb. emend. Thw. Enum. Pl. Zeyl. 205. 1860 ; Hook. f. Fl. Brit. Ind. 4 : 131. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 525. Repr. ed. 1960.

A large, aquatic, floating herb. Leaves 5-14 x 7-16 cm, orbicular, deeply cordate, margins more or less sinuate, glabrous. Flowers in clusters, appearing above the water between the basal lobes of leaves. Calyx 5-partite, lobes oblong, subacute. Corolla white, 5-lobed; lobes oblong, fimbriate, obtuse. Capsules subglobose. Seeds numerous, not mucilaginous, shining.

Fls. : Aug. Nov.; *Frt.s.* : Nov. Dec.; AKS 245, 837, Salempur.

Abundant in the water reservoirs of low lying area of Salempur.

59. HYDROPHYLACEAE

Hydrolea L.

Hydrolea zeylanica (L.) Vahl, Symb. Bot. 2 : 46. 1791; Hook. f. Fl. Brit. Ind. 4 : 144. 1883; Duthie, Fl. U. Gang. Pl. 1 : 528. Repr. ed. 1960; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 184. 1953.

An erect, annual herb, 15-30 cm high. Leaves alternate, oblong-lanceolate, narrowed at both ends, membranous. Flowers blue, in short, terminal racemes; bracts leafy. Capsules ovoid-oblong, short, enclosed in the enlarged persistent calyx.

Fls. & *frts.* : Sept. Nov.; AKS 936, Imalia.

Found in paddy fields.

60. BORAGINACEAE (including Ehretiaceae)

Ehretia L. and *Cordia* L. are treated by some botanists under a separate family Ehretiaceae but in this work these genera are included in Boraginaceae.

1a. Ovary entire or slightly 4-lobed; style terminal :

2a. Trees or shrubs :

3a. Style once forked

5. *Ehretia*

3b. Style twice forked

3. *Cordia*

2b. Herbs or undershrubs :

1. ARNEBLA Forsk.

Arnebia hispidissima (Lem.) DC. Prodr. 10 : 94, 1846 ; Hook. f. Fl. Brit. Ind. 4 : 176, 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 541, Repr. ed. 1960. *Lithospermum hispidissimum* Lehm. Icon. Nov. Stirp. t. 39, 1821.

A diffuse or prostrate, very hispid herb branching from a woody base. Leaves alternate, sessile, 2 - 5 x 0.3 - 0.6 cm, lanceolate, to linear-lanceolate, obtuse. Flowers in dense, secund, hirsute spikes. Calyx 5-partite, very hispid. Corolla yellow or yellowish-white, 6 mm long, pubescent outside. Nutlets ovoid-conic, acute, tuberculate. The plants are dimorphic with long and short styled flowers.

Fls. : Dec. - Apr.; *Frts.* : Apr. - May; *Vern.* : Ratanjot; AKS 17, Poiya ghat; 87, Dahat.

Common in dry sandy soil of cultivated and fallow fields and also in hilly tracts.

2. COLVENIA L.

Coldenia procumbens L. Sp. Pl. 125. 1753; Hook. f. Fl. Brit. Ind. 4 : 144. 1883; Duthie, Fl. U. Gang. Pl. 1 : 532. Repr. ed. 1960; Santapani in Rec. Bot. Surv. Ind. 16 (1) : 185. 1953.

A procumbent herb, usually lying flat on the ground. Young parts clothed with white, silky hairs. Leaves shortly petiolate, $1.8 - 4 \times 0.8 - 1.6$ cm, crisped, obovate-oblong, coarsely serrate or subpinnatifid, scabrous, hairy. Flowers small, solitary, axillary. Calyx 4-partite, very hairy. Corolla white, 3 mm long. Styles 2. Fruits pyramidal of 4 nutlets.

Fls. & frts. : Apr. June ; AKS 873, Tantpur.

Found in the hilly tracts, near the ponds and moist places.

3. CORDIA L.

Cordia dichotoma Forst. f. *Prodr.* 18, 1786 ; Santapani in Rec. Bot. Surv. Ind. 16 (1) : 185, 1953. *C. obliqua* Willd. Phytogr. 4, t. 4, 1794 ; Hook. f. Fl. Brit. Ind. 4 : 137, 1883.

A small or medium-sized, deciduous tree. Bark grey, brown or shining whitish. Leaves alternate, $8 - 12 \times 4 - 8$ cm, broad ovate, elliptic to suborbicular, leathery. Flowers white, in lax, terminal and axillary cymes. Calyx accrescent. Style twice forked. Drupes ovoid, cream coloured, apiculate, 10–15 mm in diam., supported by an indurate, saucer-shaped calyx.

Fls. : Feb. - Apr. ; *Frts.* : May - June ; *Vern.* : *Lisaura* ; AKS 407, Shahjahan garden.

Planted in the gardens and private places for its edible fruits.

4. CYNOGLOSSUM L.

Cynoglossum lanceolatum Forsk. Fl. Aegypt. - Arab. 41, 1775 (non Heyne); Hook. f. Fl. Brit. Ind. 4 : 156, 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 540. Repr. ed. 1960.

An erect, hispid herb, 30–100 cm high. Radical and basal caudine leaves stalked, upper leaves alternate, sessile, $4.5 - 10 \times 1 - 2.5$ cm, lanceolate, rough with bulbous based hairs. Flowers in long, 1-sided racemes which elongate in fruit. Calyx deeply 5-lobed, persistent. Corolla bluish purple, about 2–2.5 mm across; lobes 5, spreading. Nutlets 4, shortly ovate, densely glochidiate.

Fls. : July Aug. ; *Frts.* : Aug. Sept. ; AKS 758, Shahjahan garden.

Occurs in moist shady places of the gardens.

5. EURETIA L.

Ehretia laevis Roxb. Pl. Cor. 1 : 42, t. 56. 1796 ; Hook. f. Fl. Brit. Ind. 4: 141. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 531. Repr. ed. 1960.

A small, deciduous tree. Bark greyish, smooth. Leaves petiolate, green above, paler beneath. Flowers in much-branched corymbose axillary and terminal cymes composed of unilateral spikes. Calyx 5-partite, 1-2 mm long. Corolla white, rotate, 4-5 mm long, lobes 5, spreading. Style once forked. Drupes orange at first, becoming black and wrinkled when ripe, 5-6 mm in diam., breaking up at maturity into 4, single-seeded pyrenes.

Fls. : Jan. - Apr. ; *Frt.s.* : Apr. - June ; *Vern.* : *Papri* ; AKS 660, Paliwal Park.

Planted in the gardens, along roadsides and also found on the ridge.

6. HELIOTROPIUM L.

- | | |
|--|---------------------------|
| 1a. Calyx enclosing the fruit | 6. <i>H. supinum</i> |
| 1b. Calyx not enclosing the fruit : | |
| 2a. Leaves upto 20 cm long ; fruit 4-beaked, separating into two, 2-seeded pyrenes | 3. <i>H. indicum</i> |
| 2b. Leaves not exceeding 10 cm long ; fruits not beaked, separating into 2-4 nutlets : | |
| 3a. Corolla lobes caudate-acuminate | 5. <i>H. subulatum</i> |
| 3b. Corolla lobes not caudate-acuminate : | |
| 4a. An erect herb, branching from a woody base; leaves broader, elliptic to obovate | 2. <i>H. eichwaldii</i> |
| 4b. A prostrate or procumbent herb ; leaves linear or linear-lanceolate : | |
| 5a. Leaves small, linear, strigose hairy | 4. <i>H. strigosa</i> |
| 5b. Leaves linear-lanceolate, fleshy, glabrous | 1. <i>H. curassavicum</i> |

1. ***Heliotropium curassavicum* L.** Sp. Pl. 130. 1753 ; Gamble, Fl. Pres. Madras 2 : 630. Repr. ed. 1956 ; Raizada & Sharma in Ind. For. 88 (5) : 356 - 369. 1962.

A diffuse, branched, glabrous, more or less glaucous, fleshy, annual herb. Leaves shortly petiolate, $2 - 4 \times 0.3 - 0.6$ cm, linear-lanceolate, obtuse, inconspicuously veined. Flowers ebracteate, in dense flowered, usually paired spikes. Calyx 2 mm long, deeply 5 lobed. Corolla white, 2-3 mm long, lobes 5, oblong. Stamens 5, inserted on the corolla tube. Style very short; stigma large, umbrella shaped, apex not produced. Fruits globbose, not longer than the calyx; nutlets 4, glabrous.

Fls. : Aug. Nov.; *Frtts.* : Nov. Dec.; AKS 279, Kiraoli.

First report from the area, found in saline soil of unused grounds, in association of *Suaeda fruticosa* Forsk.

2. **Heliotropium eichwaldii** Steud. ex DC. Prodr. 9 : 535. 1845; Hook. f. Fl. Brit. Ind. 4 : 149. 1883; Duthie, Fl. U. Gang. Pl. 1 : 536. Repr. ed. 1960.

An erect, woolly-tomentose herb, branching from woody base. Leaves petiolate, $3 - 9 \times 1.5 - 4$ cm, elliptic-oblong or obovate, obtuse. Flowers paired, in ebracteate spikes which are short and helicoid at the apex when young. Calyx 5-partite, densely hairy. Corolla white, tube narrowly cylindric, hairy outside. Nutlets 4, ellipsoid, round at both ends, minutely verrucose.

Fls. : Dec. - Apr.; *Frtts.* : Apr. - May; *Vern.* : Kadhera; AKS 35, Salempur; 70, Chhalesar; 103, Poiya ghat.

Common in sandy soil of waste places, cultivated and on fallow fields.

3. **Heliotropium indicum** L. Sp. Pl. 130. 1753; Hook. f. Fl. Brit. Ind. 4 : 152. 1883; Duthie, Fl. U. Gang. Pl. 1 : 534. Repr. ed. 1960.

An erect, stout, hispid, annual herb, 30-75 cm high. Leaves petiolate, $7 - 20 \times 2.5 - 6$ cm, ovate or ovate-oblong, acute. Flowers paired, sessile, in simple or forked, ebracteate, extra-axillary spikes. Calyx 3 mm long, 5-partite. Corolla pale-violet, funnel-shaped, 5 mm long, tube cylindric, lobes small. Fruits deeply 2-lobed, each lobe containing 2, angular, beaked nutlets.

Fls. & frts. : Apr. Sept.; AKS 417, Shahjahan garden.

Occurs in moist shady places of the gardens and waste places.

4. **Heliotropium strigosum** Willd. Sp. Pl. 1 : 743. 1793; Hook. f. Fl. Brit. Ind. 4 : 151. 1883; Duthie, Fl. U. Gang. Pl. 1 : 537. Repr. ed. 1960.

A prostrate or procumbent, much-branched, strigose, perennial herb. Leaves alternate, nearly sessile, $0.7 - 1.8 \times 0.1 - 0.2$ cm, linear, acute. Flowers in terminal

spikes. Calyx 5 - lobed, accrescent. Corolla white, salver-shaped, 2 - 2.5 mm across. Fruits globose, of 4 nutlets.

Fls. : May - Sept. ; *Frt.s.* : Sept. - Oct. ; AKS 104, Peiya ghat.

Common in sandy soil of the fields and also on the ridge.

5. ***Heliotropium subulatum*** Hochst. ex DC. Prodr. 9 : 528. 1845 ; Duthie, Fl. U. Gang. Pl. I : 535. Repr. ed. 1960. *H. zeylanicum* Clarke in Hook. f. Fl. Brit. Ind. 4 : 148. 1883 (non Lamk.)

A woody, hispid herb or undershrub. Leaves sessile or nearly so, narrowly lanceolate. Flowers greenish-yellow, in elongated, 1 to 2 - ranked spikes. Corolla lobes caudate-acuminate, spreading. Nutlets 4, tuberculate on the back.

This plant is included on the authority of Mudro (in Duthie, Fl. U. Gang. Pl. I : 535).

6. ***Heliotropium supinum*** L. Sp. Pl. 130. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 149. 1883 ; Duthie, Fl. U. Gang. Pl. I : 535. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 186. 1953.

A prostrate, softly villous herb. Leaves alternate, petiolate, 1 - 2.5 x 0.7 - 1.5 cm, elliptic or ovate, obtuse, plicate. Flowers sessile, in simple or forked short spikes. Calyx persistent, hairy. Corolla white, 4 - 5 mm long, tube exceeding the calyx, lobes 5, small. Fruits ovate to subglobose, enclosed by the persistent calyx, nutlets 2.

Fls. : Aug. - Oct. ; *Frt.s.* : Oct. - Nov. ; AKS 554, Fatehpur Sikri ; 568, Kiraoli.

Occurs in dry sandy soil near the cultivated fields and on waysides in association of *Chrozophora prostrata* Dalz.

7 *NONEA* Medik.

Nonea pulla (L.) Lamk. ex DC. Fl. Fr. 3 : 626. 1815 ; Hook. f. Fl. Brit. Ind. 4 : 169. 1883 ; Rizada in Ind. For. 76 : 489 - 497. 1950. *Lycopsis pulla* L. Syst. ed. 10. 916. 1758.

An erect, hispid, annual herb, 10 - 30 cm high. Leaves alternate, petiolate, 5 - 11 x 0.7 - 1.3 cm, oblong, obtuse, upper ones subamplexicaul. Flowers white, in dense elongated racemes. Calyx 5 - parted, lobes acuminate. Corolla tube straight, about as long as the calyx, lobes 5, half spreading. Nutlets 4, ovoid, slightly wrinkled.

Fls. & frts. : Feb. Mar. ; AKS 632, Poiya ghat.

First report from the area. Rare, found in sandy soil on the edges of cultivated fields.

8. TRICHODESMA R. Br. nom. cons.

Trichodesma amplexicaule Roth, Nov. Pl. Sp. 104, 1821 ; Hook. f. Fl. Brit. Ind. 4 : 153, 1883 ; Santapau in Rec. Bot. Surv. Ind. 16 (ed. 2) : 147, 1960. *T. indicum* L. var. *amplexicaule* Cooke, Fl. Press. BOMB. 2 : 282. Repr. ed. 1958.

An erect or diffuse, hispid, annual herb with bulbous based, stiff hairs. Leaves sessile, 3-6.5 x 1-2.5 cm, ovate, elliptic or lanceolate, obtuse, cordate or semiamplexicaul. Flowers solitary, in leaf opposed or extra axillary, leafy racemes. Calyx deeply 5-lobed, lobes accrescent in fruit. Corolla blue or violet, funnel-shaped, 1.2.-1.5 cm across. Stamens 5; anthers connivent in a cone. Nutlets smooth, polished on the back.

Fls. : Aug. Sept. ; *Frts.* : Sept. Oct. ; AKS 144, Bichpuri campus ; 809, Chknipat.

Occurs on the slopes of the ridge and in open fields.

61. CONVOLVULACEAE

1a. Parasitic, leafless twining herb 5. *Cuscuta*

1b. Non parasitic, leafy, climbing or erect plants. :

2a. Styles 2 :

3a. Flowers white, solitary or passing into terminal clusters in upper axils ; styles 2

3. *Cressa*

3b. Flowers blue, solitary or in few flowered cymes ; styles 2, each 2-fid

5. *Evolvulus*

2b. Style 1 :

4a. Fruits indehiscent :

5a. Young branches and leaf beneath silky hairy ; flowers white, salverform

8. *Rivina*

5b. Stem and leaf beneath white-tomentose ; Flowers pink or purple, funnel-form	1. <i>Argyreia</i>
4b. Fruits dehiscent :	
6a. Stigma with elongate lobes	2. <i>Convolvulus</i>
6b. Stigma globose :	
7a. Pollen grains spinulose	6. <i>Ipomoea</i>
7b. Pollen grains not spinulose, usually with longitudinal folds	7. <i>Messersia</i>

1. ARGYREIA Lour.

Argyreia nervosa (Burm. f.) Boj. Hort. Maurit. 224, 1837; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 194, 1953. *Convolvulus nervosus* Burm. f. Fl. Ind. 48, t. 20, 1786. *Argyreia speciosa* Sweet, Hort. Brit. 289, 1827; Hook. f. Fl. Brit. Ind. 4 : 185, 1883; Duthie, Fl. U. Gang. Pl. 1 : 561, Repr. ed. 1960.

A large climber, stems stout, white - tomentose. Leaves ovate, cordate, acute, glabrous above, densely white-tomentose beneath. Flowers arranged in subcapitate cymes. Bracts large, foliaceous ovate, acute. Sepals ovate, elliptic, silky hairy. Corolla rosy-purple, 5 - 6.5 cm long, tubular-funnel shaped, the bands silky-pubescent outside. Fruits globose, apiculate.

Fls. : Aug. - Oct. ; Vern. : *Ghiabel* ; AKS 505, Khander.

Grown in the gardens, lawns, bungalows and also found along the roadsides.

2. CONVOLVULUS L.

1a. Trailing or twining herbs ; leaves auriculate or hastate at base

1. *C. arvensis*

1b. Prostrate or sub-erect herbs ; leaves not auriculate

2. *C. microphyllus*

1. *Convolvulus arvensis* L. Sp. Pl. 153, 1753; Hook. f. Fl. Brit. Ind. 4 : 219, 1883; Duthie, Fl. U. Gang. Pl. 1 : 548, Repr. ed. 1960; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 190, 1953.

A creeping or twining glabrous herb. Leaves petiolate, 3 - 6 x 1 - 1.5 cm, ovate to oblong-lanceolate, mostly auriculate or hastate at the base. Flowers

solitary, axillary on long peduncles. Corolla pink or white, funnel-shaped, 1.5-2 cm long. Capsules globose, glabrous.

Fls. & frts. : Aug. - Jan. ; *Vern.* ; *Hirankhuri* ; AKS 53, 321, Bichpuri campus.

Abundant in cultivated fields and also occurs in open grounds.

2. *Convolvulus microphyllus* Sieb. ex. Spreng. Syst. 1 : 611. 1824 ; Hook. f. Fl. Brit. Ind. 4 : 218. 1883 ; Heine in Kew Bull. 16 : 205. 1962. *Convolvulus pluricaulis* Choisy, Convol. Or. 95. 1833 ; Hook. f. Fl. Brit. Ind. 4 : 218. 1883 ; Duthie, Fl. U. Gang. Pl. : 547. Repr. ed. 1960.

A suberect or prostrate, hairy, perennial herb. Leaves petiolate, 3.5-7 x 0.5-1.5 cm, lanceolate-linear, acute, hairy. Flowers solitary or paired. Bracts linear. Sepals subequal, lanceolate to ovate. Corolla white or light pinkish, shortly funnel-shaped, 1-1.2 cm long. Capsules oblong-globose, pale brown. Seeds brown, minutely puberulous.

Fls. & frts. : Mar. - Nov. ; AKS 262, Bichpuri campus.

Common in open dry grounds, cultivated and fallow fields.

3. CRESSA L.

Cressa cretica L. Sp. Pl. 223. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 225. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 546. Repr. ed. 1960.

A small, erect, branched, annual herb. Leaves crowded, lower cordate, upper smaller ovate or lanceolate, densely hairy. Flowers white, in small clusters in the axils of upper leaves. Corolla lobes reflexed. Capsules ovoid, pointed.

This plant is included on the authority of Duthie (in Duthie, Fl. U. Gang. Pl. 1 : 546).

4. CUSCUTA L.

Cuscuta reflexa Roxb. Pl. Cor. 2 : 3, t. 104. 1799 & Fl. Ind. 1 : 446. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 225. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 543. Repr. ed. 1960.

A parasitic herb with pale green stem. Leafless. Flowers solitary, clustered or in racemes. Calyx deeply divided, lobes 5, ovate, obtuse. Corolla pale white, campanulate-tubular, 7-8 mm long, lobes reflexed. Style one, very short ; stigmas diverging. Capsules depressed-globose, circumscissile near the base.

Fls. : Oct. Mar. ; *Vern.* : *Amarbel* ; AKS 37, Salempur.

Common on shrubs, bushes and trees.

5. EVOLVULUS L.

1a. Leaves lanceolate or oblong-lanceolate, never cordate at the base

1. *E. alsinoides*

1b. Leaves orbicular or suborbicular, cordate at the base

2. *E. nummularius*

1. *Evolvulus alsinoides* (L.) Sp. Pl. 392, 1762 ; Hook. f. Fl. Brit. Ind. 4 : 220, 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 546. Repr. ed. 1960 ; Santapani in Rec. Bot. Surv. Ind. 16 (1) : 190, 1953. *Convolvulus alsinoides* L. Sp. Pl. 157, 1753.

A much-branched, perennial, densely hairy herb, prostrate or ascending. Leaves distichous, sessile or shortly petiolate, 10–15 × 4–8 mm, lanceolate or oblong-lanceolate, obtuse, clothed with appressed pubescence. Peduncles 1–3 flowered. Sepals 5 mm long, lanceolate, acute, silky hairy. Corolla light blue or blue, rotate, 6–7 mm in diam. Styles 2, each bifid. Capsules 4 seeded. Seeds irregular, glabrous, very dark brown.

Fls. : Aug. Oct. ; *Frt.* : Oct. Nov. ; AKS 238, Kitham.

Common in moist or dry open fields and in gravelly soil of the ridges.

2. *Evolvulus nummularius* (L.) Sp. Pl. (ed. 2) 391, 1762 : Raizada in J. Ind. Bot. Soc. 15 : 161, 1936. *Convolvulus nummularius* L. Sp. Pl. 157, 1753.

A small prostrate, branched perennial herb ; branches rooting at the nodes. Leaves alternate, shortly petiolate, 1–2 × 0.8–1.5 cm, orbicular or suborbicular, cordate. Peduncles 1-flowered, 1-few in the leaf axils, much shorter than the leaves. Sepals 5 mm long, oblong-lanceolate, hairy on the margins. Corolla white, funnel-shaped, about 8 mm across. Styles 2, each bifid. Capsules globose-ovoid, 3–4 mm long.

Fls. : Aug. Oct. ; *Frt.* : Oct. Nov. ; AKS 125, Paliwal Park.

Common in grassy fields, gardens and along waysides.

6. IPOMOEA L.

1a. Aquatic, floating plants

1. *I. aquatica*

1b. Terrestrial plants :

- | | |
|---|----------------------------|
| 2a. Large straggling or diffuse shrubs | 6. <i>I. fistulosa</i> |
| 2b. Herbaceous or woody twiners or climbers : | |
| 3a. Leaves entire : | |
| 4a. Flowers red | 7. <i>I. hederifolia</i> |
| 4b. Flowers white or pink : | |
| 5a. Outer sepals sagitate or cordate at the base | 13. <i>I. sinensis</i> |
| 5b. Outer sepals not cordate at the base: | |
| 6a. Flowers in sessile or nearly sessile heads : | |
| 7a. Flowers pink ; capsules hairy | 5. <i>I. eriocarpa</i> |
| 7b. Flowers white ; capsules glabrous | 12. <i>I. sindica</i> |
| 6b. Flowers in peduncled cymes
or panicles; capsules glabrous
or hairy towards the apex : | |
| 8a. Leaves silvery white-woolly beneath | 4. <i>I. dichotoma</i> |
| 8b. Leaves not white-woolly beneath | 9. <i>I. obscura</i> |
| 3b. Leaves lobed : | |
| 9a. Prostrate herbs ; sepals muriculate on the back | 3. <i>I. coptica</i> |
| 9b. Twining herbs ; sepals not as above : | |
| 10a. Leaves palmately 3-lobed | 8. <i>I. nil</i> |
| 10b. Leaves 3 - 9 lobed : | |
| 11a. Flowers in dense, long-peduncled
heads, surrounded by large bracts | 10. <i>I. pes-tigridis</i> |
| 11b. Flowers in lax, 1 to few -flowered cymes ;
not surrounded by large bracts | 2. <i>I. carica</i> |

1. *Ipomoea aquatica* Forsk. Fl. Aegypt. - Arab. 44. 1775 ; Hook. f. Fl. Brit. Ind. 4 : 210. 1883. *I. reptans* Poir. in Lamk. Encycl. Meth. Suppl. 3 : 460. 1814 ; Duthie, Fl. U. Gang. Pl. 1 : 555. Repr. ed. 1960. *Convolvulus reptans* Vahl, Symb. Bot. 1 : 17. 1790 (*non* L.).

An aquatic herb with trailing stems, rooting at nodes. Leaves petiolate, 3 - 8 x 1.5 - 5 cm, elliptic or ovate-oblong, acute, cordate or hastate at the base. Flowers on 1 to 5-flowered peduncles. Bracts small, linear. Sepals subequal, oblong, lanceolate, glabrous. Corolla pale rosy, funnel-shaped, 4.5 cm long. Capsules ovoid, glabrous.

Fls. & frts. : Sept. Dec. ; *Vern.* : *Sarnali, Nari* ; AKS 243, Kitham.

Common floating in water or in muddy soil on the bank of lake, ponds and canals.

2. *Ipomoea carnea* (L.) Sweet, Hort. Brit. 287. 1827 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 193. 1953. *Convolvulus cairicus* L. Syst. 922. 1759. *Ipomoea palmata* Forsk. Fl. Aegypt. - Arab. 43. 1775 ; Hook. f. Fl. Brit. Ind. 4 : 214. 1883 ; Bor & Raizada 6, f. 4, Pl. 1, 2. 1954.

A large, perennial, glabrous climber. Leaves palmately cut to the base into 3-lanceolate or elliptic segments, the basal pair of segments usually again lobed or parted. Flowers usually 1 - 3 on axillary peduncles. Corolla pale purple, campanulate, 3.5 - 5 cm long.

Fls. : July Oct. ; AKS 237, Bichpuri campus.

Grown as ornamental climber in gardens, lawns and houses.

3. *Ipomoea coptica* (L.) Roth, apud Roem. & Schult. Syst. 4 : 208. 1819. *Convolvulus copticus* L. Mant. 559. 1771. *Ipomoea dissecta* Willd. Phytopl. 5, t. 2, f. 3. 1794 ; Hook. f. Fl. Brit. Ind. 4 : 200. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 556. Repr. ed. 1960.

A prostrate, branched, glabrous herb. Leaves digitate ; lobes 3 - 7, narrow-lanceolate, irregularly serrate. Flowers solitary on long peduncle. Sepals 4 mm long, oblong-lanceolate, muriculate on the back. Corolla white, 1.2 cm long, funnel-shaped. Capsules subglobose, 5 - 6 mm in diam., with persistent calyx.

Fls. & frts. : Sept. Oct. ; AKS 900, Tantpur.

Common in moist, shady places, along roadsides and in unused grounds.

4. *Ipomoea dichotoma* (R. & S.) Choisy in DC. Prodr. 9 : 364. 1845. *Convolvulus dichotomus* R. & S. Syst. Veg. 4 : 263. 1819. *Ipomoea pilosa* Sweet, Hort. Brit. 289.

1827; Hook. f. Fl. Brit. Ind. 4 : 213. 1883; Duthie, Fl. U. Gang. Pl. 1 : 555. Repr. ed. 1960.

A twining annual. Stems clothed with gland-based hairs. Leaves petiolate, 3-7.8 x 2.8-7 cm, broad ovate, cordate, acuminate, silvery white-woolly beneath. Flowers in lax, bracteate cymes. Bracts lanceolate, acute, hairy. Sepals 1.4 cm long, lanceolate, acuminate, densely hairy. Corolla pink or rosy, narrowly funnel-shaped, 2 cm long. Capsules 10 x 8-10 mm, subglobose, hairy towards the apex. Seeds velvety-pubescent.

Fls. : Aug. - Sept. ; *Frt.s.* : Sept. - Oct. ; AKS 536, 805, Chiknipur.

Found on the ridge twining on shrubs and bushes.

5. *Ipomoea eriocarpa* R. Br. Prodr. 484. 1810; Hook. f. Fl. Brit. Ind. 4 : 204. 1883. *I. hispida* (Vahl) Roem. & Schult. Syst. Veg. 4 : 238. 1819; (non Zucc. 1809); Duthie, Fl. U. Gang. Pl. 1 : 554. Repr. ed. 1960. *Convolvulus hispidus* Vahl, Symb. Bot. 3 : 29. 1794.

A twining annual, clothed with appressed or spreading hairs. Leaves petiolate, 2-7.5 x 1.5-7 cm, broad ovate to triangular hastate, acute, hairy, base cordate with rounded lobes. Flowers sessile or subsessile, in axillary heads. Bracts linear or lanceolate, pilose. Sepals 7 mm long, linear-acuminate from an ovate base, pilose. Corolla pink, funnel-shaped, 8-9 mm long. Capsules hairy, 5-7 x 5-7 mm, globose, 4-seeded; immature ones purplish.

Fls. : Aug. - Sept. ; *Frt.s.* : Sept. - Oct. ; *Vern.* : Ghimbato ; AKS 511, Bichpuri campus ; 814, Chikuipur.

Common spreading or twining on *Capparis decidua* Edgew. and other bushes along the Railway lines, waysides and on the ridge.

6. *Ipomoea fistulosa* Mart. ex Choisy in DC. Prodr. 9 : 349. 1845; Fl. Males. (ser. 1) 4 : 599. 1953. *I. carnea* Jacq. Enum. Pl. Carib. 13. 1760; Bor & Raizada, 6, f. 5. 1954 ; Haines, Bot. Bih. & Or. 630. Repr. ed. 1961.

A stout, suberect or straggling shrub, with milky juice. Stems fistular. Leaves long petiolate, 11-20 x 6.5-12 cm, ovate, cordate, acuminate, glabrous, somewhat fleshy. Flowers large, in lax, dichotomous, axillary and terminal cymes. Sepals 7 mm long, broadly ovate. Corolla pink, campanulate, narrowly cylindric at the base and suddenly widened at the top.

Fls. : July - Mar. ; AKS 318, Bichpuri campus.

Grown along the borders of cultivated fields, gardens and waysides.

7. *Ipomoea hederifolia* L. Syst. Nat. ed. 10. 925. 1759 ; O! Donell, Lilloa 29 : 45. 1959. *I. angulata*. Lamk. Encycl. 1 : 464. 1759. *I. coccinea* sensu Clarke in Hook. f. Fl. Brit. Ind. 4 : 19. 1883 (non L.)

A slender, glabrescent twiner. Leaves 3 - 8 x 2.5 - 7.5 cm, broad ovate, cordate, acute. Flowers red, in few-many-flowered, peduncled cymes. Calyx persistent, deflexed in fruit. Capsules globose, glabrous.

Fls. & frts. : Aug. Oct. ; AKS 933, Rybha.

Found twining on shrubs and bushes.

8. *Ipomoea nil* (L.) Roth, Cat. Bot. 1 : 36. 1797 ; Santapan in Rec. Bot. Surv. Ind. 16 (1) : 192. 1953. *Convolvulus nil* L. Sp. Pl. 219. 1762. *Ipomoea hederacea* Clarke in Hook. f. Fl. Brit. Ind. 4 : 199. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 556. Repr. ed. 1960.

A annual or perennial twinner. Stems retrorsely hairy. Leaves petiolate, broadly ovate-cordate, 3-lobed or rarely entire. Flowers 1 - 5 flowered, axillary peduncles. Sepals 2 - 2.2 cm long, hirsute, especially in the lower portion subequal. Corolla deep blue tinged with pink, funnel-shaped, about 4 - 4.5 cm long. Capsules 3-celled, 6-ovuled, subglobose or ovoid, glabrous.

Fls. : Aug. Sept. ; *Frts.* : Sept. - Oct. ; *Vern.* : *Nilkalmi* ; AKS 131, Paliwal Park ; 516, Bichpuri campus.

Common in gardens, open grounds and on the ridges spreading or twining on shrubs and bushes.

9. *Ipomoea obscura* (L.) Ker-Gawl. in Bot. Reg. t. 239. 1817 ; Hook. f. Fl. Brit. Ind. 4 : 207. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 556. Repr. ed. 1960. *Convolvulus obscurus* L. Sp. Pl. 220. 1762.

An annual, twining plant, glabrous or slightly villous. Leaves petiolate, 1.5 - 3 x 2 - 3.5 cm, broad, ovate, acute, slightly pubescent. Corolla funnel-shaped, white with yellow bands, purple at the base, 2.4 cm long. Capsules 1.1 cm long, ovoid, glabrous.

Fls. & frts. : Oct. Nov. ; AKS 585, Bichpuri campus.

Rare, once found near the bank of canal.

10. *Ipomoea pes-tigridis* L.

1a. Leaves palmately 5 to 7 lobed

10a. *I. pes-tigridis*

1b. Leaves simple, ovate-cordate

10b. *I. pes-tigridis*
var. *capitellata*

10a. *Ipomoea pes-tigridis* L. Sp. Pl. 162. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 204. 1883 ; Duthie, Fl. U. Gang. Pl. I : 557. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 193. 1953. *I. pes-tigridis* var. *hepaticifolia* Clarke in Hook. f. Fl. Brit. Ind. 4 : 204. 1883.

A twining annual with long spreading hairs. Leaves deeply palmately 5 to 7-lobed. Flowers sessile, in long peduncled, few-flowered heads, surrounded by large persistent hairy bracts. Outer bracts oblong to linear-oblong, 1.5-2.5 cm long, inner ones smaller. Sepals lanceolate, long hairy. Corolla white or pinkish, funnel-shaped, 2.5-3.5 cm long. Capsules hidden in the calyx, ovoid, glabrous.

Fls. : Aug. - Oct. ; *Frt.s.* : Oct. - Nov. ; *Vern.* : Ghiabati ; AKS 510, Khander ; 513, Bichpuri campus.

Common in open fields and on the ridge, climbing or spreading on *Crotalaria medicaginea* Lamk. and other shrubs and bushes.

10b. *Ipomoea pes-tigridis* L. var. *capitellata* Clarke in Hook. f. Fl. Brit. Ind. 4 : 204. 1883 ; Haines, Bot. Bih. & Or. 624. Repr. ed. 1961.

It differs from the above type only in possessing ovate-cordate leaves.

Fls. : Oct. - Nov. ; AKS 528, College campus.

Found once spreading on *Crotalaria medicaginea* Lamk. in open ground.

11. *Ipomoea sindica* Stapf in Kew Bull. 346. 1894 ; Duthie, Fl. U. Gang. Pl. I : 554. Repr. ed. 1960.

A twining, hispid, annual herb. Leaves petiolate, 3.5-5.5 x 2.2-2.8 cm, triangular-hastate, acute or acuminate, hairy. Flowers solitary or in few-flowered heads. Bracts linear-subulate, hispid. Sepals 5 mm long, lanceolate, hispid. Corolla white, funnel-shaped, 6-7 mm long. Capsules 4-5 mm in diam., subglobose, glabrous.

Fls. & frts. : Aug. - Oct. ; AKS 220, Chhalesar.

Uncommon, spreading or twining on shrubs and bushes.

12. *Ipomoea sinensis* (Desr.) Choisy in Mem. Soc. Phys. Genev. 6 : 459. 1833 ; Verdcourt in Kew Bull. 204. 1958. *Convolvulus sinensis* Desr. in Lamk. Encycl. 3 : 557. 1792. *Ipomoea calycina* Clarke in Hook. f. Fl. Brit. Ind. 4 : 201. 1883 ; Duthie, Fl. U. Gang. Pl. I : 553. Repr. ed. 1960.

A twining, slender herb with villous stems. Leaves petiolate, ovate, cordate, acuminate. Flowers white, tubular, 1 - 3 together. Outer sepals with sagittate bases. Capsules ovoid, pointed, deflexed, glabrous.

This plant is included on the authority of Duthie (In Duthie, Fl. U. Gang. Pl. 1 : 553. Repr. ed. 1960)

7. MERREMPIA Dennst.

1a. Leaves digitate, leaflets 5 ; sepals densely hirsute with brown hairs ; corolla white, 2 - 2.5 cm long 1. *M. aegyptia*

1b. Leaves not digitate, reniform or ovate cordate ; sepals hairy ; corolla yellow, 8 mm long. 2. *M. emarginata*

1 *Merremia aegyptia* (L.) Urban Symb. Antill. 4 : 503. 1910 ; Hutchinson, Dalziel & Hepper, Fl. W. Trop. Africa 2 : 342. 1963. *Ipomoea aegyptia* L. Sp. Pl. 162. 1753. *I. pentaphylla* Jacq. Sc. 2 : 10, t. 319. 1786 - 1793 (non Cav.) ; Hook. f. Fl. Brit. Ind. 4 : 202. 1883.

An annual, hirsute twinner. Leaves digitately 5-foliolate ; leaflets broadly lanceolate, acuminate, tapering at ends. Flowers on long, lax dichotomous peduncles. Sepals 1.5 - 2 cm long, elliptic-oblong, obtuse, densely hirsute with brown hairs. Corolla white, funnel-shaped, 2 - 2.5 cm long. Capsules ovoid, papery.

Fls. : Aug. - Oct. ; *Frts.* : Oct. - Nov. ; *Vern.* : Ghiabel ; AKS 254, Bichpuri campus.

Common in the gardens, waysides and on the ridge, spreading or twining on shrubs and trees.

2. *Merremia emarginata* (Burm. f.) Hall. f. Eng. Bot. Jahrb. 16 : 552. 1893 ; Duthie, Fl. U. Gang. Pl. 1 : 551. Repr. ed. 1960. *Evolvulus emarginatus* Burm. f. Fl. Ind. 77, t. 30, f. 1. 1768. *Ipomoea reniformis* Choisy, in Mem. Soc. Phys. Genev. 6 : 446. 1883 ; Hook. f. Fl. Brit. Ind. 4 : 206. 1883.

A prostrate, creeping, pubescent herb, rooting at the nodes. Leaves shortly petiolate, 7 - 20 x 11 - 29 mm, broad reniform or ovate-cordate, crenate, glabrous. Flowers solitary or on 2 - 3 flowered short peduncles. Bracts very small, ovate, acute. Sepals unequal, hairy. Corolla yellow, campanulate, 8 mm long. Capsules subglobose, smooth.

Fls. : Sept. - Oct. ; *Frts.* : Oct. - Nov. ; AKS 531, Chiknipur.

Found in dry gravelly soil of the ridge.

8. RIVEA Choisy

- 1a. Leaves not broader than long, nearly cordate, acuminate ; peduncles shorter, single flowered usually ; sepals ovate, obtuse 1. *R. hypocrateriformis*
- 1b. Leaves broader than long, orbicular or reniform, apiculate ; peduncles as long as the petiole, many flowered ; sepals lanceolate, acute 2. *R. ornata*

1. ***Rivea hypocrateriformis* (Desr.) Choisy** in Mem. Soc. Phys. Geneve 6 : 408. 1833 ; Hook. f. Fl. Brit. Ind. 4 : 184. 1883 ; Duthie, Fl. U. Gang. Pl. 1 : 560. Repr. ed. 1960. *Convolvulus hypocrateriformis* Desr. in Lamk. Encycl. 3 : 561. 1779.

A stout, climbing or spreading shrub. Young branches silky-pubescent. Leaves petiolate, $3.5 - 7 \times 3.5 - 7.5$ cm, cordate, acuminate, appressed silky beneath, with a pair of pruinish glands at the base of lamina. Flowers clove-scented, usually solitary, axillary ; peduncles sometimes 2 or more flowered. Sepals 1.5 cm long, ovate-elliptic, silky hairy. Corolla white, salver-shaped, tube narrow, cylindric, 5 cm long. Fruits globose, tipped with the persistent base of the style, indehiscent.

Fls. : Aug. Sept. ; *Frt.s.* : Sept. Oct. ; AKS 539, 804, Chiknipur.

Common on the ridges of Chiknipur, climbing and spreading on shrubs and trees.

2. ***Rivea ornata* (Roxb.) Choisy** in Mem. Soc. Phys. Genev. 6 : 409. 1833 ; Duthie, Fl. U. Gang. Pl. 1 : 560. Repr. ed. 1960. *R. ornata* var. *griffithii* Clarke in Hook. f. Fl. Brit. Ind. 4 : 183. 1883. *Letsomia ornata* Roxb. Fl. Ind. 1 : 496. 1832.

A large, spreading or straggling shrub. Leaves long petiolate, $2.5 - 5.5 \times 4 - 8.5$ cm, orbicular or reniform, obtuse, apiculate at the apex, covered with dense silky hairs with a pair of greenish glands at the base of lamina. Flowers white, fragrant ; peduncles as long as the petiole, many flowered. Sepals 1.2 cm long, ovate-lanceolate, acute, persistent. Fruits 2 - 2.5 cm in diam., oblong, pointed, 1 - celled, usually with one seed, indehiscent.

Fls. & frts. : Aug. Oct. ; AKS 899, Tantpur.

Rare, first record from the area, found on the ridges spreading or straggling upon trees of *Butea monosperma* Taub.

62. SOLANACEAE

1. DATURA L.

1. *Datura inoxia* Mill. Gard. Dict. p. 5. 1768 ; Santapau in J. Bombay Nat. Hist. Soc. 47 (4) : 659. 1948 & in Rec. Bot. Surv. Ind. 16 (1) : 198. 1953. *D. metel* auct. non L. 1753; Sims in Bot. Mag. t. 1440. 1812; Hook. f. Fl. Brit. Ind. 4 : 243. 1883.

An erect, stout, short, pubescent shrub with grey tomentum. Leaves 6.5 - 16 x 3 - 6.5 cm, broadly ovate to ovate-lanceolate, acuminate, unequal at the base. Flowers solitary on axillary pedicels. Calyx tubular, 5-toothed, reflexed in fruit. Corolla white, funnel-shaped, 10-toothed, 12-14 cm long. Capsules globose, clothed with sharp long spines.

Fls. & frts. : Nov. Feb.; *Vern.* : *Dhatura*; AKS 633, Poiya ghat.

Common in open waste places, gardens and along roadsides.

2. *Datura metel* L. Sp. Pl. 179. 1753 ; Santapau in J. Bombay Nat Hist. Soc. 47 (4) : 659. 1948 & in Rec. Bot. Surv. Ind. 16 (1) : 198. 1953. *D. fastuosa* L. Syst. 2 : 932. 1759 ; Hook. f. Fl. Brit. Ind. 4 : 242. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 9. Repr. ed. 1960. *D. alba* Nees in Trans. Linn. Soc. 17 : 1834.

An erect, glabrous herb, 0.5 - 1.3 m high. Leaves 7.5 - 15 x 5-8 cm, ovate, acuminate, sinuate, unequal at the base. Flowers large, solitary, on short usually axillary pedicels. Calyx tubular, 5-toothed, 4 - 6 cm long, base persistent, reflexed. Corolla white, dirty whitish, purple on the outside and white within, funnel-shaped, 10 - 14 cm long, lobes 5. Capsules globose, armed with short spines, on a short curved stalk becoming inclined or nodding, opening irregularly. Seeds light brown.

Fls. & frts. : Dec. Feb. ; *Vern.* : *Dhatura* ; AKS 630, near College campus.

Common along roadsides and in waste places.

2. NICOTIANA L.

Nicotiana plumbaginifolia Viv. Elench. Pl. Hort. Dinergo 26, t. 5. 1802; Haines, Bot. Bih. & Or. 647. Repr. ed. 1961.

An erect, scabridly hairy herb, 20 - 60 cm high. Leaves forming a rosette at base ; upper ones elliptic, ovate-elliptic or lanceolate, acute, stem clasping; rosette leaves much larger than the caudine ones. Flowers in distant, lax racemes. Corolla pink, salver-shaped, with linear tube, 4 cm long. Capsules 10 mm long, ovoid, glabrous. Seeds many, minute.

Fls. : Dec. Mar. ; *Frts.* : Mar. May ; *Vern.* : *Jangli tambaku* ; AKS 40, Salempur.

Common in moist waste places, open grounds and along roadsides.

3. PHYSALIS L.

Physalis minima L. Sp. Pl. 183. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 238. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 5. Repr. ed. 1960 ; Santapani in Rec. Bot. Surv. Ind. 16 (1) : 197. 1953.

An erect or diffuse, annual herb, 20 - 40 cm high. Stems striate. Leaves 2 - 8 x 1.5 - 4.5 cm, ovate, acute, more or less entire or distantly crenate, glabrescent. Flowers yellow, solitary, on slender deflexed pedicels. Calyx much enlarged in fruit, about 1.5 - 2.5 cm long, 5 - 10 ribbed, glabrous, reticulately veined. Berries 10 - 12 mm across, enclosed within the inflated calyx. Seeds discoid or reniform, muriculate.

Fls. : July - Aug. ; *Frts.* : Aug. - Oct. ; *Vern.* : *Sarp Makoy* ; AKS 260, Poiyaghat.

Common in moist shady places of open unused grounds and gardens.

4. SOLANUM L.

- 1a. Plants unarmed 2. *S. nigrum*
- 1b. Plants armed with prickles :
 - 2a. Prostrate or ascending, densely armed herbs ; leaves deeply lobed 3. *S. surattense*
 - 2b. Erect shrubs or undershrubs, less densely armed; leaves shallowly lobed 1. *S. indicum*

1. ***Solanum indicum* L.** Sp. Pl. 187. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 229. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 3. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 196. 1953.

A low diffuse or erect, prickly undershrub, 0.6 - 1 m high. Prickles broad-based, straight or hooked. Leaves, 3 - 10 x 2.5 - 5.5 cm, ovate or oblong, sinuate-lobed, acute, stellately pubescent on the both surfaces. Flowers bluish-purple or violet, in extra-axillary cymes, subreflexed. Calyx 5-toothed, usually prickly. Berries globose, yellow, turning to black, 2 - 2.5 cm in diam.

Fls. : Aug. - Oct. ; *Frt.s.* : Oct. - Nov. ; *Vern.* : *Kateli, Tirri baigan*; AKS 642, Chiknipur.

2. ***Solanum nigrum* L.** Sp. Pl. 186. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 229. 1883 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 195. 1953.

An erect, glabrous, much-branched herb, 30 - 100 cm tall. Leaves 3 - 7.5 x 1.5 - 3.5 cm, ovate, ovate-oblong, sinuate or lobed. Flowers small, white, occasionally blue in drooping, subumbellate, extra-axillary cymes. Calyx 1 - 2 mm long, 5-toothed. Berries green, turning red or black when ripe, globose, smooth, 7 - 8 mm in diam. Seeds yellow.

Fls. : Oct. - Jan. ; *Frt.s.* : Jan. - Mar. ; *Vern.* : *Makoi* ; AKS 303, Salempur.

Abundant in moist places of gardens, cultivated and fallow fields.

3. ***Solanum surattense* Brum. f. Fl. Ind. 57. 1768** ; Santapau in Rec. Bot. Surv. Ind. 16 (1), (ed. 2) : 154. 1960. *S. xanthocarpum* Schrad. & Wendl. Sert. Hanov. 1 : 8, t. 2. 1795 ; Hook. f. Fl. Brit. Ind. 4 : 236. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 3. Repr. ed. 1960.

A prostrate or ascendingly spreading undershrub, copiously armed all over with straight yellow prickles. Leaves, 4 - 10 x 3 - 4.5 cm, ovate or elliptic, pinnately lobed, armed with numerous long prickles. Stamens yellow, connivent in a cone. Berries globose, yellow blotched with green, 1.5 - 2 cm in diam. Seeds smooth.

Fls. : May Aug. ; *Frt.s.* : Aug. Sept. ; *Vern.* : *Kateri* ; AKS 740, Paliwal Park.

Common along roadsides, in waste places and open grounds.

5. WITHANIA Pauq. nom. cons.

Withania somnifera (L.) Dunal in DC. Prodr. 13 (1) : 453. 1852; Hook. f. Fl. Brit. Ind. 4 : 239. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 6. Repr. ed. 1960. Santapau in J. Bombay Nat. Hist. Soc. 47 (4) : 657. 1948. *Physalis somnifera* L. Sp. Pl. 182. 1753.

A stout, erect, branching undershrub, 60 - 150 cm high, clothed with stellate hoary tomentum. Leaves 4 - 14 x 2 - 6.5 cm, ovate, subacute, base unequal. Flowers greenish or lurid yellow, 8 mm long, usually 5 together in sessile or nearly sessile, umbelliform cymes. Calyx in flower about 5 mm long, campanulate, stellate-tomentose. Stamens inserted at the base of corolla tube. Berries red when ripe, turning dull brown, globose, smooth, enclosed in the bladder-like, inflated calyx. Seeds subreniform, wrinkled, pale brown.

Fls. : Jan. Mar. ; *Frt.s.* : Mar. May ; *Vern.* : *Asgand* ; AKS 58, Bichpuri campus.

Common along waysides, in waste places and open grounds.

List of cultivated Taxa:

Capsicum annuum L. Sp. Pl. 188. 1753 ; Duthie & Fuller, Field & Gard. Crops. 3. 36. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 11. Repr. ed. 1960. *Vern.* : *Mirch*.

Cestrum nocturnum L. Sp. Pl. 191. 1753 Bailey, Man. Cult. Pl. 874. 1949 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 200. 1953 ; Bor & Raiz. 119, f. 76, Pl. 45. 46. 1954. *Vern.* : *Rat Ki Rani*.

Lycopersicon esculentum Mill. Gard. Dict. n. 2. 1768 ; Santapau, in Rec. Bot. Surv. Ind. 16 (1) : 199. 1953. *Lycopersicum esculentum* Mill. ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 237. 1883. *Solanum lycopersicum* L. Sp. Pl. 185. 1753 ; *Vern.* : *Tamatar*.

Nicotiana rustica L. Sp. Pl. 180. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 245. 1883 ; Duthie & Fuller, Field & Gard. Crops. 1 : 69, t. 17. 1883. Vern. : Tambaku.

Solanum melongena L. Sp. Pl. 186. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 235. 1883. Vern. : Bainagan.

Solanum tuberosum L. Sp. Pl. 185. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 229. 1883 ; Duthie & Fuller, Field & Gard. Crops. 3 : 15. 1883 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 196. 1953. Vern. : Alu.

63. SCROPHULARIACEAE

1a. Leaves alternate

14. *Verbascum*

1b. Leaves atleast the lowest opposite :

2a. Corolla spurred or saccate at the base :

3a. Erect herbs ; leaves linear ; flowers white or pinkish; corolla saccate

1. *Antirrhinum*

3b. Proculent or diffuse herbs ; leaves ovate to triangular-hastate ; flowers yellow ; corolla spurred

5. *Kickxia*

2b. Corolla not spurred or saccate :

4a. Corolla tube very long and narrow ; flowers in cymes

10. *Russelia*

4b. Corolla tube not very long and narrow ; flowers axillary or racemose :

5a. Corolla 2-lipped :

6a. Flowers yellow

7. *Lindenbergia*

6b. Flowers blue, white, purple or pink :

7a. Strigose herb; leaves linear ; calyx 15 - ribbed

13. *Striga*

7b. Plants not as above :

8a. Leaves mostly radical

9. *Mazus*

8b. Leaves cauline :

- 9a. Leaves usually whorled, variously dissected, the upper ones occasionally opposite 6. *Limnophila*
- 9b. Leaves opposite, not dissected :
- 10a. Marshy slender herbs; capsule loculicidal ; seeds tuberculate 3. *Dopatrium*
- 10b. Not marshy, diffuse or erect herbs ; capsule septicidal ; seeds not tuberculate 8. *Lindernia*
- 5b. Corolla not 2-lipped :
- 11a. Calyx 5-partite :
- 12a. Leaves pinnatisect ; all 5 sepals equal and same 12. *Sopubia*
- 12b. Leaves not pinnatisect, obovate-oblong ; upper sepals longer and broader than the others 2. *Bacopa*
- 11b. Calyx 3-4 lobed or 3-4 partite :
- 13a. Minute, tufted herbs ; calyx 3-lobed 4. *Glossostigma*
- 13b. Prostrate or erect herbs not minute ; calyx 4-partite :
- 14a. Flowers generally 4 from each whorl ; stamens 4 11. *Scoparia*
- 14b. Flowers solitary, axillary or in terminal racemes ; stamens 2 15. *Veronica*

1. ANTIRRHINUM L.

Antirrhinum orontium L. Sp. Pl. 617. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 253. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 16. Repr. ed. 1960.

An erect, glandular-hairy herb, 15-40 cm high. Leaves subsessile, 2.5 - 4.5 x 0.2 - 0.4 cm, linear or lanceolate, entire. Flowers solitary, axillary, shortly pedicelled. Corolla 7.5 mm long, white-purple, bilipped, gibbous at the base. Capsules hairy, obliquely ovoid, 8 x 5 mm, opening by terminal pores.

Fls. : Jan. - Mar. ; Frts. : Mar. - Apr. ; AKS 90, 294, Poiyaghat ; 690, Salempur.

Common in sandy soil of cultivated and unused fields.

2. BACOPA Aubl. nom. cons.

Bacopa monnieri (L.) Pennell in Proc. Acad. Nat. Sci. Philad. 98 : 94. 1946 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 201. 1953. *Lysimachia monnierii* L. Cest. Pl. 2 : 9. 1756. *Moniera cuneifolia* Michx. Fl. Bor - Amer. 2 : 22. 1803 (*Monnieria*) ; Duthie, Fl. U. Gang. Pl. 2 : 17. Repr. ed. 1960. *Herpestis monnieria* Benth. Scroph. Ind. 30. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 272. 1884.

A prostrate herb with spreading or ascending branches, 30 - 50 cm long, rooting at nodes. Leaves opposite, sessile, 1.1 - 2.2 x 0.4 - 0.6 cm, obovate-oblong or spatulate, obtuse-rounded, succulent. Flowers solitary, axillary, long pedicelled ; pedicel 3 - 3.5 cm long. Calyx 8 mm long, upper sepal broader and longer than the other 4 sepals. Corolla 1.2 cm long, bluish-purplish, slightly 2 - lipped, lobes nearly equal, rounded. Capsules 4 - 5 mm long, ovoid, glabrous.

Fls. : Aug. Oct. ; *Frt.s.* : Oct. Nov. ; AKS 789, Fatehpur Sikri.

Rare, found in muddy soil along the banks of bands and canals.

3. DOPATRIUM Buch.-Ham.

Dopatrium junceum (Roxb.) Buch. - Ham. in Benth. Scroph. Ind. 30. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 274. 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 22. Repr. ed. 1960. *Gratiola juncea* Roxb. Pl. Cor. 2 : 16. t. 129. 1798.

An annual, slender, glabrous, marshy herb, 20-30 cm high. Leaves few, opposite, the lower pairs small, oblong or obovate, the upper minute, remote. Flowers small, in opposite distant pairs, subracemeous ; bracteoles absent. Calyx 1 mm long. Corolla 5 mm long, purple, upper lip 2-fid, lower lip 3-fid, spreading. Stamens 2. Capsules globose. Seeds minute, tuberculate.

Fls. & frts. : Aug. Oct. ; AKS 782, on way to Niyamatpur.

Found in muddy soil and marshy places.

4. GLOSSOSTIGMA Arn. nom. cons.

Glossostigma diandrum (L.) O. Kuntze, Rev. Gen. Pl. 461. 1891 ; Santapau, Fl. Khandala, Repr. ed. 1967. *Limosella diandra* L. Man. 2 : 252. 1771. *Microcarpaea spathulata* Hook. Bot. Misc. 2 : 101, suppl. t. 1831.

Glossostigma spathulatum (Hook.) Wight & Arn. ex Arn. in Nov. Act. Acad. Leop.-Carol. Nat. Cur. 18 : 355. 1836 ; Hook. f. Fl. Brit. Ind. 4 : 288. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 27. Repr. ed. 1960.

A minute, weak tufted herb, rooting at the nodes. Leaves opposite, subsessile, 6-13 x 0.5-1.5 mm, spatulate, entire. Flowers solitary, axillary, very small. Calyx 2.5 mm long, campanulate, 3-lobed. Corolla 2.5 mm long, bluish-purplish, tubular, lobes 5, subequal. Capsules enclosed in slightly enlarged calyx.

Fls. & frts. : Jan. Feb. ; AKS 625, Salenapur.

Found in drying up muddy soil in rice fields of low lying area.

5. KICKXIA Dumort.

Kickxia ramosissima (Wall.) Janchen in Oesterr. Bot. Zeitschr. 82 : 152. 1933 ; Sanlapau in J. Bomaby Nat. Hist. Soc. 49 : 27. 1950. *Linaria ramosissima* Wall. Pl. As. Rar. 2 : 43, t. 153. 1831 ; Hook. f. Fl. Brit. Ind. 4 : 251. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 15. Repr. ed. 1960.

A slender, glabrous herb, 20-60 cm long much-branched from the base. Leaves opposite below and alternate above, very variable in size and shape, 1-2.5 x 0.5-1.5 cm, ovate-lanceolate to triangular-hastate. Flowers solitary, axillary, passing into long, terminal racemes with the floral leaves reduced to bracts. Calyx 5 mm long. Corolla 10 mm long, yellow, spurred, upper lip erect 2-lobed, lower 3-lobed. Capsules 4 mm long, ovoid or globose. Seeds echinulate.

Fls. : Dec. Apr. ; *Frts.* : Apr. June ; AKS 5, Dayalbagh ; 68, Chhalesar.

Found on the ridges, in crevices and in fissures of ancient buildings hanging downwards.

6. LIMNOPHILA R. Br.

Limnophila indica (L.) Druce in Rep. Bot. Exch. Club. Brit. Isl. 3 : 420. 1914 ; Pennell, Scroph. West. Himal. 26. 1943 ; Chatterjee & Bharadwaja, Bull. Bot. Soc. Beng. 9 : 138. 1955. *Hottonia indica* L. Syst. Nat. ed. 10. 919. 1759. *Limnophila gratioloides* R. Br. Prodr. 442. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 271. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 21. Repr. ed. 1960.

An erect, small marshy herb, 8-15 cm high. Stems quadrangular, glabrous. Leaves sessile, usually whorled, upper ones opposite, 8-10 mm long, pinnatifid or multifid. Flowers solitary, axillary. Calyx 5 mm long, funnel-form, gland

pubescent. Corolla 8 mm long, white or pinkish, upper lip 2-lobed, lower ones 3-lobed, glabrous. Capsules 4 x 3 mm, subglobose.

Fls. : Oct. Dec. ; *Frt.s.* : Dec. Jan. ; AKS 626, 848, Salempur.

Found in muddy soil of drying up rice fields.

7. LINDENBERGIA Lehm.

Lindenbergia muraria (Roxb. ex D. Don) P. Bruehl in Jour. Dept. Sci. Calc. Univ. 2 : 27. 1920. *Stemodia muraria* Roxb. ex D. Don, Prod. Fl. Nepal, 89, 1825. *Lindenbergia urticaefolia* Lehm. in Link & Otto, Sem. Hort. Hamb. 1829. 5. 1830 ; Hook. f. Fl. Brit. Ind. 4 : 262. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 33. Rept. ed. 1960. *Lindenbergia polyantha* Royle ex Benth. Scroph. Ind. 22. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 262. 1884.

An erect or tufted, glandular-hairy, annual herb with diffuse stems, 10 - 30 cm long. Leaves petiolate, 1.5 - 5 x 1.1 - 3.2 cm, broad ovate, crenate-serrate, gland pubescent. Flowers axillary as well as forming axillary and terminal racemes. Calyx 6 mm long. Corolla 1.1 cm long, yellow tinged with red, upper lip 2-lobed, lower ones 3-lobed. Capsules 5 mm long, hairy, slightly exserted from the calyx.

Fls. : Jan. Mar. ; *Frt.s.* : Mar. Apr. ; AKS 69, Chhalesar ; 641, Bichpuri campus.

Common on the ridges, in moist shady places and also hanging downwards from the fissures of ancient buildings.

8. LINDERNIA All.

1a. Stamens 2, two reduced to staminodes ; capsule twice as long as the calyx

1. *L. ciliata*

1b. Stamens 4 ; capsule about equalling the calyx

2. *L. crustacea*

1. *Lindernia ciliata* (Colsm.) Pennell in Jour. Arn. Arb. 24 : 253. 1943 ; Mukerjee in J. Ind. Bot. Soc. 24 : 133. 1945. *Gratiola ciliata* Colsm. Prod. Desc. Grat. 14. 1793. *Bonnaya brachiata* Link & Otto, Icon. Pl. Sel. 2 : 25, t. 11. 1820; Hook. f. Fl. Brit. Ind. 4 : 284. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 26. Repr. ed. 1960.

An erect, glabrous herb, 8 - 15 cm high. Stems quadrangular. Leaves shortly petiolate, 0.9 - 2.2 x 0.4 - 0.8 cm, oblong, sharply spinose-serrate. Flowers in

terminal racemes. Calyx 5.5 mm long. Corolla 7 mm long, white, upper lip 2-lobed, lower ones 3-lobed, outer surface gland-hairy. Capsules linear-oblong, glabrous.

Fls. & Frts. : July Oct. ; AKS 845, Salempur.

Found in moist places of grassy fields and near the cultivated fields.

2. *Lindernia crustacea* (L.) F. Muell. Cens. Austr. Pl. 97. 1882 ; Mukerjee in J. Ind. Bot. Soc. 34 : 130. 1945 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 203. 1953. *Capparia crustacea* L. Mant. 87. 1767. *Vandellia crustacea* Benth. Scroph. Ind. 35. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 279. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 23. Repr. ed. 1960.

A diffusely branched, glabrous or slightly hairy, annual herb, 10-20 cm high. Stems angular. Leaves opposite, shortly petiolate, 1.4-3.6 x 0.7-1.9 cm, ovate, subentire or shallow-toothed. Flowers axillary and subracemose. Calyx 6 mm long, 5-ribbed. Corolla 1 cm long, purplish, upper lip 2-lobed, lower ones 3-lobed. Capsules oblong-ovate, equalling the calyx. Seeds many, rugose.

Fls. : Aug. Sept. ; *Frts.* : Sept. Oct. ; AKS 468, Salempur.

Common in moist shady places of the gardens and cultivated fields.

9. *Mazus* Lour.

Mazus pumilus (Burm. f.) Steen. in Nova Guinea N.S. 9 : 31. 1958. *Lobelia pumila* Brum. f. Fl. Ind. 186. t. 60. f. 1768. *Lindernia japonica* Thunb. Fl. Jap. 253. 1784. *Mazus rugosus* Lour. Fl. Cochinch. 385. 1790 ; Hook. f. Fl. Brit. Ind. 4 : 259. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 19. Repr. ed. 1960. *Mazus japonicus* (Thunb.) O. Kuntze, Rev. Gen. Pl. 462. 1891.

A glabrous or slightly hairy, small, tufted, prostrate or ascending herb, 10-20 cm high. Leaves mostly radical, shortly petiolate, 1.5-4.5 x 0.9-2 cm, obovate-spatulate or oblong, irregularly crenate. Flowers in terminal lax racemes. Calyx 6 mm long, spreading in fruit. Corolla 1 cm long, purplish violet with white, upper lip erect 2-lobed, lower ones 3-lobed, spreading. Capsules subglobose. Seeds very minute, pale brown.

Fls. : Nov. - Jan. ; *Frts.* : Feb. - Mar. ; AKS 276, Shahjahan garden; 649, R.B.S. College garden ; 703, Poiya ghat.

Common in moist shady places of gardens, lawns and along the banks of Jauna river.

10. RUSSELIA Jacq.

1a. Leaves broad ovate, serrate 1. *R. coccinea*

1b. Leaves linear, lanceolate, entire 2. *R. equisetiformis*

1. *Russelia coccinea* Wetts. in Engl. & Prantl, Nat. Pfam. 4 (3b) : 63. 1891
& in Bull. Herb. Boiss. 2 : 562. 1894.

An erect, pubescent shrub, 60–100 cm high. Leaves opposite or whorled, broad ovate, serrate. Flowers on short peduncled, many-flowered, close dichotomous cymes. Calyx 4 mm long. Corolla 1 mm long, red, tubular, tube cylindrical. Stamens 4, included.

Fls. : Jan. May ; AKS 733, Shahjahan garden.

Grown as hedges in the gardens.

2. *Russelia equisetiformis* Schlecht. & Cham. in Linnæa 6 : 377. 1831 : Santapau in J. Bombay Nat. Hist. Soc. 49 : 47. 1950. *Russelia juncea* Zucc. in Flora 15 (2) : Beibl. 99. 1832 ; Haines, Bot. Bih. & Or. 651. Repr. ed. 1961.

An erect or declining, glabrous, branched, rush-like shrub, 1-1.5 m. high. Stems striate. Leaves whorled, linear-lanceolate or ovate ; upper ones reduced to scales. Flowers very numerous, on 1 to 3-flowered peduncles, borne in great profusion on the drooping branches. Calyx 4 mm long. Corolla 2.2 cm long, tubular, red or scarlet.

Fls. : Feb. Apr. ; AKS 672, R.B.S. College garden.

Grown in the gardens as ornamental plant.

11. SCOPARIA L.

Scoparia dulcis L. Sp. Pl. 116. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 289. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 27. Repr. ed. 1960.

An erect, branched, glabrous herb, 20-60 cm high. Leaves ternately whorled or opposite, petiolate, 1.3–3.5 × 0.3–1.1 cm, lanceolate or elliptic-lanceolate, serrate. Flowers generally 4 from each whorl. Calyx 2.5 mm long, 4-partite. Corolla 3 mm long, white, 4-lobed, lobes subequal, throat densely bearded. Capsules 3 mm across, subglobose.

Fls. : Feb. Apr. ; *Frts.* : Apr. May ; AKS 359, Jamuna Kinara ; 684, Salempur.

Found in waste places and near the cultivated fields.

12. SOPUBIA Buch.-Ham.

Sopubia delphinifolia G. Don, Gen. Syst. 4 : 560. 1837 ; Hook. f. Fl. Brit. Ind. 4 : 20. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 32. Repr. ed. 1960.

An erect, much-branched herb, 30 - 90 cm high. Leaves pinnatisect, segments filiform. Flowers subsessile, solitary, axillary or in few-flowered terminal racemes. Corolla rose-coloured, funnel-shaped, lobes 5, spreading. Capsules oblong-ellipsoid.

This plant is included on the authority of Munro (in Duthie, Fl. U. Gang. Pl. 1 : 32).

13. STRIGA Lour.

Striga angustifolia (D. Don) Sald. in Bull. Bot. Surv. Ind. 5 : 70. 1963. *Buchnera angustifolia* D. Don, Prodr. 91. 1825. *Striga euphrasoides* (Vahl) Benth. in Comp. Bot. Mag. 1 : 364. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 299. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 31. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 208. 1953. *Buchnera euphrasioides* Vahl, Symb. Bot. 3 : 81. 1794.

An erect, strigose, simple or branched herb, 30 - 45 cm high. Leaves lower opposite, upper alternate, sessile, 2 - 4.5 x 0.1 - 0.4 cm, linear, scabrous. Flowers solitary, axillary, forming terminal, interrupted spikes. Calyx 8 mm long, 15-ribbed, scabrous ; lobes usually reflexed in fruit. Corolla 1.2 - 1.4 cm long, white, tube slender, abruptly incurved at or above the middle ; upper lip short 2-lobed, lower lip 3-lobed. Capsules shorter than calyx.

Fls. : Sept. - Nov. ; *Frt.s.* : Nov. - Dec. ; AKS 149, Bichpuri campus; 908, Tantpar.

Found in moist grassy places and near the ponds and puddles of the hilly tracts.

14. VERBASCUM L.

1a. Stamens 4

1. *V. chinense*

1b. Stamens 5

2. *V. thapsus*

1. ***Verbascum chinense*** (L.) Santapau, Fl. Purandhar 90, 1957. *Scrophularia chinensis* L. Mant, 250, 1771. *Celsia coromandeliana* Vahl, Symb. Bot. 3 : 79, 1794 ; Hook. f. Fl. Brit. Ind. 4 : 251, 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 15. Repr. ed. 1960.

An erect, pubescent herb, 30 - 100 cm tall. Radical leaves petiolate, lyrate-pinnatifid, irregularly dentate ; caudine ones smaller, alternate, ovate, oblong-ovate, irregularly toothed, passing upwards into floral bracts. Flowers yellow, 8 - 10 mm in diam., in long simple or branched, terminal, 30 - 45 cm long racemes. Stamens 4. Capsules subglobose, glabrous, 5 - 7 mm long.

Fls. : July - Sept. ; *Frt.s.* : Sept. - Oct. ; AKS 42, Salempur ; 442, Kitham ; 665, near JALMA.

Common on the banks of river Jamuna, Lakes, canals and in open moist places.

2. ***Verbascum thapsus*** L. Sp. Pl. 177, 1753 ; Hook. f. Fl. Brit. Ind. 4 : 250, 1883 ; Duthie, Fl. U. Gang. Pl. 2 : 14. Repr. ed. 1960.

An erect, wooly-tomentose herb, 30-60 cm high. Radical leaves large, caudine ones, 5.5 - 12.5 x 2.5 - 4.5 cm, alternate, oblong to obovate-lanceolate, entire or crenate. Flowers in dense terminal, woolly, long spikes. Calyx 6 - 7 mm long. Corolla 7 - 8 mm long, yellow, subrotute. Stamens 5. Capsules ovoid, tomentose, about 7 - 8 mm long.

Fls. : Feb. - Apr. ; *Frt.s.* : Apr. - May ; AKS 361, on the bank of Jamuna river, near Taj.

Found on the banks of Jamuna river, canals, irrigation channels and on the edges of cultivated fields.

15. VERONICA L.

- | | |
|---|---------------------------------|
| 1a. Prostrate herb ; leaves ovate-cordate ; flowers
solitary, axillary | 1. <i>V. agrestis</i> |
| 1b. Erect herb; leaves oblong-lanceolate ; flowers
in racemes | 2. <i>V. anagallis-aquatica</i> |

1. ***Veronica agrestis*** L. Sp. Pl. 13, 1753 ; Hook. f. Fl. Brit. Ind. 4 : 294, 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 28. Repr. ed. 1960.

An annual, prostrate, pubescent, much-branched herb, 10–30 cm long. Leaves petiolate, 0.9–2.5 × 0.8–1.6 cm, ovate-cordate, crenate-serrate. Flowers solitary, axillary, calyx 4 mm long, 4-partite. Corolla 3.5 mm long, white tinged with purplish, rotate, lobes 4, spreading. Capsules 3 × 4 mm, on decurved pedicels, 2-lobed, lobes globose, hairy.

Fls. : Jan. Mar. ; *Frt.s.* : Mar. Apr. ; AKS 92, Poiya ghat ; 350, Rambagh.

Common in moist shady places of gardens, open fields and along the irrigation channels.

2. *Veronica anagallis-aquatica* L. Sp. Pl. 12. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 293. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 28 Repr. ed. 1960.

A glabrous, erect, succulent herb, 15–50 cm high. Stems hollow. Leaves petiolate, 6–15 × 0.9–2.2 cm, oblong-lanceolate or linear-oblong, entire or serrate. Flowers in axillary racemes. Calyx 2 mm long, 4-partite. Corolla 2 mm long, white or light purple, rotate, lobes 4. Capsules 3–4 mm long, orbicular-oblong, emarginate, glabrous.

Fls. : Jan. Mar. ; *Frt.s.* : Mar. Apr. ; AKS 329, Bichpuri campus.

Common in moist waste places, gardens and along the banks of temporary ponds and canals.

64. OROBANCHACEAE

OROBANCHE L.

Orobanche aegyptiaca Pers. Syn. 2 : 181. 1806 ; Duthie, Fl. U. Gang. Pl. 2 : 37. Repr. ed. 1960. *O. indica* Buch.-Ham. ex Roxb. Fl. Ind. 3 : 27. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 326. 1884.

An erect, pale brown, root parasite, 10–20 cm high, branching from the base. Scales few, lanceolate. Flowers blue or variable in colour, many, sessile, in a somewhat lax spike. Bracts ovate, acuminate. Calyx campanulate, unequally 4-toothed. Corolla 2-lipped, upper lip 2-lobed, lower 3-lobed, tube slightly curved above, 2–2.5 cm long. Capsules oblong, acuminate.

Fls. & frts. : Dec. Mar.; Vern. : Ramguriya ; AKS 81, Dabar ; 290, Poiya ghat ; 640, Bichpuri campus.

Common in cultivated fields, parasitic on various cultivated plants, especially members of *Cruciferae*.

65. LENTIBULARIACEAE

UTRICULARIA L.

1a. Peduncles without spongy floats ;

pedicels long

1. *U. aurea*

1b. Peduncles with a whorl of spongy floats ;

pedicels short

2. *U. inflexa* var. *stellaris*

1. *Utricularia aurea* Lour. Fl. Cochinch. 26. 1790 ; Backer & Bakh. J. Fl. Java 2 : 571. 1965. *Utricularia flexuosa* Vahl, Enum. 1 : 198. 1804 ; Hook. f. Fl. Brit. Ind. 4 : 329. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 38. Repr. ed. 1960.

A floating or submerged, rootless, aquatic herb. Leaves whorled, pinnately cut into filiform segments, each with small bladders at their bases. Flowers yellow, bracteate, in erect, aerial racemes ; peduncles without floats. Calyx 2-partite, lobes ovate, obtuse, accrescent. Corolla spurred. Capsules subglobose.

Fls. & frts. : Nov. Jan. ; AKS 313, Salempur.

Common in water reservoirs and ponds, in association of *Nymphoides cristatum* Kuntze.

2. *Utricularia inflexa* var. *stellaris* (L.f.) P. Taylor in Mitt. Bot. Staatss. München 4 : 96. 1961 et in Kew Bull. 18 : 189. 1964. *U. stellaris* L. f. suppl. 86. 1781 ; Hook. f. Fl. Brit. Ind. 4 : 328. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 38. Repr. ed. 1960.

A submerged or floating, rootless, aquatic herb. Leaves pinnately cut into numerous capillary segments, each primary segment is usually provided near the base with a small, globular, ovoid bladder with a truncate mouth. Flowers yellow, in aerial racemes ; peduncles kept erect by a whorl of spongy floats. Calyx 2-partite, lobes suborbicular accrescent. Corolla 2-lipped, upper lip rounded, lower subquadrate, spurred. Capsules globose. Seeds minute, angled.

Fls. & frts. : Sept. Nov. ; AKS 549, Pachokhara.

Commonly found floating in water of temporary ponds, puddles and water reservoirs.

66. BIGNONIACEAE

TECOMELLA Seem.

Tecomella undulata (Sm.) Seem. in Ann. & Mag. Nat. Hist. (ser. 3) 10 : 30. 1862 ; Duthie, Fl. U. Gang. Pl. 2 : 43. Repr. ed. 1960. *Bignonia undulata* Sm. Exot. Bot. 1 : 35. 1805. *Tecoma undulata* G. Don, Gen. Syst. 4 : 223. 1837 ; Hook. f. Fl. Brit. Ind. 4 : 378. 1884.

A large shrub or small tree with drooping branches. Leaves simple, petiolate, narrowly oblong, margins undulate. Flowers orange-yellow, in corymbose racemes from short, lateral branches. Calyx tubular-campanulate, 5-toothed. Corolla tubular-ventricose, mouth wide, lobes subequal.

Fls. : Mar. May ; AKS 895, Paliwal Park.

Occurs naturalized in the area and also planted in the gardens.

List of cultivated Taxa :

Campsis grandiflora K. Schum. in Engl. & Prantl, Pflanzenf. 4 (3b) : 230. 1894 ; Bailey, Man. Cult. Pl. 903. 1949. AKS 671, R.B.S. College garden.

Dolichandrone spathacea K. Schum. Fl. Kais. Wilh. Land. 123. 1881 ; Haines, Bot. Bih. & Or. 690. Repr. ed. 1961. *D. rheedii* Seem. in Seem. Journ. Bot. 8. 380 ; Hook. f. Fl. Brit. Ind. 4 : 379. 1884. AKS 717, Paliwal Park.

Haplophragma adenophyllum (Wall.) P. Dop in Bull. Soc. Bot. France 72 : 890. 1925 ; Steenis, Malay. Bignon. 1006. 1827. *Bignonia adenophylla* Wall. Cat. 6502, 1832, nom. nud. P. Dop. in Bull. Bot. Soc. France 72. 889. 1925. *Hetrophragma adenophyllum* Seem. ex Benth. & Hook. f. Gen. Pl. 2 : 407. 1876 ; Hook. f. Fl. Brit. Ind. 4 : 381. 1884.

Jacaranda mimosifolia D. Don in Bot. Reg. t. 631. 1822 & Edin. N. Phil. Jour. 264. 1823 ; Sandwith in Kew Bull. 456. 1953. AKS 711, near Municipal Corporation.

Kigelia pinnata DC. Prodr. 9 : 427. 1845 ; Duthie, Fl. U. Gang. Pl. 2 : 46. Repr. ed. 1960 ; Bailey, Man. Cult. Pl. 905. 1949. AKS 739, Paliwal Park.

Millingtonia hortensis L. f. Suppl. 291. 1781 ; Steenis, Malay. Bignon. 826. 1927 ; Blatt & Mill. Beaut. Ind. Tr. 106, t. 22. 1954.

Spathodea campanulata Beauv. Fl. Owar. 1 : 47, tt. 27-28 ; Bentall, Trees Calc. 338 ; Bailey, Man. Cult. Pl. 907. 1949.

Tecoma stans (L.) H.B. & K. Nov. Gen. & Sp. 3 : 144. 1818 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 217. 1953 ; Bor & Raizada, 37, f. 28, Pl. 9, 10. 1954. *Bignonia stans* L. Sp. Pl. 871. 1763. AKS 404. College campus.

67. PEDALIACEAE

1. PEPALEUM L.

Pedalium murex L. Syst. 1123. 1759; Haines, Bot. Bih. & Or. 692. Rept. ed. 1961.

A diffuse, spreading or ascending, much-branched herb, 20–30 cm tall. Leaves opposite, petiolate, 2.5–4.5 × 1.5–3 cm, ovate-oblong, distantly crenate, obtuse, somewhat fleshy. Two dark violet-coloured glands present at base of petioles and pedicels. Flowers solitary, axillary. Calyx small, 5-partite. Corolla-tube slender below, enlarged above, limbs sub-bilipped, lobes 5, unequal, yellow. Fruits 4-sided, abruptly narrowed at base, with 4, sharp, horizontal spines.

Fls. : Aug. Sept. ; *Frt.s.* : Sept. Oct. ; *Vern.* : *Vilayti gokhra* ; AKS 302, Kitham.

Rare, found in moist shady places near Kitham lake.

2. SESAMUM L.

Sesamum indicum L. Sp. Pl. 634. 1753; Hook. f. Fl. Brit. Ind. 4 : 387. 1884; Duthie, Fl. U. Gang. Pl. 2 : 47. Repr. ed. 1960; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 217. 1953.

An erect, pubescent herb, 30–100 cm high. Lower leaves lobed or deeply divided, oblong or broad ovate; upper ones undivided, linear-oblong. Flowers bent, solitary in the axils of higher leaves with conspicuous, vesicular glands at base. Calyx small, 5-partite. Corolla pink or rosy, tubular-ventricose, limb 2-lipped, lobes 5. Capsules erect, oblong, valvular. Seeds black or white.

Fls. : Aug. - Sept. ; *Frt.s.* : Sept. - Oct. ; *Vern.* : *Til* ; AKS 142, Bichpuri campus ; 607, Chiknipur.

Common on the slopes of the ridge and also cultivated for its seeds.

Note: The plants growing wild on the ridges show certain differences from the cultivated plants. The main difference lies with regard to the colour and surface of the seeds. The seeds of cultivated plants are white with smooth surface whereas in wild plants seeds are black with rugose surface.

68. MARTYNIACEAE

MARTYNIA L.

Martynia annua L. Sp. Pl. 618. 1753. *M. diandra* Gloc. Obs. Bot. 14, t. 1. 1785 ; Haines, Bot. Bih. & Or. 694. Repr. ed. 1961.

An erect, glandular-hairy undershrub, about 1 m high with fistular stem. Leaves large, long, petiolate, broadly ovate from a cordate base, repand-dentate. Flowers in glandular-sticky raceme. Bracts and bracteoles petaloid. Corolla rosy, obliquely campanulate-thimble-shaped. Fruits large, hard, black crowned by 2 strong claw like sharp hooks.

Fls. : Aug. - Oct. ; *Frt.s.* : Oct. - Nov. ; *Vern.* : *Baghnakha* ; AKS 183, Bichpuri campus.

Common in waste places, unused grounds, on the ridge and in hilly tracts.

69. ACANTHACEAE

- | | |
|---|-----------------------|
| 1a. Climbers (erect in <i>Thunbergia erecta</i> only) ;
calyx minute, 10 to 15-toothed | 17. <i>Thunbergia</i> |
| 1b. Erect or prostrate herbs or shrubs ;
calyx conspicuous, segments mostly 4 - 5 ; | |
| 2a. Scapigerous, stemless herbs, leaves radical | 6. <i>Elytaria</i> |
| 2b. Plants with stems and cauline leaves : | |
| 3a. Corolla without upper lip ;
lower lip large, expanded, 3-lobed | 4. <i>Blepharis</i> |
| 3b. Corolla bilipped or with 5 subequal lobes : | |

4a. Corolla lobes twisted to the left in bud :

5a. Ovules more than 2 in each cell ; capsule with 6 or more seeds :

6a. Inflorescence spinous or not ; corolla distinctly 2-lipped

10. *Hygrophila*
(*Asterochantha*)

6b. Inflorescence never spinous ; corolla subequally 5-lobed :

7a. Flowers in terminal or pseudo-axillary heads

9. *Hemigraphis*

7b. Flowers large, solitary or few together :

8a. Flowers in axillary cymes ; capsules linear ; roots with tubers

14. *Ruellia*

8b. Flowers solitary or in axillary triads ; capsules clavate ; roots without tubers

5. *Dipteracanthus*

5b. Ovules 2 in each cell ; capsule with 4 or less seeds :

9a. Corolla-tube slender, linear ; stamens 2 7. *Eranthemum*

9b. Corolla-tube widened from near the base ; stamens 4

16. *Strobilanthes*

4b. Corolla lobes imbricate in bud :

10a. Ovules 3 to 20 in each cell ; capsule normally with 6 or more seeds :

11a. Flowers in lax panicles, often in unilateral racemes ; seeds 3-6 in each cell

2. *Andrographis*

11b. Flowers in dense terminal spikes ; seeds 10 or more in each cell

8. *Hemiadelphus*

10b. Ovules 2 or rarely 1 in each cell :

- 12a. Corolla subequally 5-lobed 3. *Barleria*
 12b. Corolla distinctly bilabiate :
 13a. Spikes aggregated at the base of stem
 in globose heads ; stamens 4 12. *Lepidagathis*
 13b. Not as above ; stamens 2 :
 14a. Flowers in trichotomously branched
 cymes forming panicles 13. *Peristrophe*
 14b. Flowers in dense spikes :
 15a. Bracts with scarious margins, 2
 or 4-rowed in secund spikes,
 dimorphic 15. *Rungia*
 15b. Bracts in cylindric or 4-farious
 spikes, homomorphic :
 16a. Herbs or undershrubs ; anther cells
 with a white basal spur-like appendage 11. *Justicia*
 16b. Shubs ; anther cells apiculate,
 not spurred 1. *Adhatoda*

1. ADHATODA Nees

Adhatoda zeylanica Medic. Hist. & Commentat. Acad. Elect. Sci. Theod-Palat, 6 : 393. 1790 ; Ramam. in Said. & Nicol. Fl. Hassan 540. 1976. *Justicia adhatoda* L. Sp. Pl. 15. 1753. *Adhatoda vasica* Nees in Wall. Pl. As. Rar. 3 : 103. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 540. 1885 ; Santapau, Acanth. 92. 1952.

An evergreen, gregarious shrub, 1 - 1.5 m high with foetid smell. Leaves petiolate, 8 - 18 x 3 - 6.5 cm, ovate or elliptic-lanceolate, acuminate. Flowers in dense, axillary peduncled spikes clustered towards the ends of the branches. Bracts leafy, elliptic, glabrous, reticulate, about 14 - 16 mm long. Calyx 1 cm long. Corolla 2 cm long, white, bilipped. Capsules 2.5 - 3 cm long, clavate. Seeds suborbicular, rugose.

Fls. : Oct. - Jan. ; Frts. : Jan. - Mar. ; Vern. : *Piyabans* ; AKS 267, Circuit House.

Abundant in gravelly soil of the ridge and hilly tracts and also found in the gardens.

2. ANDROGRAPHIS Wall.

- | | |
|--|-------------------------|
| 1a. Leaves hairy ; flowers in axillary racemes ; capsules hairy | 1. <i>A. echiooides</i> |
| 1b. Leaves glabrous ; flowers in lax, panicled racemes ; capsules glabrous | 2. <i>A. paniculata</i> |

1. *Andrographis echiooides* (L.) Nees in Wall. Pl. As. Rar. 3 : 117. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 505. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 66. Repr. ed. 1960 ; Santapau, Acanth. 51. 1952. *Justicia echiooides* L. Sp. Pl. 16. 1753 ; Roxb. Fl. Ind. 1 : 118. 1832.

An erect, annual herb, 20-30 cm high. Stems quadrangular, clothed with long, spreading hairs. Leaves opposite, sessile, 3.5 - 7.5 x 1.1 - 2.1 cm, ovate-oblong or subelliptic, margins ciliate. Flowers unilateral, in axillary spreading or recurved racemes. Bracts smaller. Calyx 7 mm long, ciliate. Corolla 1.4 cm long, white tinged with purple, bilipped, densely gland hairy outside. Capsules 9 - 10 mm long, elliptic-lanceolate, hairy. Seeds several, rugose.

Fts. : Sept. - Oct. ; *Fris.* : Oct. - Nov. ; AKS 284, Fatehpur Sikri ; 490, Khander.

Common on the ridges and hilly tracts amongst rock crevices.

2. *Andrographis paniculata* (Burm. f.) Wall. ex Nees in Wall. Pl. As. Rar. 3 : 116. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 501. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 66. Repr. ed. 1960 ; Santapau, Acanth. 50. 1952. *Justicia paniculata* Bunn. f. Fl. Ind. 9. 1768.

An erect, glabrous annual, 30-100 cm tall. Leaves opposite, subsessile, ovate-lanceolate, acute. Inflorescence a lax, axillary and terminal, unilateral raceme, forming a panicle. Flowers whitish, spotted with rose-purple. Capsules tapering at ends, glabrous.

This plant is included on the authority of Munro (in Duthie, Fl. U. Gang. Pl. 2 : 66).

3. BARLERIA L.

- | | |
|---|------------------------|
| 1a. Shrubs or undershrubs without spines ; flowers blue-purple | 1. <i>B. cristata</i> |
| 1b. Shrubs or undershrubs with sharp interpetiolar spines ; flowers orange-yellow | 2. <i>B. prionitis</i> |

1. Barleria cristata L. Sp. Pl. 636. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 488 ; Duthie, Fl. U. Gang. Pl. 2 : 70. Repr. ed. 1960 ; Santapau, Acanth. 59. 1952. *B. dichotoma* Roxb. Fl. Ind. 3 : 39. 1832.

An erect undershrub, 30 - 100 cm high. Leaves petiolate, 4.5 - 12 x 1.5 - 4 cm, elliptic-oblong, acute at both ends, glaucous beneath. Flowers in axillary and terminal, short spikes. Bracts O. Bracteoles 10 - 12 mm long, linear-lanceolate, margins ciliate, distantly toothed. Outer two sepals 2 cm long lanceolate, deeply or shortly spinous toothed, acuminate ; inner two sepals 8 mm long, narrowly linear-lanceolate. Corolla 3 cm long, blue-purple, funnel-shaped. Capsules ellipsoid, 2-seeded.

Fls. : Oct. - Nov. ; *Frt.s.* : Nov. - Dec. ; AKS 219, 597, Chhalesar.

Found in gravelly soil of the ridge and ravine tract.

2. Barleria prionitis L. Sp. Pl. 636. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 482. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 69. Repr. ed. 1960 ; Santapau, Acanth. 57. 1952.

An erect, much-branched, glabrous undershrub, 60 - 100 cm high, armed with spines which are straight, sharp, 2-4 or more in the axil of leaves. Leaves petiolate, 8.5 - 13.5 x 4 - 7.5 cm, ovate to elliptic, narrowed at ends. Flowers in terminal spikes. Bracts 1.4 - 1.8 cm long, foliaceous, linear, oblong, spinescent. Calyx 1.4 cm long, segments spine-tipped. Corolla 4 cm long, orange-yellow. Capsules ovoid, pointed, glabrous, black, 2-seeded.

Fls. : Oct. - Feb. ; *Frt.s.* : Feb. - May ; *Vern.* : Kala bansa; AKS 268, Circuit House.

Found in waste places of the open fields and gardens and also found on the slopes of the ridges.

4. BLEPHARIS JUSS.

1a. Leaves petiolate, thin, acute ; corolla 2 cm long

1. *B. maderaspatensis*

1b. Leaves subsessile, thick and fleshy, obtuse ; corolla
1 cm long

2. *B. molluginifolia*

1. *Blepharis maderaspatensis* (L.) Heyne ex Roth, Nov. Pl. Sp. 320. 1821 ; Bremek. in Verh. K. Nederl. Akad. Wet. II 45 (2) : 10. 1948 ; Santapau, Acanth. 15. 1952. *Acanthus maderaspatensis* L. Sp. Pl. 639. 1753. *Blepharis boerhaviaefolia*

Pers. Syn. 2 : 180. 1807 ; Wight, Icon. t. 458 ; Hook. f. Fl. Brit. Ind. 4 : 478. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 53. Repr. ed. 1960.

An ascending or prostrate, pubescent herb, 30–100 cm long with diffuse, much-branched stems. Leaves thin, in whorls of 4, unequal, 2.3–7.1 × 0.9–2.5 cm, lanceolate, elliptic or obovate, entire or distantly denticulate. Flowers solitary, axillary or 2–3 together. Bracteoles 8, in opposite pairs, becoming larger upwards, bristly. Calyx 1.6 cm long. Corolla 2 cm long, pinkish-purple, bilipped, upper lip subobsolete, lower 3-lobed, spreading. Capsules 2-seeded.

Fls. : Sept. – Nov. ; *Frts.* : Nov. – Dec. ; AKS 581 Niyamatpur : 808, Chiknipur.

Common on the slopes of the ridges and also found spreading on *Capparis decidua* Edgew.

2. *Blepharis molluginifolia* Pers. Syn. 2 : 180. 1807 ; Hook. f. Fl. Brit. Ind. 4 : 479. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 54. Repr. ed. 1960 ; Santapau, Acauth. 16. 1952.

A slender, prostrate, hispid herb. Leaves in whorls of 4, sessile, fleshy, 0.8–2 × 0.4–0.7 cm, oblong or obovate, obtuse, mucronate. Flowers solitary. Bracteoles 10, in opposite pairs, enlarging in size upwards. Corolla 1 cm long, blue, bilipped, upper lip subobsolete, lower 3-lobed. Capsules included, ellipsoid, 2-seeded. Seeds shaggy.

Fls. : Sept. – Dec. ; *Frts.* : Dec. – Jan. ; AKS 15, Poya ghat ; 190, Chhalesar ; 240, Kitham.

Common on sandy or gravelly soil of the ridges and ravine tract.

5. DIPTERACANTHUS Nees emend. Bremek.

1a. Erect or suberect ; ovary and capsule glabrous 1. *D. patulus*

1b. Prostrate or climbing ; ovary and capsule pubescent 2. *D. prostratus*

1. *Dipteracanthus patulus* (Jacq.) Nees in Wall. Pl. As. Rar. 3 : 81. 1832 & DC. Prodr. 11 : 124; Wight, Icon. t. 1505; Santapau, Acauth. 24. 1952. *Ruellia patula* Jacq. Misc. Bot. 2 : 358. 1781 ; Hook. f. Fl. Brit. Ind. 4 : 412. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 58. Repr. ed. 1960.

An erect or straggling, hoary-pubescent herb or undershrub, 30-60 cm high. Leaves petiolate, 1.6 - 3.6 x 0.9 - 2.1 cm, ovate-elliptic, crenate, acute, hairy. Flowers sessile, solitary or 2-3 together. Bracts 1.4 - 1.6 cm long, leaf-like, elliptic, densely hairy. Calyx 8 mm long. Corolla 5 cm long, light blue, cylindric-funnel form, hairy outside. Capsules 2 cm long, clavate, glabrous.

Fls. : June Aug. ; *Frts.* : Aug. Sept. ; AKS 815, Chiknipur.

Found on the slopes of the ridges.

2. *Dipteracanthus prostratus* (Poir.) Nees in Wall. Pl. As. Rat. 3 : 81. 1832; Bremek. in Verh. K. Nederl. Akad. Wet. II 45 (1) : 16. 1948 ; Santapau, Acanth. 24. 1952. *Ruellia prostrata* Poir. in Lamk. Encyl. 6 : 349. 1840 ; Hook. f. Fl. Brit. Ind. 4 : 411. 1884. *Dipteracanthus dejectus* Nees in Wall. Pl. As. Rat. 3 : 82. 1832. *Ruellia prostrata* Poir. var. *dejecta* Clarke in Hook. f. Fl. Brit. Ind. 4 : 412. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 57. Repr. ed. 1960.

A stout, diffuse or straggling herb, 15 - 45 cm high, internodes angular, slightly hairy. Leaves petiolate, 1.5 - 6.5 x 1 - 3.2 cm, ovate, elliptic, subcordate, entire, hairy. Flowers sessile, solitary or few together. Bracts leaf-like but smaller. Calyx 1.2 cm long. Corolla 3.3 cm long, pale violet, cylindric-funnel form, hairy outside, caducous. Capsules 2 - 2.2 x 0.5 cm, clavate, pointed, pubescent. Seeds brown, glabrous.

Fls. : July Oct. ; *Frts.* : Oct. Nov. ; AKS 230, 427, Shahjahan garden ; 354, Rambagh.

Abundant in moist shady places of the gardens, waste places and unused grounds.

6. ELYTARIA Michx. nom. cons.

Elytaria acualis (L.F.) Lindau in Engl. & Prantl, Pflanzenf. 1 : 304. 1897 ; Santapau, Acanth. 11. 1952. *Justicia acualis* L. F. Suppl. 84. 1781; Roxb. Pl. Cor. 2 : t. 127. *Tubiflora acualis* Kuntze, Rev. Gen. 500. 1891; Duthie, Fl. U. Gang. Pl. 2 : 51. Repr. ed. 1960.

A stem-less herb with fibrous roots. Leaves petiolate, 6 - 20 x 2.5 - 7 cm, obovate or oblanceolate, undulate. Scapes many, usually longer or as long as the leaves, clothed with small, rigid, bract-like scales. Flowers in simple or branched, 2 - 7 cm long spikes. Bracts 6 mm long, ovate, acuminate, ciliate. Calyx 5 mm long, 4-partite. Corolla-tube 7 - 8 mm long, linear, limb bilipped, white, pale - coloured. Capsules 6-7 mm long.

Fls. : July - Sept. ; *Frt.s.* : Sept. - Oct. ; *Vern.* : *Patharchatta* ; AKS 439, Kitham.
Common in gravelly soil of the ridge and in hilly tracts amongst rock crevices.

7. ERANTHEMUM L.

Eranthemum nervosum (Vahl) R. Br. Prodr. 1 : 477. 1810 ; Bremek. in Rec. Trav. Bot. Neerl. 35 : 136, t. 14E. 1938 ; Santapau, Acanth. 35. 1952. *Justicia nervosa* Vahl, Enum. 1 : 164. 1804 ; Bot. Mag. 1. 1358. 1811. *Daedalacanthus nervosus* T. Anders. in J. Linn. Soc. 9 : 487. 1867 ; Duthie, Fl. U. Gang. Pl. 2 : 63. Repr. ed. 1960.

An erect shrub, 0.6 - 1.5 m or more high. Leaves variable in size, elliptic to ovate, entire, leathery. Flowers in bracteate, axillary and terminal spikes. Bracts leaf-like, ovate or elliptic, variegated green, 1.3 - 1.6 cm long. Corolla 2.8 - 3 cm long, deep blue, tube elongated, cylindric, narrow, widened near the top; limb subequally 5-lobed.

Fls. : March Sept. ; AKS 659, Rambagh.

Grown in the gardens as hedges and for ornamental purposes.

8. HEMIADELPHUS Nees

Hemiadelphus polyspermus Nees in Wall. Pl. As. Rar. 3 : 80. 1832 ; Bremek. in Dansk. Bot. Arkiv. 20 : 66. 1961. *Hygrophila polysperma* (Roxb.) T. Anders in J. Linn. Soc. 9 : 456. 1867 ; Hook. f. Fl. Brit. Ind. 4 : 406. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 56. Repr. ed. 1960. *Justicia polysperma* Roxb. Fl. Ind. 1 : 119. 1832.

An ascending or procumbent, pubescent herb, 15 - 30 cm high, branching and rooting near the base. Leaves opposite, subsessile, 1.4 - 3 x 0.5 - 1.3 cm, oblong to ovate, obtuse. Flowers in dense, terminal, oblong spikes. Bracts 5 mm long, elliptic-oblong, obtuse. Calyx 4.5 mm long. Corolla 6 mm long, pale-blue or white, bilipped. Capsules 8 - 9 mm long, narrowly oblong, hairy towards the tip. Seeds 24 - 28, minute, brown.

Fls. : Oct. Jan. ; *Frt.s.* : Jan. Feb. ; AKS 687, 847, Salempur.

Found in drying up marshy soil of water reservoir of low land area.

9. HEMIGRAPHIS Nees

Hemigraphis hirta T. Anders. in J. Linn. Soc. 9 : 462. 1867 ; Hook. f. Fl. Brit. Ind. 4 : 442. 1884 ; Duthie, Fl. U. Gang. Pl. 2 : 60. Repr. ed. 1960.

A prostrate, branched, softly hairy herb, 20–40 cm long. Leaves shortly petiolate, 1.5–3.5 × 0.9–2.2 cm, ovate or oblong, crenate. Flowers in few-flowered heads. Bracts 0.8–1 cm long, elliptic, pubescent. Calyx 1.1 cm long, densely hairy. Corolla 2 cm long, pale-blue to purple-pink, tubular-ventricose, falling soon. Capsules linear, glabrous.

Fls. : Mar. May ; *Frts.* : May June ; AKS 398, Bichpuri campus; 572, Kiraoli.

Common near the ponds, canals and in shady waste places.

10. HYGROPHILA R. Br.

Hygrophila auriculata (Sch.) Heyne in Kew Bull. 16 (2) : 172. 1962.
Barleria auriculata Sch. in Schumach. & Thom. Beskr. Guin. Pl. 285. 1827.
Asteracantha longifolia (L.) Nees in Wall. Pl. As. Rar. 3 : 90. 1832 ; Duthie, Fl. U. Gang. Pl. 2 : 55. Repr. ed. 1960 ; Santapau, Acanth. 17. 1952. *Hygrophila spinosa* T. Anders. in Thwaites, Enum. Pl. Zeyl. 225. 1860 ; Hook. f. Fl. Brit. Ind. 4 : 408. 1884.

A tall, hispid, marshy, stout herb, 60–100 cm high. Leaves sessile, in whorls of six, the 2 outer ones longer, oblong-lanceolate or lanceolate, each with a sharp, straight, yellow spine. Flowers in sessile, axillary whorls, surrounded by slightly recurved thorns. Bracts leafy, 1.5–2 cm long, bracteoles smaller, linear-lanceolate. Calyx 1–1.2 cm long, deeply 4-partite, the upper lobe the largest. Corolla 2.5–3 cm long, blue or bluish-purple, bilipped, the upper lip 2-lobed, lower ones 3-lobed. Capsules linear-oblong.

Fls. : Oct. Nov. ; *Frts.* : Nov. Dec. ; *Vern.* : *Talmakhana* ; AKS 44, Pachokhara.

Found on the banks of ponds and puddles.

11. JUSTICIA L.

The treatment of various species so far included under *Justicia* is far from satisfactory. Bremekamp [Verh. Nederl Akad. Wet. (2), 45 (2) : 61 & seq., 1948] has separated the various species of section 6 of C.B. Cl. (section *Rostellularia* in Hook. f. Fl. Brit. Ind. 4 : 536. 1885) and treated them under a distinct genus *Rostellularia* Roxb. L. Similarly Bremekamp (l. c.) and Ridley (Fl. Males. Pen. 2 : 593, 1923) treated *Justicia gendarussa* Burm. f. under *Gendarussa* Nees, the valid name being *Gendarussa vulgaris* Nees. In this work *Justicia* L. is treated in a broader sense as done by C. B. Clarke.

- 1a. Calyx 5-partite ; undershrubs 2. *J. gendarussa*

1b. Calyx 4-partite ; herbs ;

2a. Leaves linear to linear-lanceolate, nearly sessile ; bracts and sepals obtuse 3. *J. quinqueangulifolia*

2b. Leaves elliptic, oblong or ovate, petiolate ; bracts and sepals acute ;

3a. Sepal margins densely ciliate 4. *J. simplex*

3b. Sepal margins glabrous 1. *J. diffusa*

1. *Justicia diffusa* Willd. Sp. Pl. 1 : 87. 1797 ; Hook. f. Fl. Brit. Ind. 4 : 538. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 78. Repr. ed. 1960 ; Saplapau, Acanth. 87. 1952.

An erect, much-branched, glabrous herb, 20–30 cm high. Leaves petiolate, 3–4.6 x 1.1–1.8 cm, ovate to elliptic-lanceolate. Flowers in erect, axillary and terminal spikes. Bracts linear-lanceolate with scarious margins. Calyx 4 mm long, glabrous. Corolla 8 mm long, pink or pale-purple, bilipped. Lower anther cells spurred. Capsules oblong, glabrous.

Fls. : Aug. Oct. ; *Frtb.* : Oct. Nov. ; AKS 469, Salempur.

Common in cultivated fields and open unused grounds.

2. *Justicia gendarussa* Burm. f. Fl. Ind. 10, 1768; Hook. f. Fl. Brit. Ind. 4 : 532, 1885; Santapau, Acanth. 91, 1952. *Gendarussa vulgaris* Nees in Wall. Pl. As. Rat. 3 : 104, 1832 & in DC. Prodr. 11 : 410.

An erect undershrub, 60–100 cm high. Leaves petiolate, 6.4–11.5 × 1.3–2.4 cm, lanceolate or linear-lanceolate, coarsely crenate, glabrous. Flowers in spikes from the upper axils of leaves, forming a terminal panicle. Bracts narrow, linear. Calyx 5 mm long. Corolla 1.9 cm long, white. Spotted with purple within, bilipped, upper lip 2-lobed, lower ones 3-lobed. Stamens 2.

Fls. : Feb., Apr.; AKS 380, R.B.S. College garden.

Grown in gardens as a hedge plant.

3. *Justicia quinqueangularis* Koen. ex. Roxb. Fl. Ind. 1 : 133. 1832; Hook. f. Fl. Brit. Ind. 4 : 536. 1885; Duthie, Fl. U. Gang. Pl. 2 : 77. Repr. ed. 1960; Santapau, Acanth. 89. 1952.

A prostrate or geniculately ascending, slender herb. Stems angular. Leaves shortly petiolate, linear or linear-lanceolate, glabrous. Flowers in long, terminal

spikes. Bracts linear, obtuse, glabrous. Calyx 5 mm long. Corolla 8 mm long, rose-coloured, bilipped. Capsules oblong, pointed, glabrous.

Fls. & frts. : Mar. Sept. ; AKS 16, Poiya ghat.

Common in waste places, open fields and unused grounds.

4. **Justicia simplex** D. Don, Prodr. Fl. Nepal. 118. 1825 ; Hook. f. Fl. Brit. Ind. 4 : 539. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 78. Repr. ed. 1960 ; Santapau, Acanth. 89. 1952.

An erect herb, 10–20 cm high. Leaves petiolate, 1.4–3.5 × 0.9–1.6 cm, ovate to elliptic-oblong, acute. Flowers in axillary, terminal dense spikes. Bracts 3 mm long, elliptic, pubescent with ciliate margins. Bracteoles as long as the bracts, similar but narrower. Calyx 4 mm long. Corolla 6 mm long, pale-purple bilipped. Stamens 2 ; lower anther cells spurred. Capsules oblong, hairy at the top.

Fls. : Aug. Dec. ; *Frts.* : Dec. Feb. ; *Vern.* : Onga : AKS 286, Fatehpur Sikri ; 389 Poiya ghat ; 455, near JALMA.

Common in moist sandy soil of open fields and in gravelly soil of the ridge.

12. LEPIDAGATHIS Willd.

Lepidagathis hamiltoniana Wall. Pl. As. Rar. 3 : 96. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 515. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 72. Repr. ed. 1960.

An erect or suberect, perennial herb, 30–45 cm high. Leaves 3–7 × 0.7–1.3 cm, linear or oblong, glabrous. Spikes aggregated at the base of stem in globose, radical or subradical heads. Bracts 10–12 × 4–5 mm, lanceolate, sharply spine-tipped. Corolla white spotted with brown and purple. Stamens 4. Capsules 2-seeded.

Fls. : Nov. Feb. ; *Frts.* : Feb. Mar. ; AKS 603, Chhalesar ; 614, Arnota.

Found in sandy or gravelly soil of the ravine tract and also on the ridges.

13. PERISTROPHE Nees

Peristrophe bicalyculata (Retz.) Nees in Wall. Pl. As. Rar. 3 : 113. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 554. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 79. Repr. ed. 1960 ; Santapau, Acanth. 93. 1952. *Dianthera bicalyculata* Retz. in Vet. Akad. Handl. 297, t. 9. 1775.

An annual herb or undershrub, 50 - 60 cm high. Stems 6-angled, hairy. Leaves petiolate, 3.5 - 7.5 x 1.5 - 3 cm, ovate, acuminate. Flowers in conspicuously trichotomously branched, lax panicles. Bracts 2, unequal opposite, linear, margins scarious. Corolla pink, bilipped. Stamens 2. Capsules 9 - 11 mm long, oblong, pointed, narrowed into a stalk.

Fls. : Aug. - Oct.; *Frt.s.* : Oct. - Nov.; *Vern.* : Missi; AKS 1, Paliwal Park.

Common in moist waste places, unused grounds and along way sides.

14. RUELLIA L. emend. Bremek.

Ruellia tuberosa L. Sp. Pl. 635. 1753; Bremek. in Verh. K. Nederl. Akad. Wet. II 45 (1) : 11. 1948; Santapau, Acanth. 23. 1952.

An erect, glabrous, branched herb, 30 - 45 cm high, with number of slender, elongated root tubers. Leaves shortly petiolate, oblong-elliptic, entire to subundulate. Flowers paired, in the axils of leaves. Bracts and bracteoles narrow. Calyx 1.8 cm long. Corolla 4.5 cm long, blue-violet, tube abruptly narrowed below. Capsules linear.

Fls. : July - Sept.; *Frt.s.* : Sept. - Oct.; AKS 116, Paliwal Park.

Common in moist shady places of the gardens, lawns and waste places.

15. RUNGIA Nees

1a. Sterile and fertile bracts dissimilar

1. *R. pectinata*

1b. Sterile and fertile bracts similar

2. *R. repens*

1. **Rungia pectinata** (L.) Nees in DC. Prodr. 11 : 470. 1847; Santapau, Acanth. 77. 1952. *Justicia pectinata* L. Amoen. Acad. 4 : 299. 1759. *Rungia parviflora* var. *pectinata* Clarke in Hook. f. Fl. Brit. Ind. 4 : 550. 1885; Duthie, Fl. U. Gang. Pl. 2 : 80. Repr. ed. 1960.

An erect or procumbent, annual herb, 10 - 30 cm long. Leaves petiolate, 2 - 5 x 0.8 - 2 cm, elliptic or oblong-lanceolate, narrowed at ends. Flowers blue, in 1-sided, clustered spikes, 0.8 - 2 cm long. Bracts dimorphic, the barren ones imbricate in two rows, lanceolate, cuspidate, about 5 mm long with or without scarious margins; fertile bracts in two ventral rows, orbicular, 3 - 4 mm long with wide scarious margins. Corolla 4 mm long, blue, bilipped. Stamens 2; lower anther cells tailed. Capsules ovoid.

Fls. : Oct. Dec. ; *Frtts.* : Dec. Jan. ; AKS 234, near Shahjahan garden ; 285, Fatehpur Sikri ; 600, Chhalesar.

Abundant in moist places of the gardens, open grounds and also on the ridges.

2. *Rungia repens* (L.) Nees in Wall. Pl. As. Rar. 3 : 110. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 549. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 81. Repr. ed. 1960. *Justicia repens* L. Sp. Pl. 15. 1753.

An erect or decumbent herb, often rooting at nodes near the base. Leaves sessile, 2 - 5 x 0.7 - 1.4 cm, elliptic-lanceolate, acute. Flowers blue or pale-purple in erect, terminal spikes. Bracts orbicular, conspicuously winged. Capsules ovoid-oblong, acute, compressed.

Fls. & *frtts.* : Oct. Jan. ; AKS 941, Jagner.

Common in moist and shady places.

16. STROBILANTHES Blume

Strobilanthes scaber Nees in Wall. Pl. As. Rar. 3 : 84. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 446. 1884 ; Haines, Bot. Bih. & Or. 710. Repr. ed. 1961.

An erect, hispid herb, 0.6 - 1 m high. Leaves petiolate, 4.5 - 10.5 x 1.5 - 4.5 cm, elliptic or obovate, acute, crenate, pubescent, scabrous. Flowers in terminal spikes. Bracts 2, lanceolate, hairy. Calyx 1 cm long, hirsute. Corolla 2.8 cm long, yellow, narrowly tubular below, ventricose above, villosus within. Capsules usually 4-seeded, downy.

Fls. : March May ; AKS 400, Bichpuri campus.

Grown as hedges in gardens and on the boundaries.

17. THUNBERGIA Retz. nom. cons.

1a. Twining ; flowers yellow with dark purple throat 1. *T. alata*

1b. Erect shrub ; flowers dark blue or purplish-blue 2. *T. erecta*

1. **Thunbergia alata** Bojer ex Sims. Bot. Mag. t. 2591. 1825 ; Hook. f. Fl. Brit. Ind. 4 : 391. 1894 ; Bailey, Man. Cult. Pl. 919. 1949.

A slender, twinner with hairy branches. Leaves ovate to triangular-ovate, repand-toothed, obtuse, base cordate, pubescent. Flowers solitary on long axillary

pedicels, yellow with a brown or purple eye. Bracts 2, foliaceous. Calyx very small. Capsules with a globular base and flat beak.

Fls. : Feb. Apr. ; AKS 255, Taj Nursery.

Found spreading or twining upon shrubberies and hedges.

2. *Thunbergia erecta* (Benth.) T. Anders. in J. Linn. Soc. 7 : 18. 1864 ; Santapau, Acanth. 10. 1952 ; Bor & Raizada, 107, f. 63, Pl. 38, 39. 1954 ; Bailey, Man. Cult. Pl. 919. 1949. *Meyenia erecta* Benth. in Hook. Niger Fl. 476. 1849 & Bot. Mag. t. 4013. 1857.

A much-branched, glabrous shrub, 1–1.5 m high. Leaves ovate to ovate-lanceolate, entire or repand margins. Flowers solitary on axillary pedicels. Calyx very short, hidden by foliaceous bracts. Corolla large, dark blue or purplish-blue, funnel-form, tube curved, limb 5-lobed.

Fls. : Oct. Dec. ; AKS 551, Shahjahan garden.

Grown in gardens and parks as ornamental plant.

70. VERBENACEAE

1a. Inflorescence spicate : flowers opening centripetally :

2a. Creeping herbs, rooting at nodes ; calyx 2–4 fid ; fruit dry

3. *Phyla*

2b. Erect or rambling shrubs ; calyx truncate or obscurely 4–5 toothed ; fruit succulent

2. *Lantana*

1b. Inflorescence cymose ; flowers opening centrifugally :

3a. Leaves 3 to 5-foliate; drupes with 1, 4-celled pyrene

4. *Vitex*

3b. Leaves simple ; drupes with 4, 1-seeded pyrenes

1. *Clerodendrum*

1. CLERODENDRUM L.

1a. Flowers in axillary, 3-flowered cymes

1. *C. inerme*

1b. Flowers in dichotomous cymes forming a terminal panicle

2. *C. phlomidis*

1. *Clerodendrum inerme* (L.) Gaertn. Fruct. 1 : 271. 1788 ; Bor & Raizada 146, f. 92. 1954. *Volkameria inermis* L. Sp. Pl. 637. 1753.

A straggling or scandent, much-branched shrub, 1 - 2.5 m high. Leaves opposite, petiolate, 4 - 7.5 x 2.3 - 4.5 cm, ovate, elliptic or obovate, glabrous, subfleshy. Flowers in axillary, 3-flowered cymes. Corolla white, tube slender, limb more or less oblique. Stamens 4; filaments purple-red, hairy at the base. Drupes pyriform, subtended at base by accrescent calyx.

Fls. : June - Dec. ; AKS 448, Shahjahan garden.

Commonly grown as hedge plant in gardens and private places.

2. *Clerodendrum phlomidis* L.f. Suppl. 292. 1781 ; Duthie, Fl. U. Gang. Pl. 2 : 92. Repr. ed. 1960 ; Bor & Raizada 154, t. 98. 1954.

A large shrub or small tree. Bark light brown. Leaves opposite, petiolate, 1.4 - 5 x 1.1 - 4 cm, ovate or subrhomboid, acute, crenate, undulate or entire. Flowers in terminal and axillary, dichotomous cymes, forming a rounded panicle. Calyx campanulate, 9 mm long, lobes 5. Corolla white, tube 2.2 - 2.7 cm long, lobes 5, elliptic, obtuse. Drupes broadly ovoid, black. Seeds oblong, white.

Fls. : Sept. - Dec. ; Vern. : Arni ; AKS 345, Patchpu Sikri ; 592, Kitham.

Occurs in fallow fields, hilly tracts and on the ridges.

2. LANTANA L.

Lantana indica Roxb. Fl. Ind. 3 : 89. 1832 ; Hook. f. Fl. Brit. Ind. 4 : 562. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 83. Repr. ed. 1960.

A woody shrub, 1 - 2 m tall. Branches long and straggling, 4-angular. Leaves opposite or ternate, petiolate, 4 - 7.5 x 2.5 - 4 cm, ovate, acute or subobtuse, crenate-serrate, white-pubescent beneath. Flowers scentless, in axillary, peduncled, close heads or 1.2 - 2 cm long spikes, elongating in fruit. Lowest bracts ovate, acuminate forming involucre. Corolla white, cylindric, lobes 4, spreading. Drupes purple, enclosed in thin transparent calyx.

Fls. : Aug. - Oct. ; *Frls.* : Oct. - Nov. ; Vern. : Tulsidal ; AKS 496, Khandar.

Common on the ridges and in hilly tracts amongst other shrubs.

3. PHYLA Lour

Phyla nodiflora (L.) Greene in Pittonia 4 : 46. 1899 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 237. 1953. *Verbena nodiflora* L. Sp. Pl. 20. 1753. *Lippia nodiflora* A. Rich. in Michx. Fl. Bor. Amer. 2 : 84. Repr. ed. 1960.

A widely creeping much-branched, perennial herb. Stems rooting at the nodes. Leaves subsessile, 1 - 3 x 0.6 - 1.5 cm, spatulate, cuneate and entire at base, sharply serrate at the rounded apex. Flowers sessile, numerous, in dense, globose, long-peduncled, axillary heads, elongating later into oblong spikes. Bracts broadly elliptic or obovate, mucronate. Calyx 2 - 4 fid. Corolla pale pink, obscurely 2-lipped, 2 - 2.5 mm long. Pyrenes 2, dry, 1-seeded, plano-convex, glabrous.

Fls. & frts. : Mar. Sept. ; *Vern.* : *Bukkan* ; AKS 61, Bichpuri campus.

Common in moist sandy soil on the bank of Jamuna river, canals, in moist waste places and along waysides.

4. VITEX L.

Vitex negundo L. Sp. Pl. 638. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 583. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 90. Repr. ed. 1960.

A large shrub or small tree. Leaves opposite, digitately 3 - 5-foliate; leaflets petiolulate, 4.5 - 12 x 1.5 - 4.5 cm, lanceolate, acuminate, entire rarely crenate, white-tomentose beneath. Flowers in loose clusters, arranged in a large terminal pyramidal panicle. Calyx campanulate, 5-toothed. Corolla lavender to blue, 2-lipped, upper lip deeply 2-lobed, lower ones 3-lobed. Drapes black when ripe, with 1, 4-celled pyrene.

Fls. : Mar. Oct. ; *Vern.* : *Sambhalu*; AKS 420, Shahjahan garden; 726, Hospital road.

Planted in gardens, lawns and private places. The boiled leaves are useful in pains and rheumatic troubles.

List of cultivated Taxa :

Clerodendrum splendens G. Don in Edinb. N. Phil. Jour. 11 : 349. 1824 ; Bailey, Stand. Cycl. Hort. 1 : 800.

Petrea volubilis L. Sp. Pl. 626. 1753 ; Bor & Raizada 141, Pl. 54. 1954 ; Bailey, Man. Cult. Pl. 843. 1949 ; AKS 700, Agra College garden.

Tectona grandis L. f. Suppl. 151. 1781; Hook. f. Fl. Brit. Ind. 4 : 570. 1885; Duthie, Fl. U. Gang. Pl. 2 : 87. Repr. ed. 1960; Vern. : *Sagwan*; AKS 727, Baptist School.

71. LAMIACEAE (Labiatae)

1a. Stamens didynamous, anther cells confluent :

2a. Calyx 2-lipped, not compressed ; corolla 2-lipped, upper lip 4-lobed, lower entire *5. Ocimum*

2b. Calyx sub-2-lipped, compressed ; corolla 2-lipped, upper lip 2-lobed, lower 3-lobed *2. Hyptis*

1b. Stamens erect, spreading or ascending, anther cells 1 : 2 :

3a. Stamens 2 *7. Salvia*

3b. Stamens 4:

4a. Upper pair of stamens with 1-celled anthers *1. Anisomeles*

4b. Anthers all 2-celled :

5a. Leaves palmately divided *3. Leonurus*

5b. Leaves simple not divided :

6a. Calyx 6-10-toothed ; flowers white *4. Leucas*

6b. Calyx sub-bilabiate, 5-toothed; flowers bluish-purple *6. Nepeta*

1. ANISOMELES R. Br.

Anisomeles indica (L.) Kunze, Rev. Gen. 512. 1891. *Nepeta indica* L. Sp. Pl. 571. 1753. *Anisomeles ovata* R. Br. in Ait. f. Hort. Kew 3 : 364. 1811; Duthie, Fl. U. Gang. Pl. 2 : 109. Repr. ed. 1960.

An erect herb, 1 - 1.5 m high. Stem quadrangular. Leaves petiolate, 4.5 - 8 x 3 - 7 cm, ovate, cordate, crenate - serrate, scabrous. Flowers in many-flowered, axillary whorls, forming a more or less interrupted spikes. Bracts linear, pubescent. Calyx 8 mm long. Corolla 2 cm long, bilipped, dark red. Upper pair of stamens with 1-celled anthers. Nutlets black, smooth, shining.

Fls. : Aug. Oct. ; *Vern.* : *Kala bhangra* ; AKS 141, Bichpuri campus.

Common in moist places of open grounds and along the banks of canals.

2. HYPTIS Jacq.

Hyptis suaveolens (L.) Poit. in Ann. Mus. Hist. Nat. Par. 7 : 472, t. 29, f. 2. 1806 ; Hook. f. Fl. Brit. Ind. 4 : 630, 1885 ; Haines. Bot. Bih. & Or. 772. Repr. ed. 1961. *Ballota suaveolens* L. Syst. ed. 10, 1100. 1759.

An erect, stout, sweet-smelling, annual herb to undershrub, 1-1.5 m high. Stem 4-angled, decussately branched, pubescent. Leaves petiolate, 4.5 - 9 x 3.5 : 9.5 cm, cordate-ovate, crenate-serrate, clothed with small shining hairs. Flowers in axillary racemiform cymes. Calyx 7 mm long, compressed, sub-2-lipped, somewhat deflexed. Corolla 9 mm long, blue, upper lip 2-lobed, lower 3-lobed. Stamens 4, declinate. Nutlets compressed, ovoid-oblong, ribbed.

Fls. : Aug. Oct. ; *Frt.s.* : Oct. Nov. ; AKS 368, Bichpuri campus.

Uncommon, first report from the area; occurs in unused grounds.

3. LEONURUS L.

Leonurus sibiricus L. Sp. Pl. 584. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 678. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 110. Repr. ed. 1960.

An erect, stout herb, 60 - 100 cm high. Stems quadrangular, hirsute. Leaves petiolate, 7 - 10 x 6 - 8 cm, palmately divided with linear-lanceolate segments. Flowers in axillary dense-flowered whorls. Calyx 9 mm long. Corolla 1.2 cm long, pink, upper lip 2-lobed, hooded, lower 3-lobed, silky hairy.

Fls. : Feb. Mar. ; AKS 358, Jamuna Kinara.

Rare, found in waste places.

4. LEUCAS R. Br.

1a. Calyx mouth straight

3. *L. mollissima* var.
scoberula

2a. Calyx mouth split above ; lower lip much prolonged

5. *L. articaefolia*

2b. Calyx mouth not split, upper lip projecting forward :

- 3a. Calyx teeth long and slender 4. *L. nutans*
- 3b. Calyx-teeth very short :
- 4a. Flowers in large, terminal, globose whorls,
surrounded by an involucre of imbricating bracts;
calyx hairy within 2. *L. cephalotes*
- 4b. Flowers in axillary and terminal whorls ;
Calyx glabrous within 1. *L. aspera*

1. *Leucas aspera* (Willd.) Spreng. Syst. 2 : 743. 1825 ; Hook. f. Fl. Brit. Ind. 4 : 690. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 113. Repr. ed. 1960. *Phlomis aspera* Willd., in Link, Enum. Pl. Hort. Berol. 2 : 621. 1822.

An erect or diffuse, much-branched, annual, pubescent herb. Leaves shortly petiolate, 2.5–7.5 x 0.7–1.5 cm, elliptic-linear, subentire or crenate. Flowers in terminal or axillary whorls, upto 2.5 cm across. Bracts linear, ciliate. Calyx 8 mm long, tubular, mouth very oblique, glabrous within. Corolla 1.5 cm long, white. Nutlets oblong, smooth, brown.

Fls. : Sept. – Jan. ; *Frt.s.* : Jan. – Feb. ; *Vern.* : *Gopha* ; AKS 75, Chhalesar ; 167, Poiya ghat.

Common in cultivated and unused fields.

2. *Leucas cephalotes* (Roth.) Spreng. Syst. 2 : 743. 1825 ; Hook. f. Fl. Brit. Ind. 4 : 689. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 114. Repr. ed. 1960. *Phlomis cephalotes* Roth, Nov. Pl. Sp. 262. 1821.

An erect, pubescent, annual herb, 30–90 cm high. Stems and branches obtusely angled. Leaves petiolate, 5–9.5 x 2–4 cm, ovate or ovate-lanceolate, crenate-serrate. Flowers in terminal, head-like large globose whorls. Bracts numerous, foliar and forming an involucre, covering the floral heads. Calyx 1.2 cm long, tubular, mouth oblique, hairy within. Corolla 1.8–2 cm long, white, upper lip erect, lower longer, 3-lobed. Nutlets obovoid-oblong, smooth, dark brown.

Fls. : Aug. – Oct. ; *Frt.s.* : Oct. – Nov. ; *Vern.* : *Gubha*; AKS 264, Bichpuri campus.

Common in cultivated fields and unused grounds.

3. *Leucas mollissima* Wall. var. *scaberula* Hooker in Hook. f. Fl. Brit. Ind. 4 : 682. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 115. Repr. ed. 1960.

A straggling, much-branched, hairy herb, 30–60 cm long. Stems quadangular. Leaves petiolate, 2.2–3.5 x 1.2–2.2 cm, ovate or ovate-lanceolate, acute,

serrate. Flowers subsessile in distant many-flowered whorls. Bracts shorter than the calyx, linear, hairy. Calyx 8 mm long, tubular, 10-toothed hispid. Corolla 1.5 cm long, white, upper lip 2-lobed, densely silky, lower 3-lobed. Nutlets oblong-obovoid.

Fls. & frts. : Feb.-May; AKS 363, Taj nursery.

Uncommon, occurs in moist shady places of the gardens.

4. Leucas nutans (Roth) Spreng, Syst. 2 : 743. 1825 ; Hook. f. Fl. Brit. Ind. 4 : 688. 1885; Duthie, Fl. U. Gang. Pl. 2 : 114. Repr. ed. 1960. *Phlomis nutans* Roth, Nov. Pl. Sp. 263. 1821.

A small, straggling, diffusely-branched, annual herb. Leaves sessile or subsessile, oblong or oblong-lanceolate, obtuse, subserrate. Flowers white, in terminal and axillary, many-flowered whorls. Calyx mouth oblique; teeth 10, the uppermost one largest, the rest subequal, ciliate. Nutlets narrowly oblong-ellipsoid, smooth, brown.

This plant is included on the authority of Duthie (in Duthie, Fl. U. Gang. Pl. 2 : 114).

5. *Leucas urticaefolia* (Vahl) R. Br. Prodr. 504. 1810; hook. f. Fl. Brit. Ind. 4 : 680. 1885; Duthie, Fl. U. Gang. Pl. 2 : 212. Repr. ed. 1960. *Phlomis urticaefolia* Vahl, Symb. 3 : 76. 1790.

An erect or diffuse, hairy herb. Leaves petiolate, ovale, acute, coarsely serrate. Flowers white, in dense, globose whorls. Bracts linear or subulate-lanceolate, ciliate. Calyx mouth very oblique; upper lip very small; lower lip much prolonged. Nutlets obovoid-oblong, trigonous, brown.

This plant is included on the authority of Duthie (in Duthie, Fl. U. Gang. Pl. 2 : 112).

S. OCIMUM L.

1. **Ocimum americanum** L. Sp. Pl. 833. 1753 (non Jacq.). *Ocimum canum* Sims in Bot. Mag. t. 2452. 1824 ; Hook. f. Fl. Brit. Ind. 4 : 607. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 99. Repr. ed. 1960.

An erect, much-branched, pubescent herb, 30 - 60 cm high. Leaves petiolate, 1.5 - 4.5 x 1-2 cm, elliptic-oblong to elliptic-lanceolate, entire or crenulate. Flower whorls 4-6 flowered on an erect, 4 - 15 cm long, loose inflorescence. Calyx 4-5 mm long, upper lip rounded, flat. Corolla 6-7 mm long, upper lip 4-toothed, lower obtuse, pale violet or purplish-white. Stamens 4, declinate. Nutlets ellipsoid, black.

Fls. : Oct. - Jan. ; *Frtts.* : Jan. - Feh. ; *Vern.* : *Jangli tulsi* ; AKS 283, Fatehpur Sikri ; 317, Bichpuri campus.

Common in shady places of gardens, unused grounds and in gravelly soil of the ridge.

2. **Ocimum basilicum** L. Sp. Pl. 597. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 608. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 99. Repr. ed. 1960.

An erect, glabrous, dark purple herb, 6 - 100 cm high. Leaves petiolate, 3.5-6.5 x 0.8 - 2 cm, ovate-lanceolate, toothed or entire. Flowers in simple or much-branched often thyrsoid racemes. Calyx 5-6 mm long, upto 7 mm in fruit, upper lip broad, recurved, the lower 4-toothed. Corolla 12 mm long, upper lip subequally 4-lobed, lower entire, whitish-pink. Stamens 4, declinate. Nutlets pitted, black.

Fls. & frts. : Sept. - Mar. ; *Vern.* : *Kali tulsi* ; AKS 315, Bichpuri campus.

Grown in public and private gardens.

3. **Ocimum sanctum** L. Mant. 1 : 85. 1767 ; Hook. f. Fl. Brit. Ind. 4 : 609. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 98. Repr. ed. 1960.

An erect, much-branched herb, 30 - 60 cm high. Leaves petiolate, 2.4 - 6 x 1.5 - 2.8 cm, ovate, elliptic-oblong, entire or serrate, hairy, minutely dotted. Flowers whorled, in racemes. Calyx 4-5 mm long, glabrous, enlarging in fruit. Corolla 6 mm long, upper lip 4-toothed, purplish-pink, hairy on the back. Stamens 4, declinate. Nutlets broad ellipsoid, smooth.

Fls. & frts. : Feb. - May ; *Vern.* : *Tulsi* ; AKS 66, Bichpuri campus.

Grown in public and private gardens.

6. NEPETA L.

Nepeta hindostana (Roth.) Haines, Bot. Bih. & Or. 744, 1922 ; 781, Repr. ed. 1961. *Glechoma hindostana* Roth. Nov. Sp. Pl. 258, 1821; *Nepeta ruderalis* Buch-Ham. ex Hook. f. Fl. Brit. Ind. 4 : 661, 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 117. Repr. ed. 1960.

An erect or ascending herb, 30 - 50 cm high, branching from the base. Branches quadrangular, grooved. Leaves long petiolate, 2 - 5 x 1.8 - 4.7 cm, ovate, broad ovate to sub-orbicular, crenate. Flowers in dense, peduncled cymes, forming an interrupted spike or a slender panicle. Calyx 4.5 mm long, sub-bilabiate, villous. Corolla 6 mm long, bluish-purple, upper lip flat, 2-fid, lower 3-fid. Nutlets oblong-ellipsoid, brown with white dots.

Fls. : Feb. - Mar. ; *Frt.s.* : Mar. - Apr. ; AKS 651, St' John's College campus.

Found in St' John's College campus.

7. SALVIA L.

1a. Corolla 2 cm long, scarlet

1. *S. coccinea*

1b. Corolla 0.5 - 0.6 cm long, bluish-white

2. *S. plebeia*

1. *Salvia coccinea* Juss. ex Murr. in Commentat. Gotting. 5 : 86, 1779 ; Bailey, Man. Cult. Pl. 858, 1949.

An erect, perennial undershrub, 0.6 - 1.6 m high. Leaves petiolate, 2 - 8 x 1.8 - 4.5 cm, ovate - cordate, crenate, pubescent above, hoary-tomentose beneath. Flower-whorls 6 - 10 flowered in lax interrupted terminal racemes ; bracts ovate, acuminate, deciduous. Calyx 9 - 10 mm long, tubular-campanulate, striate. Corolla 2 cm long, upper lip entire, lower 2-lobed, scarlet. Stamens 2, ascending.

Fls. : Jan. - Apr. ; AKS 360, R. B.S. College garden.

Grown in the gardens.

2. *Salvia plebeia* R. Br. Prodr. 501, 1810; Hook. f. Fl. Brit. Ind. 4:655, 1885; Duthie, Fl. U. Gang. Pl. 2 : 118. Repr. ed. 1960.

An erect, roughly pubescent, feebly-sweet smelling, annual herb, 15-45 cm high. Stems stout, branched, 4-angled. Leaves petiolate, 2-7 x 2-3 cm, oblong-lanceolate, crenate. Flowers in panicled, usually compact spicate racemes. Calyx 3-4 mm long, upper lip 3-toothed, lower 2-toothed. Corolla 5-6 mm long, upper

lip erect, entire, lower 3-lobed, bluish-white, stamens 2 in ascending. Nutlets minute, ovoid, brown, smooth.

Fls. : Feb. Apr. ; *Frt.s.* : Apr. May ; AKS 60, Bichpuri campus ; 691, Salempur.

Common along the irrigation channels of cultivated land.

72. NYCTAGINACEAE

BOERHAVIA L.

- | | |
|---|---------------------------|
| 1a. Fruits with large, semiglobose glands at the crown | 3. <i>B. verticillata</i> |
| 1b. Fruits glandular along the ribs, not at the crown : | |
| 2a. Stamens 2 or 3, not exserted ; flowers subcapitulate ; leaves of each pair very unequal | 2. <i>B. diffusa</i> |
| 2b. Stamens 4 or 5, much exserted ; flowers in umbels ; leaves of each pair nearly equal | 1. <i>B. chinensis</i> |

1. *Boerhavia chinensis* (L.) Druce, in Rep. Bot. Exch. Cl. Brit. Isles, 3 : 415. 1914. *Valerina chinensis* L. Sp. Pl. 33. 1753. *Boerhavia repanda* Willd. Sp. Pl. 1 : 22. 1791 ; Hook. f. Fl. Brit. Ind. 4 : 709. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 128. Repr. ed. 1960.

A diffuse, sub-scandent herb. Leaves opposite, in nearly equal pairs, petiolate, 2.5 - 6.5 x 2.1 - 5 cm, deltoid-ovate, acute or acuminate, repand-sinuate, pubescent beneath. Flowers pink, in slender, long-peduncled umbels. Stamens 4 or 5, much exserted. Fruits club-shaped, obscurely ribbed, viscid-glandular.

Fls. : July Sept. ; *Frt.s.* : Sept. Oct. ; AKS 185, Bichpuri campus.

Common straggling on shrubs and bushes in gardens and along roadsides.

2. *Boerhavia diffusa* L. Sp. Pl. 3. 1763 ; Duthie, Fl. U. Gang. Pl. 2 : 127. Repr. ed. 1960. *B. repens* L. Sp. Pl. 3. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 709. 1885. *B. procumbens* Roxb. Fl. Ind. 1 : 146. 1832.

A diffusely branched, prostrate, or ascending herb. Leaves opposite, in unequal pairs, petiolate, 2 - 4.5 x 2.1 - 4 cm, broad ovate or sub-orbicular, base rounded or cordate, whitish beneath. Flowers pink, minute, 4 - 10 together in small bracteate umbels, forming long-stalked axillary and terminal panicles. Perianth 2

mm long, limb funnel-shaped, lobes 5. Stamens 2 or 3. Fruits clavate, 5-ribbed, viscidly glandular on the ribs.

Fls. & frts. : Most part of the year ; *Vern.* : *Santh* ; AKS 110, Poiya ghat ; 746, 747 and 764, College campus ; 812, Chiknipur.

Abundant in waste places, unused grounds, along waysides and on the ridge. This plant is highly variable in different habitats.

3. *Bucchavia verticillata* Poir. Encyl. Method. 5 : 56. 1804 ; Hook. f. Fl. Brit. Ind. 4 : 710. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 128. Repr. ed. 1960.

A glabrous herb, decumbent or climbing among bushes. Leaves opposite, petiolate, 2-5.5 x 2-5 cm, broadly ovate or suborbicular, acute or obtuse, sinuate, coriaceous. Flowers pink, in few flowered whorls, forming a long peduncled raceme. Stamens slightly exserted. Fruits 5-6 mm long, clavate with large semi-globose glands round the crown.

Fls. : Sept. - Oct. ; *Frts.* : Oct. - Nov. ; AKS 583, Niyamatpur ; 810, Chiknipur.

A first report from the area. Occurs on ridges spreading or climbing on bushes especially *Capparis decidua* Edgew.

73. AMARANTHACEAE

1a. Leaves alternate or fascicled :

2a. Stamnodes present between the stamens 2. *Aerva*

2b. Stamnodes absent :

3a. Seeds many 5. *Celosia*

3b. Seed solitary :

4a. Flowers hermaphrodite 6. *Digera*

4b. Flowers unisexual or polygamous 4. *Amaranthus*

1b. Leaves opposite :

5a. Anthers 1-celled :

6a. Heads smaller, from most of the leaf axils ; stigma capitate 3. *Alternanthera*

6b. Heads larger, terminal ; stigma bilobed 7. *Gomphrena*

5b. Anthers 2-celled :

- 7a. Flowers in clusters, perfect only one, imperfect several with hooked bristles *9. Pupalia*
- 7b. Flowers all perfect, in spikes :
 - 8a. Woolly short, axillary spikes bearing deflexed flowers ; stamens 2, staminodes absent *8. Nothosperma*
 - 8b. Spiny terminal spikes ; stamens 5, with interposed staminodes *1. Achyranthes*

1. ACYRANTHES L.

- 1a. Outer (upper) tepals distinctly longer and narrower than the others, aristate, others muticous ; bracteoles not spinescent *1. A. aquatica*
- 1b. Tepals subequal ; bracteoles spinescent *2. A. aspera*

1. Achyranthes aquatica R. Br. Prodr. 417. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 730. 1885 ; Haines, Bot. Bih. & Or. 805. Repr. ed. 1961.

A stout, aquatic herb with decumbent and rooting stems. Branches erect, striate, terminating in floral spikes. Leaves petiolate, 3 - 6.5 x 1.1 - 2.2 cm, linear-lanceolate to elliptic-lanceolate, acute. Flowers greenish, bisexual in erect, terminal spikes. Bracteoles orbicular, membranous, short embracing the base of the perianth, not aristate. Outer tepals linear-subulate, spinous-tipped, 7 mm long, exceeding the inner, unarmed tepals. Utricle ovoid, truncate, brown.

Fls. & frts. : Sept. Nov. ; AKS 919, Salempur.

This is first report from the area, occurs in canals and ponds.

2. Achyranthes aspera L. Sp. Pl. 204. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 730. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 140. Repr. ed. 1960.

An erect or subscandent herb, 30 - 100 cm tall. Leaves opposite, ovate, elliptic-oblong, elliptic-ovate, acute or acuminate. Flowers greenish-white, bisexual, in erect, terminal spikes which elongate in fruit. Bracts and bracteoles ovate, persistent, ending in a spine. Tepals 5, lanceolate, glabrous. Stamens 5, with interposed staminodes. Utricle oblong, enclosed by the hardened perianth. Seeds sub-cylindrical, brown.

Fls. & frts. : For most part of the year ; Vern. : Ongha., Chirchitta ; AKS 3, Paliwal Park.

Abundant in waste places, gardens, unused grounds and also on ridges.

2. AERVA Forsk. nom. cons.

Aerva persica (Burm. f.) Merril. in Phil. Sci. 10 : 348. 1928. *Iresine persica* Brum. f. Fl. Ind. 212. 1768. *Aerva javanica* (Burm. f.) Juss. ex. Schult. Syst. 5 : 565. 1819 ; Hook. f. Fl. Brit. Ind. 4 : 727. 1885 ; Hutch., Dalzel & Keay, Fl. West Trop. Afr. 1 : 149. 1954.

An erect, stiff, branched undershrub, 60–100 cm high, covered with thick woolly tomentum. Leaves alternate, 4–7.5 × 1–1.5 cm, ovate-lanceolate, linear-oblong, subacute or obtuse. Flowers unisexual, sessile, in dense, white-woolly, 2.5–10 cm long spikes forming leafless, terminal panicles. Bracteoles ovate, acute, hyaline. Staminodes present between the stamens. Seeds polished, dark brown.

Fls. : Sept. – Nov. ; Frts. : Nov. – Dec. ; Vern. : *Dholphulin* ; AKS 217, Chhalesar ; 863, Kitham.

Occurs in sandy or gravelly soil of ridges and ravine tract.

3. ALTERNANTHERA Forsk.

ta. Perianth segments not spine-tipped ; stamens 3 ; leaves linear-oblong or oblanceolate

3. *A. sessilis*

1b. Perianth segments spine-tipped ; stamens 5 ; leaves sub-orbicular or circular or spatulate-elliptic :

2a. Leaves more than 2 cm long, sub-orbicular or nearly circular 2. *A. pungens*

2b. Leaves upto 2 cm long, spatulate-elliptic 1. *A. paronychioides*

1. *Alternanthera paronychioides* St. Hill. Voy. Bras. 2 : 439. 1833 ; Raizada in Ind. For. Rec. 1 : 233. 1939.

A prostrate, tufted herb, rooting at the nodes. Leaves opposite, petiolate, 8–20 × 3–7 mm, spatulate-elliptic, acute or obtuse, glabrous. Flowers scarious, shining, white, in dense sessile, globose, axillary heads. Tepals 5. Stamens 5 ; anthers 1-celled.

Fls. : Mar. – Aug. ; Frts. : Aug. – Oct. ; AKS 101, Polya ghat ; 365, Taj nursery ; 573, Kiraoli.

This is first record from the area. A recently introduced weed; has became well established in moist places near the banks of rivers, canals and ponds.

2. *Alternanthera pungens* H.B. & K. Nov. Gen. & Sp. 2 : 206. 1818 ; Melville in Kew Bull. 174. 1958.

A prostrate or decumbent, spreading herb. Stems clothed with shaggy hairs. Leaves opposite, $1.5 - 4 \times 1 - 3$ cm, sub-orbicular or nearly circular, obtuse, entire, tapering towards the base, hairy. Flowers scarious, white, in axillary heads. Tepals 5, becoming spiny in fruit. Stamens 5 ; anthers 1-celled.

Fls. : Aug. Dec. ; *Frt.s.* : Dec. - Jan. ; AKS 2, Paliwal Park ; 342, Bichpuri campus.

Abundant along roadsides and in gardens, lawns, unused grounds and waste places.

3. *Alternanthera sessilis* (L.) R. Br. ex DC., Cat. Pl. Hort. Bot. Monspel. 4 : 77. 1813 ; Hook. f. Fl. Brit. Ind. 4 : 731. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 142. Repr. ed. 1960. *Gomphrena sessilis* L. Sp. Pl. 225. 1753.

A prostrate or ascending, glabrous herb. Leaves opposite, $2 - 5 \times 0.5 - 1$ cm, variable as to shaped and size, elliptic, linear-oblong or oblanceolate, acute or obtuse, tapering towards the base. Flowers scarious, white, shining in axillary, sessile, $0.5 - 1.5$ cm long heads. Anthers 1-celled. Utricle broadly obovate, with thickened margin. Seeds sub-orbicular.

Fls. : Aug. Oct. ; *Frt.s.* : Oct. Dec. ; AKS 211, Poiya ghat.

Common in open waste places, gardens and near the banks of canals and ponds.

4. AMARANTHUS L.

1a. Bracteoles awned or setaceous, equaling or exceeding the tepals; fruits dehiscent, circumsciss :

2a. Spiny herbs ; tepals and stamens 5

2. *A. spinosus*

2b. Spineless herbs ; tepals and stamens 3

4. *A. tricolor*

1b. Bracteoles acute, hardly awned, shorter than the tepals ; fruits usually indehiscent :

3a. Tepals and stamens 2

3. *A. tenuifolius*

3b. Tepals and stamens 3 :

4a. Fruit with an acute apex ; flowers in axillary clusters and in terminal, pedicled spikes *S. A. viridis*

4b. Fruit blunt at the apex ; flowers in axillary clusters and in terminal, simple or lobed spikes *S. A. blitum var. oleracea*

1. *Amaranthus blitum* L. var. *oleracea* Hook. f. Fl. Brit. Ind. 4 : 721. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 136. Repr. ed. 1960.

A glabrous, erect or procumbent herb. Leaves petiolate, ovate-oblong or rounded, retuse. Flowers greenish, in axillary clusters and terminal, simple or branched spikes. Tepals 3. Stamens 3. Utricle broadly ovate. Seeds shining, black, lenticular.

Fls. & frts. : Aug. Mar. ; *Vern.* : *Chauli* ; AKS 366, Taj nursery.

Occurs in gardens, open grounds and along roadsides.

2. *Amaranthus spinosus* L. Sp. Pl. 991. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 718. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 133. Repr. ed. 1960.

An erect or diffuse, armed herb or undershrub, 30 - 100 cm tall. Leaves alternate, 3 - 6 x 1.5 - 2 cm, ovate or ovate-lanceolate, spine-tipped, base caudate. Flowers greenish, unisexual, monoecious, in dense, axillary interrupted spikes. Tepals 5. Stamens 5, in male flowers. Capsules ovoid, rugose. Seeds shining, dark brown or black.

Fls. & frts. : Aug. Jan. ; *Vern.* : *Marsa* ; AKS 11, Dayalbagh.

Common in open waste places, gardens, open fields and along roadsides.

3. *Amaranthus tenuifolius* Willd. Sp. Pl. 4 : 381. 1805 ; Hook. f. Fl. Brit. Ind. 4 : 722. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 137. Repr. ed. 1960.

A prostrate or ascending, spreading, glabrous herb, 15 - 45 cm long. Leaves shortly petiolate, 1 - 2.5 x 0.4 - 0.7 cm, oblanceolate-oblong or linear, retuse. Flowers green, unisexual, monoecious, in minute, axillary clusters. Tepals 2. Stamens 2. Utricle orbicular, compressed. Seeds lenticular, shining, brown.

Fls. : July Sept. ; *Frts.* : Sept. Oct. ; AKS 438, Kitham.

Rare, found in moist places near the banks of lakes and canals.

4. *Amaranthus tricolor* L. Sp. Pl. 989. 1753 ; Santapau in Rec. Bot. Surv. Ind. 16 (1) : 249. 1953. *A. gangeticus* L. Syst. 1268. 1759 ; Hook. f. Fl. Brit. Ind. 4 : 719. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 135. Repr. ed. 1960.

An erect, stout, glabrous, branching herb, 60 - 100 cm high. Leaves alternate, 5.5 - 9.5 x 3 - 5 cm, rhomboid or deltoid-ovate, obtuse or emarginate. Flowers green, in axillary, dense clusters, forming long, distantly interrupted spikes. Bracts and tepals lanceolate, acute or awned. Tepals 3. Stamens 3. Capsules ovoid, rugose. Seeds biconvex, black.

Fls. & frts. : Aug. - Dec. ; AKS 256, Bichpuri campus.

Common in cultivated and fallow fields, waste places and along waysides.

S. Amaranthus viridis Hook. f. Fl. Brit. Ind. 4 : 720, 1885 (non L.) ; Duthie, Fl. U. Gang. Pl. 2 : 136. Repr. ed. 1960. *A. gracilis* Desf. Tahl. Hort. Par. 43, 1804.

An erect or ascending, branching herb, 30 - 60 cm high. Leaves long-petiolate, 3 - 9 x 1.5 - 3.5 cm ovate-oblong or deltoid-ovate, acute, obtuse, or retuse, base truncate or cuneate. Flowers green, unisexual, monoecious, in small axillary clusters and in axillary and terminal, panicled, spik-like racemes. Tepals 3. Stamens 3. Fruits suborbicular, compressed, strongly corrugated. Seeds black, shining, lenticular.

Fls. & frts. : July - Feb. ; Vern. : Jangli Chauli ; AKS 206, Paliwal Park ; 261, Poiya ghat.

Abundant in gardens, cultivated and unused fields and along roadsides.

S. CELOSIA L.

1a. Spikes dense, unbranched, pale pink 1. *C. argentea*

1b. Spikes branched, forming a cockscomb, red 2. *C. cristata*

1. *Celosia argentea* L. Sp. Pl. 205, 1753 ; Hook. f. Fl. Brit. Ind. 4 : 714, 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 131. Repr. ed. 1960.

An erect, glabrous, annual herb, 30 - 100 cm high. Stems branched, angular. Leaves alternate, 3.5 - 12 x 2 - 5 cm, lanceolate, linear-lanceolate or ovate-lanceolate, tapering at ends. Flowers pale pink, shining, closely imbricate. Spikes terminal, dense, oblong, 5 - 15 cm long. Perianth 5-parted. Stamens 5. Capsules ellipsoid. Seeds compressed, shining, black or brown.

Fls. : Oct. - Dec. ; *Frts.* : Dec. - Jan. ; *Vern.* : Chilmil ; AKS 41, Salempur ; 213, Chhalesar.

Common winter season weed in cultivated and fallow fields.

2. *Celosia cristata* L. Sp. Pl. 205. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 715. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 131. Repr. ed. 1960.

An erect, glabrous, branched annual, 30–60 cm tall. Leaves alternate, 7–15 × 2–4.5 cm, linear to ovate-lanceolate, acute. Inflorescence usually fasciated and crest-like divisions of the branched spikes forming cockscomb. Spikes terminal, cylindric, red or yellow. Perianth 5-parted. Stamens 5. Capsules ovoid-ellipsoid. Seeds black, very shining.

Fls. : Oct. – Nov. ; *Frt.s.* : Nov. – Dec. ; AKS 588, R.B.S. College garden.

Grown in the gardens as ornamental plant and also found as an escape in waste places.

6. DIGERA Forsk.

Digera muricata (L.) Mart. Beitr. Amar. 77 (2). 1825. *Achyranthes muricata* L. Sp. Pl. ed. 2 : 295. 1762. *A. alternifolia* L. Mant. 50. 1767. *Digera arvensis* Forsk. Fl. Aegypt. Arb. 65. 1775 ; Hook. f. Fl. Brit. Ind. 4 : 717. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 132. Repr. ed. 1960.

An erect or spreading herb, 30–60 cm high. Leaves alternate, 3–6.5 × 1.5–3.5 cm, ovate, elliptic or lanceolate, acute. Flowers pink or rose, in lax, axillary spikes. Bracts and bracteoles ovate-lanceolate, acute, persistent. Perianth 5-parted. Stamens 5. Fruits globose, slightly compressed, muriculate, 3 mm in diam.

Fls. : Aug. – Nov. ; *Frt.s.* : Nov. – Dec. ; *Vern.* : *Lahsua* : AKS 121, Bichpuri campus.

Common winter season weed in cultivated fields and also found on ridges.

7. GOMPHRENA L.

- | | |
|--|--------------------------|
| 1a. Spreading herb ; flowers heads white | 1. <i>G. celosioides</i> |
| 1b. Erect herb ; flower heads variously coloured | 2. <i>G. globosa</i> |

1. *Gomphrena celosioides* Mart. Beitr. Amar. 93. 1825 ; Sandwith in Kew Bull. 29. 1946.

An ascending, spreading, much-branched, tufted herb. Branches clothed with white, shaggy hairs. Leaves opposite, 3–5.5 × 0.8–1.8 cm, spatulate or oblong-elliptic, mucronate, cuneate, white, shaggy hairy beneath. Flowers white in dense, cylindrical or ovoid, terminal, 1.5–4.5 cm long spikes, subtended by two small

leaves. Tepals 5, cottony-woolly. Stamens 5 anthers 1 - celled. Style short ; stigma bifid. Fruit enclosed by the hardened perianth. Seeds brown.

Fls. : July Nov. ; *Frt.s.* : Nov. Jan. ; *Vern.* : *Kasia* ; AKS 51, Bichpuri campus ; 122, Paliwal Park.

Common along roadsides and in waste places, gardens and open grounds.

2. *Gomphrena globosa* L. Sp. Pl. 224. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 732. 185 ; Duthie, Fl. U. Gang. Pl. 2 : 142. Repr. ed. 1960 ; Bailey, Man. Cult. Pl. 356. 1949.

An erect, hairy, branching, annual herb. Leaves opposite shortly petiolate, 3.5-10 x 1.5-3.5 cm elliptic, obovate-oblong. Flowers purple, red or variously coloured, in long peduncled, globular heads. Bracts leafy. Anthers 1-celled. Stigma bifid. Capsules ovoid tightly enclosed by the woolly perianth. Seeds dark brown, shining.

Fls. : Oct. Dec. ; *Frt.s.* : Dec. Jan ; AKS 319, Bichpuri campus.

Grown in the gardens and lawns and also found as an escape in waste places.

8. *Nothosaerva* Wight

Nothosaerva brachiata (L.) Wight, Ic. 6 : 1. 1776 ; Hook. f. Fl. Brit. Ind. 4 : 726. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 139. Repr. ed. 1960. *Achyranthes brachiata* L. Mant. 50. 1767.

An erect, glabrous, much-branched herb, 30-60 cm tall. Leaves shortly petiolate, 1.2-3 x 0.5-1.3 cm, elliptic or ovate-lanceolate, acute, tapering to the base. Flowers greenish-white, in small, dense, axillary, 5-10 mm long spikes. Bracts and bracteoles hyaline, persistent. Tepals 5, hairy. Stamens 2 ; staminodes absent. Seeds minute, dark brown or black, shining.

Fls. : Oct. Feb. ; *Frt.s.* : Feb. Mar. ; AKS 22, 692, Salempur.

Found in the gardens and open fields under the shades of bushes and also found in hilly tracts.

9. *Pupalia* Juss. nom. cons.

Pupalia lappacea (L.) Juss. in Ann. Mus. Par. 2 : 132. 1803 ; Hook. f. Fl. Brit. Ind. 4 : 724. 1885 ; Duthie, Fl. U. Gang. Pl. 2 : 241. Repr. ed. 1960. *Achyranthes lappacea* L. Sp. Pl. 204. 1753.

An erect, woolly tomentose undershrub with long, straggling branches. Leaves opposite, 4.5 - 10.5 x 2.5 - 4.5 cm, ovate or elliptic, acute, soft-tomentose. Flowers greenish, bisexual, in axillary and terminal, long spikes. Sterile flowers reduced to hooked bristles, accrescent, stellately spreading, yellowish at maturity, subtended by a 3-nerved, aristate bracteole. Bracts and bracteoles ovate, acuminate. Tepals 5, woolly. Stamens 5, pinkish. Style slender. Utricle oblong. Seeds shining, black.

Fls. : Sept. - Nov. ; *Frt.* : Nov. - Dec. ; *Vern.* : Jhojhru ; AKS 6, Dayalbagh ; 214, Chhalesar.

Common straggling on shrubs and bushes on ridges and in ravine tract.

74. CHENOPodiACEAE

1a. Leaves flat	1. <i>Chenopodium</i>
1b. Leaves fleshy, half-terete :	
2a. Perianth transversely winged	2. <i>Salsola</i>
2b. Perianth not winged	3. <i>Suaeda</i>

1. CHENOPODIUM L.

1a. Strongly aromatic ; young vegetative parts and outer surface of perianth without powdery white vesicles ; stigmas 5	2. <i>C. ambrosioides</i>
1b. Non-aromatic ; young vegetative parts and outer surface of perianth with powdery white vesicles ; stigmas 2 :	
2a. Seeds smooth, black, shining	1. <i>C. album</i>
2b. Seeds rugose, dull black	3. <i>C. murale</i>

1. *Chenopodium album* L. Sp. Pl. 219. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 3. 1876 ; Duthie, Fl. U. Gang. Pl. 2 : 143. Repr. ed. 1960.

An erect herb, about 30 - 60 cm high ; all vegetative parts and outer surface of perianth when young, densely clothed with powdery white vesicles. Stems angular-ribbed with longitudinal, dark green or purplish streaks. Leaves variable in size, rhombic-oblong or deltoid - ovate, toothed or lobed, entire. Flowers 5 inerous, bisexual in terminal and axillary clusters, forming compact panicled spikes, the terminal spikes becoming thyrsoid. Stigmas 5. Utricle enclosed in the incurved tepals, globose. Seeds black, shining, smooth.

Fls. : Dec. - Feb. ; *Frt.* ; Feb. - Mar. ; *Vern.* *Bathua* ; AKS 297, Salempur.

Common in cultivated and fallow fields, waste places, along waysides and cultivated for vegetable.

2. ***Chenopodium ambrosioides*** L. Sp. Pl. 219. 1753 ; Haines, Bot. Bih. & Or. 808, Repr. ed. 1961.

An erect, annual, strongly foetid - smelling, much-branched undershrub, 30 - 100 cm high. Stems angular - ribbed, often purple - tinged. Leaves petiolate, 3.5 - 5.5 x 0.5 - 1.6 cm, oblong - lanceolate, sinuate - dentate, the upper ones subentire. Flowers greenish, in small clusters, forming slender, axillary, interrupted and terminal, simple or paniculate spikes ; flowers mostly bisexual. Bracts fleshy. Perianth 5 - lobed, clasping the fruit. Stigmas 5, spreading. Utricle membranous, 1 seeded. Seeds polished, smooth, brown.

Fls. : July - Aug. ; *Frt.* : Aug. - Sept. ; *Vern.* : *Khatua* ; AKS 440, Kitham.

Rare, found growing in moist places near the bank of lake.

3. ***Chenopodium murale*** L. Sp. Pl. 219. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 4. 1886 ; Duthie, Fl. U. Gang. Pl. 2 : 144. Repr. ed. 1960.

An erect, glabrous herb, 30 - 60 cm high ; all vegetative parts and outer surface of perianth with powdery white vesicles. Stems angular - ribbed, tinged with purplish. Leaves petiolate, 5 - 10 x 3.5 - 7.5 cm, rhomboid or ovate - deltoid, lobed or sharply toothed. Flowers green, in clusters of lax or dense, axillary, divaricate cymes, the terminal panicle leafless. Stamens 5, yellow. Stigmas 2. Utricle enclosed in the tepals. Seeds orbicular, dull black.

Fls. : Dec. - Feb. ; *Frt.* : Feb. - Mar. ; *Vern.* : *Khartua* ; AKS 298, Salempur.

Common in moist waste places and on the borders of cultivated fields.

2. SALSOLA L.

Salsola haryosma (Roem. & Schult.) Dandy in F. W. Andr. Fl. Pl. Anglo Egypt. Sud. 1 : 111. 1950. *Chenopodium haryosma* Roem. & Schult. Syst. 6 : 269. 1820. *Salsola foetida* Delile, Fl. Egypte 57, 1813, nom. nud. ; Hook. f. Fl. Brit. Ind. 5 : 18. 1886 ; Duthie, Fl. U. Gang. Pl. 2 : 146. Repr. ed. 1960.

An erect or ascending, much - branched, hoary undershrub, 60 - 100 cm high. Stems stout ; branches crowded, horizontal. Leaves alternate, broadly ovate to subglobose, fleshy ; floral leaves imbricate. Flowers in short, cylindric spikes.

Perianth 5-partite, silvery - white, accrescent, with broad horizontal, membranous wings. Stamens 5. Stigmas 2.

Fls. : May Aug. ; *Frt.s.* : Aug. Sept. ; AKS 239, near Shahjahan garden; 569, Kiraoli.

Uncommon, found in saline tracts, in association of *Suaeda fruticosa* Forsk.

3. SUAEDA Forsk. ex. Scop.

Suaeda fruticosa (L.) Forsk. Fl. Aegypt. - Arab. 70. 1775 Hook. I. Fl. Brit. Ind. 5 : 13. 1886 ; Duthie, Fl. U. Gang. Pl. 2 : 145. Repr. ed. 1960. *Chenopodium fruticosum* L. Sp. Pl. 221. 1753.

An erect or prostrate, much-branched, succulent undershrub. Leaves crowded all round the axis, 5-15 x 1-2 mm, linear or oblong, obtuse, flesh, half-terete. Flowers green, bisexual, solitary, axillary or clustered, the upper ones forming slender, leafy spikes. Perianth 5-partite ; segments thick, oblong. Stamens 5. Stigmas 3. Utricle turbinate, membranous, spongy. Seeds obliquely ovoid, beaked, black, shining.

Fls. : Aug. Dec. ; *Frt.s.* : Jan. Feb. ; *Vern.* : *Lonia* ; AKS 449, Shahjahan garden ; 563, Kiraoli.

Abundant in saline tracts and moist waste places, in association of *Heliotropium curassavicum* L. and *Sporobolus marginatus* Hochst.

75. PHYTOLACCACEAE

RIVINIA L.

Rivinia humilis L. Sp. Pl. 121. 1753 ; Backer in Fl. Males. I, 4 : 229, t. 1, 228. 1951. *Rivinia laevis* L. Mant. 1 : 41. 1767 ; Hook. I. Fl. Brit. Ind. 5 : 21. 1886. *Rivinia orientalis* Moq. in DC. Prod. 13, 2 : 12. 1849.

An erect herb, 30-60 cm high, with spreading branches. Leaves alternate, petiolate, 3-5 x 1.6-4.5 cm, ovate, acuminate, rounded or subcordate at the base. Flowers small, bisexual, in many-flowered, erect or flexuous racemes. Calyx 4-parted, white or rosy. Corolla absent. Stamens 4. Berries 3-4 mm in diam., red.

Fls. : Oct.-Dec. ; *Frt.* : Dec. Feb. ; AKS 273, Shahjahan garden 362, Taj nursery.

Occurs as an escape in shady places of the gardens.

76. POLYGONACEAE

- 1a. Climber with white or pink flowers. *1. Antigonon*
- 1b. Erect herbs or undershrubs :
 - 2a. Perianth 4 to 5 - parted ; stigmas capitate *2. Polygonum*
 - 2b. Perianth 6 - parted in 2 whorls of 3 each ; stigmas fimbriate *3. Rume*

1. ANTIGONON Endl.

Antigonon leptopus Hook. & Arn. Bot. Beech. Voy. 308, t. 69. 1841 ; Bailey, Man. Cult. Pl. 351. 1949 ; Bor. & Raizada. 265. 1954 ; Duthie, Fl. U. Gang. Pl. 2 : 159. Repr. ed. 1960.

A large, evergreen, handsome shrub, climbing by means of tendrils. Leaves alternate, ovate, acute to acuminate, base cordate, glabrous. Flowers showy, pink or red in copious racemes. Perianth segments 5, the 3 outer ones larger and 2 inner smaller, petaloid. Stamens 8.

Fls. : Dec. Apr. ; AKS 394, R.B.S. College garden.

Grown in gardens and lawns as ornamental plant.

2. POLYGONUM L.

- 1a. Prostrate or procumbent herb ; leaves small ; flowers in axillary clusters *4. P. plebeium*
- 1b. Erect herbs ; leaves large ; flowers in elongate, stout or filiform racemes or spikes :
 - 2a. Stipules truncate ; nutlets orbicular or biconvex *2. P. glabrum*
 - 2b. Stipules not truncate ; nutlets trigonous :

3a. Stipules fringed at the margin ; bracts closely imbricating ; perianth eglandular *P. barbatum* var. *gracile*.

3b. Stipules not fringed at the margin but ciliate ; bracts more or less distant ; perianth glandular *P. hydropiper*

1. **Polygonum barbatum L. var. gracile** Steward, in Polyg. East As., in Contr. Gray Herb. 88 : 55. 1930 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 254. 1953.

A procumbent herb, 30–100 cm tall. Leaves subsessile, 7–15 × 1–3.5 cm, lanceolate or elliptic-oblong, acute ; stipules tubular, fringed with long bristles. Flowers pink or white, in compact, terminal racemes. Bracts glabrous, with several, rough bristles from the top. Perianth 5, eglandular. Nutlets trigonous, polished.

Fls. & frts. : Sept. Jan. ; AKS 246, Kitham.

Common on the banks of lakes, canals, ponds and in moist places.

2. **Polygonum glabrum Willd.** Sp. Pl. 2 : 447. 1799 ; Hook. f. Fl. Brit. Ind. 5 : 34. 1886 ; Duthie, Fl. U. Gang. Pl. 2 : 153. Repr. ed. 1960.

An erect or decumbent, glabrous, annual herb, 0.6–1.5 m high. Leaves petiolate, 10–17 × 1–2.5 cm, lanceolate, acuminate, gland-dotted ; stipules closely sheathing the stem, mouth truncate, ciliate. Flowers pink, in erect racemes, forming a terminal panicle. Bracts ovate, obtuse, ciliate. Perianth 5, eglandular. Nutlets suborbicular, biconvex, dark brown, shining.

Fls. : Oct. Dec. ; *Frts.* : Dec. Jan. ; AKS 550, Chhalesar.

Common along the banks of canals, ponds and lakes.

3. **Polygonum hydropiper L. subsp. *microcarpum* Danser** var. *lenticularis* Danser in Bull. Jard. Bot. Buitenz. (ser. 3) 8 : 189. 1927. *P. hydropiper* Meissn. in DC. Prodr. 14 : 109. 1856 ; Hook. f. in Fl. Brit. Ind. 5 : 39. 1886 ; Gage in Rec. Bot. Surv. Ind. 2 : 401 & 425. 1903 ; Duthie, Fl. U. Gang. Pl. 2 : 155. Repr. ed. 1960.

A prostrate or procumbent, robust, glabrous herb. Leaves shortly petiolate, 3–8 × 1–2 cm, lanceolate or oblong-lanceolate, tapering at ends, margins ciliate. Stipules glandular, shortly ciliate. Flowers pink, in slender, filiform, flexuous racemes ; bracts more or less distant, glabrous, glandular or not. Perianth 5, very glandular. Nutlets trigonous, opaque, granulate, shining.

Fls. : Dec. Feb. ; *Frts.* : Feb. Mar. ; AKS 326, Bichpuri campus.

Common in moist places and near the banks of canals and ponds.

4. *Polygonum plebeium* R. Br. Prodr. 420. 1810; Hook. f. Fl. Brit. Ind. 5 : 27. 1886; Duthie, Fl. U. Gang. Pl. 2 : 149. Repr. ed. 1960.

A prostrate, branched herb, 15-30 (-60) cm long. Leaves sessile, 8-20 x 1-2 mm, oblong, linear or oblanceolate; stipules hyaline, short. Flowers minute, rosy, solitary, axillary or 2-3 together. Perianth 5. Nutlets 3-gonous, shining, black.

Fls. & frts.: Most part of the year; *Vern.*: *Machechi*; AKS 94, R.B.S. College garden; 341, Fatehpur Sikri.

3. RUMEX L.

Rumex dentatus L. Mant. 2 : 226. 1771; Hook. f. Fl. Brit. Ind. 5 : 59. 1886; Duthie, Fl. U. Gang. Pl. 2 : 158. Repr. ed. 1960.

An erect, glabrous, annual herb, 30-60 cm high, with ribbed stems. Leaves petiolate, 6.5-14 x 1.5-5 cm, oblong, obtuse, rounded or cordate. Flowers green, bisexual, in leafy or leafless distinct whorls. Perianth 6-parted, biserrate, 4-5 mm long; inner segments tubercled on the back, margins irregularly toothed; the teeth much enlarged in fruit turning to brownish red. Stamens 6. Nutlets acutely trigonous, brown.

Fls.: Jan. - Mar.; *Frt.*: Mar. - Apr.; *Vern.*: *Khat palak*; AKS 65, Bichpuri campus; 343, Fatehpur Sikri.

Common on the border of cultivated fields, in moist waste places and along waysides.

77. ARISTOLOCHIACEAE

ARISTOLOCHIA L.

Aristolochia bracteolata Laink. Encycl. 1 : 258. 1783; Andrews, Fl. Pl. Anglo-Egypt. Sudan 1 : 21, t. 17. 1950; Santapau & Wagh in Bull. Bot. Surv. Ind. 5(2) : 105. 1963. *Aristolochia bracteata* Retz. Obs. 5 : 29. 1789; Hook. f. Fl. Brit. Ind. 5 : 75. 1886; Duthie, Fl. U. Gang. Pl. 2 : 160. Repr. ed. 1960.

A prostrate or decumbent, glabrous herb. Leaves alternate, petiolate, 3-7 x 2.5-6.5 cm, reniform or broadly ovate, deeply cordate at base. Flowers solitary;

pedicels with a large sessile orbicular or subreniform bract at the base. Perianth dark purple, tube cylindric, with a trumpet - shaped mouth. Capsules 3.5 - 4.5 cm long, oblong ellipsoid, ribbed.

Fls. & frts. : Mar. May; *Vern.* : Kiramar ; AKS 702, Agra College garden.

Grown in the gardens.

78. PIPERACEAE

PEPEROMIA R. & P.

Peperomia peltucida (L.) H.B.K. Nov. Gen. 1 : 64. 1815 ; Duthie, Fl. U. Gang. Pl. 2 : 163. Repr. ed. 1960. Santapau, Fl. Khandala, 203. Repr. ed. 1960. *Piper pellucidum* L. Sp. Pl. 30. 1753.

A slender, much-branched, succulent, annual herb with procumbent, glabrous stem. Leaves opposite, petiolate, 1.3 - 2.6 x 1.1 - 2.7 cm, broadly ovate, acute, cordate at base. Flowers green, 2-sexual, in erect spikes about 1.2 - 2.5 cm long. Perianth O. Stamens 2. Berries 1-seeded, indehiscent.

Fls. : Sept. Oct. ; *Frts.* : Oct. Nov. ; AKS 523, Shahjahan garden.

Rare, found in shady places of the garden.

79. PROTEACEAE

GREVILLEA R. Br. nom. cons.

Grevillea robusta A. Cunn. in R. Br. Prot. Nov. 24. 1830 ; Bailey, Man. Cult. Pl. 345. 1949.

A lofty, robust, evergreen tree, with rusty-tomentose, young branches. Leaves bipinnate or sometimes tripinnate ; leaflets 11 - 21, entire or pinnatifid, lanceolate, acute, dark green above, white-silky beneath. Flowers orange, in secund, one sided racemes. Ovaries stipitate ; style long, lateral. Fruit a follicle, compressed, oblique, 1.5 cm long. Seeds winged all round.

Fls. : Feb. Apr. ; *Frts.* : Apr. May ; AKS 728, Opposite the Central Jail.

Planted in private and public gardens and lawns.

80. EUPHORBIACEAE

- 1a. Flowers monoecious, aggregate in heads resembling a single flower with a calyx like involucre (Cyathium) *5. Euphorbia*
- 1b. Flowers dioecious or monoecious, not arranged in cyathia, distinct, without any involucre :
- 2a. Cells of ovary 2-ovuled :
- 3a. Disc absent ; fruit fleshy, more or less succulent enclosing cocci *2. Baccinia*
 - 3b. Disc present, usually conspicuous and glandular ; fruit capsular or baccate *7. Phyllanthus*
- 2b. Cells of ovary 1-ovuled :
- 4a. Petals absent in either sex : *1. Acalypha*
 - 4b. Petals present atleast in the male flowers
 - 5a. Flowers in 2 - 3 cymous cymes or axillary racemes ; leaves palmately lobed *6. Jatropha*
 - 5b. Flowers in spikes or racemes ; leaves not palmately lobed :
 - 6a. Erect or prostrate herbs, hispid or stellately tomentose ; seeds non-strophiolate *3. Chrozophora*
 - 6b. Erect herbs, glabrous ; seeds strophiolate *4. Croton*

1. ACALYPHA L.

- 1a. Bracts of female flowers with fringed margins ; capsule glabrous *1. A. ciliata*
- 1b. Bracts of female flowers with dentate margins ; capsule hispid *2. A. indica*
1. *Acalypha ciliata* Forsk. Fl. Aegypt. Arab. 162. 1775; Hook. f. Fl. Brit. Ind. 5 : 417. 1887; Duthie, Fl. U. Gang. Pl. 2 : 209. Repr. ed. 1960.

An erect, stout herb, 30 - 60 cm high. Leaves long petiolate, 3.4 - 6.1 x 1.5 - 3.3 cm, ovate, acuminate, finely serrate. Flowers in axillary, androgynous spikes; males few, very minute, sessile at the top of spike ; females many and crowded at the base ; bracts of female flowers conspicuous, exceeding the capsules, strongly

nerved; nerves radiating and projecting in marginal fringe. Capsules glabrous, concealed by the persistent bracts. Seeds globose-ovoid, smooth.

Fls. : Sept., Oct.; *Frtv.* : Oct., Nov.; AKS 493, Khandar.

This is a first report from the area : occurs in gravelly soil of the ridge.

2. Acalypha indica L. Sp. Pl. 1003. 1753; Hook. f. Fl. Brit. Ind. 5: 416. 1887; Duthie, Fl. U. Gang. Pl. 2 : 209. Repr. ed. 1960.

An erect, annual herb, 30–100 cm high; branches many, ascending, finely pubescent. Leaves petiolate, 2.5–5.5 x 2–4.5 cm, ovate or rhomboid-ovate, crenate-serrate, cuneate at base. Flowers minute, green in lax, erect, axillary spikes; males bracteate, clustered towards the top; females solitary or paired, each enclosed by a cuneiform, leafy bract with dentate margins. Capsules hispid, concealed by persistent bracts. Seeds ovoid, smooth, pale brown.

Fls. & frts. : Sept. - Feb. : AKS 130, Paliwal Park.

Common in shady places of the gardens and lawns.

2. BREYNIA J.R. & G. Forst. (nom. cons.)

Breynia rhamnoides (Retz.) Muell.-Arg. in DC. Prodr. 15(2) : 440. 1886 ;
Hook. f. Fl. Brit. Ind. 5 : 330. 1887 ; Duthie, Fl. U. Gang. Pl. 2 : 197. Repr. ed.
1960. *Phyllanthus rhamnoides* Retz. Obs. 5 : 30. 1789.

A large, glabrous shrub or small tree. Branches many horizontal; branchlets flexuous, ascending. Leaves distichous, $1.5 - 3.5 \times 1.2 - 2$ cm, elliptic, obtuse or subacute, pale beneath, turning black when dry. Stipules subulate, persistent. Flowers unisexual, greenish-yellow, very small. Male flowers usually in small fascicles; females solitary. Stamens 3; filaments united in a short column. Fruits globose, fleshy, smooth, dull red or purple.

Fls. : June July ; *Frtis.* : July Aug. ; AKS 419, Shahjahan garden.

Grown in the gardens as hedge plant.

3. CHROZEPHORA Juss. Cott, Benth. & Hook. f. nom. cons.

- 1a. Ovary and capsule clothed with stellate-tomentum but silvery scales absent ; stamens 15 in 2 whorls 1. *C. prostrata*

1b. Ovary and capsules clothed with stellate + tomentum and silvery scales ; stamens 5 2. *C. verbascoifolia*

1. ***Chrozophora prostrata*** Dalz. & Gibbs. Bomb. Fl. 233. 1861 ; Duthie, Fl. U. Gang. Pl. 2 : 206. Repr. ed. 1960. *C. plicata* A. Juss. 3 Hook. f. Fl. Brit. Ind. 5 : 410. 1887.

A prostrate, stellate woolly, annual herb with numerous branches arising from the root. Leaves long petiolate, $1.5 - 4.5 \times 1.2 - 3$ cm broadly ovate or orbicular, base eglandular, often dark purplish - brown. Flowers unisexual, in few - flowered, axillary racemes. Calyx 3 mm long. Stamens 15, in two whorls. Capsules 6 - 7 mm long, stellate woolly, without silvery scales.

Fls. : Sept. - Oct. ; *Frt.* : Oct. - Nov. ; AKS 334, Fatchpur Sikri ; 567, Kiraoli.

Occurs in dry sandy soil near the canals, ponds and along waysides.

2. ***Chrozophora verbascifolia*** A. Juss Euph. Tent. 28. 1824 ; Spreng. Syst. 3 : 851. 1826.

An erect, stout, scabrous, woolly-tomentose, deep-rooted herb. Leaves petiolate, $2 - 7.5 \times 1.5 - 4.5$ cm ovate, entire or wavy. Flowers unisexual, in short, terminal racemes ; males crowded above ; females below. Male flowers pale green ; stamens 5. Capsules 7 - 8 mm long, clothed with stellate hairs and silvery scales. Seeds glabrous, wrinkled, black.

Fls. : Apr. - May ; *Frt.* : May - June ; AKS 106, Poiya ghat.

Occurs in sandy soil of cultivated and fallow fields.

4. CROTON L.

Croton bonplandianum Baill. in Adans. 4 : 339. 1864 ; Croizat in J. Bombay Nat. Hist. Soc. 41 : 573. 1940. *C. sparsiflorum* (*C. sparsiflorus*, sphalm.) Morong. (sphalm. auct. Indic. 'Morung') in Ann. N. Y. Acad. Sci. 7 : 221. 1893 ; Haines, Bot. Bih. & Or. 109. Repr. ed. 1961.

An erect, diffuse, branched undershrub, 30 - 100 cm high. Stems densely covered with stellate hairs. Leaves scattered, crowded near the ends of branches, $3 - 6 \times 1.6 - 3$ cm, ovate-lanceolate, serrate, acute, 2-glandular at the base. Flowers unisexual, male upwards, female below, in terminal, erect, androgynous spike. Male flowers pedicelled, in clusters of 3 - 4, pale white ; stamens about 15. Female flowers with 2 extra-floral glands at the base of pedicels. Capsules triquetrous, roundish, stellate hairy. Seeds oblong, spongy, shining, with a white cap.

Fls. : July - Sept. ; *Frt.* : Sept. - Oct. ; *Vern.* : *Kala bhangra* ; AKS 113, near Telephone Exchange.

Abundant along the roadside in the area and in open fields.

5. EUPHORBIA L.

- 1a. Plants armed with stipular spines 7. *E. nerifolia*
- 1b. Plants without spines :
 - 2a. Bracts of inflorescence parti-coloured ; garden herb 5. *E. heterophylla*
 - 2b. Bracts green or pale at base :
 - 3a. Involucres with a single, large gland ; an introduced herb 3. *E. geniculata*
 - 3b. Glands of involucre not large :
 - 4a. Leaves alternate below and opposite above, glands of involucre 2-horned without a petaloid limb 2. *E. dracunculoides*
 - 4b. Leaves all opposite ; glands of involucre not 2-horned :
 - 5a. Leaves 1.2 - 4 cm long :
 - 6a. Limbs of involucre-glands conspicuous, rounded 8. *E. parviflora*
 - 6b. Limbs of involucre-glands very small or inconspicuous 6. *E. hirta*
 - 5b. Leaves less than 1.2 cm long :
 - 7a. Capsules glabrous 1. *E. clarkeana*
 - 7b. Capsules pubescent or hirsute :
 - 8a. Capsules hairy only along the keel 9. *E. prostrata*
 - 8b. Capsules hirsute throughout 4. *E. granulata*

1. ***Euphorbia clarkeana*** Hook. f. Fl. Brit. Ind. 5 : 253. 1887 ; Duthie, Fl. U. Gang. Pl. 2 : 189. Repr. ed. 1960.

A prostrate, glabrous, annual herb. Leaves very shortly petiolate, 3 - 8 x 1.5 - 3 mm, obliquely linear-oblong, base nearly auricled on one side, glabrous. Involucres solitary, axillary, campanulate, glabrous ; glands minute, without a limb. Capsules glabrous ; cocci keeled. Seeds 4 - angled, obscurely rugose, brown.

Fls. & frts. : July Nov. ; AKS 596, Kitham ; 819, Chiknaipur.

Common on ridges and in open unused grounds.

2. **Euphorbia dracunculoides** Lamk, Encycl. 2 : 428. 1788; Hook. f. Fl. Brit. Ind. 5 : 262. 1887 ; Duthie, Fl. U. Gang. Pl. 2 : 185. Repr. ed. 1960.

An erect, dichotomously branched, glabrous herb, 15 - 30 cm high. Leaves sessile, 2-4.5 x 0.2 - 0.4 cm, linear to linear-lanceolate, subacute, alternate to opposite, 2 - 3 at each node. Involucres nearly subsessile, solitary, campanulate, glabrous ; lobes ovate, ciliolate; glands of involucre 2-horned without a petaloid limb. Flowers pale yellow. Capsules glabrous, 4 x 3 mm. Seeds ellipsoid, strophioliate.

Fls. Jan. Mar. ; *Frts.* : Mar. Apr. ; AKS 14, Poiya ghat.

Common in sandy soil of cultivated and fallow fields and also in ravine tract.

3. **Euphorbia geniculata** Orteg. Nov. Rar. Pl. Matr. 18. 1797 ; Duthie, Fl. U. Gang. Pl. 2 : 190. Repr. ed. 1960.

An erect, stout, fistular herb, 30 - 100 cm high. Leaves alternate below, opposite above, petiolate, 4.5 - 12 x 1.5 - 5 cm, ovate elliptic, elliptic-oblong to elliptic, hairy beneath ; floral leaves green towards the apex and white near the base. Involucres very small, 3 - 4 mm long, campanulate, 5 lobed ; lobes lacerate with often gland tipped fimbriate, in dense corymbose cymes. Involucre gland single, large. Capsules glabrous, 3-celled, sometimes 2-celled.

Fls. : Oct. Jan. ; *Frts.* : Jan. Mar. ; AKS 272, Shahjahan garden ; 619, Bichpuri campus.

Found in moist shady places of gardens and fruit orchards ; this is recently introduced herb.

4. **Euphorbia granulata** Forsk. Fl. Aegypt. Arab. 94. 1775 ; Hook. f. Fl. Brit. Ind. 5 : 252. 1887 ; Duthie, Fl. U. Gang. Pl. 2 : 188. Repr. ed. 1960.

A small, prostrate, hispid-hairy herb. Leaves shortly petiolate, obliquely oblong or obovate - oblong, entire, rounded or retuse. Involucres minute, axillary, subsessile, turbinate. Glands usually with a small, petaloid limb. Capsules hirsute, not keeled. Seeds brown, 4-angular.

This plant is included on the authority of Duthie (in Duthie Fl. U. Gang. Pl. 2 : 188).

5. Euphorbia heterophylla L. Sp. Pl. 453. 1753 ; Haines, Bot. Bib. & Or. 149. Repr. ed. 1961.

An erect, annual herb, 40 - 90 cm high. Leaves much variable from linear to broadly oblong-ovate, 4 - 7.5 x 2.5-5 cm, upper one smaller, lobed, blotched with deep red or white at base. Cyathium 4-5 mm across. Seeds dark brown, tuberculate, 2.5 - 3 mm across.

Fls. : Feb. - Apr. ; *Frt.* : Apr. - May ; AKS 374, Roma Catholic Cemetery.

Occurs in gardens and undisturbed places.

6. Euphorbia hirta L. Sp. Pl. 454. 1753 ; Duthie, Fl. U. Gang. Pl. 2 : 187. Repr. ed. 1960.

An erect or decumbent, hispid, annual herb, 10 - 30 cm high. Leaves shortly petiolate, 1.5 - 3 x 0.6 - 1.5 cm, elliptic or ovate - oblong with oblique bases, serrulate, dark green above, white-villous beneath. Involucres minute, crowded in capitate finally peduncled axillary cymes, campanulate, with 4 minute shortly stipitate, red tipped glands without a limb. Capsules about 1 x 1 mm, breaking into 3 cocci. Seeds reddish-brown, trigonous.

Fls. & frts. : For most part of the year ; *Vern.* : *Dudhi* ; AKS 4, Paliwal Park ; 738, College campus.

Abundant in waste places, cultivated and unused fields, along roadsides and also on the ridges.

7. Euphorbia nerifolia L. Sp. Pl. 451. 1753 ; Duthie, Fl. U. Gang. Pl. 2 : 184. Repr. ed. 1960.

A large, erect, succulent shrub or small tree. Branches terete with pairs of sharp, persistent spines arising from tubercled bases. Leaves alternate, clustered towards the ends of the branches, sessile or subsessile, obovate or obovate-oblong, fleshy. Involucres ternate, yellowish ; the central flowers usually male and sessile ; the lateral ones bisexual and pedicelled. Glands transversely oblong ; bracteoles numerous, fimbriate.

Fls. : Mar. - Apr. ; *Vern.* : *Senhar* ; AKS 896, Rambagh.

Planted in the gardens and public places.

8. Euphorbia parviflora L. Syst. (ed. 10), 1047. 1759 ; Roxb. Fl. Ind. 2 : 472. 1832 ; Santapau, Fl. Khandala, Repr. ed. 1967. *E. hypercifolia* L. Sp. Pl. 454. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 249. 1887 ; Duthie, Fl. U. Gang. Pl. 2 : 187. Repr. ed. 1960.

An erect or ascending, glabrous or thinly pubescent herb, 15–60 cm high. Leaves shortly petiolate, 1–3.0 × 0.7–1.5 cm, very variable in shape, linear-oblong to elliptic-ovate, serrulate. Involucres campanulate, minute, 4-toothed often with 2 small floral leaves at their base, in numerous small cymes, axillary or terminating short axillary branchlets; glands 4–5, shortly stipitate, usually with a minute, white or pink petaloid limb. Capsules pubescent, bent. Seeds 4-angled, ellipsoid.

Fls. : Aug. Oct.; *Frt.s.* Oct. Nov.; AKS 239, Kitham; 278, Midhakur; 509, Khander.

Common in moist waste places near the canals and along the waysides.

9. *Euphorbia prostrata* Ait. Hort. Kew. 2: 139. 1789; Hook. f. Fl. Brit. Ind. 5: 266. 1887.

A prostrate or ascending herb. Leaves petiolate, 3–7 × 1.5–4 mm, obliquely oblong, coarsely minutely serrate towards the tip. Involucres campanulate, usually paired. Glands usually 4, each with a minute petaloid limb. Capsules usually bent, 1–1.5 mm long, stiff hairy along the keels. Seeds 4-angled, brown, transversely furrowed.

Fls. & frts. : Most part of the year; AKS 292, Poiya ghat; 636, Jhirna nala; 881, Kiraoli.

Abundant along roadsides, in cultivated and fallow fields, gardens and also on the ridges.

6. JATROPHA L.

Jatropha gossypifolia L. Sp. Pl. 1006. 1753; Bor & Raizada, 175, f. 108, Pl. 64, 1954.

An erect, branched shrub. Petioles, leaf margins and young parts with numerous, fascicled and branched, glandular bristles. Leaves petiolate, palmately 3 to 5-deeply lobed. Flowers purplish-red, monoecious, in corymbose cymes. Bracts and sepals glandular-ciliate. Capsules brownish, oblong, 3-lobed, 1.2 cm long.

Fls. : Aug. Sept.; *Frt.s.* : Sept. Oct.; AKS 215, Paliwal Park.

Found as an escape in waste places of the gardens and also planted in the gardens.

Z. PUXIANTHUS L.

The genus *Kirganelia* Baill. was earlier distinguished from *Phyllanthus* L. and regarded as quite distinct. *Kirganelia* was separated on the basis of the curious androecium with 5 stamens distributed in two unequal series. Author has however, followed the monographer Webster (J. Arn. Arb. 38 : 51–80, 1967) in treating the genus *Phyllanthus* in a broad sense including *Kirganelia*.

- 1a. Stamens 5 in 2 series, the outer with free filaments,
the inner connate; straggling shrubs 3. *P. reticulatus*

1b. Stamens 3 in one series; erect herbs:

2a. Filaments free 4. *P. virgatus*

2b. Filaments united into a column:

3a. Leaves scattered, cuneate, obovate; stipules
peltate 2. *P. maderaspatensis*

3b. Leaves elliptic - obovate, obtuse at apex, pro-
minently distichous; stipules not peltate 1. *P. fraternus*

Phyllanthus fraternus Webster, Contrib. Gray Herb. 176 : 53. 1955 ;
Jour. Arn. Arab. 38 : 309. 1957. *Phyllanthus niruri* : auct. Plur. (non L.) ; Hook.
f. Fl. Brit. Ind. 5 : 298. 1887 ; Duthie, *Fl. U. Gang.* Pl. 2 : 201. Repr. ed. 1960.

An erect, glabrous, annual herb, 30–60 cm high with numerous spreading branches. Leaves distichous often overlapping, 8–15 x 3–7 mm, elliptic-oblong, obtuse or subacute, glaucous beneath. Flowers yellowish, monoecious, small, hanging down below the branchlets; males 1–3; females solitary. Stamens 3; filaments united into a column. Capsules depressed-globose, smooth. Seeds trigonous, with longitudinal ribs, pale brown.

Fls. : June-Aug. ; *Frts.* : Aug. - Sept. ; *Vern.* : Hazardana, Nunki ; AKS 257,
Poila ghat : 428, Rambagh : 750, Shabjahan garden.

Abundant in moist places of the gardens, along the edges of irrigation channels and waysides.

2. *Phyllanthus maderaspatensis* L. Sp. Pl. 982. 1753; Hook. f. Fl. Brit. Ind. 5 : 292. 1887; Duthie, Fl. U. Gang. Pl. 2 : 200. Repr. ed. 1960.

An erect, glabrous, annual herb, 30–70 cm high. Leaves distant, shortly petiolate, 1.8–2.6 × 0.6–1.2 cm, cuneate-obovate, mucronate. Stipules peltate, acute. Male flowers minute, in axillary clusters; females solitary. Stamens 3; filaments connate. Capsules 3 × 2.5 mm, depressed-globose, 3-lobed, glabrous. Seeds trigonous, muriculate in fine lines.

Fls. : Sept. Oct.; *Frt.s.* : Oct. Nov.; *Vern.* : *Hazarmani*; AKS 534, Chiknipur.

Rare, found on the ridges, hidden amongst shrubs and bushes.

3. *Phyllanthus reticulatus* Poir. in Lamk. Encycl. 5 : 298. 1804; Hook. f. Fl. Brit. Ind. 5 : 288. 1887; Duthie, Fl. U. Gang. Pl. 2 : 199. Repr. ed. 1960. *Kirganelia reticulata* (Poir.) Baill. Etud. Gen. Euph. 613. 1858.

A large, diffuse or straggling shrub with drooping branchlets. Bark greyish-brown, thin. Leaves shortly petiolate, 0.8–2.6 × 0.5–1.3 cm, oblong, elliptic or rotundate, obtuse, glabrous. Stipules ovate, acute. Male flowers purplish, in fascicles; stamens 5, three inner connate, two outer free. Female flowers solitary; ovaries 5 to 10 celled. Berries globose, dark purple, smooth, 3 × 3 mm. Seeds usually 10, trigonous, crustaceous, punctate.

Fls. : June - Sept.; *Frt.s.* : Sept. - Oct.; *Vern.* : *Neelbari*; AKS 841, Salempur.

Occurs in hilly tracts and also found near the cultivated fields.

4. *Phyllanthus virgatus* Forst. f. Prodri. 65. 1786; Backer & Bakh. f. Fl. Java 2 : 469. 1965. *Phyllanthus simplex* Retz. Obs. 5 : 29. 1788; Hook. f. Fl. Brit. Ind. 5 : 295. 1887; Duthie, Fl. U. Gang. Pl. 2 : 200. Repr. ed. 1960.

An erect or ascending, glabrous, perennial, deep rooted herb, 10–30 cm high. Leaves distichous, 10–20 × 3–7 mm, oblong to obovate, obtuse. Stipules peltate, sagittate, scarious. Female flowers numerous, solitary, larger than males, borne below males. Stamens 3; filaments free. Capsules globose, slightly 3-lobed, rough, 2.5–3 × 3 mm. Seeds minute, trigonous, dark brown.

Fls. : July Aug.; *Frt.s.* : Aug. Sept.; AKS 777, Niyamatpur.

Occurs in gravelly soil on the slopes of the ridges or near the cultivated fields.

List of cultivated Taxa :

Embelia officinalis Gaertn. Fruct. 2 : 122. 1790; Santapau in Rec. Bot. Surv. Ind. 16(1) : 277. 1953. *Phyllanthus emblica* L. Sp. Pl. 982. 1753; Hook. f. Fl. Brit. Ind. 5 : 289. 1887.

Ricinus communis L. Sp. Pl. 1007. 1753; Hook. f. Fl. Brit. Ind. 5 : 457. 1887; Duthie, Fl. U. Gang. Pl. 2 : 212. Repr. ed. 1960.

81. URTICACEAE

LAPORTEA Gaud.

Laportea interrupta (L.) Chew in Gard. Bull. Singapore 19 : 200. 1965.
Urtica interrupta L. Sp. Pl. 985. 1753. *Fleurya interrupta* (L.) Gaud. in Bot. Freyc. Voy. 497. 1826 ; Hook. f. Fl. Brit. Ind. 5 : 548. 1888.

An erect herb, 30 - 60 cm high, with stinging hairs. Leaves alternate long petiolate, 3.5 - 10 x 2 - 6.5 cm, broadly ovate, acuminate, crenate-serrate. Flowers greenish, monoecious, on solitary, interrupted, axillary racemes, arranged in distant paniculate cymes along the rachis. Achenes exserted, compressed, ovate, faces shallowly concave with few tubercles, margins keeled.

Fls. & frts. : Nov. Dec. ; AKS 275, Shahjahan garden.

This is first report from the area. Found in moist shady places of the gardens.

82. ULMACEAE

HOLOPTELEA Planch.

Holoptelea integrifolia (Roxb.) Planch. in Ann. Sc. Nat. (Ser. 3) 10 : 259. 1848 ; Hook. f. Fl. Brit. Ind. 5 : 481. 1888 ; Duthie, Fl. U. Gang. Pl. 2 : 217. Repr. ed. 1960. *Ulmus integrifolia* Roxb. Pl. Cor. 1 : 56, t. 78. 1798.

A large or medium sized tree. Bark grey. Leaves alternate, 5 - 12 x 3 - 6 cm, obliquely ovate or elliptic, acuminate, entire, sub-coriaceous. Flowers green, bisexual or male, in numerous fascicles on the leafless branches. Ovaries long stipitate, compressed ; style 2 - lfid. Samaras obliquely elliptic to suborbicular, about 2.5 cm in diam., notched at the apex ; wing reticulately veined.

Fls. & frts. : Feb. Apr. ; Vern. : Papri ; AKS 677, Paliwal Park.

Occurs on the ridges and hilly tracts and also planted in the gardens and along roadsides.

83. MORACEAE

1a. Flowers crowded on the inside of fleshy receptacle of which the mouth is closed by bracts

1. *Ficus*

- 1b. Flowers not crowded on the inside of fleshy receptacle but in spikes or heads :
- 2a. Female flowers solitary or 3-4 on a peduncle ; male flowers in pedunculate heads 3. *Streblus*
- 2b. Flowers in catkins or the female flowers subcapitate 2. *Morus*

1. *Ficus* L.

- 1a. Receptacles sessile :
- 2a. Leaves pubescent, obtuse ; receptacles red when ripe 1. *F. benghalensis*
- 2b. Leaves glabrous, apex long-tailed ; receptacles dark purple when ripe 4. *F. religiosa*
- 1b. Receptacles stalked :
- 3a. Receptacles in clusters on short leafless branches 3. *F. racemosa*
- 3b. Receptacles solitary or paired :
- 4a. Medium - sized or large trees ; leaves ovate or oblong - ovate ; receptacles whitish, tinged red and dotted 5. *F. virens*
- 4b. Woody shrubs or small - trees ; leaves orbicular-ovate, entire or 3 or 5 - lobed ; receptacles yellow or yellowish purple when ripe 2. *F. carica*

1. *Ficus benghalensis* L. Sp. Pl. 1059. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 499. 1888 ; Duthie, Fl. U. Gang. Pl. 2 : 238. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 289. 1953.

A large, evergreen tree producing numerous, aerial roots from the branches. Leaves alternate, ovate, orbicular, ovate-elliptic, obtuse, entire, coriaceous, dark glossy green above. Receptacles sessile, in axillary pairs, red when ripe, globose, 1.2-1.8 cm in diam., supported by 3 rounded bracts.

Receptacles ripen : Mar. June ; Vern. : *Bargad* ; AKS 709, Poiya ghat.

Planted in the gardens and along roadsides.

2. *Ficus carica* L. Sp. Pl. 1059. 1753 ; Bailey, Man. Cult. Pl. 339. 1949.

A small or medium-sized tree. Leaves alternate, long petiolate, 5-12 x 6-11 cm, broad ovate to nearly orbicular or 3 to 5-lobed, crenate, serrate, base cordate. Receptacles solitary or in axillary pairs, yellowish-purple when ripe, globose or pearshaped, 2-2.2 cm in diam.

Receptacles ripen : Sept. - Nov. ; Vern. : *Anjir* ; AKS 856, Salempur.

Grown in the gardeas for its edible fruits and also found on the borders of cultivated fields.

3. *Ficus racemosa* L. Sp. Pl. 1060. 1753. Corner in Dansk. Bot. Arkiv. 23 : 28. 1963. *Ficus glomerata* Roxb. Pl. Cor. 2 : 13, t. 123, 1799 & Fl. Ind. 3 : 558. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 535. 1888 ; Duthie, Fl. U. Gang. Pl. 2 : 248. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 293. 1953.

A large or medium sized, deciduous tree. Bark reddish brown. Leaves alternate, 6-12 x 3-5.5 cm, ovate - oblong to elliptic-lanceolate, subacute, entire, glabrous, basal nerves 3. Receptacles in clusters on short, leafless branchlets, red-orange when ripe, globose-pyriform, 1.5-2.5 cm in diam.

Receptacles ripen : Mar. - June ; Vern. : *Gular* ; AKS 723, R. B. S. College garden ; 875, Tantpur.

Planted along the roadsides, in the gardens and also occurs on the ridges.

4. *Ficus religiosa* L. Sp. Pl. 1059. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 513. 1888 ; Duthie, Fl. U. Gang. Pl. 2 : 241. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 291. 1953.

A large deciduous tree. Bark grey. Leaves alternate, broadly ovate-round, entire, glossy on both sides ; apex long-tailed. Receptacles sessile, in axillary pairs, dark purple when ripe, depressed globose, 1.2 cm in diam.

Receptacles ripen : Mar. - May ; Vern. : *Pipal* ; AKS 679, Paliwal Park.

Planted as avenue tree along the roadsides and public places.

5. *Ficus virens* Ait. Hort. Kew. 3 : 451. 1789 ; Corner in Gdns. Bull. Singapore 17 : 336. 1960. *F. infectoria* Willd. sensu Roxb. Fl. Ind. 3 : 551. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 515. 1888. *F. lacor* auct. non Buch. Ham. in Trans. Linn. Soc. 15 : 150. 1825.

A large spreading, deciduous tree. Bark smooth, greyish-grey. Leaves alternate, long petiolate, ovate to ovate oblong, abruptly acuminate, thinly coriaceous, glabrous. Receptacles sessile, axillary, paired, pubescent, globose, whitish flushed with red, dotted when ripe.

Receptacles ripen : Oct. - Dec. ; *Vern.* : *Pilkhan* ; AKS 897, Shahjahan garden.

Planted in the gardens, along roadsides and also found on the ridge.

2. MORUS L.

Morus indica L. Sp. Pl. 986. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 492. 1890 ; Duthie, Fl. U. Gang. Pl. 2 : 230. Repr. ed. 1960.

A small deciduous tree. Leaves alternate, 5 - 12 x 3 - 5 cm, ovate, acuminate, coarsely serrate. Flowers monoecious or dioecious, in spikes. Male spikes lax. Female spikes short, ovoid. Styles connate to one fourth their length. Fruits of many achenes enclosed in the succulent, more or less confluent perianths, dark purple when ripe.

Fls. : Feb. Apr. ; *Frt.s.* Apr. May ; *Vern.* *Shehtut.* ; AKS 356, Rambagh.

Cultivated in gardens and fruit orchards for its edible fruits.

3. STREBLUS Lour

Streblus asper Lour. Fl. Cochinch. 2: 615. 1790 ; Hook. f. Fl. Brit. Ind. 5 : 489. 1890 ; Duthie, Fl. U. Gang. Pl. 2 : 232. Repr. ed. 1960.

A small, often gnarled, evergreen tree, sometimes a shrub. Bark grey or whitish. Leaves alternate, shortly petiolate, 3.5 - 8 x 2 - 3.5 cm, elliptic or rhomboid or obovate, acute or acuminate, margins subcrenate, rough. Flowers creamy-white, dioecious. Male flowers in shortly stalked globose heads. Female flowers solitary, on slender axillary usually fascicled pedicels. Berries sub-globose, 1-seeded, yellow when ripe.

Fls. : Jan. Feb. ; *Frt.s.* : Feb. Mar. ; *Vern.* : Choriya ; AKS 694, Salempur.

Rare, found in the village Salempur and also occurs in hilly tracts.

84. CANNABINACEAE

CANNABIS L.

Cannabis sativa L. Sp. Pl. 1027. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 487. 1890; Duthie, Fl. U. Gang. Pl. 2 : 220. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 295. 1953.

An erect, robust, smelling herb, 60–100 cm high. Leaves 3 to 11 - foliolate; leaflets narrowly lanceolate, long acuminate or acute, coarsely serrate. Flowers yellowish, dioecious, rarely monoecious. Male flowers in axillary panicled cymes. Female flowers in axillary racemes. Fruit a somewhat compressed crustaceous nut.

Fls. & frts. : Feb. Apt. ; *Vern.* : *Bhang* ; AKS 378, R.B.S. College garden.

Occurs in the garden and near the cultivated fields.

85. CASUARINACEAE

CASUARINA L.

Casuarina equisetifolia L. Amoen. Acad. 4 : 143. 1759 ; Hook. f. Fl. Brit. Ind. 5 : 598. 1890 ; Duthie, Fl. U. Gang. Pl. 2 : 250. Repr. ed. 1960 ; Santapan in Rec. Bot. Surv. Ind. 16(1) : 295. 1953.

A narrow, tall, leafless tree with dropping branches. Branchlets very slender, rush like, with whorls of 6–8 scales, similar to the twigs of *Equisetum*. Male spikes cylindric, 2.5 cm long, usually numerous at the ends of branches. Female flowers in globose or ovoid heads becoming cone-like. Nutlets thin, winged.

Fls. : Feb. - April ; *Frts.* : May - June ; *Vern.* : *Vilayti Jhau* ; AKS 372, Roman Catholic Cemetery.

Planted as avenue tree in historical places and in the gardens.

86. SALICACEAE

SALIX L.

Salix tetrasperma Roxb. Pl. Cor. t. 97. 1795 et. Fl. Ind. 3 : 573. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 598. 1880 ; Duthie, Fl. U. Gang. Pl. 2 : 253. Repr. ed. 1960.

A moderate sized deciduous tree. Leaves 6–14 x 2.5–4 cm, lanceolate or elliptic-lanceolate, serrate, glaucous beneath. Flowers yellow, small, dioecious, in erect, dense catkins. Male catkins 5–10 cm long. Female catkins 7–12 cm long.

Fls. & frts. : Mar. July; AKS 947, Shahjahan Park.

Planted along the roadsides and in the gardens.

87. CERATOPHYLLACEAE

CERATOPHYLLUM L.

Ceratophyllum demersum L. Sp. Pl. 992. 1753; Hook. f. Fl. Brit. Ind. 5 : 639. 1890 ; Duthie, Fl. U. Gang. Pl. 2 : 255. Repr. ed. 1960; Santapau in Rec. Bot. Surv. Ind. 16(1) : 296. 1953.

A submerged, much branched, rootless, aquatic herb. Leaves whorled, dichotomously divided into filiform, brittle, serrate segments. Flowers minute, dioecious; male and female flowers solitary, in the axil of one leaf of a whorl; Nutlets ovoid or ellipsoid, coriaceous, small, tipped by the persistent subulate style subtended by a short, basal spine on either side.

Fls. : Oct. Dec.; Frts. : Dec. Jan.; AKS 244, Kitham.

Common in lake, ponds and ditches.

MONOCOTYLEDONES

88. HYDROCHARITACEAE

- | | |
|--|-----------------------|
| 1a. Stemless, with stolons; leaves radical, grass-like | 3. <i>Vallisneria</i> |
| 1b. Stems branched, leafy: | |
| 2a. Leaves mostly whorled; stamens 3; style undivided | 1. <i>Hydrilla</i> |
| 2b. Leaves mostly alternate; stamens 2; style notched | 2. <i>Nechamandra</i> |

1. HYDRILLA Rich.

Hydrilla verticillata (L. f.) Royle, Ill. 376. 1839; Hook. f. Fl. Brit. Ind. 5 : 659. 1890; Duthie, Fl. U. Gang. Pl. 2 : 262. Repr. ed. 1960. *Serpicula verticillata* L. f. Suppl. 416. 1781. *Vallisneria verticillata* Roxb. Fl. Ind. 3 : 751. 1832.

A slender, submerged, much-branched, aquatic herb rooting from the nodes. Leaves opposite or whorled, sessile, linear or linear-oblong, apiculate. Flowers minute, regular, monoecious or dioecious. Male flowers shortly pedicelled, solitary in a subglobose, muricate spathe; stamens 3. Female flowers sessile, solitary in a cylindrical top bifid, membranous spathe; style undivided.

Fls. : Sept. Oct. ; AKS 526, Shahjahan garden.

Common in still water of lake, ponds and canals.

2. NECHAMANDRA Planch.

Nechamandra alternifolia (Roxb.) Thw. Enum. Pl. Zeyl. 332. 1864 ; Subramanyam, Aquat. Angio. 56. 1962. *Vallisneria alternifolia* Roxb. Fl. Ind. 3 : 750. 1832. *Lagarosiphon roxburghii* (Planch.) Benth. in Benth. & Hook. f. Gen. Pl. 3 : 451. 1880 ; Hook. f. Fl. Brit. Ind. 5 : 659. 1888 ; Duthie, Fl. U. Gang. Pl. 2 : 262. Repr. ed. 1960.

A submerged, aquatic herb. Leaves alternate, sessile, linear-lanceolate, acute and often twisted. Flowers dioecious. Male flowers minute, numerous and densely crowded in an axillary, sessile, ovoid, 2-fid spathe. Stamens 2. Female flowers sessile, solitary, axillary within a bifid, tubular spathe. Ovary 1-celled, styles 3, stout, notched, stigmas finely papillose on the receptive surface.

Fls. & *frts.* : Sept. Nov. ; AKS 904, Tantpur.

Rare, found in ponds, tanks and water reservoirs.

3. VALLISNERIA L.

Vallisneria spiralis L. Sp. Pl. 1015. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 660. 1890 ; Duthie, Fl. U. Gang. Pl. 2 : 263. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 297. 1953.

A submerged, tufted, stemless, fresh water herb with fibrous roots. Leaves radical, linear, ribbon-shaped, 15 - 40 cm long. Flowers dioecious, on long or short scapes. Male flowers numerous, minute, in short stalked, ovoid spathe, which break off and rise to the surface. Female flowers solitary within a tubular, 3-toothed spathe borne at the apex of a long, slender, leafless scape, floating on the water, which becomes spirally contracted after anthesis.

Fls. : Sept. Nov. ; *Frts.* : Nov. Dec. ; AKS 562, Fatehpur Sikri.

Uncommon, occurs in rivers, canals and water reservoirs.

89. AMARYLLIDACEAE

ZEPHYRANTHES Herb. nom. cons.

Zephyranthes flava (Herb.) Nichol. Dict. Gard. 4 : 239. 1887. *Pyrolirion flavidum* Herb. App. Bot. Reg. 37. 1821.

A bulbous herb, 30-40 cm high. Bulbs 1.5 - 2 cm across. Leaves 25-35 x 0.8 - 1.2 cm, linear, radical, appearing with flowers or sometimes a little later. Flowers solitary borne on 30-40 cm long scape. Perianth lobes 6, 3.5 - 4 cm long, basally connate, sulphur yellow. Stamens 6, inserted in the tube. Carpels 3, connate; ovary 3 - celled, inferior. Fruit a subglobose, 3-lobed loculicidal capsule. Seeds numerous, compressed, black.

Fls. & frts. : June - Oct. ; *Vern.* : *Peeli Nargis* ; AKS 921, Shahjahan garden.

Common in grassy fields.

90. AGAVACEAE

AGAVE L.

Agave wightii Dr. & Prain in Agric. Ledger 13(7) : 91, 1906 (sb litt. J) ; Duthie, Fl. U. Gang. Pl. 2 : 317. Repr. ed. 1960.

A stout Agave with a conspicuous trunk. Leaves 60 - 100 x 7.5 - 12 cm, ensiform, linear-lanceolate, many, forming a stiff rosette; marginal prickles spreading or erect, with a small, brown cushion, sharply recurved and parallel to the leaf edge; terminal spine pale, decurrent. Scape 4-5 m high with the oblong-pyramidal panicle, main branches short 3-chotomous, fascicles rather crowded. Ovary nearly spindle-shaped, shorter than the petiole. Capsule broadly turbinate, brown.

Commonly planted on the boundaries of the gardens and cultivated fields.

91. LILIACEAE

1a. Leaves minute, scale-like; stems modified into needle-like, slightly flattened cladodes

1. *Asparagus*

1b. Leaves well developed; stems not modified into cladodes :

- 2a. Bulbiferous herbs ; flowers appearing before the leaves ; seeds flattened *3. Urginea*

2b. Non-bulbiferous herbs ; flowers and leaves contemporary ; seeds - trigonous *2. Asphodelus*

1. ASPARAGUS L.

Asparagus racemosus Willd. Sp. Pl. 2 : 152. 1799 ; Hook. f. Fl. Brit. Ind. 6 : 316. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 327. Repr. ed. 1960.

An extensively scandent or straggling, spinous, much - branched undershrub or shrub. Spines suberect or subrecurved. Leaves minute, scale-like bearing in their axils, a tuft of 2 - 6, narrowly oblong-linear, falcate, cladodes. ; Flowers white, hermaphrodite, small, in solitary or fascicled, simple or branched racemes. Perianth petaloid, 6 - partite, campanulate. Berries globose.

Fls. & frts. : July–Oct. ; *Vern.* : Satyawar ; AKS 803, Chiknur.

Common on the ridge straggling upon other shrubs and bushes.

2. *Asemoneus* L.

Asphodelus tenuifolius Cav. in An. Cienc. Nat. 3 : 46, t. 27, f. 2. 1801 ; Hook. f. Fl. Brit. Ind. 5 : 332. 1892 ; Duthie, Fl. U. Gang. Pl. 2: 333. Repr. ed. 1960.

An annual, stemless herb. Leaves radical, 15 - 30 cm long, terete, fistulous, acute. Scapes several from the root, much branched in the upper part, 30 - 60 cm high. Flowers white, distant, laxly racemose, solitary in each bract. Bracts broad ovate, scarious. Perianth petaloid, segments 6, oblong, obtuse. Capsules globose, loculicidal. Seeds 3-gonous, black, rugose.

Fls. : Dec. – Mar. ; *Frts.* : Mar. – Apr. ; *Vern.* : *Pizzi* : AKS 34, Salempur.

Abundant as winter season weed in cultivated fields and moist waste places.

3. URGUINEA Stein

Urginea indica (Roxb.) Kunth. Epim. 4 : 333, 1843 ; Hook. f. Fl. Brit. Ind. 6 : 347, 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 332. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 332, 1953. *Scilla indica* Roxb. Fl. Ind. 2 : 147, 1832.

A bulbous, scapigerous herb. Bulbs ovoid, about 6-8 cm in diam. Leaves appearing after the flowers, radical, linear, acute, nearly flat. Flowers pale brown.

very distant in slender laxly flowered racemes on erect, brittle scape. Perianth campanulate, 8 - 10 mm long, segments 6. Capsules oblong, triquetrous, loculicidal. Seeds flattened, black.

Fls. & frts. : May June ; *Vern.* : *Jangli Piyaz* ; AKS 508, Khander.

Occurs in gravelly soil of the ridges and in rock crevices.

92. PONTEDERIACEAE

- 1a. Flowers sessile ; perianth strongly zygomorphic ; stamens 6, three much longer than others, filaments not horned 1. *Eichhornia*
- 1b. Flowers distinctly pedicelled ; perianth actinomorphic ; one stamen longer, filament horned on one side 2. *Monochoria*

1. EICHHORNIA Kunth nom. cons.

Eichhornia crassipes (Mart.) Solms. in DC. Mon. Phan. 4 : 527. 1882 ; Haines, Bot. Bih. & Or. 1151. Repr. ed. 1961. *Pontederia crassipes* Mart. Nov. Gen. Sp. Pl. 1 : 9, t. 4. 1823.

An aquatic, floating herb, rooting at the nodes. Leaves radical, rosulate, ovate-rhomboid. The spongy petioles inflated near the middle portion into bladder - like structures. Flowers lilac or pale violet, in many flowered spikes. Perianth zygomorphic or subactinomorphic, 6-parted, about 3.5 - 4 cm long. Stamens 6, unequal, decurved. Ovary sessile, 3-celled; cells many ovuled.

Fls. : June Oct. ; *Frts.* : Oct. Nov. ; AKS 433, Kitham.

Abundant and troublesome weed in Kitham lake and also common in ponds and water reservoirs.

2. MONOCHORIA Presl

Monochoria vaginalis (Burm. f.) Presl Rel. Haen. 1: 128. 1827. Hook. f. Fl. Brit. Ind. 6 : 368. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 336. Repr. ed. 1960 ; Backer in Fl. Males 1, 4 : 256, 598. 1951. *Pontederia vaginalis* Burm. f. Fl. Ind. 80. 1768.

An aquatic herb. Leaves long petiolate, radical, 8 - 11.5 x 4.5 - 6.5 cm, ovate to ovate - lanceolate, acuminate. Flowers in dense sub - spicate racemes. Perianth lobes 6, white, free almost to the base. Stamens 6, filaments of larger anther with

an acute horn on one side. Ovary 3 - celled, ovules many in each cell. Fruit oblong, membranous capsule opening loculicidally. Seeds many, ovoid, longitudinally ribbed.

Fls. & frts. : Sept., Oct.; *Vern.* : Piazzi AKS 834, Salempur.

Common in water reservoirs of low lying area in association of *Sagittaria guayanensis* H.B. & K., *Limnophyton obtusifolium* Miq. and *Nymphaea stellata* Willd.

93. COMMELINACEAE

- 1a.** All the six stamens fertile 2. *Cyanotis*

1b. Fertile stamens usually 3, staminodes 2 - 4 :

 - 2a.** Inflorescence leaf-opposed, enclosed by a spathaceous bract and composed of 1 - 2 cincinni 1. *Commelinaceae*
 - 2b.** Inflorescence otherwise, the cymes invariably paniculate 3. *Mutellinae*

1. COMMELINA L.

L. Commelinna benghalensis L. Sp. Pl. 41. 1753; Hook. f. Fl. Brit. Ind. 6 : 370. 1892; Duthie, Fl. U. Gang. Pl. 2 : 339. Repr. ed. 1960.

A slender, branched herb, branches diffuse, creeping and rooting below. Leaves sessile or shortly petiolate, 3 - 7 x 1. 3.5 cm, ovate to oblong, obtuse, base rounded, cuneate or cordate. Aerial spathes 1-3 together in the axils, funnel-shaped or turbinate. Sepals 3, small, oblong. Petal 3, blue, one larger than the others, orbicular. Ovary 3-celled. Capsules 5-seeded, pyriform. Seeds wrinkled, pitted. Underground flowers perfect, usually solitary in a spathe.

Fls. : July - Oct. ; *Frt.s.* : Oct. - Nov. ; *Vern.* : Kankaua ; AKS 186, College campus ; 767, Poya ghat ; 818, Chiknipur.

Common in moist waste places, open grounds and gardens.

2. **Commelinia forskalaei** Vahl, Enum. 2 : 172. 1806 ; Hook. f. Fl. Brit. Ind. 6 : 371. 1892.

A diffuse, branched, creeping herb, rooting at the nodes. Leaves 2 - 4 x 0.4 - 0.6 cm, narrowly oblong, obtuse, or subacute, narrowed at the base, margins usually undulate. Aerial spathe axillary, broadly ovate, acute, 3 - 5 flowered. Petals 3, blue, 2 larger obovate, with a long slender claw. Filaments very long, spirally coiled. Capsules usually 3-seeded. Seeds subglobose, smooth.

Fls. : Dec. - Feb. ; *Frt.s.* : Feb. - Mar. ; AKS 301, Salempur ; 328, Bichpuri campus.

Common in moist shady places of gardens, fields and waste places.

3. **Commelinia paludosa** Bl. Enum. Pl. Java, 1 : 2. 1827 ; Rolla Rao in J. Bombay Nat. His. Soc. 59(1) : 60. 1962 and in notes Roy. Bot. Gard. 25(2) : 181. 1965 excl. var. *viscida* (C.B. Cl.) Rolla Rao et. Kannamathy. *C. obliqua* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 45. 1825 (non Vahl, 1806) ; Hook. f. Fl. Brit. Ind. 6 : 372. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 340. Repr. ed. 1960.

A branched, straggling or erect, tall herb, 60 - 90 cm high. Leaves sessile or petiolate, 7 - 12.5 x 1.5 - 3.2 cm, lanceolate or elliptic-lanceolate, acute, glabrous or scabrous ; sheaths about 2.5 cm or more long, the mouth bearded with long hairs. Spathes sessile, 2 - 2.5 cm long, nearly as broad as long, solitary or crowded in terminal heads, turbinately funnel-shaped. Flowers violet-blue. Ovary 3-celled. Capsules trigonous-obvoid, 3-seeded. Seeds smooth, lead-coloured.

Fls. : Aug. - Oct. ; *Frt.s.* : Oct. - Nov. ; AKS 492, Khander ; 779, Niyamatpur.

Common on ridges in depressions, amongst stones and in the shades of shrubs.

2. CYANOTIS D. Don nom. cons.

Ia. Flowers in axillary clusters, enclosed in the sheaths of the leaves ; bracteoles small not imbricating

1. *C. axillaris*

Ib. Flowers in cymes, enclosed in 2-seriate falcate, imbricating bracteoles

2. *C. tuberosa* var.
adscendens

1. *Cyanotis axillaris* Schult. f. Syst. 7 : 1154. 1830 ; Hook. f. Fl. Brit. Ind. 6 : 388. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 344. Repr. ed. 1960. *Tradescantia axillaris* L. Mant. 321. 1771.

A suberect or creeping diffusely branched, annual herb. Roots fibrous. Leaves sessile, 7.5 - 20 x 0.6 - 1 cm, narrowly linear or linear-lanceolate, acute or acuminate. Flowers blue, in cymes reduced to axillary fascicles in the ocreate, inflated sheaths. Sepals 3, 5 mm long, lanceolate, acute. Petals 3, 1.4 cm long, broadly ovate, subacute. Stamens 6, all perfect. Ovary 3-celled. Capsules oblong-ellipsoid, beaked.

Fls. : Sept. Oct. ; *Frt.* : Oct. Nov. ; AKS 451, College campus.

Uncommon, found in moist, damp places.

2. *Cyanotis tuberosa* Schult. f. Syst. 7 : 1153. 1830, var. *adscendens*, Clarke in DC. Mon. 3, 249 ; Hook. f. Fl. Brit. Ind. 6 : 386. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 344. Repr. ed. 1960. *Tradescantia tuberosa* Roxb. Fl. Ind. 2 : 119. 1832.

A creeping herb. Roots of fusiform tubers. Leaves sessile, the radical and lower caudine ones very long, linear or ensiform ; upper caudine leaves much shorter. Flowers bluish-purple, in cymes, in the axils of short, falcately decurved bracts ; bracteoles many, imbricate in 2 series. Capsules ellipsoid, hairy on its upper half.

This plant is included on the authority of Jacquemont (in Duthie, Fl. U. Gang. Pl. 2 : 344).

3. MURDIANIA Royle (nom. cons.)

Murdannia nudiflora (L.) Brenan in Kew Bull. 1952, 189. 1952. *Commelina nudiflora* L. Sp. Pl. 41. 1753 (p.p.). *Aneilema nudiflorum* R. Br. Prodr. 271. 1810 ; Hook. f. Fl. Brit. Ind. 6 : 378. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 342. Repr. ed. 1960.

A weak procumbent, simple or branched, fibrous rooted herb. Leaves 5 - 9 x 0.5 - 0.8 cm, linear-oblong or lanceolate, acute or acuminate. Flowers blue, in terminal few-flowered, subglobose or subcorymbose cymes, cymes becoming paniculate with elongate peduncles. Sepals 3, 3 mm long, oblong, obtuse. Petals 3, 3.5 mm long, suborbicular. Stamens 2. Capsules subglobose, unilocular, 3-celled, with 3-seeds in each cell.

Fls. : Aug. Sept. ; *Frt.* : Sept. Oct. ; AKS 466, Bichpuri campus ; 909, Tanpur.

Common in wet shady places of unused grounds.

94. JUNCACEAE

JUNCUS L.

Juncus hufonius L. Sp. Pl. 328. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 392. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 346. Repr. ed. 1960.

A densely tufted, much dichotomously branched, annual herb, 10–30 cm high. Leaves chiefly radical, very narrow, grass-like. Flowers pale green, solitary or in scattered, few-flowered cymes ; lateral flowers 6-androus, terminal ones 3-androus. Perianth lobes 6, 2-seriate, 4.5 mm long, lanceolate, acuminate, margins membranous. Capsules 4 mm long, obovoid, closely embraced by the perianth. Seeds very numerous, finely reticulate.

Fls. : Dec. Mar. ; Frts. : Mar. Apr. ; Vern. : *Pola* ; AKS 390, Poiya ghat ; 613, Arnota ; 695, Salempur.

Common in sandy soil on the bank of Jamuna and Utangan rivers and near the ponds and canals.

95. ARECACEAE (PALMAE)

PHOENIX L.

Phoenix sylvestris (L.) Roxb. Fl. Ind. 3 : 787. 1832 ; Brandis, For. Fl. 554 & Ind. Ir. 645. 1874 ; Hook. f. Fl. Brit. Ind. 6 : 425. 1892 ; Duthie, Fl. U. Gang. Pl. 2 : 354. Repr. ed. 1960 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 327. 1953. *Elate sylvestris* L. Sp. Pl. 1189. 1753.

A tall or moderate-sized palm with a large, thick, hemispherical crown. Trunk rough with the persistent bases of petioles. Leaves pinnate, greyish-green ; petioles compressed towards the apex and bearing a few short triangular spines at the base. Leaflets fascicled, rigid, ensiform, channelled, spinous-pointed. Male panicles compact on a short peduncle ; flowers white, scented. Fruits oblong-ellipsoid, orange-yellow to reddish-brown, edible. Seeds pale brown.

Fls. & frts. : Jan. May ; Vern. : *Khajoor*.

Occurs wild on the ridges and also planted in the area.

96. TYPHACEAE

TYPHA L.

Typha angustata Bory & Chaub. Exp. Sc. Mor. 3(2) : 338. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 489. 1893 ; Santapau in Rec. Bot. Surv. Ind. 16(1) : 328. 1953 ; Duthie, Fl. U. Gang. Pl. 2 : 359. Repr. ed. 1960.

A robust, marshy, perennial plant growing upto 4m high. Leaves radical or subradical, elongate-linear, rather thick and spongy, usually exceeding the flowering stem. Flowers numerous, very closely packed in 2, terete, unisexual spikes; male and female separated by a long interval. Male flowers with 3, flat hairs together surrounding 2-5 stamens. Female spikes pale brown.

Fls. : Sept. Mar. ; *Vern.* : Patera ; AKS 887, Kitham.

Common in marshy and swampy places near Kitham lake.

97. ARACEAE

CRYPTOCORYNE Fisch.

Cryptocoryne retrospiralis Kunth, Enum. 3 : 12. 1841 ; Hook. f. Fl. Brit. Ind. 6 : 493. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 362. Repr. ed. 1960.

An aquatic herb, usually submerged. Stem short or none. Leaves many, radical, sessile or with a short stout petiole, narrowly linear or linear-lanceolate, acute or finely acuminate. Spathe subsessile, about as long as the leaves. Spadix very slender. Male inflorescence cylindric ; stamens 1 or 2, distinct. Female inflorescence a single whorl of 5-6 connate, 1-celled, ovaries.

This plant is included on the authority of Munro (in Duthie, Fl. U. Gang. Pl. 2 : 362.)

98. LEMNACEAE

- 1a. Fronds subglobose, without roots ; inflorescence of 1-staminate and 1-carpellate flowers 3. *Wolffia*
- 1b. Fronds flat, with 2-many roots ; inflorescence of 2-staminate and 1-carpellate flowers :

- | | |
|------------------------|---------------------|
| 2a. Fronds 1-rooted | 1. <i>Lemna</i> |
| 2b. Fronds many rooted | 2. <i>Spirodela</i> |

1. LEMNA L.

Lemna perpusilla Torrey, Fl. N. York 2 : 245, 1843 ; Daubs, Illin. Biolog. Monogr. 34 : 25, 1965. Hartog, Blumea 18 : 363, 1970 ; *Lemna paucicostata* Hegelm. Lemnae. 138, t. 8, 1868 ; Hook. f. Fl. Brit. Ind. 6 : 556, 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 368. Repr. ed. 1960.

A scale-like, floating, aquatic plant. Fronds oblong, obovate-oblong, rather thin, nearly flat on both surface, asymmetrical, entire. Single root has an appendaged root-sheath and an acute root cap. Inflorescence of 1-carpellate and 2-staminate flowers surrounded by a membranous spathe. Ovary 1-celled and single ovuled.

Vern. : Chowpatti, AKS 888, Kitham.

Common in still water of ponds, puddles and ditches.

2. SPIRODELA Schleid.

Spirodela polyrhiza (L.) Schleid. in Linnaea 13 : 392, 1839 ; Duthie, Fl. U. Gang. Pl. 2 : 368. Repr. ed. 1960. *Lemna polyrhiza* L. Sp. Pl. 970, 1753 ; Hook. f. Fl. Brit. Ind. 6: 557, 1893.

Fronds herbaceous, 7 to 13-nerved, with many roots, broadly obovate or orbicular, floating, dark green above, usually purplish beneath. Spathe with 2-staminate flowers and 1-carpellate flower. Fruit 1-seeded.

AKS 950, Kitham.

Common in stagnant water of ponds, puddles and canals and floating on the surface of water.

3. WOLFFIA Horkel

Wolffia arrhiza (L.) Horkel ex Wimm. Fl. Schles. 140, 1857 ; Hook. f. Fl. Brit. Ind. 6 : 557, 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 369. Repr. ed. 1960. *Lemna arrhiza* L. Mant. 2 : 294, 1767.

A very minute, granular, floating plant. Fronds very minute, subglobose or ellipsoid, slightly convex above, rootless. Young fronds sessile arising from a single, funnel-shaped pouch at the base of the old frond. Flowers arising from a central cup-like hollow in the centre of the frond, naked; spathe absent. Male flower consists of a single stamen with a 2-loculed anther. Female represented by a single carpel; ovary globose or ovoid.

Fls. : Sept. - Nov. ; AKS 889, Agra College garden.

Common in stagnant water of ponds, puddles and canals.

99. ALISMATACEAE

- 1a. Carpels crowded on a minute receptacle; achenes swollen, not surrounded by such a wing. 1. *Limnophyton*
- 1b. Carpels inserted on a large globular or oblong receptacle; achenes more or less compressed and surrounded by a broad, blunt-spiny wing 2. *Sagittaria*

1. LIMNOPHYTON Miq.

Limnophyton obtusifolium (L.) Miq. Fl. Ind. Bat. 3 : 242. 1855 ; Hook. f. Fl. Brit. Ind. 6 : 560. 1893 ; Subramanyam, Aquatic Angio. 86. 1962. *Sagittaria obtusifolia* L. Sp. Pl. 993. 1753.

An erect, robust, succulent, aquatic herb. Leaves basal, long petiolate, broadly sagittate, acute, pellucid-punctate. Flowers white, pedicelled, in 3-bracteate whorls at the nodes of branches of pyramidal panicle; lower whorls with bisexual flowers; upper ones male. Sepals 3, ribbed, green. Petals 3, broadly obovate. Carpels 15 to many, crowded in small receptacle. Achenes numerous, on a globose head, ovoid, turgid, wrinkled.

Fls. & *frts.* Aug. - Oct. ; AKS 835, Salempur.

Common in water reservoirs of low lying area, associated with *Sagittaria guayanensis* H. B. & K. and *Nymphaea stellata* Willd.

2. SAGITTARIA L.

- 1a. Leaves floating, broadly ovate, deeply cordate, obtuse; stamens 6 - 10 in male flowers, 9 - 12 in hermaphrodite flowers 1. *S. guayanensis*

Ib. Leaves rising above the surface of water, sagittate ;
stamens about 24 in male flowers, reduced to staminodes
in female ones

2. *S. sagittifolia*

1. *Sagittaria guayanensis* H. B. & K. Nov. Gen. & Sp. I : 250. 1815 ; Hook.
f. Fl. Brit. Ind. 6 : 561. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 372. Repr. ed. 1960.

A scapigerous, floating, fibrous-rooted, aquatic herb. Leaves broadly ovate, deeply cordate, obtuse or rounded, membranous. Flowers whitish, shortly pedicelled, in few close whorls ; lower whorls with bisexual flowers ; upper ones male. Sepals 3, persistent. Petals 3, membranous, deciduous. Carpels many, flattened, spirally arranged in a head on a large globular receptacle. Achenes numerous, flat, surrounded by a broad, toothed wing.

Fls. & frts. : Aug. Oct. ; AKS 833, Salempur.

Common in water reservoirs and ponds of low lying area in association of *Nymphaea stellata* Willd., *Nymphoides cristatum* Kuntze and *Limnophyton obtusifolium* Miq.

2. *Sagittaria sagittifolia* L. Sp. Pl. 993. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 561. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 371. Repr. ed. 1960.

A scapigerous, aquatic herb. Leaves radical, sagittate, acute with more or less divergent basal lobes. Flowers white, often with a purple claw, in 3-5 whorls along the scape ; with usually 3 flowers in each whorl, the lower whorls with female flowers and upper ones male. Achenes obliquely obovate, flattened, apiculate, winged.

This plant is included on the authority of Munro (in Duthie, Fl. U. Gang. Pl. 2 : 371).

100. BUTOMACEAE

TENAGOCIARIS Hochst.

Tenagocharis latifolia (D. Don) Buchen. Abh. Naturw. Ver. Bremen 2 : 2, 3, 6. 1868 ; van Steenis in Fl. Males. I, 5 : 118, f. I. 1954. *Butomus latifolius* D. Don, Prodr. Fl. Nep. 22, 1825. *Butomopsis lanceolata* Kunth, Enum. Pl. 3 : 165. 1841 ; Hook. f. Fl. Brit. Ind. 6 : 562. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 372. Repr. ed. 1960.

An erect, annual herb, 10 - 40 cm tall. Leaves petiolate, elliptic - oblanceolate. Flowers white, in long-peduncled, 2 - 6 flowered umbels. Calyx herbaceous, persistent. Petals membranous, deciduous. Fruits of 6-7 erect, membranous follicles slightly connate below.

Fls. & frts. : Aug. Nov. ; AKS 951, Jagner.

Common in water reservoirs and ponds of low lying area.

101. POTAMOGETONACEAE

POTAMOGETON L.

Ia. Leaves linear-oblong, crisped, translucent ; spikes few-flowered *1. P. crispus*

Ib. Leaves filiform, opaque ; flowers in distant whorls on the peduncle *2. P. pectinatus*

1. **Potamogeton crispus** L. Sp. Pl. 126, 1753 ; Hook. f. Fl. Brit. Ind. 6 : 566, 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 375. Repr. ed. 1960.

A submerged, aquatic herb. Leaves sessile, 3 - 7 x 0.4 - 0.8 cm, linear or linear-oblong, crisped, finely serrulate, translucent. Flowers bisexual, small, greenish, in few flowered, 1-1.5 cm long spikes. Sepals 4, rounded, valvate, concave. Stamens 4. Fruits obliquely ovoid, 5-6 mm long.

Fls. : Nov. Feb. ; *Frts.* : Feb. Apr. ; AKS 561, Fatehpur Sikri ; 712, Agra College garden.

Common in lakes, ponds and canals.

2. **Potamogeton pectinatus** L. Sp. Pl. 127, 1753 ; Hook. f. Fl. Brit. Ind. 6 : 567, 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 565. Repr. ed. 1960.

A grass - like aquatic herb. Stems filiform, copiously, distichously branched. Leaves narrowly linear or filiform, acute, 2.5 - 15 x 0.2 - 0.3 cm. Stipules adnate to the leaf sheath with free tips. Flowers bisexual, interruptedly whorled on a spike 0.6 - 3.3 cm long. Sepals 4, suborbicular. Fruits dimidiate-obovate, shortly beaked.

Fls. & frts. : Jan. Apr. ; AKS 280, Kiraoli ; 403, Bichpuri campus.

Common in canals and temporary ponds.

102. ZANNICHELLIACEAE

ZANNICHELLIA L.

Zannichellia palustris L. Sp. Pl. 969. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 568. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 367. Repr. ed. 1960.

A slender, submersed, aquatic herb. Leaves pseudoverticillate, linear or filiform, entire with sheathing or free stipules. Flowers minute, unisexual, naked, axillary ; 1 - staminate and 2 - 5 - pistillate flowers often in the same axillary, cup-shaped involucr. Staminate flower without a perianth ; stamen solitary. Female flower with a cupular, hyaline perianth ; carpels 1 - 9, sessile or stipitate ; stigma peltate. Fruits stipitate, horned.

Fls. : Nov. Jan ; Frts. : Jan. Mar. ; AKS 314, Salempur, 327, Bichpuri campus.

Common in temporary ponds, puddles and canals.

103. ERIOCAULACEAE

ERIOCAULON L.

Eriocaulon trilobum Buch. Ham. ex Koern. in Linnaea XXVII (1856), 645 ; Hook. f. Fl. Brit. Ind. 6 : 583. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 378. Repr. ed. 1960.

Leaves linear ensiform 3-8 cm long. Peduncles many 6 - 20 cm high ; heads 3 - 4 mm across, globose ; receptacle columnar, villosus. Involucral bracts oblong, obtuse, pale brown. Floral bract narrowly obovate-cuneate, obtuse or acute, blackish-green. Male floret : sepals 3, connate to the middle in a spathe ; petals stipitate, minute. Female floret : sepals 3, obovate-oblong, boat-shaped ; petals linear-spathulate.

Fls. & frts. : Sept. Dec. ; AKS 934, Jagner.

Found in rice fields.

104 CYPERACEAE

- 1a. Flowering glumes all distichous ; hypogynous bristles absent 2. *Cyperus*

1b. Flowering glumes spirally arranged ; hypogynous
bristles or scales present or absent :

2a. Style bases not swollen, gradually passing into the
nut 5. *Scirpus*

2b. Style bases swollen with a constriction above the
point of insertion on the nut :

3a. Leaves absent ; hypogynous bristles present 3. *Eleocharis*

3b. Leaves present usually at the base of the stem ;
hypogynous bristles absent:

4a. Style deciduous, leaving a tumor on the nut 1. *Bulbostylis*

4b. Style often persistent, if deciduous not leaving a
tumor on the nut 4. *Fimbristylis*

1. *Bulbostylis* Kunth nom. cons.

- 1a. Plants glabrous only leaf sheaths hairy; heads not prickly 1. *B. barbata*
 1b. Plants pubescent, heads almost prickly 2. *B. subsinuosa*

1. *Bulbostylis barbata* (Rottb.) Clarke in Hook. f. F1. Brit. Ind. 6:651, 1893; Duthie, F1. U. Gang. Pl. 2:408. Repr. ed. 1960; Kern in Reinwardtia 6(1):51, 1961. *Scirpus barbatus* Rottb. 27, 1772; Descr. Icon. 52, t. 17, f. 4, 1773.

All erect, tufted, annual herb. Stems slender, striate. Leaf sheath with long, slender hairs in the mouth. Leaves as long or shorter than the stem, filiform, acute. Spikelets 6 x 8 mm. 6-20 in dense, terminal heads. Glumes 2 mm long, boat-shaped, keel excurrent as a small mucro. Rachilla after the fall of glumes winged and scaly. Nuts obovoid, trigonous, dull white, very minutely stipitate; style leaving a very minute button on the nut.

Fls. & frts. : Sept. Oct. ; AKS 178, Peiya ghat.

Abundantly found on sandy soil of fallow fields and also on cultivated and open grounds.

2. *Bulbostylis subspinosus* Clarke in Hook. f. Fl. Brit. Ind. 6 : 652. 1893; Haines, Bot. Bih. & Or. 967. Repr. ed. 1961.

A densely, tufted, pubescent plant with fibrous roots. Stems and leaf blades filiform. Spikelets in small, dense terminal heads, green. Bracts about as long as the head. Glumes boat-shaped, keeled, pubescent. Stamens 2. Stigmas 3. Nuts trigonous, dull white, style leaving a very minute button on the nut.

Fls. & frts. : July Sept. ; AKS 447, Kitham.

Found in marshy places near the kitham lake.

2. CYPERUS L. *sensu lato*

1a. Stigmas 3 ; nut trigonous or triquetrous :

2a. Rachilla of spikelets disarticulating above the 2 lowest glumes

C. compactus

2b. Rachilla of spikelets persistent :

3a. Inflorescence a solitary head of 3 - 8 spikelets

C. nivews

3b. Inflorescence umbellate:

4a. Spikelets digitate on the ultimate rays, not spicate

C. difformis

4b. Spikelets not digitate ; either spicate or racemose:

5a. Rachilla of spikelets distinctly winged :

6a. Stolons bulbiferous ; leaves arising from the stem some distance above the base

C. bulbosus

6b. Stolons not bulbiferous ; leaves radical

C. rotundus

5b. Rachilla of spikelets not winged :

7a. Glumes cuspidate or aristate :

8a. Spikelets strongly compressed ; nut about half the length of the glume

C. compressus

8b. Spikelets not compressed ; nut less than half the length of the glume

C. squarrosum

- 7b. Glumes obtuse or minutely mucronate, neither cuspidate nor aristate :
- 8a. Glumes suborbicular 11. *C. radiatus*
- 8b. Glumes boat-shaped :
- 10a. Rachis glabrous ; glumes 3 - 5 nerved on the dorsal side 7. *C. iria*
- 10b. Rachis hispid ; glumes 7 - 9 nerved on the dorsal side 1. *C. ululatus*
- 1b. Stigmas 2 ; nut flattened or compressed :
- 11a. Fruit a flattened nut ; rachilla of spikelets persistent 8. *C. laevigatus*
- 11b. Fruit a laterally compressed nut ; rachilla of spikelets deciduous :
- 12a. Glumes many; heads large, dense 10. *C. pygmaeus*
- 12b. Glumes 4 - 5 only; heads smaller :
- 13a. Spikes 3, aggregated into a compact head 14. *C. triceps*
- 13b. Heads solitary 2. *C. brevifolius*

1. *Cyperus ululatus* Kern in Reinwardtia 1 (4) : 463. 1952 ; Raizada in Proc. Nat. Inst. Sci. Ind. 201. 1958 ; Malik & Prasad in Ind. For. 94 (12) : 885. 1968. *C. iria* L. var. *rectangularis* Kükenthal in Engl. Pflanzenr. 101 : 152. 1936. *C. iria* sensu. Clarke in Illus. Cyp. tab. 14. 1909.

An erect, glabrous sedge, 30 - 40 cm high. Stems triquetrous, striated. Leaves linear, finely acuminate. Inflorescence of compound umbels, the primary rays branched secondarily in an umbellate manner. Primary bracts foliar 3 - 6, unequal, very long. Spikelets 5 - 6 x 3 mm, spicately arranged, 6 - 10 flowered, compressed. Rachis hispid. Glumes 1.5 mm long, broadly boat-shaped, 7 - nerved on the dorsal surface. Stigmas 3. Nuts triquetrous, ellipsoid, smooth.

Fls. & frts. : July Sept. ; AKS 793, Fatehpur Sikri ; 898, College campus.

Found in moist unused grounds and near the ponds.

2. *Cyperus brevifolius* (Rottb.) Hassk. Cat. Hort. Bog. 24. 1884; Kukenthal in Engl. Pflanzenr. 101 : 600. 1936; Kern in Reinwardtia 3 (1) : 62. 1954 & 6 (1) : 66. 1961. *Kyllinga brevifolia* Rottb. Descr. & Icon. 13, t. 4, f. 3. 1773; Hook. f. Fl. Brit. Ind. 8 : 588. 1993; Duthie, Fl. U. Gang. Pl. 2 : 396. Repr. ed. 1960.

A glabrous, erect herb, 20 - 50 cm high with slender, horizontally running rhizomes. Stems clothed at the base with brown, shiny leaf sheaths. Leaves linear, acuminate, shorter or as long as long as the stems. Spikes ovoid, solitary, white; bracts foliar, 3 - 4. Spikelets 2 x 1 mm, ovate-lanceolate to lanceolate, 1-flowered. Lowest glumes empty and subequal. Third glume boat-shaped, acuminate, 2-nerved on either side of the serrated, non-winged keel. Fourth glume slightly larger, thinner in texture. Stigmas 2. Nuts obovate ellipsoid, much laterally compressed.

Fls. & frts. : July Oct. ; AKS 136, Kitham ; 525, Shahajahan garden.

Common in moist shady places of the gardens and near the ponds.

3. *Cyperus bulbosus* Vahl, Enn. 2 : 342. 1806; Hook. f. Fl. Brit. Ind. 6 : 611. 1893; Duthie, Fl. U. Gang. Pl. 2 : 391. Repr. ed. 1960.

A tufted, erect, glabrous, perennial herb, 30 - 45 cm high. Bulbs clothed with scale leaves. Leaves arising all in the lower part of the stem, shorter than the stems, narrowly linear. Inflorescence with tufts of sessile spikelets in a spike and forming a contracted umbel. Spikelets 1 - 1.5 cm long, linear, chestnut brown. Rachilla of spikelets winged. Glumes 3 mm long, elliptic, many-nerved. Stigmas 3. Nuts obovoid, trigonous, black.

Fls. & frts. : July Oct. ; AKS 770, Poiya ghat.

Occurs on sandy soil of fallow fields and in waste places.

4. *Cyperus compactus* Retz. Obs. 5 : 10. 1789; Kukenthal in Engl. Pflanzenr. 101 : 423. 1936; Kern in Reinwardtia 2 (1) : 126. 1952 & 6 (1) : 63. 1961. *Mariscus microcephalus* Persl. Rel. Haenke. 182. 1830; Hook. f. Fl. Brit. Ind. 6 : 624. 1893. *M. dilatus* Nees in Wt. Contrib. 90. 1834; Duthie, Fl. U. Gang. Pl. 2 : 398. Repr. ed. 1960.

A tufted, erect, glabrous herb, 60 - 100 cm high. Stems trigonous, striated. Leaves as long as the stem or shorter, linear, finely acuminate. Inflorescence of compound umbels with the rays of secondary umbels ending in compact spikes; primary bracts numerous, foliar. Spikelets 3 - 4 x 3 mm, narrowly linear, 8 - 20 flowered. Glumes 3 mm long, oblong-lanceolate, obtuse. Stigmas 3. Nuts trigonous, oblong, smooth.

Fls. & frts. : Aug. Oct. ; AKS 476, Salempur.

Common along the canals and temporary ponds.

5. *Cyperus compressus* L. Sp. Pl. 1 : 45. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 605. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 384. Repr. ed. 1960 ; Kukenthal in Engl. Pflanzent. 101 : 156. 1936 ; Kern in Reinwardtia 6 (1) : 56. 1961.

An erect, glabrous herb, 10–30 cm high with numerous, fine, tufted roots. Leaves as long as or longer than the stem, narrowly linear, finely acuminate. Inflorescence umbellate ; some of the rays sessile. Spikelets 1.1–2.3 × 0.3–0.4 cm, 4–7 in each ultimate condensed, umbellate spike, strongly compressed laterally ; bracts foliar, unequal, generally three, exceeding the umbel. Glumes 4 × 2 mm, broadly ovate, winged, aristate. Stigmas 3. Nuts 1.5 × 1 mm, broadly triquetrous, obovoid, dark brown.

Fls. & frts. : July Oct. ; AKS 176, Poya ghat ; 470, Salempur.

Common on sandy soil of Jamuna bank and on saline soil near the ponds.

6. *Cyperus difformis* L. Cent. Pl. 2 : 6. 1756 ; Hook. fl. Brit. Ind. 6 : 599. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 382. Repr. ed. 1960 ; Kukenthal in Engl. Pflanzent. 101 : 237. 1936 ; Kern in Reinwardtia 6 (1) : 58. 1961.

A glabrous, erect, tufted, annual sedge, 10–30 cm high. Roots fibrous, numerous. Leaves as long as the stem, linear, smooth, flaccid. Inflorescence of 3–6 compact heads of spikelets, some rayed, others sessile. Spikelets 3–5 × 1–1.5 mm, linear-oblong, 12–20 flowered, brownish. Glumes closely imbricate, 0.5 mm long, obovate-oblong, obtuse. Stigmas 3. Nuts trigonous, obovoid, smooth, pale-brown.

Fls. & frts. : Sept. Nov. ; AKS 556, Fatehpur Sikri.

Found near the ponds and on sandy soil of fallow fields.

7. *Cyperus iria* L. Sp. Pl. 45. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 606. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 385. Repr. ed. 1960 ; Kukenthal in Engl. Pflanzent. 101 : 150. 1936 ; Kern in Reinwardtia 6 (1) : 55. 1961.

An erect, glabrous annual, 15–40 cm. high. Stems triquetrous, striated. Leaves linear, tapering to an acuminate tip. Inflorescence of compound umbels, the primary rays branched secondarily in an umbellate manner. Primary bracts foliar 3–6, unequal, very long. Spikelets 5–7 × 2 mm, spicately arranged, 8–15 flowered, compressed. Glumes 2 mm long, broadly boat-shaped, 3–5 nerved on the dorsal surface. Stigmas 3. Nuts 1–1.5 mm, triquetrous, ellipsoid, black.

Fls. & frts. : July Sept. ; AKS 506, Khander ; 906, Tautpur.

14. *Cyperus triceps* (Rottb.). Eudi. Cat. Hort. Ac. Vindob. 1 : 94, 1842; Kükenthal in Engl. Pflanzenr. 101 : 578, 1936; Kern in Reinwardtia 3(1) : 61, 1954 & 6(1) : 66, 1961. *Kyllinga triceps* Rottb. Descr. & Icon. 14, t. 4, f. 6(excl. cit. Rheed.). 1773 ; Hook. f. Fl. Brit. Ind. 6 : 578, 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 396. Repr. ed. 1960.

An erect, glabrous, tufted plant, 10 - 20 cm high. Stems clothed at the base by more or less fibrous leaf sheaths. Leaves linear, about half the length of stem or as long as stems. Spikes ovoid or cylindric - ovoid, white, usually 3, aggregated into a compact head, in which case the central spike is larger than the lateral ones; bracts 3 or 4, foliar. Spikelets 1 - flowered. Two lowest glumes empty. Third glume ovate, 3 - ribbed on either side of smooth keel. Stigmas 2. Nuts oblong or ellipsoid - oblong, laterally compressed.

Fls. & frts. : Aug. - Oct. ; AKS 124, Paliwal Park.

Found in moist, shady places.

3. ELEOCHARIS R.Br.

- | | |
|------------------------------------|---------------------------|
| 1a. Stems not transversely septate | 1. <i>E. acutangula</i> |
| 1b. Stems transversely septate | 2. <i>E. atropurpurea</i> |

1. *Eleocharis acutangula* (Roxb.) Schultes in R. & S., Mant. 2 : 91, 1824; Kern in Reinwardtia 6(1) : 35, 1961 ; Son Deva & Naithani in Ind. For. 100 : 636 - 654, 1974. *Scirpus acutangulus* Roxb., Fl. Ind. 1 : 216, 1820. *E. fistulosa* Schultes in Roem. & Sch. Syst. II. Mant. 89, 1824 ; Hook. f. Fl. Brit. Ind. 6 : 626, 1893 ; Singh and Murty in J. Bombay Nat. Hist. Soc. 63(2) : 462, 1966 ; Singh & Dixit in Ind. For. 98(2) : 124, 1972.

An erect, marshy, tufted plant with creeping rhizome, 20 - 45 cm high. Stems triquetrous. Leaves absent, sheaths truncate. Spikelets solitary, terminal, 1 - 4 x 0.3 - 0.5 cm, ellipsoid or cylindric, brownish, scarcely broader than the stem. Glumes closely imbricate on all sides of rachilla, 6 mm long, ovato-lanceolate or obovate. Hypogynous bristles brown, retrorsely scabrid. Stamens 3. Stigmas 2. Nuts broadly obovoid, biconvex, pale brown, tipped by the broad style base.

Fls. & frts. : Aug.-Oct. ; AKS 853, Salemput.

Found in drying paddy fields and muddy soil

2. *Eleocharis atropurpurea* (Retz.) Kunth, Enum. Pl. 2 : 151, 1837; Hook. f. Fl. Brit. Ind. 6 : 627, 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 400. Repr. ed. 1960. *Scirpus atropurpureus* Retz. Obs. 5 : 14, 1788.

A small, tufted, glabrous annual upto 15 cm high. Stems angular, ridged. Leaves absent; sheath short, membranous. Spikelets solitary, terminal, $2.5 - 5 \times 2 - 2.5$ mm, ovoid, dark brown, broader than the stem. Glumes loosely imbricate, ovate-oblong, obtuse. Bristles white or brown, exceeding the nut. Stamens 1 - 2. Stigmas 3. Nuts oblong-ovate, biconvex, tipped by the style base.

Fls. & frts. : Aug.-Oct ; AKS 942, Jagner.

Occurs in drying rice fields and muddy soil.

4. *FIMBRISTYLIS* Vahl nom. cons.

Ia. Stigmas 2; nuts biconvex :

2a. Spikelets solitary or 2 - 3 8. *F. schoenoides*

2b. Spikelets many :

3a. Glumes hoary-hairy in the upper half 4. *F. ferruginea*

3b. Glumes glabrous :

4a. Leaves often as long as the stem, not coriaceous; nuts ribbed and trabeculate 1. *F. bisumbellata*

4b. Leaves always short, coriaceous, nuts not ribbed or trabeculate 2. *F. cymosa*

Ib. Stigmas 3; nuts trigonous :

5a. Spikelets solitary 6. *F. ornata*

5b. Spikelets several to numerous :

6a. Spikelets or some of them in clusters of 2 - 5 3. *F. falcatia*

6b. Spikelets discrete :

7a. Lower glumes distichous 9. *F. tenera*

7b. All glumes spirally imbricate :

8a. Spikelets ellipsoid, subacute 7. *F. quinquangularis*

8b. Spikelets subglobose, obtuse 5. *F. miliacea*

1. *Fimbristylis bisumbellata* (Forsk.) Bub. Dodec. 30, 1850; Kern in Blumea 8(1) : 135, 1955 & in Reinwardtia 6(1) : 47, 1961. *Scirpus bisumbellatus* Forsk. Fl. Aeg. Arab. 1 : 15, 1775. *F. dichotoma* auct., Clarke in Hook. f. Fl. Brit. Ind. 6 : 635, 1893; *non* Vahl, 1806.

An erect, tufted, annual herb. Roots fibrous, slender. Stems striate, filiform, smooth. Leaves as long as stems or less, very narrow, acuminate, scabrous beneath. Umbels compound or decomound. Spikelets 4 - 5 x 2 mm, ovate, subcylindric, sessile and pedicelled, many flowered. Primary bracts foliar exceeding the umbels. Glumes closely imbricate, 1 mm long, boat-shaped, keel prominent and excurrent as a macro, pale brown. Stigmas 2, recurved. Nuts biconvex, 5 to 9 ribbed, transversely rugose, pale brown.

Fls. & frts. : Nov. - May ; AKS 98, Poya ghat; 248, Kitham; 612, Amota.

Commonly found in moist, sandy soil of Jamuna and Utangan rivers and near the ponds.

2. *Fimbristylis cymosa* R. Br. Prodr. 228, 1810. *F. spathacea* Roth, Nov. Pl. Sp. 24, 1821 ; Hook. f. Fl. Brit. Ind. 6 : 640, 1893; Duthie, Fl. U. Gang. Pl. 2 : 403. Repr. ed. 1960.

A tufted, perennial sedge, 30 - 60 cm high. Rhizome short or elongate, stout. Stems terete, striate. Leaves many at the base, much shorter than the stems, narrowly linear, coriaceous, margins scabrid. Spikelets 4-6 x 2-3 mm, brown, ovoid, in simple or compound umbels. Glumes 3 mm long, ovate, boat-shaped, keeled, cuspidate. Stigmas 2. Nuts 1 mm long, minutely stipitate, biconvex, broadly obovate, minutely rugose.

Fls. & frts. : Aug. - Nov. ; AKS 560, Patehpur Sikri.

Common along the temporary ponds, on roadsides and along the streams.

3. *Fimbristylis falcata* (Vahl) Kunth, En. Pl. 2 : 239, 1837 ; Kern in Blumea 8(1) : 113, 1955 and in Reinwardtia 6(1) : 39, 1961. *Scirpus falcatus* Vahl, Eauth. Pl. 2 : 275, 1806. *F. junciformis* Kunth, Enom. 2 : 239, 1837 ; Hook. I. Fl. Brit. Ind. 6 : 647, 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 407. Repr. ed. 1960.

An erect, tufted, glabrous plant, 20 - 30 cm high. Rhizome woody, horizontal with fibrous roots. Stems angular, striate. Leaves crowded at the base, shorter than the stems, linear, pointed, margins scabrid. Spikelets 3 - 4 x 1.5 mm, clustered or solitary in compound umbels. Bracts foliar, much shorter than the umbels. Glumes 2 mm long, ovate, keeled, mucronate, pale brown. Stigmas 3. Nuts trigonous, obovoid, straw-coloured, smooth.

Fls. & frts. : July - Sept. ; AKS 754, Shahjahan garden.

Found in moist, shady places of the gardens.

4. *Fimbristylis ferruginea* (L.) Vahl, En. 2 : 291, 1806; Hook. f. Fl. Brit. Ind. 6 : 638, 1893; Duthie, Fl. U. Gang. Pl. 2 : 405. Repr. ed. 1960; Blake in J. Arnold Arb. 35 : 211, 1954; Kern in Blumea 8(1) 154, 1955. *Scirpus ferrugineus* L. Sp. Pl. 50, 1753.

A tufted, erect herb, 60 - 90 cm high. Stems striate. Leaves half the length of stem or less, margins scabrid. Umbels simple or sometimes compound, of 5 - 15 spikelets. Spikelets 8 - 10 x 3 - 4 mm, ellipsoid, pale brown. Glumes 3 - 4 mm long, ovate, boat-shaped, hoary-hairy in the upper half, keeled, cuspidate. Stigmas 2, short. Nuts biconvex, suborbicular, minutely stipitate and apiculate, pale brown.

Fls. & frts. : Apr. - Oct. ; AKS 247, Kithan; 880, Tantpur.

Commonly found along the bank of Kithan lake and along the temporary ponds on roadsides.

5. *Fimbristylis miliacea* (L.) Vahl, En. 2 : 287, 1806; Hook. f. Fl. Brit. Ind. 6 : 644, 1893; Duthie, Fl. U. Gang. Pl. 2 : 406. Repr. ed. 1960; Kern in Blumea 8(1) : 151, 1955. *Scirpus miliaceus* L. Syst. Nat. ed. 10 : 868, 1759.

An erect, tufted, annual sedge, 30-60 cm high. Stems angular, striate. Leaves as long as or longer than the stem, linear, acuminate, margins scabrid. Spikelets 2 x 2 mm, subglobose, obtuse, in decompound umbels; rays and pedicel filiform. Bracts foliar, shorter than the umbels. Glumes 1 mm long, ovate, obtuse somewhat boat-shaped. Stigmas 3. Nuts obovoid, pale-brown, minutely tuberculate.

Fls. & frts. : Aug. - Oct. ; AKS 477, Salempur.

Found in drying paddy fields and marshy places.

6. *Fimbristylis ovata* (Burm. f.) Kern. in Blumea 15(1) : 126, 1967. *F. monostachya* (L.) Hassk. Pl. Jav. Rar. 61, 1848; Hook. f. Fl. Brit. Ind. 6 : 649, 1893; Duthie, Fl. U. Gang. Pl. 2 : 255, 1929; Kern in Blumea 8(1) : 157, 1955 & in Reinwardtia 6(1) : 41, 1961. *Cyperus monostachyos* L. Mant. 2 : 180, 1771.

An erect, tufted sedge, 10-30 cm high. Stems slender or filiform, striate. Leaves as long or shorter than the stem, filiform, acute. Spikelets 6-10 x 4 mm, ovoid, acute, solitary, terminally situated on the stem, pale green, 8-14 flowered. Glumes distichous, 4 mm long, ovate, boat-shaped, keeled, cuspidate. Stigmas 3. Nuts pyriform, trigonous, tubercled, straw-coloured.

Fls. & frts. : June - Sept.; AKS 744, Shahjahan garden.

Found in moist places of the gardens and unused grounds.

7. *Fimbristylis quinquangularis* (Vahl) Kunth, Enum. 2:229. 1837; Hook. f. Fl. Brit. Ind. 6:664. 1893; Duthie, Fl. U. Gang. Pl. 2:406. Repr. ed. 1960. *Scirpus quinquangularis* Vahl, Enum. Pl. 2:229. 1837.

An erect, tufted, annual sedge with several fibrous roots. Leaves longer or shorter than the stems, scabrid along the margins. Spikelets very numerous, small, ellipsoid or narrowly ovoid, in decompound umbels; pedicels filiform. Glumes ovate; keel 3-nerved, slightly excurrent. Nuts globose-ovoid, minutely tuberculate, pale brown.

This plant is included on the authority of Jameson (in Duthie, Fl. U. Gang. Pl. 2:406).

8. *Fimbristylis schoenoides* (Retz.) Vahl, Enum. 2:286. 1806; Hook. f. Fl. Brit. Ind. 6:634. 1893; Duthie, Fl. U. Gang. Pl. 2:402. Repr. ed. 1960; Kern in Blumea 8(1):155. 1955 & in Reinwardtia 6(1):45. 1961. *Scirpus schoenoides* Retz. Observ. Bot. 5:14. 1789.

An erect, tufted, glabrous sedge, 10-20 cm high. Stems slender, striate. Leaves shorter than the stem, filiform, acute. Spikelets 5-8 x 4-5 mm, ovoid, solitary, sometimes 2 or 3. Glumes 3 mm long, suborbicular, shortly mucronate, pale brown, deciduous. Stigmas 2. Nuts biconvex, compressed, obovoid, shining, whitish.

Fls. & frts. : July - Oct.; AKS 907, Tantpur.

Found in moist shady places of unused grounds.

9. *Fimbristylis tenera* Roem. & Schult. Syst. 2. Mant. 57. 1824; Hook. f. Fl. Brit. Ind. 6:642. 1893; Duthie, Fl. U. Gang. Pl. 2 : 406. Repr. ed. 1960.

A tufted, annual sedge. Leaves up to half the length of the stem. Spikelets ovoid or subcylindric in lax subcompound umbels; bracts foliar shorter than the rays. Glumes broadly ovate, acuminate, somewhat boat-shaped, brown. Style swollen at the base; stigmas 3. Nuts trigonous-obvoid, minutely verrucose, dirty white.

This plant is included on the authority of Jameson (in Duthie, Fl. U. Gang. Pl. 2:406).

5. *Scirpus* L.

1a. Spikelets 1 - many in simple clusters or heads :

2a. Bristles present	7. <i>S. microstachys</i>
2b. Bristles absent:	
3a. Clusters terminal	4. <i>S. michelianus</i>
3b. Clusters lateral on the stem:	
4a. Leaves setaceous	9. <i>S. setaceus</i>
4b. Leaves absent, if present not setaceous:	
5a. Glumes acute	1. <i>S. articulatus</i>
5b. Glumes mucronate:	
6a. Glumes multistriate, 4 mm long	8. <i>S. roylei</i>
6b. Glumes smooth, 2-3 mm long:	
7a. Glumes 2-2.5 mm long	2. <i>S. lateriflorus</i>
7b. Glumes 2.5 - 3 mm long	10. <i>S. supinus</i>

1b. Spikelets many, stalked or umbellled:

8a. Umbels lateral, the lowest bract erect, appearing as a continuation of the stem	3. <i>S. littoralis</i>
8b. Umbels terminal, bracts foliar:	
9a. Style 3 - fid	5. <i>S. maritimus</i>
9b. Style 2-fid	6. <i>S. maritimus</i> var. <i>affinis</i>

1. ***Scirpus articulatus* L.** Sp. Pl. 49, 1753; Hook. f. Fl. Brit. Ind. 6:655, 1893;
Duthie. Fl. U. Gang. Pl. 2:410. Repr. ed. 1960.

An erect, tufted sedge, 20-60 cm high with fibrous roots. Stems hollow, terete, light green with loose, membranous sheaths. Spikelets pale brown, in a solitary, dense, lateral head, situated near the base. Glumes ovate, acute, membranous. Bristles absent. Nuts obovoid, triquetrous, apiculate, black.

Fls. & frts. : Aug. - Oct.; AKS 932, Jagner.

Found near canal banks, ponds and in marshy places.

2. ***Scirpus lateriflorus*** Gmel. Syst. Veg. 1:227. 1791; Kern in Steenis, Fl. Males., ser. I. 7:514. 1974. *S. supinus* var. *uninodis* Clarke in Hook. f. Fl. Brit. Ind. 6:656. 1893, non *Isolepis uninodis* Delile.

An erect, annual sedge 30-60 cm high. Stems slender, tufted, subterete. Leaves absent; sheaths 2-3, membranaceous, the uppermost sometimes bearing upto 2 cm long lamina. Inflorescence pseudolateral, capitate, bearing 2-3 spikelets or sometimes reduced to a solitary spikelet; bract solitary, stem-like, erect 4-15 cm long, sometimes a second much smaller bract also present. Spikelets 5-8 x 2.5-3.0 mm, ovoid-oblong, subterete, acute. Glumes 2-2.5 mm long, ovate, macronate, laxly imbricating, sometimes with purplish dots along the midrib. Nuts sessile, broadly obovoid, trigonous, blackish.

Fls. & frts. : Aug.- Oct.; AKS 929, Jagner.

Found near the temporary ponds.

3. ***Scirpus littoralis*** Schrad. Fl. Germ. 1:142, t. 5, f. 7. 1806; Hook. f. Fl. Brit. Ind. 6:659. 1893; Duthie, Fl. U. Gang. Pl. 2:411. Repr. ed. 1960.

An erect, hygrophilous sedge, 60-120 cm tall with creeping rhizomes. Stems terete, hollow, striate, smooth. Leaves develop under the surface of water and fall before the appearance of aerial inflorescence, grass-like, very slender. Spikelets 4-5 x 2 mm in loose, subcorymbose or paniculate umbels, borne laterally on the apex of the stem, reddish-brown; the lowest bract erect, appearing as a continuation of the stem. Glumes 4 mm long, elliptic-oblong, membranous, notched at the tip, macronate by the excurrent keel in the notch. Bristles of linear structures. Nuts obovoid, biconvex, apiculate, dull brown.

Fls. & frts. : Sept. - Nov.; AKS 854, Salempur.

found in drying paddy fields and near the temporary ponds.

4. ***Scirpus michelianus*** L. Sp. Pl. 52. 1753; Hook. f. Fl. Brit. Ind. 6:662. 1893; Duthie, Fl. U. Gang. Pl. 2: 411. Repr. ed. 1960.

An erect tufted, annual, fibrous rooted sedge. Stems triquetrous, striate. Leaves narrowly linear, grass-like, as long as or longer than the stem. Spikelets 2-3 x 1 mm, several, in dense terminal heads. Bracts several, foliar. Glumes 1.5 mm long, elliptic, keel 3-nerved, produced as a mucro. Bristles absent. Nuts fusiform, slightly rugose, pale dull brown.

Fls. & frts. : Mar. - July; AKS 391, Poiya ghat.

Common on wet sandy soil of Jamuna river and near temporary ponds.

5. *Scirpus maritimus* L. Sp. Pl. 51, 1753; Hook. f. Fl. Brit. Ind. 6: 658, 1893; Duthie, Fl. U. Gang. Pl. 2: 412. Repr. ed. 1960; Stewart, Fl. West Pakistan, 102, 1972.

An erect, glabrous sedge, 60-100 cm high, with creeping rhizomes and woody tubers. Stems trigonous, stout. Leaves grass-like, often as long as and exceeding the stem, coriaceous. Inflorescence of simple or compound, terminal umbels; rays unequal. Spikelets 0.9 - 1.4 x 0.4 - 0.5 cm, 3-8 or solitary on each ray, ovate-oblong, brown. Glumes 6-7 mm long, broadly ovate, membranous, bifid at the apex, keel excurrent as a curved awn. Bristles unequal retrorsely scabrid. Style 3-fid. Nuts obovoid, plane-convex, smooth, brown.

Fls. & frts. : June - Oct.; AKS 446, Kitham; 559, Fatehpur Sikri.

Found along the canals, ponds and in marshy places.

6. *Scirpus maritimus* var. *affinis* Roth, Nov. Pl. Sp. 30, 1821; Hook. f. Fl. Brit. Ind. 6: 659, 1893; Duthie, Fl. U. Gang. Pl. 2: 412. Repr. ed. 1960.

An erect, tufted sedge, 15-20 cm high. Leaves grass-like, exceeding the stem. Spikelets 1-1.5 x 0.5 cm, capitate usually 3-1, large, ovoid-lanceolate. Glumes slightly bifid at the apex, keel excurrent as an awn, glabrous. Bristles 4-5. Style 2-fid. Nuts small, biconvex, rugose.

Fls. & frts. : Nov. - Feb.; AKS 96, Poiya ghat; 611, Amlota.

Common on wet sandy soil of Jamuna and Utangan rivers.

7. *Scirpus mucronatus* L. Sp. Pl. 50, 1753; Hook. f. Fl. Brit. Ind. 6: 657, 1893; Duthie, Fl. U. Gang. Pl. 2: 409. Repr. ed. 1960.

An erect, tufted, perennial sedge with fibrous roots. Stems sharply triquetrous. Leaves absent. Leaf sheaths membranous, loose. Spikelets sessile, in a single lateral cluster of 1-12, close below the top of the stem. Glumes broadly ovate, acute, keeled, multistriate. Bristles 5-6, retrorsely scabrid. Nuts obovate, apiculate, unequally trigonous or biconvex, shining, dark brown.

This plant is included on the authority of Jameson (in Duthie, Fl. U. Gang. Pl. 2: 400).

8. *Scirpus roylei* (Nees) Parker in Duthie, Fl. U. Gang. Pl. 2: 410. Repr. ed. 1960. *Isolepis roylei* Nees in Wt. Contrib. 107, 1834. *Scirpus quinquefarius* Ham. ex Boeck. in Linnaea 36: 701, 1870; Hook. f. Fl. Brit. Ind. 6: 657, 1893.

An erect, tufted sedge, 20-40 cm high with fibrous roots. Stems terete, slender, conspicuously transversely septate. Leaves absent. Leaf sheaths membranous, loose. Spikelets 7-10 x 4 mm, sessile, ovoid-oblong, slightly compressed, usually several and above the middle of the stem, in a solitary dense lateral head, yellowish. Glumes 4 mm long, multistriate, elliptic-oblong, concave, mucronate, membranous. Bristles absent. Nuts trigonous, apiculate, rugose, dark brown.

Fls. & frts. : Oct. - Jan. ; AKS 555, Fatehpur Sikri ; 628, Salempur.

Commonly found on muddy soil near the ponds and streams and in drying paddy fields.

9. *Scirpus setaceus* L. Sp. Pl. 73. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 654. 1893.

An erect, tufted sedge 15-30 cm high. Stems hollow, terete. Leaves setaceous, sometimes nearly as long as the stem. Spikelets in a quasi-lateral head; bract appearing as a continuation of stem. Glumes ovate, obtuse, keeled. Bristles absent. Nuts obovoid, trigonous, apiculate, longitudinally striate.

Fls. & frts. : Aug. - Oct. ; AKS 928, Jagner.

Found near the temporary ponds.

10. *Scirpus supinus* L. Sp. Pl. 47. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 656. 1893 ; Duthie, Fl. U. Gang. Pl. 2 : 410 Repr. ed. 1960.

An erect, tufted sedge, 20-30 cm high with fibrous roots. Stems terete, striate. Leaves very short at the base of the stem. Spikelets 5-7 x 2-3 mm, sessile, usually several in a single lateral cluster situated below the apex of the stem. Glumes 2.5-3 mm long, ovate, smooth, keeled, keel produced as a suberect mucro. Bristles absent. Nuts 1 mm long globose-obvoid, trigonous, apiculate, rugose, dark brown.

Fls. & frts. : Sept. - Dec. ; AKS 311, Salempur.

Common along the temporary ponds on roadsides.

105. POACEAE (Gramineae)

1a. Spikelets 2-flowered, falling entire at maturity, usually with the upper floret hermaphrodite and the lower male or barren and if the latter, often reduced to the lemma or rarely the lemma entirely absent, all alike or more often differing in size, shape and structure, frequently dorsally compressed :

2a. Male and female spikelets in different parts of the same inflorescence and of different appearance; lemmas hyaline or membranous and thinner than the glumes

14. *Cox*

- 2b. Spikelets all hermaphrodite, with male or barren or hermaphrodite spikelets mixed in the same inflorescence and so arranged that a male or barren spikelet is near a hermaphrodite spikelet or if unisexual then the lemma of the fertile floret indurated :
- 3a. Spikelets often paired with one sessile and the other pedicelled, those of each pair similar or more often dissimilar, rarely solitary and all alike; glumes as long as the spikelet and enclosing the florets, more or less rigid and firmer than the lemmas which are both hyaline or membranous ; upper usually awned :
- 4a. Joints of the rachis and pedicel of the pedicelled spikelet swollen, 3-angled, rounded or flattened .
- 5a. Upper lemma usually awned 3. *Apluda*
- 5b. Upper lemma awnless 25. *Hemarthria*
- 4b. Joints of the rachis and pedicel narrow, seldom thickened upwards, occasionally with a translucent longitudinal groove ; sessile spikelets grooved :
- 6a. Spikelets of each pair similar, the sessile and the pedicelled hermaphrodite : 28. *Imperata*
- 7a. Spikelets all pedicelled
- 7b. Spikelets, one sessile and the other pedicelled 41. *Saccharum*
- 6b. Spikelets of each pair dissimilar, the sessile hermaphrodite, the pedicelled male or sterile :
- 8a. Spikelets in racemes. Racemes collected into whorled panicle, not interrupted by spathe :
- 9a. Racemes usually verticillate or in panicle along the axis :
- 10a. Spikelets in groups of three, each consisting of a sessile and two more or less reduced pedicelled spikelets ; lower glume smooth not tuberculate 11. *Chrysopogon*
- 10b. Spikelets with many pairs of spikelets arranged in whorled racemes ; lower glumes tuberculate 47. *Vetiveria*

- 9b. Racemes solitary, scattered or digitate :

 - 11a. Racemes solitary 26. *Heteropogon*
 - 11b. Racemes digitate :
 - 12a. Lower involucral glumes with pits 7. *Bolbitisochloa*
 - 12b. Lower involucral glumes without pits 17. *Dichanthium*

8b. Panicles of racemes interrupted by spathe :

 - 13a. Racemes solitary in each spathole 23. *Eremopogon*
 - 13b. Racemes paired in each spathole 12. *Cymbopogon*

3b. Spikelets solitary or paired, more or less similar; glumes usually membranous, the lower usually smaller or sometimes suppressed; lower lemma mostly resembling the upper glume in texture; upper lemmas, papery to very tough and rigid, usually awnless :

 - 14a. Spikelets falling singly, not subtended by bristles, or if so, then the bristles persisting after the spikelets have fallen (*Setaria*) :
 - 15a. Spikelets arranged in more or less open panicles, or with the panicles contracted and spikelike :
 - 16a. Spikelets subtended by 1 to many bristles 43. *Setaria*
 - 16b. Spikelets not subtended by bristles 35. *Panicum*.
 - 15b. Spikelets in one-sided spikes or spikelike racemes; spikes or racemes digitate or scattered :
 - 17a. A swollen annular callus present at the base of the spikelet 24. *Eriochloa*
 - 17b. No swollen annular callus present at the base of the spikelet :
 - 18a. Racemes digitate or subdigitate :
 - 19a. Spikelets awned 2. *Alloteropsis*
 - 19b. Spikelets awnless :

- | | |
|---|------------------------|
| 20a. Racemes usually 2 | 37. <i>Paspalum</i> |
| 20b. Racemes usually more than 2 | 18. <i>Digitaria</i> |
| 18b. Racemes not digitate; spikelets
arranged in spike-like racemes | |
| 21a. Lower glume (when present)
turned away from the rachis of
the racemes or spikes, the back
of the upper lemma facing it, i.e.
spikelets adaxial : | |
| 22a. Glumes awnless, if acuminate
then with the upper lemma | 36. <i>Paspalidium</i> |
| 22b. Glumes acuminate or awned, rarely
only acute; upper lemma not mucronate : | |
| 23a. Leaf blade lanceolate to ovate; racemes
loose to moderately dense;
culms creeping and ascending | 32. <i>Opismenus</i> |
| 23b. Leaf blade linear; racemes dense; culms
erect or suberect | 20. <i>Echinochloa</i> |
| 21b. Lower glume turned towards the rachis; the back
of upper lemma turned away from it i.e. spikelets
abaxial | 8. <i>Brachiaria</i> |
| 14b. Spikelets surrounded by an involucre of spines or
rigid bristles united at the base into a cup | 9. <i>Cenchrus</i> |
| 1b. Spikelets 1 - to many - flowered, breaking up at maturity
above the more or less persistent glumes, or if falling
entire, then not 2 - flowered with the lower floret male or
barren and the upper hermaphrodite, usually more or less
laterally compressed or terete : | |
| 24a. Glumes usually as long as or slightly longer than
spikelet enclosing all the florets | 6. <i>Avena</i> |
| 24b. Glumes usually shorter than the lowest floret, in any
case not enclosing all the florets as in <i>Avena</i> : | |
| 25a. Spikelets sessile or subsessile, along one side of the
rachis of solitary or digitate or spike - like racemes
or on opposite sides of the rachis of solitary spikes
or racemes : | |

- 26a. Spikes digitate :
- 27a. Spikelets with one fertile floret and one or more imperfect florets above them 10. *Chloris*
- 27b. Spikelets with one fertile floret, imperfect florets not present 13. *Cynodon*
- 26b. Spike solitary :
- 28a. Spikelets half immersed in the alternating distichous cavities of the rachis of the spike 33. *Oropetium*
- 28b. Spikelets not as above :
- 29a. Rachilla produced beyond the lower floral glume 45. *Tetrapogon*
- 29b. Rachilla not at all produced beyond the lower floral glume ; spikelets white feathery 31. *Melanocenchrus*
- 25b. Spikelets borne in open or contracted or spike-like panicles or less often in racemes or spikes :
- 30a. Spikelets usually with 2 or more fertile florets :
- 31a. Lemmas or rachilla joints bearing long silky hairs which envelope the lemma ; lemmas awnless ; tall grasses with usually large glume like panicles 5. *Arundo*
- 31b. Lemmas and rachilla glabrous or hairy but with hairs not enveloping lemma or if so then the lemma with a geniculate awn ; low or moderately tall grasses :
- 32a. Lemmas 5 - 7 nerved :
- 33a. Spikelets borne in the hollows of a long spike 30. *Lolium*
- 33b. Spikelets borne in loose or contracted panicles 39. *Poa*
- 32b. Lemmas 1 - 3 nerved :

- 34a. Glumes aristate or aristate-acuminate 19. *Dinebra*
 34b. Glumes obtuse, acute or acuminate, rarely
 upper awned and the spikelets then in
 digitate spikes or a short raceme of spikes (*Dactyloctenium*) :
 35a. Spikelets in open, contracted or spike - like panicles 22. *Eragrostis*
 35b. Spikelets sessile or very short - pedicelled, loosely to
 densely imbricate, in digitate or racemosely arranged
 spikes or spike - like racemes, very rarely in solitary
 spikes :
 36a. Inflorescence of digitate or scattered or whorled spikes :
 37a. Inflorescence of scattered or whorled spikes 1. *Acrachne*
 37b. Inflorescence of digitate spikes :
 38a. Axis of the spike terminating in a spikelet 21. *Eleusine*
 38b. Axis of the spike terminating in a mucro
 (or sharp point) 5. *Dactyloctenium*
 36b. Inflorescence not of digitate or whorled spikes :
 39a. Inflorescence very coarse, 15 - 45 cm
 long, narrowly pyramidal or columnar,
 often interrupted ; spikelets
 pale brown 16. *Desmostachya*
 39b. Inflorescence of racemosely
 arranged spikes ; spikes upto 10 cm
 long or longer ; spikelets not pale
 brown 29. *Leptochloa*
 30b. Spikelets with 1 - fertile floret (male or female in
 unisexual 1 - flowered spikelets) with or without one or
 two male or barren florets :
 40a. Glumes very minute or
 suppressed ; fertile lemma
 and palea very similar in shape
 and texture :
 41a. Leaf blades ovate to ovate -
 lanceolate ; plants floating ;
 glumes absent 27. *Hygroryza*

41b. Leaf blades linear, acute or acuminate ;
plants not floating ; glumes reduced to tip -
like structure

34. *Oryza*

40b. Glumes usually well developed ; fertile lemma and
palea not similar :

42a. Spikelets usually breaking up at maturity,
the rachilla disarticulating above the more
or less persistent glumes, very rarely
falling entire :

43a. Lemmas hyaline or membranous at
maturity, awnless or awned from low
down on the back or from the entire or
bifid tip :

44a. Lemmas usually 3 - 5 nerved, frequently
awned

40. *Polypogon*

44b. Lemmas 1 - 3 nerved, awnless

44. *Sporobolus*

43b. Lemmas indurated and rigid at maturity ;
spikelets with trifid awn

4. *Aristida*

42b. Spikelets falling entire at maturity from the
axis of the slender spike-like panicles or racemes :

45a. Spikelets solitary ; glumes awned

38. *Pteris*

45b. Spikelets in clusters of 2 - 5 ;
glumes awnless

46. *Pragus*

1. ACRACHNE Wight

Acrachne racemosa (Heyne ex Roem. & Schult.) Ohwi in Bull. Tokyo Sci. Mus. n. 18 : 1. 1947 ; Bot. Gr. Ind. 487. 1960. *Eleusine racemosa* Heyne ex Roem. & Schult. Syst. Veg. 2 : 583. 1817. *E. verticillata* Roxb. Fl. Ind. 1 : 346. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 295. 1897.

An erect, tufted, simple or branched, glabrous annual, 20 - 60 cm high. Leaves 8 - 20 x 0.3 - 0.5 cm, linear-lanceolate, tapering to a fine point, margins subdenticulate. Spikes 6 - 20, scattered or whorled, 5 - 9 cm long, with numerous close spikelets. Spikelets 5 - 6 mm long ovate or oblong ; 6 - 12 flowered. Involucral glumes unequal, lanceolate; keels subdenticulate. Florets hermaphrodite ; floral glume 3 - 4 mm long, ovate, acuminate, paleate. Stamens 3. Grains oblong, rugose.

Fls. & frts. : July - Nov. ; *Vern.* : *Makra* ; AKS 199, Chhalesar ; 485, Rambagh.

Found in the gardens and in sandy soil of ravine tract.

2. ALLOTROPSIS Presl emend. Hitch.

Alloteropsis cimicina (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 487, 1919 ; Blatt. & McC. Bomb. Gr. 129, t. 83, 1935 ; Bor, Gr. Ind. 276, 1960. *Milium cimicinum* L. Mant. 184, 1771. *Axonopus cimicinus* (L.) Beauv. Ess. Agrost. 12, 1812 ; Hook. f. Fl. Brit. Ind. 7 : 64, 1897.

An erect or slightly decumbent, tufted, perennial grass, 30 - 60 cm high. Leaves 2.5 - 7 x 0.9 - 1.8 cm, ovate-lanceolate, acute, base cordate and broad, margins bulbous-based ciliate, long white hairy. Racemes spikes-like, 3 - 6, on the top of a slender, hairy peduncle. Spikelets 3 - 4 x 1.5 mm, solitary or clustered, ovate or elliptic, dorsally compressed, awned, shortly pedicelled ; 2-flowered. Involucral glumes unequal, ovate-lanceolate, acuminate, 3 - 5 nerved ; upper one with long, purplish hairs on the marginal nerves. Lower floret male. Upper floret hermaphrodite ; floral glume 3 mm long, ovate-oblong, 3-nerved with a short, stout awn, paleate. Stamens 3. Grains ovate, flattened.

Fls. & frts. : July - Oct. ; AKS 785, Niyamatpur.

Found on the slopes of the ridges and in sandy soils of unused fields.

3. APIUDA L.

Aploidea mutica L. Sp. Pl. 1 : 82, 1753 ; Bor, Gr. Ind. 93, 1960. *A. aristata* L. Aitken, Acad. 4, 303, 1756. *A. varia* Hack. var. *aristata* Hack. in DC. Mon. Phan. 6 : 196, 1889 ; Hook. f. Fl. Brit. Ind. 7 : 150, 1897 ; Blatt. & McC. Bomb. Gr. 29, t. 20, 1935. *A. mutica* L. var. *aristata* Pilger in Engl. & Prantl, Pflanzentr (ed. 2) 14c : 130, 1945.

A tall, perennial, leafy grass, 30 - 150 cm high. Leaves 6.5 - 35 x 0.4 - 1.8 cm, linear-lanceolate, narrowed above to a filiform tip and below into a long slender petiole, upper surface and margin scabrous. Inflorescence a leafy panicle of many, solitary, simple racemes or spikes, each enclosed in a membranous spathe. Spikelets in threes ; one sessile, two pedicelled, one of two pedicelled is reduced to a flat pedicel. Other pedicelled spikelet 2-flowered, both the flowers male. Stamens 3. Sessile spikelet seated upon the swollen base of the rachis ; 2-flowered, lower male and upper hermaphrodite ; upper floral glume hyaline, cleft half way down, awned in the cleft.

Fls. & frts. : Sept. - Dec. ; AKS 197, 200, Chhalesar.

Commonly found on the slopes of the ridges and in waste places.

4. ARISTIDA L.

- | | |
|--------------------------|---------------------------|
| 1a. Awn without a column | 1. <i>A. adscensionis</i> |
| 1b. Awn with a column | 2. <i>A. funiculata</i> |

1. *Aristida adscensionis* L. Sp. Pl. 82. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 224. 1897 ; Blatt. & McC Bomb. Gr. 209, t. 138. 1935 ; Bor, Gr. Ind. 407. 1960.

A densely tufted, slender, erect or ascending, simple or branched grass, 30 - 75 cm high. Leaves 6 - 25 x 0.1 - 0.2 cm, narrowly linear, tapering to a fine point, margins slightly scabrid. Inflorescence a lax, linear, spike-like panicle, usually interrupted 8 - 20 cm long, branches single or 2 - nate, erect or nodding, filiform. Spikelets 6 - 8 mm long, erect, green ; mature ones turning purplish ; 1 flowered. Involucral glumes linear-lanceolate, acute, 1 nerved ; upper longer than the lower. Floret hermaphrodite ; floral glume 6 - 7 mm long, linear, laterally compressed, awned ; awn tripartite, scabrid. Palea minute. Stamens 3. Grain is linear and as long as the glume.

Fls. & frts. : July Oct ; Vern. : Lamp ; AKS 152, Bichpuri campus ; 192, Chhalesar.

Abundant on two ridges, in cultivated and fallow fields.

2. *Aristida funiculata* Trin. & Rupr. Sp. Gram. Sip. 159. 1842 ; Hook. f. Fl. Brit. Ind. 7 : 226. 1897 ; Bor, Gr. Ind. 410. 1960.

An erect or geniculately ascending, annual grass, 15 - 45 cm tall. Leaves 5 - 15 x 0.1 - 0.2 cm, narrowly linear, acuminate, flat, pubescent. Inflorescence a narrow, lax panicle ; branches capillary or filiform, short, erect. Spikelets 1.2 - 1.8 cm long, erect, greenish ; 1 flowered. Involucral glumes linear-lanceolate, acute, 1 nerved, terminating in an awn. Floret hermaphrodite ; floral glume short and prolonged towards the apex as a narrow firmly convolute strap, forming a twisted column and this ends in 3 - slender, scabrid awns. Palea short. Stamens 3. Grain is cylindric.

Fls. & frts. : Aug. - Oct. ; AKS 180, Poiya ghat.

Common in sandy soil of the cultivated fields.

5. ARUNDO L.

Arundo donax L. Sp. Pl. ed. 81. 1753; Hook. f. Fl. Brit. Ind. 7: 302. 1897; Blatt. & McC. Bomb. Gr. 204. 1935; Bot. Gr. Ind. 413. 1960.

A tall, stout, reed-like, perennial grass, 2-6 m high. Stems fistular, many noded, green and glabrous. Leaves 30-60 x 2-6 cm, linear-lanceolate, flat, tapering to a very fine point; ligules short, membranous. Inflorescence a large, erect, decompound, terminal, plumose panicle 30-60 x 8-10 cm. Spikelets 10-12 x 2 mm, light brown; 3-flowered. Involucral glumes broadly lanceolate, acuminate, glabrous, 3-5 nerved. Floral glumes long-hairy on the back in the lower half; middle nerve of upper floral glume produced into a short awl. Stamens 3. Grains obovoid, loosely enclosed by lemma and palea.

Fls. & frts.: Oct. - Feb.; Vern.: *Narhal*; AKS 43, Salempur; 553, Shahjahan garden.

Found along the ponds and also grown in the gardens.

6. AVENA L.

Avena sterilis L. var. *culta* Raizada in Ind. For. 80: 36. 1954.

An erect, annual grass, 60-120 cm high. Culms simple, tufted, fistular. Leaves 10-30 x 0.5-1 cm, linear-lanceolate, scaberulous; ligules prominent, membranaceous. Spikelets 25-30 x 4-5 mm in large, lax, terminal, open panicles, drooping from one side; 2 to 3-flowered. Florets all hermaphrodite one awned at the base and one or two awnless florets above or with all the florets awnless. Involucral glumes about equal, membranous, several-nerved, broadly lanceolate, acuminate, usually exceeding the upper floret. Floral glume lanceolate, acuminate, paleate. Grains tightly enclosed by the floral glume and palea, silky.

Fls. & frts.: Feb. - Apr.; Vern.: *Jai*; AKS 707, Poiya ghat.

Common on sandy soil of cultivated fields.

7. BOTRIOCHELO A Kuntze

Bothriochloa pertusa (L.) A. camus in Ann. Soc. L. Lyon (n.s.) 76: 164. 1931; Bot. Gr. Ind. 109. 1960. *Holcus pertusus* L. Mant. Alt. 301. 1771. *Andropogon pertusus* (L.) Willd. Sp. Pl. 4: 922. 1806; Hook. f. Fl. Brit. Ind. 7: 173. 1897.

A tufted erect or geniculately ascending, perennial grass, 0.3 - 1 m long. Nodes are bearded. Leaves 5 - 15 x 0.3 - 0.4 cm, linear, tapering to a fine point. Racemes 3 - 6 cm long, subdigitately fascicled, whitish or pale purplish, silky; joints and pedicels ciliate. Spikelets 3 - 4 mm long, 2-nate, one sessile and the other pedicelled. Sessile spikelets awned, oblong-lanceolate with a shortly bearded callus. Involucral glumes subequal, oblong-lanceolate, coriaceous; lower one with a deep pit above the middle. Floret hermaphrodite; lower floral glume linear-oblong, acute, nerveless; upper floral glume reduced to an awn. Stamens 3. Pedicelled spikelet male or neuter, not awned grains oblong-ovate.

Fls. & frts.: July - Dec.; AKS 291, Poiya ghat.

Common in cultivated fields, open grounds and also found on the ridges.

8. BRACHIARIA Griseb.

1. *Brachiaria distachya* (L.) Stapf in Prain, Fl. Trop. Afr. 9: 565, 1919; Bor, Gr. Ind. 281, 1960. *Panicum distachyrum* L. Mant. 183, 1771.

An erect or ascending, slender, glabrous, branched, annual grass, 30 - 45 cm tall. Leaves 2 - 4 x 0.5 - 0.7 cm, linear-lanceolate, rounded or amplexicaul, acute or acuminate, thin, flat, margins hispid. Panicle of 2 - 3 erect or spreading spikes, 2 - 3 cm long. Spikelets 3 mm long, elliptic-ovate, subacute, shortly pedicelled, glabrous; 2-flowered. Involucral glumes unequal. Lower floret neuter. Upper floret hermaphrodite; floral glume 2.5 mm long, elliptic or oblong, 3-nerved, paleate.

Fls. & frts. : July - Nov. ; AKS 287, Fatehpur Sikri.

Found in dry open places and near the cultivated fields.

2. **Brachiaria mutica** (Forsk.) Stapf in Prain, Fl. Trop. Africa 9 : 526. 1919. Blatt. & McC. Bomb. Gr. 134. 1935 ; Bor. Gr. Ind. 284. 1960. *Panicum muticum* Forsk. Fl. Aegypt. - Arab. 20. 1775.

An erect or ascending, branched, perennial grass, 50 - 120 cm high. Culms geniculate at the base, compressed, striate, glabrous ; nodes covered with long white hairs. Leaves 5 - 25 x 0.8 - 1.3 cm, linear or linear-lanceolate, acuminate, subcordate at the base, scaberulous. Panicles 7.5 - 15 cm long, of 8 - 20, false spikes or racemes, erect or obliquely spreading. Spikelets 3 - 3.5 x 1 mm, ovate, acute or oblong, densely crowded in more than 2 rows. Involucral glumes unequal, ovate, acute. Lower floret male or neuter. Upper floret hermaphrodite ; floral glume 2 - 3 mm long, ovate-oblong, obtuse, subcoriaceous, paleate. Stamens 3.

Fls. & frts. : Aug. - Nov. AKS 595, Kitham.

Occurs along the banks of the lakes, canals and ponds.

3. **Brachiaria paspaloides** (Presl) C.E. Hubbard. Hook. Ic. Pl. sub tab. 3363. 1938 ; Bor. Gr. Ind. 284. 1960. *Urochloa paspaloides* Presl, Rel. Haen. 1 : 318. 1830.

A slender, erect, branching annual, 30 - 100 cm tall. Leaves 5 - 15 x 0.5 - 0.8 cm, linear, acuminate, flat, margins rough, hairy. Panicle of 3 - 6 false-spikes, sub-erect, 2.5 - 6 cm long. Spikelets 5 x 2 mm, oblong-ovate, acuminate, compressed, imbricate, laxly biserrate ; 2-flowered. Lower involucral glume 3.5 mm long, ovate, acute ; upper 4.5 - 5 mm long, ovate-lanceolate, acuminate. Lower floret male. Upper floret hermaphrodite ; floral glume 3.5 - 4 mm long, elliptic-oblong, aristulate, 5-nerved, paleate. Stamens 3.

Fls. & frts. : July - Oct. ; AKS 193, Chhalesar.

Common in sandy soil of ravine region.

4. **Brachiaria ramosa** (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 542. 1919 ; Blatt. & McC. Bomb. Gr. 134, t. 86. 1935 ; Bor. Gr. Ind. 284. 1960. *Panicum ramosum* L. Mant. 29. 1767 ; Hook. f. Fl. Brit. Ind. 7 : 36. 1897.

An erect or ascending, annual grass, 30 - 60 cm high. Culms geniculately ascending, branched with roots at the lower nodes. Leaves 4.5 - 10.5 x 0.8 - 1.5 cm, flat, linear-lanceolate, with a rounded, often clasping base, finely acuminate.

Panicles 5-15 cm long, subpyramidal; rachis angular, terminating in a spikelet. Racemes 5-12 or more, erect or spreading, 1.5-4.5 cm long. Spikelets 2.5-3 x 0.5 mm, ovoid, close or distant, often in pairs, one sessile and the other pedicelled, pubescent; 2-flowered. Lower involucral glume 0.7 mm long, ovate, 5-nerved; upper one 1.5-2 mm long, ovate, acute, 5-7 nerved. Lower floret neuter. Upper floret hermaphrodite; floral glume coriaceous, acute, transversely rugose, paleate. Stamens 3. Caryopsis broad elliptic.

Fls. & frts. : July - Oct. ; *Vern.* : Makrargas ; AKS 753, Shahjahan garden.

Common in moist places of the gardens and open grounds.

5. *Brachilaria subquadripara* (Trin.) Hitch. in Lingnan Sc. J. 7 : 214. 1931 ; Bor, Gr. Ind. 286. 1960. *Panicum subquadriparum* Trin. Gram. Panin. 145. 1826.

An annual, erect or ascending from a creeping and rooting base, 30-60 cm high. Leaves 5-10.5 x 1.2-2 cm, lanceolate, acuminate, amplexicaul, flat, margins very scabrid. Panicle of 4-7 racemes, erect or spreading, 3-4 cm long. Spikelets 4 mm long, lanceolate-oblong, pubescent, shortly pedicelled, imbricate; 2-flowered. Lower involucral glume 1.5 mm long, 5-7 nerved; upper one 4 mm long, oblong, acute, 7-nerved. Lower floret neuter. Upper floret hermaphrodite; floral glume 3 mm long, elliptic, subcoriaceous, rugose, shortly aristate, paleate, palea transversely rugose. Stamens 3.

Fls. & frts. : July - Sept. ; AKS 482, College campus.

Occurs in open unused grounds and fallow fields.

9. CENCHRUS L.

1a. Involucral bristles not spinose

2. *C. ciliaris*

1b. Involucral bristles spinose :

2a. Base of involucre rounded; bristles all erect

3. *C. setigerus*

2b. Base of involucre turbinated, outer bristles spreading or recurved, inner ones hard sharp and spiny

1. *C. biflorus*

1. *Cenchrus biflorus* Roxb. Fl. Ind. 1 : 238. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 89. 1897 ; Achariyat, S. Ind. Gr. 121. 1921 ; Blatt. & McC. Bomb. Gr. 185, t. 118. 1935 ; Bor, Gr. Ind. 287. 1960. *C. catharticus* Delile, Cat. hort. Monsp. 1838, 4. 1839 & in Linnaea 13 : Litt.-Bericht 103. 1839 ; Hook. f. Fl. Brit. Ind. 7, 90. 1897.

An erect or ascending, annual grass, 30 - 60 cm high. Leaves 6 - 20 x 0.4 - 0.9 cm, linear-lanceolate, finely acuminate, glabrous or hairy. Inflorescence solitary, cylindric, raceme 5 - 8 cm long, enclosed in the uppermost leaf sheath; rachis flexuous, angular. Involucels 1 cm long, 2 to 1 - flowered; bristles erect, lanceolate subulate, dorsally flattened, the outer short, spreading, the inner of hard, sharp spines. Each floret 5 mm long, hermaphrodite. Stamens 3. grains ovoid-oblong, compressed, pale.

Fls. & frts. : July - Oct. ; *Vern.* : *Anjan* ; AKS 111, College campus ; 196, Chhalesar.

Common in ravine region, open fields and along roadsides.

2. *Cenchrus ciliatus* L. Mant. Alt. 302, 1771; Raizada in Ind. For. 80 : 40, 1954; Bor, Gr. Ind. 287, 1960. *Pennisetum cenchroides* Rich. in Pers. Syn. 1 : 72, 1805; Achariyar, S. Ind. Gr. 118, 1921. *P. ciliare* Link, Hort. Berol. 1 : 213, 1827; Blatt. & McC. Bomb. Gr. 181, t. 116, 1935.

An erect or decumbent, tufted, perennial grass, 30 - 90 cm high, much branching from the base. Leaves 8 - 30 x 0.3 - 0.7 cm, linear, tapering to a fine point, glabrous or so. Inflorescence a dense, cylindric raceme, 3 - 10 x 0.5 - 1 cm, pale or purplish. Involucels sub-sessile, 2 series of bristles, outer bristles numerous, filiform; inner ones flattened and thickened at the base, ciliate, connate below into a ring. Spikelets 4 - 6 mm long, oblong-lanceolate, 3 - 1 in each involucel; 2 - flowered. Lower and upper involucral glumes ovate-lanceolate, hyaline, 1 - nerved. Lower floret usually male, sometimes empty. Upper floret hermaphrodite. Stamens 3.

Fls. & frts. : July - Mar. ; *Vern.* : *Anjan* ; AKS 13, Poiya ghat ; 25, Salempur ; 195, Chhalesar.

Abundant in waste open grounds, along roadsides and in ravine region, and found in association of *Cenchrus setigerus* Vahl.

3. *Cenchrus setigerus* Vahl, Enum. Pl. 2 : 395, 1806; Raizada, Ind. For. 80 : 40, 1954. *C. biflorus* Hook. f. Pl. Brit. Ind. 7 : 89, 1897 (non Roxb.)

An erect or ascending, tufted, annual grass, 60 - 90 cm high. Leaves 5 - 15 x 0.4 - 0.6 cm, linear-lanceolate, finely acuminate, hairy. Inflorescence a dense cylindric raceme, 6 - 8 cm long, greenish, turning black later on. Involucels of 2 series of bristles, outer bristles short, erect; inner ones erect, subulate-lanceolate, all connate forming a cup. Spikelets 4 - 5 mm long, ovate-oblong, 3 in each involucel; 2 - flowered. Lower floret barren; upper floret hermaphrodite. Stamens 3.

Fls. & frts.: July - Oct.; AKS 111, Bichpuri campus; 196, Chhalesar.

Common along roadsides and in waste open grounds and fields.

10. OLEORIS Sw.

1. *Chloris barbata* (L.) Sw. Fl. Ind. Occ. 1 : 200. 1797; Hook. f. Fl. Brit. Ind. 292. 1897; Blatt. & McC. Bomb. Gr. 256. 1935; Bor, Gr. Ind. 124. 1960. *Andropogon barbatus* L. Mant. 302. 1771.

A robust, erect or geniculately ascending, simple or branched, perennial grass, 30–60 cm tall. Leaves narrowly linear, flat, tapering to a fine point, rough on the margins. Spikes 5–15, 4–5 x 0.4 cm, suberect, digitately arranged in a terminal fascicle. Spikelets 2.5 mm long, 3-awned; rachilla produced bearing two, small, awned barren glumes. Involucral glumes very unequal; lanceolate. Lowest floret hermaphrodite; glume broad elliptic or ovate, with margins densely bearded above the middle, awned, paleate. Stamens 3.

Fls. & frts. : July - Oct.; AKS 827, Annot.

Common on the ridges, waste places and in cultivated fields.

2. Chloris montana Roxb. Fl. Ind. 1 : 331. 1820; Hook. f. Fl. Brit. Ind. 7 : 292. 1897; Bur. Gr. Ind. 466. 1960.

A prostrate or geniculately ascending from a creeping base, rooting at the nodes, tufted, perennial grass, 20 - 30 cm long. Leaves 2 - 6.5 x 0.2 - 0.6 cm narrowly

linear, finely acuminate, glabrous. Spikes 3 - 6, erect, 2 - 4 cm long, digitate ; young ones enclosed in a spathiform sheath. Spikelets 2.5 mm long, unilateral, biserrate, 4 - awned ; 1 - flowered. Lower involucral glume 2 mm long, lanceolate ; upper one 2.5 mm long, 1 - nerved. Lowest flower thermaphrodite ; floral glume 2.5 mm long, oblong, bearded with long hairs along the margins, awned, paleate. Stamens 3. Upper 3 florets barren, awned.

Fls. & frts. : Aug. - Nov. ; AKS 472, Salempur.

Found on saline soil and near the drying up ponds of the low lying area.

3. *Chloris pallida* Hook. f. *Fl. Brit. Ind.* 7 : 289. 1897 ; Haines, *Bot. Bih. & Or.* 1013. Repr. ed. 1961.

A slender, tufted, simple or branched, annual grass, 25-45 cm high. Leaves 10-20 x 0.2 - 0.5 cm, narrowly linear, flaccid. Spikes 1 - 3, erect, digitate, yellow, 7 - 12 cm long, closely pectinate with the two rows of erecto - patent long awned spikelets. Rachilla not produced beyond the lower floral glume. Spikelets 3 mm long, narrowly tapering, subsessile. No rudimentary upper floral glume. Involucral glumes unequal, ovate-lanceolate, 1 - nerved, acuminate. Lower floral glume ovate, hairy, tip minutely notched, awn 15 - 25 mm long ; palea narrow, ciliate on keels. Grains linear, very slender.

Fls. & frts. : Aug. - Oct. ; AKS 545, Chiknipur.

Occurs on gravelly soil of the ridges and among rock crevices.

4. *Chloris virgata* Sw. *Fl. Ind. Occ.* 1 : 203. 1797 ; Hook. f. *Fl. Brit. Ind.* 7 : 291. 1897 ; Blatt. & McC. *Bomb. Gr.* 255, t. 170. 1935 ; Bor. *Gr. Ind.* 468. 1960.

A tufted, erect grass also with creeping stems, rooting below, 30 - 60 cm long. Leaves 6 - 35 x 0.3 - 0.6 cm, narrowly linear, flat, acuminate. Spikes 5 - 10, erect, digitate, 4 - 6 cm long, young ones enclosed in an inflated sheath. Spikelets 3 - 4 mm long, arranged in two rows, with 4 glumes. Lower involucral glume small, lanceolate, 1 - nerved ; upper one awned. Lower floral glume 3.5 mm long, oblong-lanceolate, bifid at the apex, awned, long ciliate on the margins in the upper half almost to the tip. Rachilla shortly produced bearing a well developed, auricled, awned glume. Grains shining, trigonous.

Fls. & frts. : July - Nov. ; AKS 154, Bichpuri campus ; 762, College campus.

Abundant in unused places, gardens, cultivated fields and along roadsides.

11. CHYSOPOGON Trin. nom. cons.

Chrysopogon fulvus (Spreng.) Chiov. Fl. Somalia 1 : 327. 1929 ; Bor, Gr. Ind. 116. 1960. *Pollinia fulva* Spreng. Pugill. 2 : 10. 1845. *Andropogon monticolas* Rottm. & Schult. in Hook. f. Fl. Brit. Ind. 7 : 129. 1897.

An erect or ascending, densely tufted, simple or branched, perennial grass, 30 - 120 cm tall. Leaves 5 - 30 x 0.3 - 0.6 cm, narrow linear, acute, flat, rigid, margins scabrid. Inflorescence an open, ovate or cylindrical panicle, 5 - 12 cm long ; branches capillary, whorled, spreading ; tip oblique brown - bearded and bearing solitary raceme of a single, sessile, hermaphrodite and two, pedicelled, male spikelets. Sessile spikelet 8 mm long, laterally compressed. Lower involucral glume 6 mm long, chartaceous, linear, 2 - toothed at the tip, 4 nerved ; upper one 6 mm long, ovate lanceolate, with a terminal awn, 3 - nerved. Floret hermaphrodite ; lower floral glume 3 mm long, narrowly oblong, obtuse ; upper one 3 mm long, hyaline with an awn. Stamens 3. Pedicelled spikelet 8 mm long, dorsally compressed ; floret male.

Fls. & frts. : July - Oct. ; *Vern.* : Zarga ; AKS 504, Khander ; 826, Arnotta.

Common on the ridges and hilly tracts in rock crevices.

12. CYMBOPOGON Spreng.

Cymbopogon parkeri Stapf in Kew Bull. 10. 1929 ; Bor, Gr. Ind. 131. 1960.

A tall perennial grass, 1 - 1.5 m high. Roots aromatic. Leaves 15 - 60 x 0.4 - 0.5 cm, narrowly linear, tips capillary. Panicles long, narrow, interrupted, with compressed, fascicled branches bearing spathes about 5 cm long and spatholes 10 - 20 mm long. Racemes unequal, 6 - 18 mm long. Spikelets 3 - 4 pairs, half hidden by the 5 mm long villae of the joints and pedicels. Sessile spikelets 5 mm long, linear lanceolate ; lowest pair of the sessile raceme homogamous, those of the peduncled raceme heterogamous. Involucral glumes equal, ciliate. Lower floret neuter ; upper hermaphrodite ; floral glume cleft at the top, ciliate. Pedicelled spikelets equal to the sessile, lanceolate. Grains oblong.

Fls. & frts. : Aug. - Jan. ; AKS 77, Fatehpur Sikri.

Occurs on the ridges in gravelly soils and among rock crevices.

13. CYNODON Rich. ex Pers. nom. cons.

Cynodon dactylon (L.) Pers. Syn. Pl. 1 : 85. 1805 ; Hook. f. Fl. Brit. Ind. 7 : 288. 1897 ; Blatt. & McC. Bonib. Gr. 250, t. 166. 1935 ; Bor, Gr. Ind. 469. 1960. *Panicum dactylon* L. Sp. Pl. 58. 1753.

An ascending, widely creeping, rooting at nodes forming matted tufts, perennial grass. Leaves 2 - 8 x 0.2 - 0.4 cm, narrowly linear, acuminate, margins scabrous, glaucous. Inflorescence of 4 - 7, digitate spikes, 2 - 5 cm long, green or purplish. Spikelets 2.5 mm long, laterally compressed, sessile, imbricate, arranged alternately in 2 series; 1 - flowered. Involucral glumes subequal, lanceolate, acute, 1 - nerved. Floret hermaphrodite; floral glume 2.5 mm long, boat shaped, acute, ciliate on the keel; palea 2 - nerved. Stamens 3. Grains oblong, slightly flattened, brownish.

Fls. & frts. : Most part of the year; *Vern.* : *Doob*; AKS 28, Salempur; 154, Bichpuri campus.

Abundant in gardens and lawns.

14. COIX L.

Coix lacryma - Jobl L. Sp. Pl. 972, 1753; Hook. f. Fl. Brit. Ind. 7: 100, 1897; Blatt. & McC. Bomb. Gr. 3, t. 1, 1935; Bor-Gr. Ind. 264, 1960. *C. lacryma* L. Syst. (ed. 10.) 1261, 1759.

A robust, annual grass, 1-2 m high. Culms branching, rooting at lower nodes, spongy, polished, glabrous. Leaves 10 - 50 x 2-5 cm, flat, ovate-lanceolate, cordate at the base, acuminate. Inflorescence consists of peduncled, sub-erect, false spikes. Spikelets unisexual; male spikelets 2-3 nate, loosely imbricate on a slender rachis; 2-flowered. Lower involucral glume papyraceous; upper one oblong-lanceolate. Lower floret male; upper one male or empty; floral glumes oblong-lanceolate, acute. Stamens 3. Female spikelets ovoid, entirely surrounded by the hardened bract, forming a bony involucre. Caryopsis ovoid or globose.

Fls. & frts. : Aug. - Nov.; AKS 587, R.B.S. College garden.

Grown in the gardens.

15. DACTYLOCTENTUM Willd.

- | | |
|--|------------------------|
| 1a. Annuals; spikes 1.3 - 4 cm long | 1. <i>D. aegyptium</i> |
| 1b. Perennials; spikes 0.6 - 1.3 cm long | 2. <i>D. sindicum</i> |

1. *Dactyloctenium aegyptium* (L.) P.-Beauv. Ess. Agrost. Expl. Pl. 15, 1812; Blatt. & McC. Bomb. Gr. 262, t. 176, 1935; Bor, Fl. Assam 5: 110, 1940 & Gr. Ind. 489, 1960. *Cynosurus aegyptius* L. Sp. Pl. 72, 1753. *Eleusine aegyptia* (L.) Desf. Hook. f. Fl. Brit. Ind. 7: 295, 1897.

An erect or ascending, glabrous, annual grass, 30-60 cm high. Leaves 10-24 x 0.8-1 cm, linear, tapering to a fine point, flat, glabrous. Spikes 2-6, digitately radiate, 1.2-3.8 cm long. Spikelets 4 mm long, laterally compressed, densely crowded, spreading at right angles to the rachis; 3-5-flowered. Lower involucral glume 1.5 mm long, ovate, acute; upper one 2 mm long, broadly ovate, awned. Florets hermaphrodite; floral glume 3 mm long, ovate, awned, paleate. Stamens 3. Grains ovoid-globose, very rugose.

Fls. & frts. : June - Nov. ; AKS 146, Bichpuri campus.

Abundant in the open grounds, gardens and along roadsides.

2. *Dactyloctenium sindicum* Boiss. Diagn. Pl. Orient (ser. 2) fasc. 4 : 131. 1859; Blatt. & McC. Bomb. Gr. 264. 1935; Bor, Gr. Ind. 489. 1960. *Eleusine aristata* Ehrenb. ex Boiss. Fl. Orient. 5 : 557. 1884. Hook. f. Fl. Brit. Ind. 7 : 296. 1897.

A prostrate, slender, proliferously branched, perennial grass. Stems smooth, stiff, spreading, rooting at distant, thickened, leafy nodes. Leaves 2.5-5 x 0.1-0.2 cm, linear, acuminate, margins ciliate with bulbous based hairs. Spikes 2-6, 6-13 mm long, spreading or decurved. Spikelets 4 mm long, laterally compressed, imbricate biserrate; 3-5-flowered. Lower involucral glume 2.5 mm long, ovate acute; upper one 3 mm long, suborbicular, awned. Florets hermaphrodite; floral glume 4 mm long ovate, cuspidate, keeled, membranous, paleate. Stamens 3. Grains ovoid, rugose.

Fls. & frts. : July - Oct. ; AKS 182, Polya ghat ; 464, near JALMA; 484, Rawbagh.

Abundant along the roadsides and in sandy soils.

16. DESMOSTACHYA Stapf

Desmostachya bipinnata (L.) Stapf, Fl. Cap. 7 : 632. 1900 ; Blatt & McC. Bomb. Gr. 244, t. 162. 1935 ; Bor, Gr. Ind. 491. 1960. *Briza bipinnata* L. Syst. Nat. ed. 10, 875. 1759. *Eragrostis cynosuroides* (Retz.) P. Beauv. Ess. Agrost. 162. 1812; Hook. f. Fl. Brit. Ind. 7 : 324. 1897.

A tall, tufted, ascending from a stout creeping root stock, perennial grass, 30-120 cm high. Stolons very stout, covered with shining sheaths. Leaves 11-40 x 0.5-1 cm, linear, linear-lanceolate, tapering to a filiform tip, rigid. Panicles 35-45 cm long, narrowly pyramidal or columnar, often interrupted. Branches are many with sessile imbricating spikelets. Spikelets 1.3 cm long, secund, 2-seriate, deflexed,

shining, upto 30 - flowered. Involucral glumes unequal. Florets hermaphrodite ; floral glume coriaceous, ovate, acute, paleate. Stamens 3. Grains obliquely ovoid, laterally compressed.

Fls. & frts. : July - Dec. ; *Vern.* : *Daab* ; AKS 109. *Polya ghat* ; 312, Salempur.

Common in sandy soil of unused grounds and along the boundaries of cultivated fields.

17. DICHANTHIUM Willem.

Dichanthium annulatum (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178, 1917; Blatt. & McC. Bomb. Gr. 94, t. 62, 1935 ; Bor, Gr. Ind. 133, 1960. *Andropogon annulatus* Forssk. Fl. Aegypt. - Arab. 173, 1775 ; Hook. t. Fl. Brit. Ind. 7 : 196, 1987.

A densely tufted, erect or geniculated ascending, early, perennial grass, 50 - 100 cm high. Leaves 5 - 30 x 0.3 - 0.6 cm, linear or narrowly lanceolate, acuminate, scabrid, rigid, glaucous. Racemes 3 - 9, subdigitately fascicled, spiciform, erect or slightly spreading, greenish or purplish, 3 - 6 cm long. Spikelets 3 - 5 mm long, ovate oblong, in pairs, one sessile and the other pedicelled. Sessile spikelets compressed, awned, with a thick callus, shortly bearded at the base ; 2 - flowered. Lower involucral glume ovate - oblong, hairy, upper one 3 - 5 mm long, lanceolate, 3 - nerved. Lower floret barren. Upper floret hermaphrodite ; upper floral glume reduced to a slender awn. Stamens 3. Pedicelled spikelets male or neuter. Grains obovate - oblong, compressed.

Fls. & frts. : May - Dec. ; *Vern.* : *Zarga* ; AKS 20, Salempur ; 228, Chhalesar ; 527, Shahjahan garden.

Abundantly found in cultivated fields, gardens, open grounds and along roadsides.

18. DIGITARIA Heist. ex Fabr

1a. Hairs on the spikelets clavate, i.e. passing abruptly into an obtuse, obovate or globular head :

2a. Tip of the pedicels cupuliform with hairs on the rim and below, hairs exceeding the summit

4. *D. stricta*

2b. Tip of the pedicels somewhat thickened, without a rim of hairs

1. *D. ciliolata*

- 1b. Hairs on the spikelets, if any, without a globular thickening,
not clavate :
- 3a. Nerves of the lower lemma smooth, without minute
triangular spines on nerves 2. *D. adscendens*
- 3b. Nerves of the lower lemma with minute triangular spines
on the upper part of the nerves 3. *D. sanguinalis*

1. *Digitaria abtudens* (Roem. & Schult.) Veldkamp. in Blumea 21 : 53, 1973.
Panicum abtudens Roem. & Schult. Syst. Veg. 2 : 457, 1817. *Digitaria granularis* (Spreng.) Henr. Monogr. 302, 1950.

An erect, annual or perennial grass, 15 - 60 cm high. Culms slender, tufted, branched. Leaves 3.5 - 10 × 0.2 - 0.4 cm, linear-lanceolate, finely acuminate, margins minutely scabrid. Inflorescence a panicle of 5 - 10 false spikes or racemes, slender, alternate, contracted, erect or spreading, lax, 2 - 5 cm long. Spikelets 1 - 1.5 mm long, elliptic, acute, spaced ; the upper of each fascicle on a pedicel which exceeds the lower spikelet in length, hairy with clavate-tipped short hairs. Lower floret sterile. Upper floret hermaphrodite ; floral glume elliptic-oblong, coriaceous, paleate.

Fls. & frts. : July - Oct. ; 157, Bichpuri campus.

Common in cultivated fields, unused grounds and along roadsides.

2. *Digitaria ciliaris* (Retz.) Koel. Grass. 27, 1802; Bor in Fl. Iraq. 9 : 478, 1968; Jain, S.K. & Doli Das, Ind. For. 99 : 570 - 578, 1973. *Panicum ciliare* Retz. Obs. Bot. 4 : 16, 1786. *Digitaria adscendens* (H.B. & K.) Henr. in Blumea 1 : 92, 1934 ; Bor in Webbia 11 : 350, 1955 & Gr. Ind. 298, 1960. *Panicum adscendens* H.B. & K. Nov. Gen. & Sp. 1 : 97, 1815.

An annual grass, 30 - 60 cm high. Culms tufted, ascending from a geniculate often rooting base. Leaves 6 - 12.5 × 0.5 - 0.8 cm, linear to linear-lanceolate, tapering to a fine point, glabrous or sparingly hairy. Spikes 2 - 6 or more, sessile, subdigitate, erect or spreading 6 - 15 cm long. Spikelets 3 - 4 mm long, oblong, acute, appressed to the rachis, binate, pedicel of one row shorter than the other ; 2-flowered. Involucral glumes unequal ; upper one ovate-lanceolate, ciliate. Lower floret sterile. Upper floret hermaphrodite ; floral glume bearded with soft hairs, paleate. Stamens 3. Caryopsis oblong.

Fls. & frts. : Nov. ; AKS 117, College campus ; 752, Shahjahan garden ; 867, Salempur.

Abundant in moist and dry places of the gardens, open grounds and cultivated fields.

3. *Digitaria sanguinalis* (L.) Scop., *Flor. Carn.* ed. 2, 1 : 52. 1772; Bor, Gr. Ind. 304. 1960. *Panicum sanguinale* L. Sp. Pl. ed. 1 : 57. 1753; Hook. f. Fl. Brit. Ind. 7: 13. 1897. *Paspalum sanguinale* (L.) Lamk., Tab. Encycl. Meth. Bot. 1 : 176. 1791.

An annual, erect grass, 30-90 cm tall. Leaves 3 - 6 x 0.4 - 0.6 cm ; linear lanceolate, flat. Spikes 2 - 6, subdigitate, erect or spreading, 3.5 - 6 cm long ; rachis triquetrous, narrowly winged. Spikelets 3 mm long, oblong, acute, binate, appressed to the rachis. Lower involucral glume very minute, scaly ; upper one ciliate, membranous. Lower floret sterile ; lemma with minute triangular spines on the upper part of the nerves. Upper floret hermaphrodite ; floral glume oblong-lanceolate, somewhat chartaceous, paleate. Stamens 3.

Fls. & frts. : July - Oct. ; 795, Fatehpur Sikri.

Common on the ridges, in rock crevices and among stones.

4. *Digitaria stricta* Roth ex Röem. & Schult. Syst. Veg. 2 : 474. 1817; Bor, Gr. Ind. 305. 1960. *Paspalum royleanum* Nees ex Thw., Enum. 358. 1864; Hook. f. Fl. Brit. Ind. 7 : 18. 1897. *Digitaria royleana* Prain, Beng. Pl. 1181. 1903; Blatt. & McC. Bomb. Gr. 127, t.32. 1935.

An erect, tufted, annual grass, 30 - 60 cm high. Culms geniculate at the base, very slender, smooth, glabrous. Leaves 6 - 15 x 0.4 - 0.7 cm, linear-lanceolate, tapering to a fine point. Racemes 3 - 6, sometimes subdigitate, usually alternate, 4 - 10 cm long. Spikelets 1 - 1.5 mm long, elliptic, acute, very numerous, covered with clavate-tipped short hairs. Lower involucral glume absent ; upper one absent or represented by few hairs. Lower floret neuter. Upper floret hermaphrodite ; floral glume elliptic-oblong, subcoriaceous, paleate.

Fls. & frts. : July - Oct. ; AKS 475, Salempur ; 765, College campus ; 794, Fatehpur Sikri.

Common in cultivated and fallow fields and along roadsides.

19. DINEBRA Jacq.

Dinebra retroflexa (Vahl) Pauzer in Denkrehr. Acad. Wiss. Munchen 270, t. 12. 1814 ; Bor, Gr. Ind. 491. 1960. *Cynosurus retroflexa* Vahl, Symb. Bot. 2 : 20. 1791.

An erect or ascending, annual grass, 20 - 60 cm high. Leaves linear-lanceolate, glabrous or sparsely pilose. Inflorescence a raceme, made of several spikes, alternate, opposite or whorled 0.5 - 3.5 cm long. Spikelets closely imbricate, 4 - 6 mm long,

2 - 3 - flowered. Lower glume 4 - 5 mm long, aristate; upper glume similar except a little longer. Lower lemma 2 mm long, 3-nerved, pilose. Stamens 3, yellow. Caryopsis oblong.

Fls. & frts. : July - Nov.; AKS 952; Polya ghat.

Grows in dry fields.

20. ECHINOCHLOA Beauv.

- | | |
|--|--------------------------|
| 1a. Cultivated, tall plants; panicle large of many spikes | <i>3. E. frumentacea</i> |
| 1b. Wild species; panicle small of fewer spikes : | |
| 2a. Lower involucral glume and upper per floral glume equally acute or cuspidate | <i>1. E. coloenum</i> |
| 2b. Lower involucral glume and upper floral glume cuspidate or produced into an awn, the latter more than the former | <i>2. E. crusgalli</i> |

1. *Echinochloa coloenum* (L.) Link, Hort. Berol. 2:209. 1833; Bot. Fl. Assam 5:246. 1940 & Gr. Ind. 308. 1960. *Panicum coloenum* L. Syst. Nat. ed. 10.2 : 870. 1759 & Sp. Pl. (ed. 2) 84; Hook. f. Fl. Brit. Ind. 7:32. 1897.

A slender, erect or geniculately ascending, tufted, annual grass, 30-60 cm tall. Leaves 7-16.5 x 0.4-0.6 cm, linear or narrowly lanceolate, tapering to an acute point, margins rough. Inflorescence a contracted panicle; spikes 6 to 20, distant, 1-3 cm long, erect, sessile and often appressed to the axis. Spikelets 3.5 mm long, globosely ovoid, acute, pubescent, crowded; 2-flowered. Lower involucral glume 1.5 mm long, broadly ovate, acute, 3-nerved; upper one 3.5 mm long, 5-nerved. Lower floret barren. Upper floret hermaphrodite; floral glume 2 mm long, broadly ovate, cuspidate, coriaceous, turgid, paleate. Stamens 3. Grains plano-convex.

Fls. & frts. : July - Nov.; AKS 21, Salempur; 251 Kitham; 480, Pachokhra.

Abundant along the ponds, canals and also found near the lake.

2. *Echinochloa crusgalli* (L.) P. Beauv. Ess. Agrost. 53:161. 1812; Blatt & MaC. Bomb. Gr. 150, t. 95. 1935; Bot. Fl. Assam 5:247. 1940 & Gr. Ind. 310. 1960. *Panicum crusgalli* L., Sp. Pl. 56. 1753; Hook. f. Fl. Brit. Ind. 7:30. 1897.

A tufted, geniculately ascending or decumbent, branched, annual grass, 30-100 cm long. Leaves 8-20 x 0.6 - 1 cm, linear-lanceolate, acuminate, margins finely cartilaginous, glabrous. Inflorescence an erect, stout or flexuous lobed panicle 5-10 cm long; branches solitary or binate, suberect or spreading, distant except the upper

ones. Spikelets 3-3.7 mm long, ovate-elliptic, cuspidate or awned, turgid; 2-flowered. Lower involucral glume broadly ovate, cuspidate; upper one ovate, short awned. Lower floret barren; upper floret hermaphrodite; floral glumes cuspidate or produced into a long, flexuous awn. Grains ovoid.

Fls. & frts. : July - Oct.; AKS 309, 866, Salempur.

Common in the cultivated fields and near the ponds and canals.

3. *Echinochloa frumentacea* (Roxb.) Link, Hort. Berol. 1:204, 1827 = 4. *Gr.* Ind. 311. 1960. *Panicum frumentaceum* Roxb., Fl. Ind. 1:307. 1820

A tufted, erect, robust, annual grass, 1-1.5 m high. Leaves 30-35 x 1.5-2.5 cm, linear-lanceolate, acuminate, glabrous. Inflorescence a panicle; spikes many, 2-nate or 3-nate arranged distantly on central axis. Spikelets 3-4 mm long, obovate, acute, cuspidate, turgid; 2-flowered. Lower involucral glume 1.5 mm long, clasping, apiculate; upper one 3-4 mm long, 5-nerved. Lower floret barren. Upper floret hermaphrodite; floral glume 3 mm long, elliptic, acute, chartaceous, paleate. Stamens 3. Grains convex-ovoid.

Fls. & frts. : July - Oct.; AKS 473, Salempur.

Occurs along the borders of cultivated and unused fields.

21. ELEUSINE Gaertn.

- 1a. Perennials; prostrate or creeping grass, rooting at the nodes *E. compressa*
- 1b. Annuals; erect grass 2. *E. indica*

1. ***Eleusine compressa* (Forsk.) Aschers. & Schwilh. ex C. Christensen in Dansk. Bot. Archiv. 4 : No. 3, 12. 1922; Bot. Gr. Ind. 492, 1960. *Panicum compressum* Forsk. Fl. Aegypt.-Arab. 18. 1775. *E. flagellifera* Nees in Linnaea 16:220. 1842; Hook. f. Fl. Brit. Ind. 7:294. 1897.**

A perennial, prostrate, proliferously branched grass. Stems smooth, stiff, widely spreading, rooting at the distant, leafy nodes and sending up slender branches. Leaves 1.5-4 x 0.2-0.3 cm, linear-lanceolate, acuminate, rigid. Spikes 3-6, digitate, 2-4 cm long; rachis slender, flexuous. Spikelets 3-6 mm long, imbricate; 4-6 flowered. Lower involucral glume 2.5 mm long, ovate, acute, membranous; upper one 4 mm long, lanceolate, aristate, coriaceous. Floral glume ovate, acute, 3-nerved; palea oblong with ciliate keels. Stamens 3. Grains oblong.

Fls. & frts. : July - Oct. : AKS 460, near JALMA.

Common on the ridge and in sandy soil near Jamuna river.

2. ***Eleusine indica* (L.) Gaertn.** Fruct. 1:8. 1788; Blatt & McC. Boj. Gr. 259, 1935; Bor, Fl. Assam 5:108. 1940 & Gr. Ind. 493. 1960. *Cynosurus indicus* L. Sp. Pl. 72. 1753.

A tufted, erect or slightly geniculate, annual grass 30-60 cm high. Culms compressed, simple or branched, glabrous. Leaves 5.5 - 15 x 0.1-0.3 cm, narrowly linear, acuminate, erect, rigid, glabrous. Inflorescence of 4-6, digitate spikes 2.5 - 5 cm long; the rachis is slender and flattened. Spikelets 4 mm long, ovate or oblong, biseriate, secund, pointing upward to an acute angle with the rachis; 3 to 6-flowered. Lower involucral glume 1.5 mm long, 1-nerved; upper one 3 mm long, lanceolate, acute 3-nerved. Florets hermaphrodite; floral glume 4 mm long, lanceolate, acute, paleate. Stamens 3. Uppermost floret barren. Grains oblong, obtusely trigonous.

Fls. & frts.: July - Nov.; Vern.: Sawan; AKS 159, Sikandra; 594, Kitham.

Common in the open waste places, fields and along roadsides.

22. ERAGROSIS Beauv.

- 1a. Rachilla of spikelets tough, persistent;
floral glumes falling away from its base upwards :

2a Leaf margins glandular; involucral glumes 1-nerved 4. *E. poaeoides*

2b. Leaf margins eglandular :

3a. Spikelets versatile, about 2 cm long narrowly linear 6. *E. tremula*

3b. Spikelets not versatile, small, 4 mm
long or less; mouth of leaf sheath bearded 3. *E. pilosa*

1b. Rachilla of spikelets more or less
jointed and breaking up from above downwards :

4a. Panicles short, compact, spike-
like, cylindric, about 3 cm long 1. *E. ciliaris*

4b. Panicles longer, open or more or less contracted :

5a. Stamens 2; paleas scaberulous or smooth on the
keels 2. *E. diarrhena*

5b. Stamens 3; paleas ciliolate on the keels 5. *E. tenella*

1. Eragrostis ciliaris (L.) R. Br. in Tuckey, Narr. Exp. Congo App. 478. 1818; Bor, Gr. Ind. 506. 1960. *Poa ciliaris* L. Syst. 875. 1759.

An erect or decumbent, geniculately ascending, glabrous, annual grass, 10-20 cm high. Leaves 3-7 x 0.1-0.2 cm, very narrow, acuminate. Panicles compact, 2-3 x 0.5 - 0.6 cm, spiciform, hairy due to the presence of long cilia on palea. Spikelets 2-4 x 1-2 mm, pale, densely aggregated, 6-12 flowered, compressed. Involucral glumes subequal, ovate-lanceolate. Floral glume 1 mm long, oblong; palea equal to the glume, keels with long rigid cilia. Stamens 3. Grains elongate-ovoid.

Fls. & frts.: July - Nov.; *Vern.* : Panghas; AKS 177, Poiya ghat.

Common on moist sandy soil of Jamuna river and cultivated fields.

2. Eragrostis diarrhena (Schult.) Steud. Syn. Pl. Glum. 266. 1854; Bor, Gr. Ind. 507. 1960. *Poa diarrhena* Schult. Mant. 3:616. 1827. *Eragrostis interrupta* var. *diarrhena* Stapf ex Hook. f. Fl. Brit. Ind. 7:316. 1897.

An erect, tufted, slender grass, 30-100 cm tall. Leaves 5-17 x 0.1-0.3 cm, linear, flat, acuminate, glabrous. Panicles 10-30 cm long, erect, narrow, contracted, of appressed or shortly spreading, numerous, fascicled or subwhorled, spiculate branches giving the panicle a lobed appearance. Spikelets 1.5 - 3 mm long, ovate to linear, often purplish in colour, 6-14 flowered. Involucral glumes sub-equal, ovate-oblong, hyaline, 1-nerved. Floral glume 1 mm long, obtuse, paleate. Stamens 2. Grains obovoid.

Fls. & frts. : Aug - Nov.; *Vern.* : Lamp; AKS 864, Salempur.

Common near the ponds and canals and also found in moist places.

3. Eragrostis pilosa (L.) P. Beauv. Ess. Agrost. 71. 1812; Blatt. & McC. Bomb. Gr. 241, t. 160. 1935; Bor, Gr. Ind. 512. 1960. *Poa pilosa* L. Sp. Pl. 68. 1753.

A densely tufted, erect, slender, annual grass, 10-30 cm tall. Leaves 3-9 x 0.2-0.3 cm, narrowly linear, finely acuminate, rough on the margins; sheaths bearded. Panicle 4-10 cm long, elliptic-oblong, erect, spreading at anthesis ; branches capillary, flexuous; pedicles almost as long as spikelets. Spikelets 2-5 x 1 mm, linear or narrowly ovate; 4-10-flowered. Involucral glumes very unequal, hyaline; lower nerveless; upper 1-nerved. Floral glume 1 mm long, ovate, acute, 3-nerved, paleate. Keel of palea subdenticulate. Stamens 3. Grains narrowly obovoid or ellipsoid.

Fls. & frts. : July - Nov.; *Vern.* : Kiwai; AKS 857, Salempur.

Found along canals, ponds and in moist places.

4. Eragrostis poaeoides P. Beauv. Ess. Agrost. 162. 1812; Sprague & C.E. Hubb. in Kew Bull. 17. 1933; Bot. Gr. Ind. 512. 1960. *Poa eragrostis* L. Sp. Pl. 68. 1753. *Eragrostis minor* Host, Gram. Austr. 4:15. 1809 (in nota) & Flora. Austr. 1:135. 1827; Blatt. & McC. Bomb. Gr. 238, t. 158. 1935.

An erect, densely tufted, annual grass, 10-45 cm tall. Leaves 4-10 x 0.2 - 05. cm, linear, tapering to a fine point, margins glandular. Panicles ovate to oblong; branches angled, spreading when mature. Spikelets 4-12 x 2 mm, linear-oblong, pale green or purplish; 4-15 flowered. Lower involucral glume smaller than the upper, 1-nerved, acute. Floral glumes overlapping, ovate, acute, paleate. Stamens 3. Grains about 0.5 x 0.4 mm, rounded.

Fls. & frts. : July - Dec. ; AKS 99, Poiya ghat ; 227, Chhalesar; 608, Amota.

Common in moist open grounds, on the roadsides and on sandy soil of Jamuna and Utangan rivers.

5. Eragrostis tenella (L.) P. Beauv.

1a. Panicle loose with spreading branches

5a. *E. tenella* var.
tenella

1b. Panicle contracted with ascending branches

5b. *E. tenella* var.
insularis

5a. *Eragrostis tenella* var. *tenella* (L.) Hook. f. Trimen, Fl. Ceyl. 5:291. 1900; Bot. Gr. Ind. 514. 1960. *Poa tenella* L. Sp. Pl. 1:60. 1753.

A loosely tufted, erect or geniculately ascending, annual grass, 16-50 cm tall. Leaves 5-12 x 0.1 - 0.3 cm, narrowly linear, tapering to a fine point, glabrous; sheaths bearded. Culms and leaves not viscidous. Panicles loose with spreading branches; axis more or less hairy at the nodes. Spikelets 2-3 x 1 mm, oblong; 2-9 flowered. Involucral glumes unequal, ovate - oblong, 1-nerved. Floral glume 1 mm long, oblong, membranous, paleate; paleas ciliate on the keels. Stamens 3.

Fls. & frts. : June - Nov. ; AKS 201, Chhalesar ; 249, Kitham; 483, College campus.

Abundant in moist waste places, open grounds and on roadsides.

5b. *Eragrostis tenella* var. *insularis* C.E. Hubbard in Kew Bull. 1939, 654 (1939); Bot. Gr. Ind. 514. 1960.

It differs from the above only with regard to panicle contracted with ascending branches; axis glabrous.

Fls. & frts. : Aug. - Jan.; AKS 12, Poiya ghat; 609, Amota.

Common on sandy soil of Jamuna and Utangan rivers and in cultivated fields.

6. *Eragrostis tremula* (Lamk.) Hochst. ex Steud. *Syn. Pl. Gram.* 269, 1854; Hook. f. *Fl. Brit. Ind.* 7:320, 1897; Blatt. & McC. *Bomb. Gr.* 239, t. 159, 1935; Bor, *Gr. Ind.* 514, 1960. *Poa tremula* Lamk. *Tahl. Encycl.* 1:185, 1791.

An annual grass, 15-60 cm high. Culms erect or ascending, densely tufted, branching. Leaves 4.5 - 15 x 0.2 - 0.6 cm, linear-lanceolate, acuminate, margins eglandular and serrulate. Panicles large, diffuse, nodding; branches solitary, ascending. Spikelets 6 - 20 x 2 - 3 mm, linear, compressed, versatile, many-flowered. Involucral glumes sub-equal, ovate, acute, membranous, nerved. Floral glume 1 - 1.5 mm long, broadly ovate, paleate, 3-nerved. Stamens 3. Grains nearly globose.

Fls. & frts. : Aug. - Dec.; *Vern.* : *Dholpholio*; AKS 179, Poiya ghat; 226, Chhalesar; 582, Niyamatpur.

Commonly found in cultivated fields and on sandy soils of Jamuna river.

23. EREMOPOGON Stapf.

Eremopogon foveolatus (Del.) Stapf in Prain, *Fl. Trop. Afr.* 9:183, 1917; Bor, *Gr. Ind.* 148, 1960. *Andropogon foveolatus* Del. *Fl. Aegypte* 16, t. 8, f. 2, 1812. *E. strictus* A. Camus in Ann. Soc. Linn. Lyon (n.s.) 68:208, 1922; Raizada in Ind. For. 80:45, 1954.

An erect or geniculately ascending densely tufted, slender grass, 30-100 cm high. Nodes bearded. Leaves 7.5 - 15 x 1.2 - 2.5 cm, linear, acuminate, scaberulous beneath. Spikes 2.5 - 5 cm long, solitary, on long peduncles. Joints and pedicels filiform, compressed with long silky hairs. Spikelets 3 mm long, 2-nate, the sessile one bisexual, the pedicelled one male, both with a circular pit on the back of the lower involucral glumes. Sessile spikelets lanceolate-oblong, bisexual. Involucral glumes equal, 3 mm long, 3-nerved. Lower floral glume oblong-lanceolate, nerveless; upper one passing into a geniculate awn. Stamens 3. Pedicelled spikelets male, awnless.

Fls. & frts. : Aug. - Dec.; *Vern.* : *Zarga*; AKS 79, 194, Chhalesar; 547, Chikniper.

Common on the ridge, in hilly tracts and ravine region.

24. ERIOCHLOA H.B. & K.

Eriochloa procera (Retz.) C.E. Hubbard in Kew Bull. 256, 1930; Raizada, Ind. For. 80: 40, 1954. *Agrostis procera* Retz. Obs. Bot. 4:19, 1786. *E. polystachya* Hook. f. Fl. Brit. Ind. 7: 20, 1897 (non H.B. & K.) ; Bor, Gr. Ind. 312, 1960.

A densely tufted, erect or ascending, perennial grass, 30-100 cm high. Culms simple or branched, swollen and pubescent at the nodes. Leaves 5.5 - 15 x 0.5 - 0.9 cm, linear or lanceolate, acuminate, flat, margins scabrid. Inflorescence a panicle, 8-14 cm long, made up of simple or branched, suberect spikes. Spikelets 4.5 mm long, ovate-lanceolate, shortly pedicelled, erect, distichous, laxly imbricate; 2-flowered. Pedicel swollen at the apex. Lower involucral glume absent; upper one 4.5 mm long, ovate-lanceolate, acuminate, 3-5 nerved, silky hairy. Lower floret barren or sterile. Upper floret hermaphrodite; floral glume 2 mm long, oblong, coriaceous, paleate. Stamens 3. Caryopsis oblong, obtuse, smooth.

Fls. & frts. : July Oct. ; AKS 120, Bichpuri campus; 478, Pachokhra; 796, Fatehpur Sikri.

Abundant along the banks of canals, ponds and puddles.

25. HEMARTHRIA R. Br.

Hemarthria compressa (L.f.) R. Br. Prod. 207, 1810; Blatt. & McC. Bomb. Gr. 31, 1935; Bor, Gr. Ind. 161, 1960. *Rottboellia compressa* L. f. Suppl. 114, 1781; Hook. f. Fl. Brit. Ind. 7:153, 1897.

An erect or ascending, hygrophilous, perennial grass, 30-100 cm tall. Leaves 5-12 x 0.2 - 0.4 cm, linear, flat, scabrid on the margins. Racemes 4.9 cm long, compressed, erect; joints of the rachis thickened by the fusing of the pedicel. Spikelets 2-nate, each pair formed of a sessile and a pedicelled spikelet. Sessile spikelets 4-4.5 mm long, linear-lanceolate, 2-flowered; lower glume with a flat back, linear-oblong; upper one concave, membranous, closely applied and adnate to the excavation in the rachis; floral glumes hyaline. Pedicelled spikelets 6 mm long (including pedicel), linear-lanceolate, hermaphrodite or male.

Fls. & frts. : July Nov. ; AKS 450, Shahjahan garden ; 565, Kiraoli ; 792, Fatehpur Sikri.

Abundant along the temporary ponds, canals and in moist waste places.

26. HETEROPOGON Pers.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2:836. 1817; Blatt. & McC. Bomb. Gr. 109, t. 71, 1935; Bor, Gr. Ind. 163, 1960. *Andropogon contortus* L. Sp. Pl. 1045, 1753; Hook. f. Fl. Brit. Ind. 7:199, 1897.

A tufted, tall, perennial grass, 90-120 cm high. Leaves 6-18 x 0.20 - 0.5 cm, linear, acuminate, margins cartilaginous; sheaths compressed. Inflorescence a single raceme or more often of several flowering branches. Spikelets 2-nate, lower ones alike in sex and shape, awnless, male or neuter, the upper ones of pairs of one sessile and the other pedicelled, long-awned, female. Sessile spikelet 6 mm long, hispid, the upper floral glume reduced to a stout geniculate awn. Pedicelled spikelets 6-7 mm long, somewhat asymmetric, hispid at the back with bulbous-based hairs. Male spikelets 8-10 mm long, dorsally flattened, oblong-lanceolate. Stamens 3. Grains linear, sub-terete, dorsally compressed.

Fls. & frts. : Aug. - Nov. ; AKS 107, Chhalesar.

Common in ravine region and on the ridges.

27. HYGRORYZA Nees

Hygroryza aristata (Retz.) Nees in Wt. & Am. Edinb. New Phil. J. 15:380, 1833; *Pharus aristatus* Retz. Obs. Bot. 5:23, 1789.

An annual, aquatic, free floating grass with fibrous roots. Culms spreading 15-35 cm high. Leaves 2 - 4 x 0.7 - 1.8 cm, ovate to ovate-lanceolate. Inflorescence a globose panicle. Spikelets 1-flowered, 1.6 - 1.8 cm long including awn. Glumes reduced. Lemma 7 mm long, chartaceous, hispid, 5-nerved, awn 10 mm long. Palea 6 mm long, chartaceous, hispid, awnless, 3-veined. Stamens 6, yellow. Caryopsis lanceolate, awned.

Fls. & frts. : Sept. - Jan. ; AKS 937, Kotaki.

Common along the bank of canals, ponds and puddles.

28. IMPERATA Cyril.

Imperata cylindrica (L.) Raeuschel, Nom. Bot. ed. 3, 10, 1797. Beauv. Agrost. 165, t. 5, f. 1, Expl. Planch. 5, 1812; Blatt. & McC. Bomb. Gr. 42, t. 30, 1935; Bor, Gr. Ind. 169, 1960. *Lagurus cylindricus* L. Syst. 878, 1759. *Imperata arundinacea* Cyril. Pl. Rar. Neap. 2: 26, t. 11, 1792; Hook. f. Fl. Brit. Ind. 7:106, 1897.

An erect, perennial grass, 15-45 cm high, with creeping, stoloniferous rootstocks. Leaves 4-12 x 0.3 - 0.6 cm, linear, tapering to an acuminate tip, scabrous above. Inflorescence a spike-like panicle, 4 - 6 cm long, cylindric, very dense, branches are short and appressed. Spikelets lanceolate, 3 mm long, concealed by long silvery hairs of the callus; 2-flowered. Lower involucral glume lanceolate, membranous; upper one keeled. Lower floret reduced to an empty lemma; upper floret hermaphrodite, floral glume lanceolate, denticulate, paleate; palea 1 mm long. Anthers 2. Grains small, oblong.

Fls. & frts. : July - Jan. ; AKS 33, Salempur; 253, Kitham.

Common along irrigation channels, canals, ponds and in moist places of the gardens.

29. LEPTOCHLOA Beauv.

Leptochloa panicoides (Retz.) Ohwi in Bot. Mag. Tokyo 55:311. 1941; Bor, Gr. Ind. 517. 1960. *Poa panicoides* Retz. Obs. 3:11. 1783. *Leptochloa filiformis* Hook. f. Fl. Brit. Ind. 7:298. 1897.

A slender, geniculately ascending, annual grass, 30-60 cm tall. Leaves 5 - 15 x 0.3 - 0.6 cm, linear-lanceolate, flat, tapering to a fine point. Panicles 10-25 cm long, contracted or diffuse; branches very many, capillary. Spikes 5-10 cm long, ascending or spreading, bearing unilaterally 2-seriate, numerous spikelets. Spikelets 2 mm long, shortly pedicelled, laterally compressed; 3-flowered. Lower involucral glume 1 mm long, linear-lanceolate; upper one 1.5 mm long, 1-nerved. Florets hermaphrodite; floral glume 1 mm long, 1-nerved, paleate. Stamens 3. Grains fusiform-oblong.

Fls. & frts. : Aug. - Nov. ; AKS 463, Taj nursery; 868, College campus.

Common along the irrigation channels, and in moist open grounds.

30. LOLLUM L.

1a. Lemmas 3-4 mm long, awned; awn weak, flexuous,
upto 5 mm long

1. *L. remotum* var.
aristatum

1b. Lemmas 6-8 mm long, rounded on the back, awned
from near the tip; awn upto 2 cm long

2. *L. temulentum*

1. *Lolium remotum* Schrank var. *aristatum* (Doell) Aschers, in Fl. Brand. 1:876. 1864. *L. linicolum* var. *aristatum* Doell in Fl. Bad. 1:513. 1857.

An erect, annual grass, 45-60 cm high. Leaves 8-16 x 0.3 - 0.5 cm, narrowly linear, entire, tapering to a point. Spikes erect, 8-12 cm long, with 9-14 spikelets. Spikelets 7-13 mm long, 4-7 flowered, compressed, 2-ranked, alternate, sessile in the hollows of the rachis of a simple spike. Florets all hermaphrodite, elliptic. Lemmas 3-4 mm long, awned; awn weak, flexuous, upto 5 mm long.

Fls. & frts.: Jan. - Mar. ; AKS 638, Jhirna nala.

Its occurrence is reported from India for the first time. Found in the cultivated fields.

2. *Lotium temulentum* L. Sp. Pl. 83. 1753; Bot. Gr. Ind. 546. 1960.

An erect, annual grass, with culms fascicled or solitary, glabrous, 60-100 cm high. Leaves 15-30 x 0.3 - 0.7 cm, linear, entire, acute, scabrous. Spikes erect, 10-20 cm long, with 10-25 spikelets. Spikelets 12-16 mm long, 5-10 flowered, more or less compressed, 2-ranked, alternate, sessile in the hollows of the rachis of a simple spike. Florets all hermaphrodite. Lower involucral glume absent or hidden in hollows of rachis; upper ones oblong, rigid, turgid, coriaceous, glabrous, 7-9 nerved. Floral glumes 8 mm long, elliptic-oblong, obtuse, 5-nerved, awned; awn upto 2 cm long, subterminal, straight, scaberulous. Palea broad, 2-keeled. Stamens 3. Grains elliptic-oblong, grooved in front.

Fls. & frts. : Dec. - Mar. ; AKS 637, Jhirna nala.

Common as a weed in the fields of wheat and barley etc.

31. MELANOCENCHRIS NEES

Melanocenchris jacquemontii Jaub & Spach, Ill. Pl. Or. 4:36, t. 325. 1851; Santapau in Rec. Bot. Surv. Ind. 16(1) : 358. 1953; Bot. Gr. Ind. 473. 1960. *Gracilea royleana* (Nees) Hook. f. in Fl. Brit. Ind. 7:284. 1897; Blatt & McC. Bomb. Gr. 1935. *Melanocenchris royleana* Nees in Proc. L. Soc. 1:95. 1841. nomen.

An erect or ascending, slender, tufted, annual grass, 10 - 20 cm high. Leaves 0.8 - 3.5 x 0.1 - 0.2 cm, linear-lanceolate, filiform, acuminate, margins distantly ciliate, slightly hairy. Inflorescence 1.5 - 5 cm long, consisting of fascicles of spikelets ; rachis smooth and flexuous. Spikelets surrounded by 5 - 8 awned, involucral glumes besides other two involucral glumes. Spikelets 5 mm long ; 2 flowered having one hermaphrodite floret and other barren floret. Lower and upper involucral glumes 2.5 mm long, awned, awns longer than the glumes, outer surface white hairy. Outer floral glume of hermaphrodite floret 3-toothed at the apex, paleate ; palea 3.5 mm long, 2-toothed at the apex. Stamens 3. Grains linear-oblong.

Fls. & frts. : July - Nov. ; 500, Khauder ; 790, Fatehpur Sikri.

Abundant on the ridges among rock crevices.

32. OPLISMENUS P. Beauv.

Oplismenus burmanii (Retz.) P. Beauv. Ess. Agrost. 54 : 168 - 169. 1812 ; Hook. f. Fl. Brit. Ind. 7 : 68. 1896. *Panicum burmanii* Retz. Obs. Bot. 3 : 10. 1783.

An annual, ascending from a decumbent and rambling, rooting base, 10 - 45 cm long. Leaves 1.5 - 4 x 0.5 - 1 cm, ovate-lanceolate, acute, margins slightly scabrous, flat, pubescent. Spikes secund, close, in short panicles with distant, spicate branches. Spikelets 2.5 mm long, oblong-lanceolate, provided with 15 - 20 bristles at the base ; 2 - flowered. Lower and upper involucral glumes 2 mm long, oblong, ciliate, capillary awned. Lower floret barren, awned. Upper floret hermaphrodite ; floral glume 1.5 mm long, oblong, paleate. Stamens 3.

Fls. & frts. : July - Dec. ; AKS 593, Kitham.

Common in moist places of the gardens and open grounds.

33. OROPETIUM Trin.

Oropetium thomaeum (L.f.) Trin. Fund. Agrost. 98, t. 3. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 366. 1896 ; Blatt. & McC. Bomb. Gr. 247. 1935 ; Bor, Gr. Ind. 474. 1960. *Nardus thomaea* L.f. Suppl. 105. 1781.

A small, densely tufted, annual grass, 5 - 10 cm high. Leaves 0.8 - 2.5 x 0.1 cm, linear, filiform, ciliate with long hairs, erect or curved. Spikes 2-5 x 0.1-0.2 cm, erect, straight or slightly curved ; rachis undulating, tetragonal. Spikelets 2 mm long, half-immersed in the distichous cavities of the rachis ; 1-flowered. Lower involucral glume very minute, hyaline ; upper one longest, 2 mm long linear-lanceolate, rigid. Floret hermaphrodite ; floral glumes 1 mm long, hyaline, membranous. Stamens 3. Grains somewhat fusiform, reddish-brown.

Fls. & frts. : Aug. - Oct. ; AKS 501, Khauder ; 791, Fatehpur Sikri.

Common in gravelly soils of the hilly tracts and on the ridges.

34. ORYZA L.

Oryza sativa L. Sp. Pl. 33. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 92. 1897 ; Blatt. & McC. Bomb. Gr. 274, t. 187. 1935 ; Bor, Gr. Ind. 605. 1960.

An erect, annual grass, 60 - 120 cm tall. Stems spongy below. Leaves 20 - 40 x 0.7 - 1.4 cm, linear-lanceolate, tapering to a point, margins scabrid. Inflorescence a lax, erect panicle, finally nodding, 12 - 18 cm long, young ones concealed within the spathe-like sheaths. Spikelets 9 mm long, ovate-oblong or ovoid, erect, awned or not. Lower lemmas 3 mm long, oblong-lanceolate, acute, empty. Fertile lemma 9 mm long, hispid-ciliate, awned, paleate. Caryopsis oblong, angular, tightly enclosed in the lemma and palea.

Fls. & frts.; Sept., Dec.; Vern.: Pasai, Dhan; AKS 310, Salempur.

Cultivated in the fields and also found wild along the canals and ponds of the low lying area.

35. PANICUM L.

1. *Panicum antidotale* Retz, Obs. 4 : 17, 1786 ; Hook. f. Fl. Brit. Ind. 7 : 52, 1897 ; Blatt. & McC. Bomb. Gr. 163, t. 104, 1935 ; Bor, Gr. Ind. 322, 1940.

An erect, glabrous, perennial grass, 60 - 150 cm tall. Stems solid, woody, terete, nodes thickened. Leaves 10 - 45 x 0.7 - 2 cm, linear, tapering to a fine point. Panicles 12 - 30 cm long, effuse, pyramidal; branches usually fascicled, filiform, spreading and drooping; branchlets capillary. Spikelets 3 x 1.5 mm, ovoid, acute, laxly crowded on the branchlets; 2-flowered. Lower involucral glume 1.5 mm long, ovate, 3-nerved; upper one 3 mm long, ovate, acuminate. Lower floret barren or male. Upper floret hermaphrodite; floral glume elliptic, obtuse, coriaceous, paleate. Stamens 3.

Fls. & frts. : July - Dec. ; AKS 78, 225, Chhalesar ; 228, Fatchpur Sikri.

Common in sandy soil on the borders of cultivated fields and also occurs in the ravine region.

2. **Panicum atrosanguineum** Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 375, 1851; Bor, Gr. Ind. 322, 1960. *P. hydaspicum* Edgew. in J. Linn Soc. 6 : 207, 1862; Hook. f. Fl. Brit. Ind. 7 : 48, 1897.

An erect or geniculately ascending, branched, annual grass, 15 - 30 cm high. Leaves 2 - 5 x 0.4 - 0.8 cm, linear-lanceolate, acute, hairy. Panicles 3 - 8 cm long, effuse, much-branched, ovoid; branches erecto-patent, alternate rarely opposite. Spikelets 3 x 1 mm, ovate, acute, glabrous; 2-flowered. Lower involucral glume 1.5 mm long; upper one 2.5 mm long. Lower floret barren. Upper floret hermaphrodite; floral glume 3 mm long, elliptic, obtuse, shining, paleate. Stamens 3.

Fls. & frts. : July - Oct. ; AKS 153, Bichpuri campus.

Occurs in open waste fields and unused grounds.

3. **Panicum maximum** Jacq. Coll. Bot. 1 : 76, 1786 & Ic. 1 : 13; Hook. f. Fl. Brit. Ind. 7 : 49, 1896; Bor, Fl. Assam 5 : 224, 1940 & Gr. Ind. 327, 1960; Blatt. & McC. Bomb. Gr. 161, t. 103, 1935.

An erect, robust, simple or branched, perennial grass, 60 - 150 cm tall. Leaves 10 - 40 x 0.7 - 1.5 cm, linear-lanceolate, tapering to a fine point, hairy or coarse-hirsute with tubercle based hairs, margins serrulately scabrid. Panicle 12 - 20 cm long, erect or nodding, contracted or open, decompound: lower branches whorled, suberect or spreading, distant, divided almost from the base; pedicels fascicled, 3-2 nate, capillary, flexuous, scabrid. Spikelets 3.5 mm long, oblong, light green also tinged with purplish; 2-flowered. Lower involucral glume 1 mm long, rounded, subhyaline; upper one 3.5 mm long, oblong, acute, 5-nerved. Lower floret male. Upper floret hermaphrodite, floral glumes 2.5 mm long, oblong, 5-nerved, finely transversely rugose. Stamens 3.

Fls. & frts. : Dec. - Mar. ; AKS 601, Chhalesar.

Common in open waste places and ravine region.

4. **Panicum paludosum** Roxb. Fl. Ind. 1 : 310, 1820; Blatt. & McC. Bomb. Gr. 162, 1935; Bor, Fl. Assam 5 : 229, 1940 & Gr. Ind. 329, 1960. *P. proliferum* Hook. f. in Fl. Brit. Ind. 7 : 50, 1897 (non Lamk.)

A simple or branched, leafy, perennial grass, 50 - 150 cm high, ascending from a creeping or spongy root-stock. Leaves 12 - 25 x 1.2 - 1.6 cm, linear or ensiform,

sharp, flat, subcoriaceous, margins scaberulous, many-nerved. Panicles 10 - 20 cm long, at first contracted, then spreading; branches robust, fasciculate below, scabrous. Spikelets 3 mm long, ovate-lanceolate, acuminate, almost parallel to the axis, solitary or in pairs; 2-flowered. Lower involucral glume 1 mm long, clasping, orbicular, hyaline, 1-nerved; upper one 3 mm long, broadly ovate-acuminate, 3-5 nerved. Lower floret male. Upper floret hermaphrodite; floral glume 2 mm long, narrowly oblong-acute, subcoriaceous, paleate. Stamens 3.

Fls. & frts. : July - Nov.; AKS 852, Salempur.

Common along the banks of canals, ponds and lake.

5. *Panicum tryphetum* Schult. Mant. 2 : 244. 1824; Hook. f. Fl. Brit. Ind. 7 : 47. 1897; Blatt. & McC. Bomb. Gr. 158. 1935; Bor. Gr. Ind. 331. 1960.

An annual, erect, tufted, leafy grass, 30 - 100 cm high. Leaves 7 - 25 x 0.4 - 0.6 cm, narrowly linear, acuminate, flat, hairy. Panicles 10 - 25 cm long, diffuse, erect or nodding, broadly oblong, lax; rachis slender, scaberulous; branches filiform, rigid, divercate, scaberulous, angled. Spikelets 3 - 4 x 1.5 mm, distant, ovoid, acuminate, glabrous, green or purple; 2-flowered. Lower involucral glume 1.5 mm long, broadly ovate, cuspidate, finely acuminate; upper one 2.5 - 3 mm long, ovate, acuminate. Lower floret barren. Upper floret hermaphrodite; floral glume 2 mm long, elliptic-oblong, coriaceous, shining, paleate. Stamens 3.

Fls. & frts. : Aug. - Dec.; AKS 518, Bichpuri campus.

Common along the drying up ponds and in open and cultivated fields.

36. PASPALIDIUM Stapf

Paspalidium flavidum (Retz.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7 : 419. 1922; Blatt. & McC. Bomb. Gr. 141, t. 90. 1935; Bor. Gr. Ind. 333. 1960. *Panicum flavidum* Retz., Obs. 4 : 15. 1786; Hook f. Fl. Brit. Ind. 7 : 28. 1897.

A tufted, ascending or erect annual, 30 - 80 cm long. Leaves 6.5 - 30 x 0.3 - 1 cm, linear-lanceolate, acuminate, flat, ascending. Inflorescence of 6-9 false, sessile, distant, erect spikes, appressed to the main axis. Spikelets 1.5 - 2.5 x 1.5, ovate oblong, closely imbricate, secund, in two rows on a flattened rachis; 2-flowered. Lower involucral glume suborbicular, 3-nerved; upper one broadly ovate, obtuse, 7-nerved. Lower floret usually male or barren. Upper floret hermaphrodite, 1.5 - 3 mm long; floral glume broadly ovate, acute, coriaceous, paleate. Stamens 3.

Fls. & frts. : June - Oct. ; AKS 158, Sikandra ; 757, Shahjahan garden.

Common in moist places, gardens and near the temporary ponds.

37. PASPALUM L.

Paspalum paspaloides (Michaux) Scribnér in Mem. Torr. Bot. Cl. 5 : 29, 1894; Jain, S. K. & Duli Das in Jut. For. 99 : 570 - 578, 1973. *Digitaria paspaloides* Michaux, Fl. Bor. Am. 1 : 16, 1803. *Paspalum distichum* Auctt. pl. including Bor. Gr. Ind. 338, 1960, nou L. Syst. Nat. ed. 10, 2 : 855, 1959.

An erect or decumbent, moisture loving, rhizomatous, perennial grass. Stolons long, forming loose mats. Leaves 4 - 10.5 x 0.3 - 0.7 cm, linear, acuminate, ascending, glabrous. Racemes generally 2, sometimes 3 or more, 4 - 6 cm long, erect, later spreading, spikelets 3.5 x 2 mm, solitary, distichous, elliptic, acute, ascending and appressed on the rachis; 2-flowered. Lower involucral glume absent; upper one 3.5 long, 3 - 5 nerved. Lower floret barren, reduced to the lemma. Upper floret hermaphrodite; floral glume 3 mm long, ovate elliptic, 3 - 5 nerved, paleate. Stamens 3. Grains elliptic.

Fls. & frts. : July - Oct. ; AKS 443, Kitham ; 481, Pachokhra.

Abundant along the bank of canals, ponds and puddles.

38. PEROTIS Ait.

Perotis indica (L.) Kuntze, Rev. Gen. 2 : 787, 1881; Blatt. & McC. Bomb. Gr. 220, t. 147, 1935; Bor. Gr. Ind. 611, 1960. *Anthoxanthum indicum* L. Sp. Pl. 28, 1753. *Perotis latifolia* Ait. Hort. Kew 1 : 85, 1789; Hook. f. Fl. Brit. Ind. 7 : 98, 1897.

A suberect, ascending, annual grass, 15 - 45 cm high. Stems geniculate, glabrous. Leaves 1 - 4 x 0.5 - 0.8 cm, ovate or lanceolate from a broad amplexicaul base, acute, margin spinulose, glabrous. Inflorescence a spike-like terminal raceme consisting of numerous small spikelets. Spikelets 2 - 3 mm long, narrowly linear, scabrid; 1-flowered. Involucral glumes subequal, long-awned. Stamens 3. Grains cylindric.

Fls. & frts. : Sept. - Nov. ; AKS 173, Poiya ghat ; 548, Anota.

Common in wet sandy soil of cultivated fields and also found on the slopes of the ridges. It is said to be useful in the treatment of Kala phora.

39. POA L.

Poa annua L. Sp. Pl. 68. 1753; Hook. f. Fl. Brit. Ind. 7 : 345. 1897; Bor, Gr. Ind. 55. 1960.

A prostrate or suberect, tufted, glabrous grass, 10 - 30 cm long. Leaves 3.5 - 7.5 x 0.2 - 0.5 cm, linear, acute, flat, flaccid, margins scabrous. Panicles 3.5 - 8 cm long, ovate or lax ; branches filiform, spreading. Spikelets 6 mm long, oblong, ovate or lower lanceolate, green or purplish ; 3 - 5 flowered. Lower involucral glume 2 mm long, lanceolate, acute, 1-nerved ; upper one 3 mm long, ovate, 3-nerved. Lower two florets hermaphrodite and upper ones female. Floral glume 3.5 mm long, oblong, obtuse, silky ciliate below along the keel, paleate ; palea 3 mm long, 2-toothed at the apex, keels ciliate. Stamens 3. Caryopsis oblong.

Fls. & frts. : Dec. - Apr. ; AKS 623, Taj nursery ; 652, R.B.S. College garden.

Common in moist places of the gardens and open grounds.

40. POLYPOGON Desf.

Polypogon monspeliensis (L.) Desf. Fl. Atlant. 1 : 67. 1798; Hook. f. Fl. Brit. Ind. 7 : 245. 1897; Blatt. & McC. Bomb. Gr. 207. 1935; Bor, Gr. Ind. 403. 1960. *Alopecurus monspeliensis* L. Sp. Pl. 61. 1753.

A tufted, annual grass, stout or slender from a geniculate base, 15 - 60 cm high. Leaves 4 - 8 x 0.5 - 0.6 cm, ovate-lanceolate, acuminate, scabrid, glabrous, sheaths swollen. Panicles 3.5 - 10 cm long, spike-like, cylindric, sometimes lobed or interrupted below, silky, light green or straw coloured. Spikelets 2 mm long, shortly pedicelled, minutely pubescent ; 1-flowered. Involucral glumes subequal, ob lanceolate-oblong, ciliate, awned. Floral glume broadly ovate-truncate, awned, paleate ; palea oblong, notched at the tip. Stamens 3. Caryopsis suberect, grooved.

Fls. & frts. : Oct. - Apr. ; AKS 208, Poiya ghat.

Common on sandy soil of Jamuna river and on the edges of cultivated fields.

41. SACCHARUM L.

Saccharum spontaneum L. Mant. 183. 1771; Hook. f. Fl. Brit. Ind. 7:118. 1897; Blatt. & McC. Bomb. Gr. 45. 1935; Bor, Gr. Ind. 214. 1940.

A robust, very tall, perennial grass. Leaves very long, rigid, linear, acuminate, margins often involute, coriaceous, glaucous. Inflorescence a dense, lanceolate,

white-silvery panicle 20 - 55 x 5 - 10 cm; branches whorled or slightly ascending, with the callus hairs closely appressed to the branches. Spikelets paired, one pedicelled, the other sessile, 4 - 5 mm long; 1-flowered, hermaphrodite. Lower glume lanceolate-acuminate, membranous, 2-nerved; upper glume equalling the lower, broadly lanceolate, margins ciliate, 1-nerved. Stamens 3. Grains subglobose.

Fls. & frts. : Aug. - Dec. ; *Vern.* : Kans; AKS 474, Salempur.

Common along the canals, and in fallow fields.

42. SETARIA Beauv., nom. cons.

1a. Bristles retrorsely barbellate	4. <i>S. verticillata</i>
1b. Bristles antrosely barbellate :	
2a. Panicles interrupted, narrow, lobed	2. <i>S. intermedia</i>
2b. Panicles spiciform, continuous, cylindric :	
3a. Spikelets 3 mm long; upper floral glume coarsely rugose, broad, dorsally strongly curved on the back and slightly keeled upwards	1. <i>S. glauca</i>
3b. Spikelets 2.25 mm long; upper floral glume usually finely rugose, narrow, dorsally gently curved and not at all keeled	3. <i>S. pumila</i>

1. *Setaria glauca* (L.) P. Beauv. Ess. Agrost. 51, 1812; Hook. f. Fl. Brit. Ind. 7 : 78, 1897; Bor, Gr. Ind. 360, 1960. *Panicum glaucum* L. Sp. Pl. 56, 1753.

A slender, loosely tufted, annual grass, 20 - 60 cm high. Leaves 5 - 20 x 0.3 - 1 cm, linear-lanceolate, tapering to a fine point, glaeid, margins slightly rough. Inflorescence a cylindric, dense, spiciform racemes upto 10 cm long, usually yellow. Spikelets 3 mm long, broadly oblong or elliptic, subtended by 6 - 8 rigid, unequal bristles; 2 - flowered. Lower floret male or barren, upper one hermaphrodite, boat-shaped, very convex on the back, marked with numerous transverse ridges. Stamens 3. Caryopsis rotundate - elliptic, plano - convex.

Fls. & frts. : July - Oct. ; *Vern.* : Bandra Bandri ; AKS 308, Salempur ; 786, Niyamatpur.

Common along the canals, ponds and in moist waste places.

2. *Setaria intermedia* Roem. & Schult. Syst. Veg. 2 : 489, 1817; Hook. f. Fl. Brit. Ind. 7 : 79, 1897. *Panicum tomentosum* Roxb. Fl. Ind. 1 : 303, 1820; P.

intermedium (Roem. & Schult.) Roth, Nov. Sp. Pl. 47, 1821. *Setaria tomentosa* (Roxb.) Kunth, Rev. Gram. 1 : 47, 1829 ; Bor, Gr. Ind. 365, 1960.

An ascending, annual grass. Culms loosely tufted, linear, glabrous. Leaves 5 - 18 x 0.5 - 1 cm, linear or narrowly lanceolate, tapering to a fine point, flat, flaccid. Inflorescence linear - lanceolate, loose, interrupted, panicles 3.5 - 10 x 0.7 - 1 cm, upper branches reduced to sub - sessile clusters or solitary spikelets supported by a bristle. Spikelets 2 mm long, ovate to elliptic, subtended by few antorseously barbed bristles ; 2 - flowered. Lower involucral glume broadly ovate ; upper one elliptic, 5 - 7 nerved. Lower floret barren. Upper floret hermaphrodite ; floral glume boat shaped, prominently transversely wrinkled, paleate. Stamens 3. Caryopsis rotundate - ovate, obtuse.

Fls. & frts. : Aug. - Mar. ; AKS 46, Salempur ; 624, Taj nursery.

Common in moist places, near canals and in the gardens.

3. *Setaria pumila* (Poir.) Roem. & Schult. Syst. Veg. 2 : 191, 1817. *Panicum pumilum* Poir. Encycl. Meth. Bot. Suppl. 4, 273, 1816. *Setaria pallide-fusca* (Schum.) Stapf & Hubb. in Kew Bull. 1930 : 259, 1930. *Panicum pallide-fuscum* Schum. Beskr. Guin. Pl. 58, 1827.

A geniculately ascending, tufted, smooth, annual grass, 30 - 60 cm high. Leaves 5 - 18 x 0.2 - 0.5 cm, linear, long tapering to a fine point, glabrous. Inflorescence an erect, dense continuous spike, 1 - 2 cm long ; branches reduced to involucral bristles, supporting a solitary, perfect, spikelet. Bristles about 8, rigid or flexuous. Spikelets 2.25 mm long ; 2 - flowered. Lower floret male or barren ; upper floret hermaphrodite, boat - shaped, paleate. Stamens 3. Caryopsis elliptic - rotundate, plano - convex.

Fls. & frts. : Aug. - Oct. ; AKS 465, Bichpuri campus.

Common in cultivated fields and near ponds.

4. *Setaria verticillata* (L.) P. Beauv. Ess. Agrost. 51, 1812 ; Hook. f. Fl. Brit. Ind. 7 : 80, 1897 ; Blatt. & McC. Bomb. Gr. 174, 1935 ; Bor, Gr. Ind. 365, 1960. *Panicum verticillatum* L. Sp. Pl. 82, 1762.

An erect, ascending, loosely tufted, annual grass, 30 - 150 cm high. Culms branching from the base, with a conspicuous channel on one side. Leaves 14 - 36 x 1.5 - 2.7 cm, linear - lanceolate, tapering to an acute point. Inflorescence an erect, straight or curved, cylindrical spike like panicles 2.5 - 8 cm long. Bristles rough, one or more with reverse barbs and teeth. Spikelets 2 mm long, ellipsoidal, subtended by one to many persistent bristles ; 2 - flowered. Lower involucral glume much smaller, broadly ovate ; upper one membranous and equal to the upper floret. Lower floret

sterile ; upper one 2 mm long, hermaphrodite, elliptic-oblong, plane-convex, coriaceous. Stamens 3. Caryopsis broadly elliptic.

Fls. & frts. : July - Dec. ; *Vern.* : *Laptuna* ; AKS 161, Sikandra ; 252, Kithau ; 730, Rambagh.

Abundant in moist open grounds, gardens and along roadsides.

43. SORGHUM Moench nom. cons.

Sorghum halepense (L.) Pers. Syn. Pl. 1 : 101. 1805 ; Blatt. & McC. Bomb. Gr. 55, t. 37. 1935 ; Bor, Gr. Ind. 222. 1960. *Holcus halepensis* L. Sp. Pl. 1047. 1753. *Andropogon halepensis* Brot. Fl. Lus. 1 : 89. 1804 ; Hook. f. Fl. Brit. Ind. 7 : 182. 1897.

A perennial, simple or branched grass, 60-100 cm high, with a creeping, stoloniferous rootstock. Leaves 10-50 x 0.7-1.2 cm, linear-lanceolate, acute, margins scabrid, glabrous. Inflorescence a decompound panicle, 10-30 cm long, pale green or purplish in colour, branches 1 to 3-nate, distant, diffuse. Spikelets 7 mm long, 2-nate, sessile and pedicelled, borne at the tops of the branches and branchlets. Sessile spikelets linear, hermaphrodite. Involucral glumes subequal, linear-lanceolate, acuminate, 3-nerved. Lower floret barren. Upper floret hermaphrodite; floral glume linear-oblong, ciliate on the margins, paleate. Stamens 3. Pedicelled spikelet, lanceolate, male or neuter. Caryopsis obovoid.

Fls. & frts. : Sept.-Dec.; *Vern.* : *Baru*; AKS 175, Poiya ghat; 558, Fatehpur Sikri; 602, Chhalesar.

Common in open places, fallow fields and on the borders of cultivated fields.

44. SPOROBOLUS R. Br.

- | | |
|---|-------------------------|
| 1a. Involucral glumes both shorter than the floral glumes | <i>I. S. diander</i> |
| 1b. Lower involucral glume shorter than the upper and floral glumes : | |
| 2a. Panicles contracted, spike-like | <i>3. S. tremulus</i> |
| 2b. Panicles open, effuse | <i>2. S. marginatus</i> |

1. *Sporobolus diander* (Retz.) P. Beauv. Ess. Agrost. 26. 1812; Hook. f. Fl. Brit. Ind. 7:247. 1897; Blatt. & McC. Bomb. Gr. 221, t. 148. 1935; Bor, Gr. Ind. 629. 1960. *Agrostis diander* Retz. Obs. Bot. 5:19. 1788.

A tufted, erect, slender, annual grass, 15-45 cm tall. Leaves 5-20 x 0.1-0.3 cm, very narrow, flat, tapering to a point, strongly nerved. Inflorescence an erect narrow pyramidal panicle; branches suberect or spreading, in scattered fascicles. Spikelets 1.5 mm long, very shortly pedicelled; 1-flowered. Lower involucral glume 0.5 mm long, oblong, hyaline, nerveless; upper one 0.8-1 mm long, nerveless. Floret hermaphrodite; floral glume 1.5 mm long, broadly ovate-oblong, 1-nerved, palea equally long. Stamens 2 or 3. Grains obovoid, truncaate, rugose, reddish-brown.

Fls. & frts. : July - Nov.; *Vern.*: *Doob*; AKS 156, Bichpuri campus; 458, near JALMA; 503, Khander.

Common on the ridges, along roadsides and in the fallow fields.

2. *Sporobolus marginatus* Hochst. ex A. Rich. Tent. Fl. Abyss. 2:397. 1851; Bor, Gr. Ind. 632. 1960.

An erect, perennial grass with a woody stolon, 20-60 cm tall. Leaves 2.5-12 x 0.2-0.3 cm, narrowed from the rounded base to the tip, flat, minutely ciliate-serrulate. Inflorescence an open, effuse, pyramidal panicle; branches whorled, horizontally ascending, nodding, capillary. Spikelets 1.5 - 2.25 x 1 mm, spindle-shaped, crowded and subsessile at the ends of branches; 1-flowered. Involucral glumes unequal, nerveless. Floret hermaphrodite; floral glume 1.5 - 2.25 mm long, ovate, 1-nerved, paleate; palea hyaline. Grains broadly oblong, laterally compressed.

Fls. & frts. : June - Nov.; AKS 495, near JALMA; 471, Salempur; 507, Khander.

Commonly found in saline soils in association of *Suaeda fruticosa* Forsk. and also found on the ridges.

3. *Sporobolus tremulus* (Willd.) Kunth, Rev. Gram. 1:67. 1829 & Enum. 1:210, Suppl. 166; Hook. f. Fl. Brit. Ind. 7:250. 1897; Bor, Gr. Ind. 633. 1960. *Agrostis tremula* Willd. Sp. Pl. 1:372. 1798. *A. tenacissima* Roxb., Fl. Ind. 318. 1820, non L. f. 1781.

A prostrate or ascending, tufted, perennial grass 15-45 cm high. Leaves 1-3.5 x 0.1 - 0.2 cm, narrowly linear, flat, tapering to a sharp point, rigid. Inflorescence a narrow, sub-spiciform panicle 2-6 cm long, interrupted with erect branches. Spikelets 1.5 - 2.5 x 0.5 - 1 mm, oblong-lanceolate, crowded, seated on a very short pedicel; 1-flowered. Involucral glumes unequal, lanceolate, 1-nerved. Floret hermaphrodite; floral glume broadly oblong, 1-nerved, paleate. Stamens 3. Grains oblong.

Fls. & frts. : July - Dec.; AKS 445, Kitham.

Common in moist open places and near the banks of lake and canals.

45. TETRAPOGON Desf.

Tetrapogon tenellus (Roxb.) Chiov. in Ann. Inst. Bot. Roma 8:352. 1980; Raizada in Ind. For. 80:36. 1954; Bor, Gr. Ind. 475. 1960. *Chloris tenella* Roxb. Fl. Ind. 1:330. 1820; Hook. f. Fl. Brit. Ind. 7:290. 1897; Blatt. & McC. Bomb. Gr. 254. 1935.

An erect, weak stemmed, annual grass, 30-50 cm high, branching from the base. Leaves 5-16 × 0.2 - 0.5 cm, linear-lanceolate, entire, acuminate, flaccid. Spikes solitary or sometimes 2, erect, 2-5 cm long. Spikelets large 5-6 × 4 mm, biflorous, 4-awned. Involucral glumes unequal; lower 4 mm long; upper 5.5 mm long, shortly awned. Glumes of hermaphrodite floret 5 mm long, broad cuneate, truncate, awned, paleate; the next floral glume smaller but similar; the other still smaller and awned but the last terminal floral glume not awned but slightly truncate. Grains oblong, lenticular, brownish.

Fls. & frts. : Aug. - Nov.; AKS 457, near JALMA; 502, Khander.

Commonly found in rock crevices of the hilly tracts and on the ridges.

46. TRAGUS Hall, nom. cons.

Tragus roxburghii Panigrahi, in Kew Bull. 29(3) : 496. 1974. *T. biflorus* (Roxb.) Schult. Mant. 2:205. 1824; Bor, Fl. Assam 5:162. 1940 & Gr. Ind. 682. 1960. *Lappago biflora* Roxb. Fl. Ind. 1:284. 1820.

A document, spreading or erect, leafy grass, 6-15 cm high. Leaves 1-3 × 0.3-0.4 cm, linear-lanceolate, rigid, margins distantly spinulose. Inflorescence a spike-like raceme 3-5 cm long. Spikelets are arranged in groups of two, facing each other and appearing like a single spikelet with two equal echinate glumes, 4-5 mm long; 1-flowered. Lower involucral glume usually suppressed, if present very minute and hyaline; upper one narrowly lanceolate, 5 mm long, with hooked spines along the ribs. Floral glume 4.5 mm long, oblong-lanceolate, minutely hairy, embracing a oblong palea, 3-stamens and ovary. Grains linear-oblong, pale brown.

Fls. & frts. : Aug. - Nov.; AKS 160, near Sikandra.

Abundant among the rock crevices of the ridges, open fields and waste places.

47. VETIVERIA Lem.-Lisanc.

Vetiveria zizanioides (L.) Nash in Small, Fl. South-east U.S. 67. 1903; Blatt. & McC. Bomb. Gr. 65, t. 40. 1935; Bor, Gr. Ind. 258. 1960. *Phalaris zizanioides* L.

Mant. Pl. 2:183, 1771. *Andropogon squarrosus* Hook. f. in Fl. Brit. Ind. 7:186, 1897 (non L. f.).

A densely tufted, leafy, perennial grass with branching root-stocks and spongy aromatic roots, 60-120 cm high. Leaves 25-40×0.2-0.4 cm, linear, acuminate, erect. Panicles 15-25 cm long, oblong, usually contracted; whorls of branches 4-10 with upto 20 rays. Racemes slender and consists of both sessile and pedicelled spikelets. Sessile spikelets 3.5 - 4 mm long, linear-lanceolate, hermaphrodite, yellowish later turning to violet-brown, purplish or almost black; 2-flowered. Involucral glumes 3.5 mm long, coriaceous, muriculate all over the back. Lower floret barren. Upper floret hermaphrodite; floral glume 3 mm long, linear - oblong, paleate. Stamens 3. Pedicelled spikelets barren with lower involucral glume tubercled on the back and upper tubercled on the keel. Grains oblong.

Fls. & frts. : July - Oct.; Vern. : Khaskhas; AKS 250, Kitham; 497, Pachokhra.

Common along the canals, lake and ponds. The oil extracted from its roots is useful as aromatic and medicinal.

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