

FLORA
OF THE
PUNJAB PLAINS

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OF THE
PUNJAB PLAINS

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FOREWORD

Flora of the Punjab Plains is based on intensive floristic studies made by Dr. N. C. Nair during 1961-66 when he worked as Systematic Botanist in the Northern Circle, Botanical Survey of India, Dehra Dun.

The Botanical Survey of India is now involved in a major programme of preparing the Flora of India. It is proposed to bring it out in four series namely Ser. I. The National Flora (Flora of India). Ser. II. State Flora Analysis. Ser. III. District or Small Regional Flora. Ser. IV. Miscellaneous — not falling under the above three series. The present Flora of the Punjab Plains could rightly be one such volume under Ser. III. At the time when Dr. Nair completed the work and prepared the manuscript on the present flora, the details of publication of Flora of India series had not been finalised and hence it was decided to publish his work as Records of the Botanical Survey of India.

Botanical Survey of India is happy to release the present work as it should adequately serve the needs of a regional flora for the area covered by it.

Botanical Survey of India
P. O. Botanic Garden
Howrah-711103
March, 1978

S. K. JAIN
Director

PREFACE

This Flora of the Punjab Plains is the outcome of an interest born ever since I joined the Botanical Survey of India. The main object of the work is to provide the means of determining the various taxa which comprise the flora of Haryana and Punjab States, to supply the currently accepted nomenclature of the taxa, their important synonyms (names mentioned in Indian works) and any other information which may prove useful to those interested in the study of the plants of the area.

No flora can be claimed to be perfect; at most "it will represent the best summary of information available to its author". The larger the number of specimens studied the more reliable should be the work; it is necessary, therefore, to give information about the methods employed and materials examined by me.

The present work is based on field studies and collections made by me during 1961-1966 from all over the Punjab plains, except parts of Hoshiarpur and Gurdaspur Districts, and on the relevant materials housed in the herbaria of the Forest Research Institute, Dehra Dun (DD), and Botanical Survey of India, Dehra Dun (BSD). The specimens I have examined are cited under each taxon. This will facilitate any verification, if this becomes necessary. Plants, which I have not seen but reported from the area by earlier works, are also included giving the authority. Ethnobotanical notes given are mostly from literature. The main part of the work was completed at Dehra Dun; the concluding part was carried out at Calcutta.

I am thankful to the authorities of the Forest Research Institute, Dehra Dun, for giving me permission to examine the herbarium materials housed there. I owe my gratitude to late Rev. Fr. H. Santapau, Dr. S. K. Mukherjee, Dr. K. Subramanyam, former Directors, Botanical Survey of India and Dr. M. A. Rau, former Deputy Director, Botanical Survey of India, Dehra Dun, for their interest and encouragement, without which the completion of the present work would not have been possible. From the very beginning of my explorations I was fortunate in having the constant company and assistance of Dr. V. J. Nair, Botanical Survey of India, Dehra Dun. I am deeply thankful to him.

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INTRODUCTION

PHYSICAL FEATURES

The area covered in this flora extends roughly from 28°50' to 32°50' N Lat. and from 73°80' to 78°E Long. and is bounded on the west by Pakistan, on the north by Jammu and Kashmir and Himachal Pradesh, on the east by Uttar Pradesh and Delhi and on the south-west by Rajasthan. It includes two states, Haryana and Punjab, and comprises 16 districts, namely Hissar, Rohtak, Gurgaon, Karnal, Ambala, Hoshiarpur, Jullundur, Ludhiana, Ferozepore, Amritsar, Bhatinda, Kapurthala, Mahendragarh, Patiala, Gurdaspur and Sangrur.

The area can be divided into two regions: The vast alluvial plain extending from the Ravi to the Jamuna with a gradual slope towards the south-west which hardly exceeds 66 cm per kilometre. The Plain ranks with the best lands in India in fertility. The westerly portion of it is drained by the Sutlej, the Beas, and the Ravi which between themselves form two river-locked tracts, viz. the Bist Doab, lying between the Beas and the Sutlej and the Bari, contained between the Beas and the Ravi. From Ludhiana to Jamuna valley the country is a portion of the Gangetic Plain.

The Ghaggar and its tributary (known as Chitang in east Punjab), relics of a gigantic system, have their source in the south-western Himalayan region and flow through the entire length of the Punjab plains and disappear in the Great Indian Desert. There is evidence to show that these two rivers, which are responsible for the annual flood in Hissar district during the rainy season, are the ancient Saraswati and Drishadavati mentioned in the Rig Veda; in the east Punjab region they carry some water and by the time they reach the border of Rajasthan their beds are dry. Only narrow belts of land on either side of Ghaggar can, therefore, be irrigated.

In the districts of Ferozepore, Hissar and Mahendragarh, due to their close proximity to the Rajasthan desert, a desertic topography prevails. Sand dunes and rippled sandy areas are abundant; these are unproductive.

The Aravalli ranges of Rajasthan, the oldest mountain system of India, which came into existence towards the close of Dharwar era and was once a lofty mountain system and is now represented only by small hills, have a north-westerly branch. This branch passes through Hissar district as isolated hillocks.

The sub-montane region comprises parts of Hoshiarpur, Gurdaspur and Ambala districts. A refreshing break in the stereotyped configuration of

the plains is given by the Siwalik Hills running parallel to the mountain wall of the Himalayas.

Climate: The climate is very hot in summer and markedly cold in winter. The summer season is from April to the end of June. The temperature rises to 43.3°C-48.9°C in May and June. The intensity of heat is relieved by dust and thunderstorms which are often followed by rain. Towards the close of the summer the south-west monsoon clouds coming from the Bay of Bengal and striking the eastern Himalayas, are deflected to the west. The rain clouds are forced up the plains by the south-eastern winds. The lower Himalayan ranges in this way receive heavy rainfall. The monsoon exhausts itself in its journey through the plains and dies away towards the south and the west. A part of the Bombay branch of the monsoon is sucked into the Bay currents from time to time and this results in wide-spread rain. The heat during the monsoon season, though mild on rainy days, is still intense. It comes down from the middle of September. October and November, when the weather is dry and cool, are the most pleasant months of the year.

January is the coldest month and the mercury often falls down to freezing point or below. Table I shows the temperature variation in three principal places of the area.

Table I: Showing temperature variation in the Punjab Plains

Station	Mean Max. (°C)		Mean Min. (°C)		Temperature	
	May	June	Dec.	Jan.	Highest	Lowest
Hissar	41.4	41.6	6.0	5.9	49.5	-1.7
Ambala	39.8	39.3	6.2	6.3	47.6	-0.7
Ludhiana	39.9	40.4	6.9	6.9	48.3	-4.4

The winter or north-east monsoon does not get into the Punjab plains. The rains, that are received during this season, are due to land storms which originate beyond the western frontier. Table II shows the rainfall of the principal districts.

Table II: Showing rainfall of the Punjab Plains

District	June-September (cm)	December-March (cm)	Annual Rains
Hissar	31.01	4.75	38.76
Rohtak	42.67	5.26	50.19
Gurgaon	47.98	4.70	56.08
Karnal	46.84	6.96	57.58
Ambala	70.80	11.05	87.06
Hoshiarpur	61.63	13.54	79.96
Jullundur	49.68	10.46	64.44
Ferozepore	28.50	5.69	36.98
Ludhiana	49.48	9.01	62.81
Amritsar	41.52	9.78	55.29
Gurdaspur	68.43	17.02	90.93

Relative humidity is lowest in April-May and highest in August ; in the rainy season it is 78-80% in the morning and 60% in the afternoon. During December to February it is generally 60-70% in the morning and 30-36% in the afternoon ; the air is very dry in April and May and in the afternoon hours the relative humidity falls to nearly 10%. The variation of relative humidity during the day is 28-38% in winter, 18-28% in Summer, and 19-31% in rainy season.

Winds are generally stronger over the western and south-western arid and semiarid regions than over the areas further east. Winds are strongest in June and lightest in November. During the cold weather periods winds are generally light and variable, but north-westerly and northerly winds are more frequent than those from other directions. In the hot season and during the monsoon, winds blow between south-west and west. Hot and dust raising winds are present throughout the area during summer. In the arid tracts they are sometimes violent when the maximum velocity is about 136 km per hour.

Thunder-storms occur more frequently in the eastern and northern part of the area particularly in Ambala and Gurdaspur districts. Hail-storms are frequent in the eastern and north-eastern parts during March-April and they do much damage to crops and vegetation. Dust-storms are most frequent in the arid tracts, decreasing progressively towards the north-east and east. Fog is common during the cold season in the morning and in the evening. Ground frost is also common during winter and it has adverse effect on the vegetation.

Geology and Soil : The plains consist of Indo-gangetic alluvium. They also contain beds of sedimentary rocks of a transition age, which form a series of outliers of the Aravalli rocks of the Delhi system. They are composed of an upper thicker group of quartzites, limestones and a lower group of slates.

Except a major portion of Gurdaspur district, the area has alluvial soils. In Gurdaspur district the soils are loamy with a clay content below 10% ; they contain small quantities of lime, but the magnesia content is high. The soils of Hoshiarpur are loamy, fairly rich in total phosphoric acid, potash and nitrogen. Sandy loam and silt loam occur in Jullundur district. The soils of Ferozepore district are sandy loam and alkaline. The soils of Ambala district are mostly of a loamy nature ; they are slightly alkaline and contain enough total potash and phosphoric acid, but nitrogen content is low. Sandy to sandy loam soils occur in Karnal district ; they are highly alkaline and show deficiency of available phosphoric acid ; surface soils are supplied with enough nitrogen. Soils of Rohtak district are loamy on the surface and the clay content increases with depth ; these soils are neutral or slightly alkaline and deficient in phosphoric acid and nitrogen. The soils of

Hissar district are loamy, the fine fractions increasing with depth. On the whole the soil of the plains consists of a crust of varying depth on a sandy substratum; the crust has 10-15% clay; sodium salts are usually present and in some localities are abundant and appear like effervescence during summer months. Though the soils contain plenty of mineral matter, they are deficient in organic matter and nitrogen.

Irrigation: Before the partition of 1947, Punjab had one of the best canal systems in the world; only about one third of the area served by these canals came to India. At present there are five main canals in the region: (1) the Upper Bari Doab canal which takes off from the Ravi at Madhopur; (2) the Sirhind canal which starts from the Sutlej at Rupar; (3) the western Jamuna canal which takes off from the Jamuna at Tajewala; (4) the group of inundation canals called the grey canals in Ferozepore district; (5) the Bhakra canal system.

PREVIOUS WORK

Royle (1833-1840) mentions a little more than 3 score plants of the Punjab plains. J. L. Stewart (1868, 1869) gave the botanical and vernacular names and uses of economically important trees, shrubs and herbs. Powel (1868) also gave the economic importance and vernacular names of some Punjab plants. Aitchison (1868) published a list of the plants of Hoshiarpur district and his collections are housed in the herbarium of Forest Research Institute, Dehra Dun. He also (1869) catalogued the plants of the Punjab, but this account mostly deals with plants of the area now in Pakistan. A few sheets of J. R. Drummond are preserved in the herbarium of the Forest Research Institute, Dehra Dun. Stewart and Brandis (1874) made reference to the plants of the Punjab in their flora. Coldstream (1889) gave photolithographs of some of the principal grasses of Hissar district. The extensive collections from Hissar made by J. F. Duthie in the latter half of the last century are preserved in the herbarium of the Forest Research Institute, Dehra Dun. A catalogue of the principal trees and shrubs of the Punjab was given by Coventry (1901). Gamble gave an account of several timber-yielding trees and shrubs and the nature of their bark and wood in 1902. Bamber's (1916) work covered the Punjab and North West Frontier Provinces of the former undivided India and Kashmir; this work does not include Cyperaceae and Gramineae. Parker's (1918; 2nd ed. 1924; 3rd ed. 1956) flora includes only the trees and shrubs of the erstwhile Punjab, Hazara and Delhi. Sabnis (1940-1941) gave a list of plants of the Punjab plains and adjoining hilly areas.

Among recent collectors are M. B. Raizada (Hissar), O. P. Sharma (E. Punjab), M. A. Rau (Hissar), T. A. Rao (Gurgaon, Patiala, Chandigarh

and Hoshiarpur), J. N. Vohra (Karnal, Ambala, Amritsar and Kapurthala) and V. J. Nair (Rohtak and Hissar). The specimens of Raizada and Sharma are preserved in the herbarium of the Forest Research Institute, Dehra Dun; the specimens of the rest are in the herbarium of the Botanical Survey of India, Northern Circle, Dehra Dun.

Occasional collections of Harsukh (Hissar), Ganga Singh (Patiala), Gupta (Ambala Siwaliks), T. S. Bakshi (Laroha, Jullundur Dist.) and P. N. Mehra (Chandigarh) are housed in the herbarium of the Forest Research Institute, Dehra Dun. Nair (1961, 1967) and Nair and Nair (1963, 1964a, b, 1966) published a number of new records for the Punjab plains. Sharma and Sharma (1974, 1975) gave floristic account of Ludhiana District. Other significant papers in which plants of the Punjab plains are referred to include those of Anonymous (1880, 1896), Cleghorn (1864), Duthie (1881, 1883, 1885, 1886, 1888), Duthie and Fuller (1882-1883), Edgeworth (1838, 1842), Luthra (1937), Maheshwari (1963), Mohan (1940, 1955), Parker (1935), Ribbentrop (1873), Sharma and Sharma (1966-1968) and R. R. Stewart (1945).

VEGETATION

Vegetation of the sandy tract

Sandy tracts occur in the regions adjoining the desert of Rajasthan. Due to extreme aridity, the vegetation here is very sparse and exhibits a striking uniformity. Only those plants, which are drought resistant, constitute the permanent structural framework of the vegetation. They are xeromorphic in character. The vegetation can be divided into three categories—(a) vegetation of loose sand dunes, (b) vegetation of stabilized dunes and (c) vegetation of spreadout sand.

(a) *Vegetation of loose sand dunes*: Sand is piled up into dunes in a definite direction, depending on the direction of the wind. The great speed of the wind sorts out sand particles into wind ripples which show a forward motion; as a result of this, hardly any plant can obtain a footing. During the rainy season the sand gets set, and stray seeds carried by wind and lodged in the sand germinate. The early pioneers are *Calotropis procera* R. Br., *Zizyphus nummularia* (Burm. f.) Wt. et Arn., *Crotalaria burhia* Buch.-Ham., *Aerva persica* (Burm. f.) Merr., *Leptadenia pyrotechnica* (Forsk.) Decne., *Farsetia hamiltonii* Royle, *Calligonum polygonoides* Linn., *Cenchrus biflorus* Roxb., *C. ciliaris* Linn., *Eragrostis ciliaris* R. Br., *Arnebia hispidissima* DC. etc. Of these *Crotalaria*, *Leptadenia*, *Calligonum* and *Arnebia* are typical psammophytes and are not found in stabilized soil. Large shrubs of *Calligonum* and *Leptadenia* are sometimes found on the very crest of the dunes. Another plant which

at times occurs on loose sand dunes is *Citrullus colocynthis* (Linn.) Schrad.; this plant has long trailing branches, which remain green throughout the year. Trees are rare in these sand dune areas, and, when present, are widely spaced. The characteristic trees are *Prosopis cineraria* (Linn.) Druce, *Balanites aegyptiaca* (Linn.) Del., *Acacia nilotica* (Linn.) Del. and *Tecomella undulata* (Sm.) Seem.

(b) *Vegetation of stabilized dunes*: Due to encroachment of vegetation, sand dunes get stabilized and support a comparatively good vegetation. At times trees of considerable size, like *Prosopis cineraria* (Linn.) Druce, *Tecomella undulata* (Sm.) Seem. and *Acacia nilotica* (Linn.) Del. are found on them. These trees have very slow rate of growth. Seemingly, therefore, these dunes were stabilized a considerable time ago. The common elements of these stabilized dunes include *Calotropis procera* R. Br., *Leptadenia pyrotechnica* (Forsk.) Decne., *Zizyphus nummularia* (Burm. f.) Wt. & Arn., *Boerhavia diffusa* Linn., *Capparis decidua* (Forsk.) Edgew., *Pupalia lappacea* Juss., *Clerodendrum phlomidis* Linn. f., *Calligonum polygonoides* Linn., *Lycium europaeum* Linn., *Salvadora oleoides* Decne., *Maytenus emarginatus* (Willd.) Ding. and *Acacia jacquemontii* Benth.

(c) *Vegetation of spreadout sand*: When loose sand is spread out, it is easily colonized by *Zizyphus nummularia* (Burm. f.) Wt. & Arn., *Aerua persica* (Burm. f.) Merr., *A. pseudotomentosa* Blatt. & Hallb., *Blepharis linearifolia* Pers., *Crotalaria burhia* Buch.-Ham., *Farsetia jacquemontii* Hook. f. et Thoms., *Citrullus colocynthis* (Linn.) Schrad., *Arnebia hispidissima* DC., *Sericostoma pauciflorum* Stocks and species of *Cenchrus*, *Cyperus*, etc. during the rainy season. From December to July all these disappear except *Citrullus*. Sometimes large tracts show pure stands of *Calligonum*, *Leptadenia* and *Acacia*.

Due to prolonged weathering and by the admixture and accumulation of organic matter, the sand becomes stabilized. In such places often an open thorny scrub vegetation is seen comprising of *Prosopis cineraria* (Linn.) Druce, *Capparis decidua* (Forsk.) Edgew., *Maytenus emarginatus* (Willd.) Ding., *Acacia nilotica* (Linn.) Del., *A. jacquemontii* Benth., *Mimosa hamata* Willd., *Balanites aegyptiaca* (Linn.) Del., *Zizyphus nummularia* (Burm. f.) Wt. & Arn., *Calotropis procera* R. Br., *Securinega leucopyrus* Muell.-Arg., *Salvadora oleoides* Decne., etc. Sometimes pure stands of *Salvadora* are seen for long distances. Pure stands of *Balanites* are also often met with. This tree regenerates itself in dense shady clumps by producing root suckers. *Anogeissus* and *Acacia* trees, when growing near temporary ponds, at times, reach a height of more than 20 m.^o

During the rainy season the stabilized soil puts on a thick green carpet of herbaceous vegetation consisting of species of *Trianthema*, *Zaleya*, *Tribulus*, *Cenchrus*, *Fagonia*, *Eragrostis*, *Boerhavia*, *Heliotropium*,

Tephrosia, *Panicum*, *Tridax*, *Indigofera*, *Digera*, *Mollugo*, *Achyranthes*, *Aerva*, *Phyllanthus*, etc. Most of these plants die away in winter, and new plants such as *Solanum nigrum* Linn., *Justicia* sp., *Echinops echinatus* Roxb., *Psammogeton canescens* (DC.) Vatke, *Argemone mexicana* Linn., *Carthamus oxyacantha* Bieb., *Heliotropium ellipticum* Ldb., *Gastrocotyle hispida* (Forsk.) Bunge, etc. come up. The ground is barren in summer except for plants like *solanum surattense* Burm. f., *Boerhavia diffusa* Linn., etc.

Climbers are in large numbers among the bushes and they are mostly perennial such as *Pergularia daemia* Bl. & Mac., *Coccinia grandis* (Linn.) Voigt., *Ephedra foliata* Boiss., *Cocculus pendulus* Diels, *C. hirsutus* Diels, *Maerua oblongifolia* A. Rich., *Momordica balsamina* Linn., *Rhynchosia minima* DC., *Pentatropis spiralis* Decne., etc.

Wherever subsoil water is present, cultivation is carried on. The chief plants grown are *Pennisetum typhoides* Stapf & Hubb., *Zea mays* Linn. and cucurbits.

Exotic plants such as *Albizia lebbek* Benth., *Prosopis juliflora* DC., *Melia azedarach* Linn., *Azadirachta indica* A. Juss., *Ficus religiosa* Linn., *Zizyphus mauritiana* Lamk., etc. thrive well in these localities.

Vegetation of the isolated hills

There are a few isolated rocky hills in Rohtak, Hissar, Gurgaon and Patiala. The vegetation on these is open scrub; the bulk of the vegetation consists of spinous trees and hardy shrubs. The tree species characteristic of this habitat are *Acacia senegal* Willd., *Wrightia tinctoria* R. Br., *Cordia dichotoma* Forst. f., *Anogeissus pendula* Edgew., *Boswellia serrata* Roxb. and *Balanites aegyptiaca* (Linn.) Del. The thorny shrubby vegetation consists of *Euphorbia nivulia* Buch.-Ham., *Capparis sepiaria* Linn., *C. decidua* (Forsk.) Edgew., *Mimosa hamata* Willd., *Grewia tenax* Fiori, *Maytenus emarginatus* (Willd.) Ding., *Maerua oblongifolia* A. Rich., *Hibiscus micranthus* Linn. f., *Abutilon indicum* Sweet, etc. *Corbichonia decumbens* (Forsk.) Exell is found only on the hills and is a typical lithophyte.

During the rains these hills are completely covered with a green blanket of herbaceous vegetation consisting of species of *Tribulus*, *Vernonia*, *Euphorbia*, *Corchorus*, *Cenchrus*, *Oropetium*, *Aristida*, *Melanocenchrus*, etc. *Rhynchosia*, *Melothria*, *Pergularia* and *Ipomoea* are the chief climbers.

Vegetation of the fertile and irrigated region

The rest of the Punjab plains is irrigated by a network of canals and is extensively cultivated. There is very little or no natural vegetation.

Where the area is not cultivated it is worked for fire wood. The agricultural year includes two seasons, the Kharif (rainy season) and the Rabi (cold season).

The Kharif crops include *Pennisetum typhoides* Stapf & Hubb. (Indian millet, *Bajra*), *Sorghum vulgare* Pers. (Great millet, *Jowar*), *Oryza sativa* Linn. (Rice, *Chawal*), *Zea mays* Linn. (Corn, *Bhutta*), *Gossypium* (Cotton, *Rui*), *Hibiscus cannabinus* Linn. (Roselle hemp, *San*), *Crotalaria juncea* Linn. (San hemp, *San*), *Cyamopsis tetragonolobus* Taub. (*Gaur*), *Sesamum indicum* Linn. (Sesame, *Till*), *Vigna unguiculata* (Linn.) Walp. (Cowpea, *Lobia*), *Cajanus cajan* Mill. (Pigeon pea, *Thur*) etc.

The Rabi crops include *Triticum aestivum* Linn. (Wheat, *Gahum*), *Hordeum vulgare* Linn. (Barley, *Jow*), *Brassica campestris* var. *sarson* Prain (Mustard, *Sarsum*), *Linum usitatissimum* Linn. (Linseed, *Alsi*), *Cicer arietinum* Linn. (Gram, *Chena*), *Lens culinaris* Medik (Lentil, *Masur*), *Pisum sativum* Linn. (Pea, *Mattar*), *Trigonella foenum-graecum* Linn. (Fenugreek, *Methi*), etc. *Saccharum officinarum* Linn. (Sugarcane, *Ganna*) is planted from January to April and harvested during the following cold season.

A number of garden crops are grown during the cold season as well as during summer. The chief cold season crops are *Allium sativum* Linn. (Garlic, *Lasum*), *A. cepa* Linn. (Onion, *Piaj*), *Beta vulgaris* Linn. (Beet root, *Chikundari*), *Daucus carota* Linn. (Carrot, *Gajar*), *Brassica oleracea* var. *botrytis* Linn. (Cauliflower, *Phoolgobi*), *B. oleracea* var. *capitata* Linn. (Cabbage, *Bandhgobi*), *Raphanus sativus* Linn. (Radish, *Mooli*), *Coriandrum sativum* Linn. (Coriander, *Dhaniya*), *Brassica juncea* Czern & Coss. (Leaf mustard, *Sarsum*), *Spinacia oleracea* Linn. (Spinach, *Palak*), etc.

During the summer months a number of cucurbits are grown. These include *Citrullus lanatus* (Thunb.) Matsumara (Water melon, *Kharbuza*), *Momordica charantia* Linn. (Bitter gourd, *Karela*), *Luffa acutangula* Roxb., (*Tori*), *L. aegyptiaca* Mill. (*Giatori*), *Cucumis melo* Linn. (Melon, *Karbuza*), *Cucumis melo* var. *momordica* Duthie & Fuller (*Phunt*), *C. melo* var. *utilissimus* Duthie & Fuller (*Kakri*), *Trichosanthes dioica* Roxb. (*Parwal*) etc.

The most common weeds associated with the rainy season crops are species of *Cleome*, *Corchorus*, *Polycarphaea*, *Justicia*, *Digera*, *Celosia*, *Crotalaria*, *Trianthema*, *Aeschynomene*, *Gisekia*, *Euphorbia*, *Artemesia*, *Heliotropium*, *Leucas*, *Desmostachya*, etc.

The weeds of the winter season are *Vicia indica* DC., *Oxalis corniculata* Linn., *Fumaria indica* Pugsley, *Coronopus didymus* Sm., and species of *Potentilla*, *Cotula*, *Anagallis*, *Sisymbrium*, *Spergula*, *Spergularia*, *Lathyrus*, *Orobanche*, *Sonchus*, *Antirrhinum*, *Asphodelus*, *Polypogon*, *Lolium*, *Melilotus*, *Vicia*, *Medicago*, *Trigonella*, *Cirsium*, etc.

Vegetation of the river sides

The riverine tracts are lowlying and during the monsoon they are subjected to inundation. The silt accumulated in the floods is colonized by *Tamarix dioica* Roxb., and *Alhagi pseudalhagi* Desv.; and these pioneers pave the way for other plants such as *Vetiveria zizanioides* Nash., *Sporobolus marginatus* Hochst. ex A. Rich., *Polygonum plebium* R. Br., etc.

As the water recedes, water-loving herbs develop on the muddy flats; the commoner species are *Marsilea minuta* Linn., *Ranunculus sceleratus* Linn., *Anagallis arvensis* Linn., *Juncus bufonius* Linn., *Potentilla supina* Linn., *Gnaphalium indicum* Linn., *Veronica anagallis-aquatica* Linn., *V. agrestis* Linn., *Verbascum chinense* (Linn.) Santap., *Pulicaria angustifolia* DC., *Salvia plebia* R. Br., etc. *Acacia farnesiana* Willd. has become naturalized along the river sides at many places.

Vegetation of ponds, lakes and canals

A number of algae, mostly filamentous, are collected soon after the rains. In still-water they decay as the climate becomes hotter. Species of *Chara* and *Nitella* are common. Submerged phanerogamic hydrophytes include species of *Vallisneria*, *Zannichellia*, *Ceratophyllum*, *Hydrilla*, *Potamogeton* and *Najas*. Plants rooted in the mud with floating parts include *Potamogeton nodosus* Poir., *Ipomoea reptans* Poir., *Lophotocarpus guyanensis* (Kunth) Morong, *Sagittaria sagittifolia* Linn., *Nymphaea nouchali* Burm. f. and *Marsilea minuta* Linn.

Free floating vegetation consists of *Aponogeton natans* (Linn.) Engl. & Krause, *Lemna paucicostata* Hegel., *L. trisulca* Linn., *Spirodela polyrrhiza* (Linn.) Schleid., *Utricularia inflexa* var. *stellaris* (Linn. f.) Tayl., *Wolffia microscopica* Kurz, *Trapa natans* Linn. var. *bispinosa* (Roxb.) Makino., *Eichhornia crassipes* Solms. and *Azolla pinnata* R. Br.

The margins of canals, lakes and ponds have a rich vegetation consisting of amphibious plants; this reed swamp flora comprises *Typha elephantina* Roxb., *T. angustata* Bory & Chaub., *Echinochloa crusgalli* Beauv., *Scirpus* spp., *Fimbristylis dichotoma* Vahl, species of *Cyperus*, *Hemarthria*, *Cynodon*, *Verbascum*, *Phyla*, *Alternanthera*, *Glinus* etc.

On the canal banks and slightly away from the water margin are *Alhagi pseudalhagi* Desv., *Equisetum* sp., *Grangea maderaspatana* Poir., *Sporobolus marginatus* Hochst. ex A. Rich., *Cynodon dactylon* Pers., *Vetiveria zizanioides* Nash, *Corchorus capsularis* Linn., *Eclipta prostrata* Linn., *Achyranthes aspera* Linn., *Polygonum barbatum* Linn., *P. plebium* R. Br., *Nicotiana plumbaginifolia* Viv., *Chenopodium ambrosioides* Linn., *Centella asiatica* Urb., *Rorippa indica* Hiern, *Ageratum conyzoides* Linn., *Paspalidium flavidum* A. Camus etc. Trees such as *Tamarix*, *Acacia*, *Prosopis*, *Ficus* and *Dalbergia* are often planted along the canal banks, where they thrive very well.

Vegetation of marshes

The marshy vegetation consists of *Typha angustata* Bory & Chaub., *T. elephantina* Roxb., *Monochoria vaginalis* Presl, *Sagittaria sagittifolia* Linn., *Lophotocarpus guayanensis* (Kunth) Morong, *Bacopa monnieri* (Linn.) Pennell, *Veronica anagallis-aquatica* Linn., *Hemarthria compressa* R. Br. and *Fimbristylis dichotoma* Vahl. The trees found near marshy localities are *Phoenix sylvestris* Roxb., *Acacia nilotica* (Linn.) Del., *Butea monosperma* Taub. and *Tamarix aphylla* (Linn.) Karst.

Vegetation of saline areas

The saline localities may be very small or may cover large areas; these are water-logged during the rainy season, the soil being impervious to water. In the dry season they are desertic in character and often show crusts of salt shining in the sun. The vegetation is very sparse comprising of *Sporobolus marginatus* Hochst., *Sueda fruticosa* Forsk., *Salsola baryosma* Dandy, *Chenopodium album* Linn., *Cressa cretica* Linn., *Polygonum plebeium* R. Br., *Solanum surattense* Burm. f., *Alhagi pseudalhagi* Desv., *Kochia indica* Wt., *Scirpus maritimus* Linn., and *Tamarix aphylla* (Linn.) Karst., *Acacia nilotica* (Linn.) Del. and *Butea monosperma* Taub. appear to stand extreme saline conditions.

Fruit trees

Orchards are common; the following plants are cultivated: *Mangifera indica* Linn. (*Am*), *Morus alba* Linn. (*Sethud*), *Eriobotrya japonica* Lindl. (*Loquat*), *Manilkara hexandra* (Roxb.) Durb. (*Kirni*), *Psidium guajava* Linn. (*Amruth*), *Grewia asiatica* Linn. (*Phalsa*), *Syzygium cumini* Skeels (*Jamun*), *Prunus persica* Stokes (*Adu*), *Embllica officinalis* Gaertn. (*Amla*), *Zizyphus mauritiana* Lamk. (*Baer*), *Carica papaya* Linn. (*Papitha*), *Tamarindus indica* Linn. (*Imli*), *Cordia rothii* Roem. & Schult. (*Gondi*), *Ficus racemosa* Linn. (*Gular*), *F. carica* Linn. (*Anjir*), *Punica granatum* Linn. (*Anar*), and *Musa paradisiaca* Linn. (*Kela*).

Wayside trees

The common wayside and avenue trees are: *Delonix regia* (Bog.) Raf., *Albizia lebbek* Benth., *Syzygium cumini* Skeels, *Azadirachta indica* Juss., *Kigelia pinnata* DC., *Tamarindus indica* Linn., *Polyalthia longifolia* Thw., *Mimusops elengi* Linn., *Millingtonia hortensis* Linn., *Cassia fistula* Linn., *Ficus religiosa* Linn., *Ailanthus excelsa* Roxb., *Dalbergia sissoo* Roxb., *Acacia leucophloea* Willd., *A. farnesiana* Willd., *Mangifera indica* Linn., *Terminalia arjuna* (Roxb.) Wt. et Arn., and *Melia azedarach* Linn. These trees are also planted in parks of cities and towns.

Ruderal flora

A characteristic ruderal vegetation develops in places which are subjected to change from time to time, such as waste places around villages, towns, old garden sites, along railway lines and roads and in fallow fields. *Xanthium strumarium* Linn., *Solanum surattense* Burm. f., *Cannabis sativa* Linn., *Amaranthus spinosus* Linn., *Erigeron bonariensis* Linn., *Cassia obtusifolia* Linn., *Argemone mexicana* Linn. and *Croton bonplandianum* Baill. are the common plants of these places. Sometimes escapes of cultivation, like *Ricinus communis* Linn., *Lycopersicon lycopersicum* (Linn.) Karstén, *Coriandrum sativum* Linn., and *Sesamum indicum* Linn., are found growing on rubbish heaps.

Vegetation of sub-Himalayan region

Parts of Hoshiarpur, Gurdaspur and Ambala districts, though part of the Punjab plains, have a sub-Himalayan flora. The vegetation is very rich. The chief tree species are *Shorea robusta* Gaertn., *Anogeissus latifolia* Wall. ex Brand., *Terminalia tomentosa* Wt. et Arn., *Bauhinia variegata* Linn., *Emblica officinalis* Gaertn., *Ougeinia oojenensis* (Roxb.) Hochr., *Cassia fistula* Linn., *Xylocarpus longifolium* Clos., and *Pinus roxburghii* Sarg. *Woodfordia fruticosa* (Linn.) Kurz, *Caryopteris wallichiana* Schau., *Clerodendrum fragrans* Vent., *C. indicum* (Linn.) Kuntze, *Colebrookea oppositifolia* Sm. etc. are the common shrubs.

Recent introductions

Oxalis corymbosa DC., *O. pes-caprae* Linn., *Moschosma polystachyum* (Linn.) Wall., *Merremia emarginata* (Burm. f.) Hall., *Galium aparine* Linn., *Dactyloctenium aegyptium* Linn., *Cuscuta capitata* Roxb., *C. hyalina* Roth, *Aerva pseudotomentosa* Blatt. et Hallb., *Alternanthera pungens* H. B.K., *A. paronychioides* St. Hil., *Anogeissus sericea* Brand., *Argemone ochroleuca* Sweet, *Chenopodium ambrosioides* Linn., *Euphorbia prostrata* Ait., *Gomphrena celosioides* Mart., *Phyllanthus maderaspatensis* Linn., *Polygala irregularis* Boiss., *Ruellia tuberosa* Linn., *Zaleya govindia* var. *flava* (Blatt. et Hallb.) N. C. Nair, *Euphorbia geniculata* Ort., *E. heyneana* Spr., *Ipomoea sinensis* (Desv.) Choisy, *Merremia aegyptia* (Linn.) Urb., *Heliotropium curassavicum* Linn., *Physalis longifolia* Nutt., *Tephrosia uniflora* subsp. *petrosa* (Blatt. et Hallb.) Gill. et Ali, *Trifolium fragiferum* Linn., *Trigonella occulta* Del., *Cyperus bulbosus* Vahl and *Enneapogon persicus* Boiss. have been recently reported from the area (cf. Nair, 1967; Nair & Nair, 1963, 1964a, 1964b, 1966).

NOTES ON THE FLORA

Out of 1064 taxa representing 574 genera and 127 families treated in this work, 807 taxa of 460 genera and 110 families are either indigenous or naturalized. The ratio of genera to species is 1: 1.75. This shows the small proportion of species to the number of genera and families. In the adjoining Delhi State, Upper Gangetic Plain and Rajasthan the ratio of genera to species is 1: 1.63, 1:2.2 and 1: 1.99 respectively. The prevailing arid and semi-arid conditions probably are responsible for the low proportion of genera to species in these when compared with the rest of India where the ratio is 1: 7.

Table III: Showing the percentage composition of the flora

	Dicotyledons		Monocotyledons		Total
	No.	%	No.	%	
Families	89	80.99	21	19.01	110
Genera	369	80.22	91	19.78	460
Species	630	78.19	177	21.81	807

Except for Gramineae and Cyperaceae, the Monocotyledons are poorly represented. Of the 177 species of monocotyledons, 103 belong to Gramineae and 35 to Cyperaceae, while the remaining 39 belong to 19 families, none of which has more than 5 species. The ratio of monocotyledons to dicotyledons is 1: 4.24 of families, 1: 4.05 of genera and 1: 3.56 of species.

The genera which have 6 or more species are *Abutilon* (6), *Sida* (6), *Corchorus* (7), *Acacia* (9), *Cassia* (7), *Crotalaria* (7), *Indigofera* (15), *Heliotropium* (9), *Ipomoea* (8), *Euphorbia* (11), *Cyperus* (17), *Scirpus* (7), *Eragrostis* (11) and *Panicum* (6).

The Punjab plains border the arid districts of Rajasthan, the drier parts of Uttar Pradesh, Delhi State and Himachal Pradesh. Therefore, one would expect common features with the flora of these adjoining places. Himachal Pradesh has a predominantly temperate and alpine vegetation and the elements constituting this type of vegetation are lacking in the plains except for a few taxa found on the Siwalik ranges. Comparison should, therefore, be made only with Delhi, Upper Gangetic plain and Rajasthan. The ten dominant families of these regions and the Punjab plains are given in Table IV.

Table IV *Principal families of the Punjab plains and adjoining regions*

Punjab plains	Gangetic plain (Hooker, 1907)	Rajputana (Blatter & Hallberg, 1920)	Delhi (Maheshwari, 1963)	India (Hooker, 1907).
Gramineae	Gramineae	Gramineae	Gramineae	Orchidaceae
Papilionaceae	Leguminosae	Leguminosae	Leguminosae	Leguminosae
Compositae	Cyperaceae	Compositae	Compositae	Gramineae
Cyperaceae	Compositae	Cyperaceae	Cyperaceae	Rubiaceae
Malvaceae	Scrophulariaceae	Convolvulaceae	Acanthaceae	Euphorbiaceae
Acanthaceae	Malvaceae	Amaranthaceae	Euphorbiaceae	Acanthaceae
Euphorbiaceae	Acanthaceae	Boraginaceae	Convolvulaceae	Compositae
Convolvulaceae	Euphorbiaceae	Cucurbitaceae	Malvaceae	Cyperaceae
Scrophulariaceae	Convolvulaceae	Euphorbiaceae	Amaranthaceae	Labiatae
Amaranthaceae	Labiatae	Malvaceae	Scrophulariaceae	Urticaceae

The flora of the region is composed of the following elements.

Table V: *Showing elements comprising the flora*

Elements	No.	%
Tropical (cosmopolitan) element	282	31.94
Indian element	168	20.81
N. African, Indian desert element	68	8.42
Indo-Malayan-African element	56	6.93
Tropical African element	52	6.45
Tropical African, N. African desert element	15	3.57
Indo-Malayan-E. Asiatic element	40	4.95
W. Asian-African element	38	4.70
Mediterranean element	22	2.71
Temperate element	18	2.21
New World element	18	2.21

The elements mentioned in Table V can be classified under three broad heads. The general element comprising the widespread elements of the tropical countries and Indian elements, the eastern elements comprising of the Indo-Malayan elements, and the western elements comprising of the African, West Asian and Mediterranean elements. The western elements comprise 225 species and the eastern elements comprise 56 species. The eastern elements are only $\frac{1}{4}$ of the western elements. In the adjoining Rajasthan they are $\frac{1}{7}$ and in Delhi they are $\frac{1}{3}$.

The type of vegetation on the eastern part of the Punjab plains bears a striking resemblance to that of the Upper Gangetic Plains ; the southern and the south-western parts are similar to the dry thorny scrub of Rajasthan desert. The density of vegetation thins out from south-east to north-west.

Of the taxa mentioned in the present work 92 are not given by Duthie (1960), 150 by Puri *et al.* (1964) and 87 by Maheshwari (1963).

ABBREVIATIONS

For economy of space the conventional abbreviations of some of the well-known works have been condensed as follows:

Bamber	...	<i>Plants of the Punjab</i> by C. J. Bamber. 1916, Lahore.
FBI	...	<i>The Flora of British India</i> by J. D. Hooker <i>et al.</i> 1872-1897, London.
Bor	...	<i>The Grasses of Burma, Ceylon, India and Pakistan (excluding Bambuseae)</i> by N. L. Bor. 1960, London.
Duthie	...	<i>Flora of the Upper Gangetic Plain and of the Adjacent Siwalik and Sub-Himalayan Tracts</i> by J. F. Duthie (Rep. Ed.), 1960, Calcutta.
JBNHS	...	<i>Journal of the Bombay Natural History Society.</i> Bombay.
Maheshw.	...	<i>Flora of Delhi</i> by J. K. Maheshwari. 1963, New Delhi.
Parker	...	<i>A Forest Flora of the Punjab</i> by R. N. Parker. 3rd Ed. 1956, Lahore.
Puri	...	<i>Flora of Rajasthan</i> by G. S. Puri, S. K. Jain, S. K. Mukerjee, S. Sarup and N. N. Kotwal. <i>Records of the Botanical Survey of India</i> 19(1) 1964.
RBSI	...	<i>Records of the Botanical Survey of India, Calcutta.</i>
Sabnis	...	<i>Flora of the Punjab and associated hill regions</i> by T. S. Sabnis 1940-1941 in <i>Journal of the Bombay Natural History Society</i> , vol. 42.

KEY TO THE FAMILIES

27. Stamens monadelphous; pollen rough; leaves simple 22. MALVACEAE
27. Stamens polyadelphous; pollen smooth:
28. Leaves compound; spiny trees 23. BOMBACACEAE
28. Leaves simple; unarmed shrubs or undershrubs 20. HYPERICACEAE
26. Stamens few, 15 or less united in a column with 5 sterile prolongations opposite the petals; anthers 2-celled 24. STERCULIACEAE
25. Stamens free:
29. Stamens with prolonged connectives 21. DIPTEROCARPACEAE
29. Stamens without prolonged connectives 25. TILIACEAE
6. Stamens not arising directly from the receptacle:
30. A conspicuous hypogynous disc present; stamens attached either to the outer or to the inner surface of the disc:
31. Flowers polygamous or unisexual:
32. Fruits drupe; ovary 1-celled 40. ANACARDIACEAE
32. Fruits capsule; ovary 3-celled 39. SAPINDACEAE
31. Flowers bisexual:
33. All stamens antipetalous; petals valvate:
34. Spinescent shrubs 37. RHAMNACEAE
34. Unarmed tendril climbers; fruit berry 38. VITACEAE
33. All stamens not antipetalous; petals usually imbricate:
35. Leaves simple:
36. Stamens in two whorls, all fertile 27. MALPIGHIACEAE
36. Stamens only in one whorl, antisepalous:
37. Stamens alternating with staminodes; herbs or small shrubs 26. LINACEAE
37. Staminodes absent; large shrubs or small trees 36. CELASTRACEAE
35. Leaves compound (some times unifoliate):
38. Leaves pellucidly gland-dotted 30. RUTACEAE
38. Leaves not pellucidly gland-dotted:
39. Herbs or very small undershrubs (trees in *Averrhoa* but then fruit berry); leaves stipulate:
40. Leaves opposite (alternate and multifid in *Peganum*); stamens free 28. ZYGOPHYLLACEAE
40. Leaves alternate; stamens slightly united at the base 29. OXALIDACEAE
39. Large shrubs or trees:
41. Corolla irregular; petals 5, the upper 2 small, the lowest largest; ovary 1-celled; fruits cylindrical capsule 41. MORINGACEAE
41. Corolla regular; ovary multilocular; fruits various:
42. Filaments united to form a tube (filaments free in *Toona*) 34. MELIACEAE
42. Filaments free:
43. Ovary deeply lobed or carpels free at the base; ovules solitary in each carpel; fruits samaroid; leaves foetid 32. SIMAROUBACEAE
43. Ovary entire:
44. Trees armed with sharp spines; leaves 2-foliolate; fruits a 1-seeded fleshy drupe 31. BALANITACEAE
44. Trees unarmed:
45. Leaves many-foliolate; ovules 2 in each carpel; fruits 3-seeded drupe 33. BURSERACEAE
45. Leaves simple; fruits 1-seeded drupe 35. OLACACEAE

30. Outer zone of torus elongated to form a tube;
ovary often included in the tube or inferior:
46. Gynoecium usually monocarpellary; when more than
one carpel present apocarpous or enclosed within the
hypanthium:
47. Corolla papilionaceous; stamens monadelphous
or diadelphous 44. PAPILIONACEAE
47. Corolla not papilionaceous; stamens free:
48. Stamens many 45. ROSACEAE
48. Stamens few:
49. Flowers zygomorphic; petals imbricate, the
posterior most petal innermost and
smallest; or flowers apetalous 43. CAESALPINIACEAE
49. Flowers actinomorphic; petals valvate or
imbricate, all equal:
50. Carpel 1; petals not persistent 42. MIMOSACEAE
50. Carpels as many as persistent petals 46. CRASSULACEAE
46. Gynoecium not monocarpellary and usually syncarpous;
when apocarpous not enclosed within the hypanthium:
51. Ovary free from the hypanthium:
52. Petals present, some times absent in
Ammannia; style 1, stigma capitate;
embryos not curved 49. LYTHRACEAE
52. Petals absent; styles as many as carpels;
embryos curved; seeds reniform 57. AIZOACEAE
51. Ovary partly or completely fused with the
hypanthium:
53. Leafless looking succulent plants; stems flat and
articulated, usually often prickly 55. CACTACEAE
53. Non succulent plants:
54. Locules of ovary superposed 50. PUNICACEAE
54. Locules of ovary not superposed:
55. Tendril climbers; flowers unisexual 53. CUCURBITACEAE
55. Plants without tendril; flowers unisexual:
56. Flowers in simple or compound umbels:
57. Fruit a cremocarp 58. UMBELLIFERAE
57. Fruit a berry, 5-celled 59. ARALIACEAE
56. Flowers not in umbels:
58. Stamens many; ovary many celled; leaves
gland-dotted; erect shrubs or trees 48. MYRTACEAE
58. Stamens few; leaves not gland-dotted:
59. Trees or climbing shrubs; ovary
unilocular 47. COMBRETACEAE
59. Herbs; ovary more than 1-celled:
60. Fruit with lateral horns; aquatic
plants 52. TRAPACEAE
60. Fruit without horns 51. ONAGRACEAE
5. Petals united; carpels as many as the petals or fewer:
61. Ovary inferior:
62. Ovary unilocular 62. COMPOSITAE
62. Ovary with two or more locules:
63. Calyx unrolling in fruit into 5-15 feathery
bristles united into a short tube at the base 61. VALERIANACEAE
63. Calyx not as above:
64. Leaves opposite or whorled 60. RUBIACEAE
64. Leaves alternate 63. CAMPANULACEAE
61. Ovary not inferior:
65. Ovary unilocular:
66. Ovule solitary:
67. Styles elongated, 3-fid; fruits capsule 64. PLUMBAGINACEAE
67. Styles very short or absent; fruits drupe 70. SALVADORACEAE
66. Ovules 2-many; styles undivided:
68. Flowers actinomorphic:
69. Stamens twice as many as the corolla:
70. Trees; leaves pinnatifid; petiole hollow;
fruit a large berry 56. CARICACEAE

70. Succulent herbs; leaves with adventitious buds; fruits follicle 46. GRASSULACEAE
69. Stamens as many as the corolla :
71. Trees or large shrubs; flowers in axillary fascicles 66. MYRSINACEAE
71. Flowers solitary, axillary or in small cymes or umbels; herbs :
72. Flowers solitary axillary or when in umbels heterostylous 65. PRIMULACEAE
72. Flowers in dichotomous cymes; not heterostylous 74. GENTIANACEAE
68. Flowers zygomorphic; stamens 2; alternating with 3 anterior petals; aquatic herbs 81. LENTIBULARIACEAE
65. Ovary with 2-many locules; corolla lobes few or many:
73. Corolla lobes 18-24 in 2 or 3 series 67. SAPOTACEAE
73. Corolla lobes unlike the above:
74. Flowers dioecious; trees or large shrubs; stamens free; seeds arillate 68. EBENACEAE
74. Flowers bisexual; stamens united to the corolla :
75. Carpels free, united by the styles; fruit a pair of follicles:
76. Anthers forming a column with the style and stigma; pollen form 1 or 2 waxy or rarely granular masses (pollinia) in each anther lobe 74. ASCLEPIADACEAE
76. Anthers often conniving and some times adhering by a point on the connective to the swollen top of the style but not forming a column; pollen granular 71. APOCYNACEAE
75. Carpels and styles united:
77. Corolla irregular:
78. Ovary unilocular with parietal placentation and many ovules; leafless parasites 80. OROBANCHACEAE
78. Ovary bilocular; not leafless parasites:
79. Seeds winged; trees or large shrubs; anther cells divaricate; fruit elongated 82. BIGNONIACEAE
79. Seeds not winged:
80. Seeds supported by hard upwardly curved retinacula (retinacula, absent in *Elytraria*) 86. ACANTHACEAE
80. Seeds not supported by retinacula:
81. Locules of ovary many ovuled:
82. Ovary bilocular; ovules uniseriate in each locule:
83. Fruit with 2 large hooks 84. MARTYNIACEAE
83. Fruit without hooks angular 83. PEDALIACEAE
82. Ovary bilocular; ovules many in each locule 79. SCROPHULARIACEAE
81. Seeds 1 or 2 in each locule:
84. Ovary deeply 4-lobed or partite; style gynobasic; each locule uniovulate; fruits carcerulus 88. LABIATAE
84. Ovary not deeply 4-lobed; style not gynobasic; each locule 2-ovuled:
85. Calyx reduced, annular or of fimbriate hairs 85. THUNBURGIACEAE
85. Calyx not reduced 87. VERBENACEAE
77. Corolla regular:
86. Stamens 2 69. OLEACEAE
86. Stamens 4 or 5:
87. Ovules many:
88. Corolla not plicate; placentas not swollen 73. LOGANIACEAE

88. Corolla usually plicate; placenta swollen 78. SOLANACEAE
87. Ovules few, 2-8 in each carpel :
89. Flowers tetramerous, in spikes; scapigerous herbs; leaves radical 89. PLANTAGINACEAE
89. Flowers pentamerous :
90. Fruit a drupe or nut :
91. Herbs or small undershrubs; inflorescence dichotomous scorpioid cyme 75. BORAGINACEAE
91. Shrubs or trees; inflorescence lax cyme 76. EHRETIACEAE
90. Fruit a capsule; corolla campanulate or infundibuliform, lobes plicate or contorted in bud; mostly climbing herbs 77. CONVULVACEAE
4. Flowers with only one whorl of tepals :
92. Ovary inferior :
93. Tepals zygomorphic; fruits capsule; climbing herbs 97. ARISTOLOCHIACEAE
93. Tepals actinomorphic; fruits berry; parasitic herbs 96. LORANTHACEAE
92. Ovary superior :
94. Lower portion of the coloured tepal persisting and covering the ovary to form an anthocarp; fruits 1-seeded 90. NYCTAGINACEAE
94. Fruits not an anthocarp :
95. Flowers always unisexual :
96. Aquatic herbs, dichotomously branched, branches filiform; flowers monoecious 103. CERATOPHYLLACEAE
96. Land plants :
97. Ovary 2-3-locular; ovules 1-2 in each locule 98. EUPHORBIACEAE
97. Ovary unilocular :
98. Fruits many seeded; stamens many 14. FLACOURTIACEAE
98. Fruits 1-seeded :
99. Leaves simple; anthers reversed; filaments inflexed in bud :
100. Trees or large shrubs; style simple or stylar branches 2; stipules deciduous; 101. Inflorescence cyme (male), female flowers solitary or 2-4 together 101. ULMACEAE
101. Inflorescence spikate or hypanthodium 100. MORACEAE
100. Herbs; style single :
102. Inflorescence spike 95. PIPERACEAE
102. Inflorescence cyme 99. URTICACEAE
99. Leaves palmately compound and opposite at least in the lower part; anthers not reversed; filaments not inflexed in bud 102. CANNABACEAE
95. Flowers bisexual or polygamous :
103. Trees or large shrubs; seeds arillate, aril red 54. SAMYDACEAE
103. Herbs or small shrubs; seeds not arillate :
104. Leaves stipulate :
105. Stipule connate to form a tube around the node; tepals coloured; leaves alternate 94. POLYGONACEAE
105. Stipules not like above; tepals greenish; leaves opposite; prostrate herbs 91. ILLECEBRACEAE
104. Leaves exstipulate :
106. Tepals scarious and dry; flowers with scarious or hyaline bracts 92. AMARANTHACEAE
106. Tepals not scarious often fleshy and green; flowers usually ebracteate :
107. Flowers hypogynous 93. CHENOPODIACEAE
107. Flowers perigynous 57. AIZOACEAE

3. Cotyledon single; stems usually without a central pith; stem without secondary thickening, bundles scattered:
108. Flowers without perianth or perianth of hairs or scales:
109. Flowers in spikelets composed of bracts (glumes); ovary 1-celled, 1-ovuled:
110. Seed coat adhering to the pericarp (caryopsis); stems usually hollow; leaves 2-ranked; sheath ligulate 127. GRAMINEAE
110. Seeds free within the pericarp, a trigonous nut; stems 3-angled, usually solid; leaves 3-ranked 126. CYPERACEAE
109. Flowers not in spikelets:
111. Free floating minute plants with 1 or more roots 119. LEMNACEAE
111. Large rooted plants:
112. Flowers in cylindric spikes:
113. Perianth of slender hairs; rhizomatous plants 117. TYPHACEAE
113. Perianth of green scales 120. SPARGANIACEAE
112. Flowers in spadix 118. ARACEAE
108. Flowers with distinct perianth:
114. Perianth petaloid:
115. Flowers irregular:
116. Stamens and gynoecium united to form a column; ovary unilocular 105. ORCHIDACEAE
116. Stamens free; ovary 3-locular:
117. Stamens petaloid with only a half anther attached to one of them 110. CANNACEAE
117. Stamens not petaloid, anthers 6: 100. MUSACEAE
118. Plants tree-like; fruit berry 134. COMMELINACEAE
118. Prostrate herbs 116. PALMAE
115. Flowers regular:
119. Trees
119. Plants not arborescent:
120. Inflorescence subtended by spathe-like leaf sheath 113. FONTEDERIACEAE
120. Inflorescence not as above:
121. Carpels free, uniovulate: 121. ALISMATACEAE
122. Perianth of calyx and corolla 122. Perianth petaloid in a single whorl 123. APINOGETONACEAE
121. Carpels united, ovary 3-locular with 2 ovules in each locule:
123. Ovary superior:
124. Petioles with cirrhi at the top of the sheath 107. SMILACACEAE
124. Petioles without cirrhi 106. LILIACEAE
123. Ovary inferior: 108. DIOSCOREACEAE
125. Climbing herbs
125. Plants not climbing:
126. Flowers on large panicles more than 2 m long; leaf large and fibrous 112. AGAVACEAE
126. Flowers on small umbels; leaves not fibrous 111. AMARYLLIDACEAE
114. Perianth not petaloid:
127. Ovary inferior; flowers unisexual 104. HYDROCHARITACEAE
127. Ovary superior:
128. Gynoecium monoxarpellary, 1-ovuled; flowers axillary: 122. NAJADACEAE
129. Stigma 2-4 125. ZANNICHELLIACEAE
129. Stigma single
128. Gynoecium of more than 1 carpel:
130. Carpels free, uniovulate; submerged aquatic herbs 124. POTAMOGETONACEAE
130. Carpels united; perianth rigid; fruits 3-valved capsule; grass-like herbs 115. JUNCACEAE

GYMNOSPERMAE

1. PINACEAE

PINUS Linn.

P. roxburghii Sargent, *Silv. North Amer.* 11: 9, 1897. *P. longifolia* Roxb. *Fl. Ind.* 3: 651, 1832; FBI 5: 652; Bamber 569; Parker 536 (non Salisb.); Duthie 259.

Large trees with fissured bark. Leaves needle-like in bundles of threes. On Siwalik hills.

Flowers: March-April.

Hoshiarpur, *Aitchison* 292 (DD)*.

2. EPHEDRACEAE

EPHEDRA Linn.

E. foliata Boiss. var. *ciliata* Stapf in *Denkschr. Math.-Natur. Kl. Akad. Wiss. Wien* 1889: 49, 1889; FBI 5: 863. *E. foliata* Boiss. *Fl. Or.* 5: 716, 1881; Parker 535; Puri 152. *E. peduncularis* Boiss. *Fl. Or.* 5: 717, 1881; FBI 5: 641.

A climbing shrub. Leaves only on young branches. Male cones 2-3 together. Female flowers in pairs enclosed by bracts which become fleshy at maturity. Common in sandy places.

Local name: Phog.

Flowers: Feb.-May.

Loharu, **20095, 20097; Bhiwani, 20063; Siwani, 26566.

ANGIOSPERMAE

3. RANUNCULACEAE

1. Carpels with more than one ovule; flowers spurred
1. Carpels uniovulate; flowers not spurred

1. *Delphinium*
2. *Ranunculus*

1. DELPHINIUM Linn.

D. ajacis Linn. *Sp. Pl.* 531, 1753; Mukerjee in *Bull. bot. Surv. India* 2: 293, 1960. *D. pauciflorum* D. Don. *Prodr. Fl. Nep.* 196, 1825.

Erect herbs with deeply lobed leaves. Flowers irregular on racemes,

* The specimens cited are from the Herbarium of the Botanical Survey of India, Dehra Dun unless otherwise specified by (DD) for specimens from the Herbarium of the Forest Research Institute, Dehra Dun.

**The herbarium numbers given in this work refer to N. C. Nair unless a name is cited before the number.

bluish-white to purple. Grown in gardens.

Local name : Delphinium.

Flowers : Cold season and spring.

Muktesar, 36520; Hissar, *V. J. Nair* 19981.

2. RANUNCULUS Linn.

1. Aquatic herbs; leaves much divided, segments thread-like, submerged; flowers white; achenes wrinkled 1. *R. trichophyllus* subsp. *trichophyllus*
1. Semiaquatic or moisture-loving herbs; leaf segments not thread-like; flowers yellow; achenes smooth or tubercled not wrinkled:
 2. Achenes spinous 2. *R. arvensis*
 2. Achenes not spinous:
 3. Achenes with an intramarginal rib:
 4. Leaves ternatisect, hairy; achenes very smooth, receptacle pilose 4. *R. cantonensis*
 4. Leaves trifid, usually glabrous; achenes with tubercles (sometimes absent); receptacle not pilose 5. *R. muricatus*
 3. Achenes without an intramarginal rib, smooth 3. *R. sceleratus*

1. *R. trichophyllus* Chaix in Vill. Hist. Pl. Dauph. 1: 335, 1786 subsp. *trichophyllus*; Cook in Mitteil. Bot. Staatss. Munch. 6: 126, 1966. *R. aquatilis* Linn. var. *trichophyllus* Hook. f. et Thoms. FBI 1: 16, 1872; Sabnis 125; Bamber 633; Mukherjee in Bull. bot. Surv. India 2: 102, 1960; Maheshw. 50; Duthie 21.

Leaf segments up to 6 cm long; stipules auricled. Flowers shortly pedicelled, up to 2 cm long. Achenes in globular head.

Flowers and fruits : March.

Subhanpur, *J. N. Vohra* 11332.

2. *R. arvensis* Linn. Sp. Pl. 555, 1753; FBI 1: 20.

Radical leaves wedge-shaped; stem-leaves shortly stalked and deeply divided into 2-3 narrow segments. Flowers up to 2 cm across, pale yellow. Achenes flat in globose head.

Flowers and fruits : March-April.

Pinjaur, *Drummond* 1169 (DD).

3. *R. sceleratus* Linn. Sp. Pl. 776, 1753; DC. Syst. 1: 268, 1818; Royle Ill. 53, 1839; FBI 1: 19; Bamber 349; Sabnis 125; Mukerjee 105; Maheshw. 50; Duthie 21.

Annual glabrous and succulent herbs, very variable in height, usually 30-75 cm, sometimes as small as 10-12 cm. Leaves 3-partite, cuneately segmented; radical leaves long stalked, cauline sessile. Sepals reflexed. Corolla yellow. Achenes many in oblong head. Receptacle hairy.

Common in moist places and canal banks.

Flowers and fruits : Feb.-March.

Binjhol (Panipat), 25827; Hissar, *V. J. Nair* 19372, 19920; Laroha (Jullunder), *T. S. Bakshi* s. n. (DD); Kapurthala, 36314.

4. *R. cantonensis* DC. Prodr. 1: 43, 1824; Mukerjee 102. *R. pennsylvanicus* Hook. f. et Thoms. FBI 1: 19, (non Linn. f.); Sabnis 125; Duthie 22.

Erect hairy herbs. Radical leaves long petioled, cauline shorter, gradually becoming nearly sessile, ternatisect. Flowers yellow; sepals reflexed; stamens many; receptacle pilose. Achenes flattened with an intramarginal rib. glabrous, beak almost straight.

Common in marshy places and near edges of canals and ponds.

Flowers and fruits: Hot season.

Yamunanagar, 26398.

5. *R. muricatus* Linn. Sp. Pl. 780, 1753; DC. Syst. 1: 298, 1818 et Prodr. 1: 42, 1824, FBI 1: 20; Bamber 502; Sabnis 125; Mukherjee 104.

Glabrous or sparsely hairy herb. Leaves 3-fid, lobes irregularly cut. Flowers yellow on terminal panicles. Sepals shorter than petals. Achenes muricate, closely punctate, with a straight beak and intramarginal rib.

In moist places.

Flowers and fruits: March.

Beas, J. N. Vohra 11318; Hoshiarpur, Aitchison 569 (DD); Laroha, T. S. Bakshi s. n. (DD).

4. MAGNOLIACEAE

MICHELIA Linn.

M. champaca Linn. Sp. Pl. 563, 1753; FBI 1: 42; Sabnis 126; Parker 5. Maheshw. 51.

Trees. Flowers yellow or orange, fragrant.

Cultivated.

Local name: Champa.

Hoshiarpur, Aitchison 555 (DD).

5. ANNONACEAE

1. Carpels free; fruit a cluster of drupelets or berries; sepals 3, petals 6 in two whorls:

2. Flowers solitary or paired, very fragrant, yellow; climbing shrubs with hooked peduncles; fruit aggregate of 2-seeded berries

2. Flowers in fascicles or umbels, yellowish green; fruit aggregate of drupelets; large shrubs or trees

1. Carpels subconnate; fruit compact, formed by the fusion of carpels and receptacle; sepals 3, petals 6 in 2 whorls of which the inner is minute or wanting

2. *Artabotrys*

3. *Polyalthia*

1. *Annona*

1. ANNONA Linn.

A. squamosa Linn. Sp. Pl. 537, 1753; Bamber 110; Parker 6; Mukerjee in Bull. bot. Surv. India 5(1): 45, 1963; Maheshw. 51; Puri 17; Duthie 25.

Shrubs or small trees. Leaves elliptic or oblong-lanceolate, pellucid dotted, glabrous. Flowers greenish yellow on leaf-opposed peduncles. Fruit globose.

Cultivated occasionally for its fruits.

Local name: Sitaphal.

Flowers: Hot season.

Hoshiarpur, *Aitchison* s. n. (DD); without precise locality *Anonymous* (DD).

2. ARTABOTRYS R. Br.

A. hexapetalus (Linn. f.) Bhandari in Bailey 12: 147, 1964. *Annona hexapetala* Linn. f. Suppl. 270, 1781. *Artabotrys odoratissimus* R. Br. ex Ker in Bot. Reg. 5: t. 423, 1820; FBI 1: 54; Parker 7. *Uvaria odoratissima* Roxb. Fl. Ind. 2: 666, 1824. *Artabotrys uncinatus* (Lamk.) Merr. in Phil. Jour. Sc. (Bot.) 7: 234, 1912; Mukerjee 40.

A large scandent shrub. Leaves oblong-lanceolate, shortly acuminate, glabrous. Flowers yellow with a characteristic fragrans. Bases of petals thick and conniving over the stamens and carpels, limb spreading. Fruit glabrous, yellow.

Cultivated in gardens.

Flowers: Apr.-Sept.

This plant is mentioned on the authority of Parker. I have not seen any specimen from the area.

3. POLYALTHIA Blume

P. longifolia (Sonn.) Thw. Enum. 398, 1864; FBI 1: 62; Parker 7; Sabnis 126; Mukherjee 42; Maheshw. 52; Duthie 25. *Uvaria longifolia* Sonn. Voy. Ind. Or. 2: 233, t. 131. 1782.

Evergreen trees. Leaves lanceolate with undulate margin. Flowers in umbellate fascicles. Fruit 1-seeded.

Cultivated as an ornamental tree in avenues and gardens.

Flowers: Hot season.

Hoshiarpur, *Aitchison* 552 (DD); *Parker* 14383 (DD).

6. MENISPERMACEAE

1. Carpels solitary; stamens united in column; leaves peltate
2. Carpels more than one; stamens free; leaves not peltate:
 1. Flowers appearing when the plant is leafless; leaves ovate or ovate-cordate, glabrous
 2. Plants not deciduous; leaves ovate-oblong, villous

1. *Cissampelos*

3. *Tinospora*
2. *Cocculus*

1. CISSAMPELOS Linn.

C. pareira Linn. Sp. Pl. 1031, 1753; FBI 1 : 103; Bamber 606; Parker 10; Sabnis 127; Maheshw. 52; Puri 18; Duthie 31.

Softly pubescent perennial shrub. Branches wiry. Leaves pubescent when young, ultimately glabrous. Male flowers in axillary branched peduncles, females 1-3 in the axils of orbicular bracts arranged to form dense racemes.

Common in hedges of parks and gardens and climbing on trees or shrubs.

Flowers and fruits : Aug.-Oct.

Karnal, *Drummond* 1219, 1220 B, C, D, 1221A (all DD); Panipat, 24683, 24700, *Drummond* 1222 (DD).

2. COCCULUS DC.

1. Woody climber; leaves subglabrous; male flowers in sessile axillary clusters; sepals glabrous

2. *C. pendulus*

1. Bushy climber; leaves pubescent; male flowers in axillary panicles; sepals pubescent

1. *C. hirsutus*

1. *C. hirsutus* (Linn.) Diels in Pflanzenr. 46 : 236, 1910; Parker 551; Maheshw. 52; Puri 17. *Menispermum hirsutum* Linn. Sp. Pl. 341, 1753. *Cocculus villosus* DC. Syst. 1 : 525, 1818; FBI 1 : 101; Bamber 605; Sabnis 125; Parker 8; Duthie 29.

Branches pendulous. Young stem, leaves and inflorescence clothed with greyish hairs. Leaves short petioled ovate to lanceolate, mucronate. Female flowers 1-3, axillary, green. Drupelets dark purple.

Common climber on shrubs and trees in jungles.

Local name : Karta ki bel.

Flowers : Feb.-April. *Fruits* : Sept.

Ambala, *Parker* 21041 (DD); Karnal, *Drummond* 1647 (DD); *Rambuksh & Sham Singh* 4747 (DD); Jind, 18687, 25861; Ludwa, 26434; Panipat, 18607, 18682; Patiala, *T. A. Rao* 10944; Sohna, *T. A. Rao* 11073.

2. *C. pendulus* (Forst.) Diels in Pflanzenr. 46; 237, 1910; Parker 551; Puri 17. *Epibaterium pendulum* Forst. f. Char. Gen. 108, 1776. *Cocculus laeba* DC. Syst. 1 : 529, 1818; FBI 1 : 102; Bamber 605; Parker 8; Sabnis 127; Duthie 30.

Stem woody up to 10 cm diam.; bark corky. Branches puberulous when young. Leaves variable in shape, lobed, sub-orbicular or linear oblong, base truncate. Petiole hairy. Flowers minute. Drupelets black.

Common woody climber in jungles.

Flowers : Throughout the year.

Bhiwani, 16336; Chakkajheel (Sirsa), 18996; Hansi, 25877; Hissar,

18804, 18996, 19916, 21535; *Raizada* 20978 (DD), 21019 (DD); *Rau* 3546; Karnal, *Drummond* 1214 a (DD); Ludhiana, *Drummond* 4826 (DD); Sidrauli (Near Sirsa), 20806.

3. TINOSPORA Miers

T. cordifolia (Willd.) Hook. f. et Thoms. Fl. Ind. 184, 1855; FBI 1: 97; Sabnis 127; Parker 9; Maheshw. 53; Puri 17; Duthie 27.

Glabrous climbing shrub. Leaves cordate, petioled, deciduous when flowering. Flowers small, yellow; female flowers solitary, males in fascicles.

Cultivated in gardens. The stem is used in Ayurvedic medicine.

Local name : Gulael.

Hissar, 34532; Karnal, *Drummond* 6291 (DD).

7. NYMPHAEACEAE

- | | |
|--|--------------------|
| 1. Carpels sunk in fleshy torus | 2. <i>Nelumbo</i> |
| 1. Carpels united into a many-celled ovary | 1. <i>Nymphaea</i> |

1. NYMPHAEA Linn.

- | | |
|---|-----------------------|
| 1. Leaves blotched with purple beneath, entire; anthers with appendages | 2. <i>N. stellata</i> |
| 1. Leaves not blotched with purple beneath, pubescent beneath, sharply toothed on the margin; anthers without appendage | 1. <i>N. nouchali</i> |

1. **N. nouchali** Burm. f. Fl. Ind. 120, 1768; Merr. in Phil. Jour. Sci. (Bot.) 19: 350, 1921 & Enum. 2: 140, 1923; Maheshw. 54. *N. pubescens* Willd. Sp. Pl. 2: 1154, 1799; Puri 18. *N. lotus* auct. plur. (non Linn.).

Aquatic herbs with floating leaves. Flowers variable in colour and size. Berries globose; stigmatic rays with appendages. Seeds broadly ellipsoid.

Local name : Chota Kamal.

Flowers : Sept.-Oct.

Karnal, *J. N. Vohra* 9908; Bahmanwas (Rohtak Dist.), *V. J. Nair* 23161; Rohtak, *V. J. Nair* 23273.

2. **N. stellata** Willd. Sp. Pl. 2: 1153, 1799; FBI 1: 114; Sabnis 128; Bamber 629; Maheshw. 54; Puri 18; Duthie 34.

Large aquatic herb. Leaves peltate, orbicular, dentate. Flowers white, mildly fragrant. Peduncle long. Fruit globose.

Local name : Chota Kamal.

Flowers and fruits : July-Nov.

Between Jind and Hansi, 24787; Hansi, 18779, 24841; Hoshiarpur, *Aitchison* 289 (DD).

2. NELUMBO Adans.

N. nucifera Gaertn. Fruct. 1 : 73, t. 19, f. 2, 1788; Santapau in RBSI. 16 (1) : 7, 1953; Maheshw. 54; Puri 18. *Nymphaea nelumbo* Linn. Sp. Pl. 511, 1753. *Nelumbium speciosum* Willd. Sp. Pl. 2 : 1258, 1799; FBI 1 : 116; Sabnis 128; Bamber 630; Duthie 35.

Aquatic herbs with creeping rhizome and orbicular, centrally peltate leaves. Flowers white or light pink, solitary, mildly fragrant. Anthers yellow or orange.

The plant is reported to be cultivated in several localities. I have seen no specimen. Its rhizomes are sold in market.

Local name : Kamal.

8. PAPAVERACEAE

- | | |
|--|-------------------------|
| 1. Vegetative parts sepals and carpels spinous | 1. <i>Argemone</i> |
| 1. No part spinous: | |
| 2. Leaves multifid into linear segments | 2. <i>Eschscholtzia</i> |
| 2. Leaves not multifid into linear segments | 3. <i>Papaver</i> |

1. ARGEMONE Linn.

- | | |
|---|-------------------------|
| 1. Flower buds sub-spherical; petals bright yellow; stigmatic lobes broad, closely crowded and adpressed to the style | 1. <i>A. mexicana</i> |
| 1. Flower buds oblong, petals white or light yellow, stigmatic lobes narrow, spreading | 2. <i>A. ochroleuca</i> |

1. *A. mexicana* Linn. Sp. Pl. 503, 1753; FBI 1 : 117; Bamber 354; Maheshw. 55; Puri 19; Duthie 37.

Robust herb. Leaves pinnatifid, ash green. Sepals with a tail each at the top. Stamens many. Stigmas red. Capsule dehiscent by short valves. Seeds many, black.

Common everywhere during the cold season. Stray plants are found throughout the year. The seed is said to be an emetic and narcotic similar to opium.

Local name : Satyanashi.

Flowers and fruits : Oct.-April.

Bhiwani, 19003, 20048, 20049; Choudriwas (Hissar), V. J. Nair 19221; Fatehbad, 24917; Hansi, 16161; Rewari, 20762; Rohtak, 20043.

2. *A. ochroleuca* Sweet in Britt. Fl. Gard. 3 : t. 242, 1828; Venkatesh in Curr. Sci. 31 : 250, 1962; Nair & Nair in Bull. bot. Surv. India 5: 219, 1963; Maheshw. 55.

Similar to the above taxon but easily distinguished by its ash coloured and non-stem clasping leaves, white flowers and narrow spreading stigmas.

Local name : Satyanashi.

Flowers and fruits : Feb.-April.

Bhatinda, 26258; Bhiwani, 20047; Mahendragarh, 20605.

2. ESCHSCHOLTZIA Cham.

E. californica Cham. in Nees, *Hor. Phys. Berol.* 74, 1826; Fedde in *Engler Pflanzenr.* 40: 154, 1909; Sabnis 128.

Glaucous herbs, glabrous or nearly so. Leaves ternately dissected into very narrow segments. Sepals 2, united into a calyptra which is pushed off by the expanding petals. Petals yellow.

Californian poppy. Cultivated in gardens, often runs wild.

Flowers and fruits : March-April.

Barnala, 36587.

3. PAPAVER Linn.

1. Capsule setulose

1. Capsule glabrous;

2. Stigmatic rays up to 12

2. Stigmatic rays 12-30

1. *P. somniferum*

2. *P. rhoeas*

3. *P. hookeri*

1. **P. somniferum** Linn. *Sp. Pl.* 508, 1753; Fedde in *Engler Pflanzenr.* 40: 338, 1909; FBI 1: 117; Bamber 353; Maheshw. 56; Duthie 36.

Erect glabrous herb with stem-clasping leaves.

Flowers variously coloured. Capsule globose.

Cultivated.

Local name : Afim.

This species is mentioned on the authority of Bamber although I have not seen any specimen.

2. **P. rhoeas** Linn. *Sp. Pl.* 507, 1753; Fedde in *Engler Pflanzenr.* 40: 293, 1909.

Slender herb with spreading hairs and irregularly pinnatifid non stem-clasping leaves. Flowers variously coloured.

Cultivated ornamental.

Flowers : Feb.-March.

Khanna, 35980.

3. **P. hookeri** Baker ex Hook. *Bot. Mag.* t. 6729, 1883; Sabnis 128. *P. rhoeas* L. var. *hookeri* (Baker ex Hook.) Fedde in *Adh. Bot. Ver. Prov. Brandenb.* 45: 230, 1903 et *Engler Pflanzenr.* 40: 301, 1909.

Like the last species but differs in its more robust habit, double the number of stigmatic rays and larger seeds.

Flowers: March.

Karnal, *Drummond* 6293 (DD).

9. FUMARIACEAE

FUMARIA Linn.

F. indica Pugsl. in Jour. Linn. Soc. Bot. 44 : 313, 1919; Duthie 37; Maheshw. 56; Puri 19. *F. parviflora* Wt. et Arn. Prodr. 18, 1834 (non Lamk.): FBI 1 : 128; Bamber 355; Sabnis 128.

Weak herbs with much dissected leaves. Bracts shorter than the fruit stalk. Flowers purplish pink.

Weed of cultivated fields, gardens and orchards in moist soil.

A substitute for fumitory, used in stomach derangements, afflictions of the liver and skin infections.

Local name: Pitpapra.

Flowers and fruits: Nov.-April.

Barwala, *V. J. Nair* 19285; Badopal, *V. J. Nair* 19821; Bhinjol, 25821; Hissar, 25918; *V. J. Nair* 19215, 19331; Lambi, 26210; Mahendragarh, 20643; Narnaul, 20666; Rewari, 20732; Sarsudh, *V. J. Nair* 19321; Taran Taran, 36361.

10. CRUCIFERAE

- | | |
|---|-----------------------|
| 1. Pods indehiscent, cylindric and elongated with tapering beaks; more than 2-seeded, seeds separated by pith | 8. <i>Raphanus</i> |
| 1. Pods dehiscent, seeds not separated by pith: | |
| 2. Pods flattened: | |
| 3. Pods 2-seeded, deeply notched | 6. <i>Lepidium</i> |
| 3. Pods many seeded | 5. <i>Farsetia</i> |
| 2. Pods not flattened: | |
| 4. Pods globose or nearly so: | |
| 5. Pods 2-seeded | 3. <i>Coronopus</i> |
| 5. Pods many-seeded | 2. <i>Cochlearia</i> |
| 4. Pods elongated: | |
| 6. Pods prolonged into a short horn; flowers purple | 7. <i>Malcomia</i> |
| 6. Pods without horn; flowers not purple: | |
| 7. Pods with a seedless indehiscent beak: | |
| 8. Flowers yellow | 1. <i>Brassica</i> |
| 8. Flowers lilac or yellowish with purple veins | 4. <i>Eruca</i> |
| 7. Pods without seedless beak, dehiscent and bearing seeds completely: | |
| 9. Seeds 1-seriate; valves 3-nerved | 10. <i>Sisymbrium</i> |
| 9. Seeds 2-seriate; valves faintly 1-nerved | 9. <i>Rorippa</i> |

1. BRASSICA Linn.

- | | |
|---|-------------------|
| 1. Cauline leaves stem clasping or amplexicaul; sepals erect: | |
| 2. Tap roots tuberous | 5. <i>B. rapa</i> |
| 2. Tap roots not tuberous: | |

- 3. Radical leaves in rosettes 6. *B. tournefortii*
- 3. Radical leaves not in rosettes;
- 4. Lower leaves lyrate pinnatifid 1. *B. campestris*
- 4. Leaves not pinnatifid, fleshy:
- 5. Stems short, enlarged into a spherical edible portion
with large leaf scars 4c. *B. oleracea* var. *gongloides*
- 5. Stems not enlarged:
- 6. Leaves not packed into a head, inflorescence thick and
fleshy; flowers aggregated to form a head 4a. *B. oleracea* var. *botrytis*
- 6. Leaves packed into a head 4b. *B. oleracea* var. *capitata*
- 1. Cauline leaves not stem clasping; sepals spreading:
- 7. Pods adpressed to the axis, angular, torulose 3. *B. nigra*
- 7. Pods spreading, terete, torulose 2. *B. juncea*

1. ***B. campestris*** Linn. Sp. Pl. 666, 1753.

- 1. Stems compressed; leaves large bristly and hairy in rosette;
seed coats with a mucilagenous epidermis var. *dichotoma*
- 1. Stems not compressed; leaves not bristly and not in
rosette; seeds not mucilagenous:
- 2. Petals overlapping along lateral margins; pod some
what torulose var. *toria*
- 2. Petals narrow not overlapping; pods plumpy, not torulose var. *sarson*

var. ***dichotoma*** (Roxb.) Watt Dict. Econ. Prod. 1 : 523, 1889; Duthie

45. *Sinapis dichotoma* Roxb. Fl. Ind. 3 : 117, 1832.

Erect herbs with dichotomous branches. Flowers yellow. Seeds brown.

Cultivated for the oil bearing seeds.

Local name : Kali sarson.

Flowering time : Feb.-April.

Barnala, 36582.

var. ***toria*** Duthie et Fuller, Field Gard. Crop. N. W. Prov. Oudh 2 : 29, 1882; Watt 525; Duthie 45.

Erect herbs with open habit and dichotomous branches. Flowers yellow. Seeds bluish brown, rugose with distinct circular marks on the testa.

Cultivated in irrigated fields for the seeds. The fatty oil from the seed is edible and the oil cake used as cattle feed and manure.

Local name : Tori, Toria.

Flowers : Feb.-March.

Barnala, 36580.

var. ***sarson*** Prain in Dept. Land Rec. Agric. Beng. Bull. No. 4 : 24, tt. 5-7, 1898; Maheshw. 61; Duthie 44.

Erect herbs up to 1.5 m. Lower leaves large-lyrate pinnatifid, stem clasping, upper leaves gradually become small. Flowers bright yellow. Fruits stout, beaked, long pedicelled. Seeds yellowish white to brown smooth.

Extensively cultivated in the area. Sown during the cold months and harvested in April-May. The leaves and young parts are a favourite vegetable of the people. An edible oil is extracted from the seeds. The dried stem is collected and used as fuel.

Local name : Sarsom.

Flowers and fruits : Jan.-April.

Binjhol (Panipat), 25823; Fatehbad, 24917, 25963; Ferozpur, 363666; Hissar, 24917, 25912.

2. **B. juncea** (Linn.) Czern. et Coss. in Czern. Consp. Pl. Chark. 8, n. 5, 1859 et Coss. in Bull. Soc. Bot. France 6 : 609, 1859; FBI 1 : 157 (pro parte); Bamber 357; Maheshw. 61; Duthie 43. *Sinapis juncea* Linn. Sp. Pl. 668, 1753 (excl. Syn. Herm.).

Erect tall annual. Stems tinted red. Leaves petioled, lyrate, pinnatifid or entire, gradually decreasing in size upwards. Flowers yellow. Sepals spreading. Pod narrow, torulose with a conical beak.

Widely cultivated for its seeds during the cold season.

Local name : Asl Rai, Chotiya-lai.

Flowers and fruits : Dec.-March.

Binjhol (Panipat), 25828; Fatehbad, 25953, 25954; Lambi, 26224.

3. **B. nigra** Koch in Roehl. Deutschl. Fl. 4 : 713, 1833; FBI 1 : 156; Bamber 356; Maheshw. 62; Duthie 43.

An erect branched annual up to 1 m high. Leaves petioled, lyrate becoming entire upwards. Flowers yellow. Racemes naked. Pods somewhat 4-angular, adpressed to the stem, torulose, seeds somewhat oblong.

Cultivated throughout the area for the seeds which are known as black mustard.

Local name : Rai, Poorbirai.

Flowers and fruits : Feb.-April.

Mahendragarh, 20639.

4a. **B. oleracea** Linn. var. **botrytis** Linn. Sp. Pl. 667, 1753; Maheshw. 60.

Cultivated during cold season. Cauliflower.

Local name : Phoolgobi.

Ferozpur, 36380.

4b. **B. oleracea** Linn. var. **capitata** Linn. Sp. Pl. 667, 1753; Maheshw. 60.

Cultivated during cold season. Cabbage.

Local name : Bandhgobi.

4c. *B. oleracea* Linn. var. *gongloides* Linn. Sp. Pl. 667, 1753.

Cultivated during the cold season. Knol-kol.

Local name: Ghandgobi.

5. *B. rapa* Linn. Sp. Pl. 666, 1753; Maheshw. 60.

Erect herbs. Tap roots tuberous, napiform. Stems with reddish tint. Leaves lyrate pinnatifid, becoming smaller upwards. Flowers pale yellow.

Cultivated during the cold season for the roots which are cooked as vegetable. Also used as forage. The turnip.

Local name: Shaljam.

Ratia, 25996.

6. *B. tournefortii* Gouan III. 44, t. 20 A, 1773; FBI 1: 156; Bamber 357; Maheshw. 61; Duthie 45.

Erect, branching, hispid, herbs. Radical leaves form a rosette, pinnately divided with backwardly pointed lobes. Stem leaves linear lanceolate mostly entire. Flowers pale yellow. Pods erect.

According to Zafar Alam in Ind. Jour. Agric. Sci. 15: 173-181, 1945, this plant is commonly grown in the Punjab on borders of fields. I have not seen any specimen.

2. COCHLEARIA Linn.

C. cochlearioides (Roth) Santapau et Maheshwari in JBNHS. 54: 804, 1957; Maheshw. 59. *Alyssum cochlearioides* Roth, Nov. Pl. Sp. 322, 1821. *Cochlearia flava* Buch.-Ham. ex Roxb. Hort. Beng. 48, 1814 (nomen nud.); FBI 1: 145; Bamber 355; Duthie 41.

Erect branched herbs, glabrous. Leaves radical and cauline, pinnatifid, lobes sinuate toothed. Racemes axillary towards the end of branches. Flowers yellow. Common along canal banks and marshy places.

Flowers: Cold season.

Ratia, 26005; Chakka Jheel, 26022.

3. CORONOPUS Boehm.

C. didymus (Linn.) Smith Fl. Brit. 2: 691, 1800; Maheshw. 57; Puri 21. *Lepidium didymum* Linn. Mant. 1: 92, 1767. *Senebiera didyma* Pers. Syn. 2: 185, 1807. *S. pinnatifida* DC. in Mem. Soc. Hist. Nat. Par. 144, t. 9, 1799; Duthie 46.

A hispid herb with finely divided pinnatifid leaves. Flowers minute, yellowish green, apetalous (rarely petals are seen). Stamens 2. Fruits dehiscent into 2 indehiscent parts. Seeds brown or brownish black.

A weed of cultivation during the cold season.

Flowers and fruits : Jan.-May.

Bhatinda, 27762; Hissar, 25907; *V. J. Nair* 14763, 19806; Lambi, 26239; Sampla, 20021.

4. ERUCA Adans.

E. sativa Mill. Gard. Dict. n. 1, 1768; FBI 1 : 158; Bamber 358; Maheshw. 62; Puri 20; Duthie 45.

Erect branching herbs. Leaves lyrate pinnatifid, petiole slightly winged. Flowers yellow with purple veins. Pods erect, adpressed against the stem.

Cultivated as a cold season crop. An oil is obtained from the seeds which is often mixed with mustard oil.

Local name : Taramira.

Flowers and fruits : Feb.-March.

Fatehbad, 25964; Taran Taran, 36335a; Kapurthala, 36308.

5. FARSETIA Desv.

1. Flowers 3 mm across; petals short, slightly exceeding the sepals 1. *F. hamiltonii*
 1. Flowers 5-10 mm across; petals long, much exceeding the sepals 2. *F. jacquemontii*

1. *F. hamiltonii* Royle. Ill. 71, 1834; Hook. f. et Thoms. in Jour. Linn. Soc. Bot. 5 : 148, 1861; FBI 1 : 140; Bamber 111; Jafri in notes Roy. Bot. Gard. Edinb. 22(3) : 212, 1957; Maheshw. 59; Puri 20; Duthie 40.

Erect undershrubs. Branches many. Leaves linear. Flowers small 2.5-3 mm across. Petals slightly exceeding the sepals, pink or pinkish white. Pod linear oblong, pointed. Common in sandy places.

Local name : Aridbuti.

Flowers and fruits : Feb.-Nov. Stray flowers throughout the year.

Bhatinda, 26291; Dabwali, 26125; Fatehbad, 18842, 25980; Jhabua, 20730; Khansala, *V. J. Nair* 23253; Lambi, 26184, 27843; Mojukheda, 26110; Ottu bridge (Sirsa), 18943; Rohtak, *V. J. Nair* 23187; Talwandi, 16217; Taoru, *T. A. Rao* 11089; Tosham, 25061.

2. *F. jacquemontii* Hook. f. et Thoms. in Jour. Linn. Soc. Bot. 5 : 148, 1861; Boiss. Fl. Or. 1 : 158, 1867; FBI 1 : 140; Bamber 110; Sabnis 129; Jafri *ibid.* 213, 1957, subsp. *jacquemontii*.

Undershrubs. Branches many hairy. Leaves linear oblong. Flowers large, 6-12 mm across. Petals 2-3 times longer than the sepals, pink. Siliqua 2-4.5 cm long, 0.3-0.5 cm broad.

Frequently met with in sandy areas. Sabnis (loc. cit.) remarks that the plant is eaten as tonic, small branches eaten raw and chutney is made.

Flowers and fruits : Apr.-Dec.

Badopal, 16229; Bhatinda, 262263; Dadri, 16269; Fatehbad, 26578; Hissar, *Duthie* 38331 (DD); *Raizada* 20973 (DD); Sirsa, 18912.

6. LEPIDIUM Linn.

L. sativum Linn. Sp. Pl. 644, 1753; FBI 1 : 159; Bamber 359; Sabnis 130; Maheshw. 62; Puri 21; *Duthie* 47.

Glabrous annuals up to 1 m high. Basal leaves long petioled, bipinnatisect, stem leaves sessile often entire. Flowers small, white in long racemes. Siliqua winged, orbicular, deeply notched, 2-seeded.

A weed of cultivation during the cold season.

Local name : Alsa, Hala.

Flowers and fruits : Feb.-May.

Badopal, 34537; Barnala, 36591; Binjhol (Panipat), 25812, 25818; Fatehbad, 25974; Hissar. *M. A. Rau* 3593; Jind, 25868; Rohtak, 26367; *V. J. Nair* 29716.

7. MALCOMIA R. Br.

M. africana R. Br. in Ait. Hort. Kew 3(4): 121, 1812; FBI 1 : 146; Bamber 319; Sabnis 129.

Erect leafy annuals up to 50 cm high, rough with forked and simple hairs. Leaves petioled, oblong or lanceolate, toothed. Flowers in terminal racemes; pink to purple. Pods linear, elongate, clothed with forked hairs, subsessile.

Common weed during the cold season and spring.

Considered to be a very good fodder for sheep and cattle.

Bhatinda, 26280; Dabwali, 26138, 26144, 26156.

8. RAPHANUS Linn.

R. sativus Linn. Sp. Pl. 669, 1753; FBI 1 : 166; Bamber 504; Maheshw. 57; Puri 21; *Duthie* 47.

Annual herbs up to 1.5 m high, rough or smooth, hairy. Tap roots fusiform, tuberous. Leaves pinnately divided, end lobe largest. Flowers large, white with purple veins. Pod terete, indehiscent. Seed globose, brownish black.

Cultivated during the cold season for the edible roots; young leaves and tender fruits used as vegetables.

Local name : Muli.

Flowers and fruits : Dec.-June.

Badopal, 25922; Ratia, 25993; Taran Taran, 36335.

9. RORIPPA Scap.

1. Flowers white

3. *R. nasturtium-aquaticum*

1. Flowers yellow:

2. Leaves pinnatifid or not, entire

2. *R. montana*

2. Leaves pinnatifid, lobes toothed

1. *R. indica*

1. *R. indica* (Linn.) Hiern, Cat. Afr. Pl. Welw. pt. 1, 26, Addit. & Corr. 1896. *Sisymbrium indicum* Linn. Mant. 1 : 93, 1767. *Nasturtium indicum* (Linn.) DC. Prodr. 1 : 139, 1824; FBI 1 : 134; Bamber 638; Puri 19; Duthie 39.

An erect almost hairy annual. Radical leaves pinnatifid; upper leaves lyrate, margin toothed. Racemes long. Flowers yellow, small. Pods cylindrical.

A garden weed.

Flowers and fruits : Feb.-March.

There are a few sheets in DD without precise locality.

2. *R. montana* (Wall. ex Hook. f. et Thoms.) Small, Fl. S. E. U. S. 1336, 1913; Maheshw. 58. *Nasturtium montanum* Wall. ex Hook. f. et Thoms. in Jour. Linn. Soc. 5 : 139, 1861; FBI 1 : 134; Bamber 638; Duthie 39.

Erect herbs up to 1 m. Flowers yellow. Pods cylindrical, narrow. Common in moist places.

Flowers : March-April.

Hissar, V. J. Nair 21505.

3. *R. nasturtium-aquaticum* (Linn.) Hayek, Sched Fl. Stir. Exs. 3-4 : 22, 1905. *Sisymbrium nasturtium-aquaticum* Linn. Sp. Pl. 657, 1753. *Nasturtium officinale* R. Br. in Ait. f. Hort. Kew 4 : 111, 1812; FBI 1 : 133; Bamber 638; Duthie 39.

A semi-aquatic herb with creeping stem; leaves pinnate, leaflets entire or wavy. Flowers white in short racemes. Pods cylindrical, stalked. Water cress.

Local name : Halim.

Flowers and fruits : Feb.-March.

Hoshiarpur, Aitchison s. n. (DD), Anonymous s. n. (DD).

10. SISYMBRIUM Linn.

S. irio Linn. Sp. Pl. 659, 1753; Hook. f. et Thoms. in Jour. Linn. Soc. 5 : 157, 1861; FBI 1 : 150; Bamber 504; Sabnis 130; Maheshw. 58; Puri 20; Duthie 42.

Erect herbs up to 1 m or more high, smooth. Leaves pinnately divided, end lobe large and often arrow-headed. Flowers yellow. Pods erect.

Common in waste places and as a weed in gardens during the cold season.

Local name : Jungli-sarson.

Flowers and fruits : Feb.-April.

Badopal, *V. J. Nair* 19826; Bhatinda, 27813; Binjhol (Panipat), 25831; Dabwali, 26137, 26146; Fatehbad, 25969; Hissar, 25908; *V. J. Nair* 19353; Jhabua, 20707; Mahendragarh, 20599, 20627; Sampla, 20014; Taran Taran, 36355.

11. CAPPARACEAE

- | | |
|--|--------------------|
| 1. Herbs with usually digitate leaves; fruit an elongated capsule with a persistent replum | 3. <i>Cleome</i> |
| 1. Shrubs or trees usually with simple (trifoliate in <i>Crataeva</i>) leaves; fruits berry or rarely dehiscent, then without a replum; | |
| 2. Androphore elongated, longer than the sepals; fruits narrowly cylindrical, slightly torulose | 1. <i>Cadaba</i> |
| 2. Androphore short, not as long as the sepals; fruits various: | |
| 3. Branches spiny | 2. <i>Capparis</i> |
| 3. Branches not spiny: | |
| 4. Leaves simple | 5. <i>Maerua</i> |
| 4. Leaves trifoliate | 4. <i>Crataeva</i> |

1. CADABA Forsk.

C. fruticosa (Linn.) Druce in Rep. Bot. Exch. Cl. Brit. Isles 1913 (3) : 415, 1914; Santapau et Wagh in Bull. Bot. Surv. Ind. 5(2) : 105, 1963; Puri 23. *Cleome fruticosa* Linn. Sp. Pl. 671, 1753. *Cadaba farinosa* Forsk. Fl. Aegypt. Arab. 68, 1775; FBI 1 : 173; Bamber 51; Parker 17. *C. indica* Lamk. Encycl. 1 : 544, 1783; FBI 1 : 173; Sabnis 132.

A straggling pubescent shrub, becoming glabrescent. Leaves simple, elliptic-oblong, entire, mealy when young. Stipules minute. Flowers yellowish white. Petals clawed. Stamens 4 or rarely 5. Fruit cylindrical, irregularly torulose; seed striate, clothed by a red aril.

Common on the walls of ruins and deserted buildings.

Flowers and fruits : Nov.-Jan.

Hissar, *V. J. Nair* 14770.

2. CAPPARIS Linn.

- | | |
|--|------------------------|
| 1. Erect shrubs or small trees; branches leafless; flowers deep or light scarlet | 1. <i>C. decidua</i> |
| 1. Climbing shrubs; branches leaty; flowers white: | 3. <i>C. zeylanica</i> |
| 2. Flowers supra-axillary; fruits reddish brown | 2. <i>C. sepiaria</i> |
| 2. Flowers solitary axillary; fruits black | |

1. *C. decidua* (Forsk.) Edgew. in Jour. Linn. Soc. Lond. Bot. 6 : 184, 1862; Pax in Engl. & Prant. Pflanzenfam. 3(2) : 231, f. 139, 1891; Jacobs in Blumea 12(3) : 424, 1965; Maheshw. 65; Puri 23. *Sodada decidua* Forsk. Fl. Aegypt. Arab. 81, 1775. *Capparis aphylla* Roth, Nov. Sp. Pl. Ind. Or. 238, 1821; FBI 1 : 174; Bamber 73; Sabnis 132; Parker 19; Duthie 51.

A large shrub or small tree with rough grey and corky bark. Tender branches with waxy bloom. Leaves caducous. Stipular spines straight up to 3 mm, often wanting. Gynophore 1.5-2 cm long. Berry 2 cm across, globose, red or pink.

This plant with *Prosopis cineraria*, *Acacia nilotica* var. *tomentosa*, *Salvadora oleoides*, *Maerua oblongifolia* and *Cocculus pendulus* constitute the bulk of the scrubby vegetation. The flower buds and fruits are used for pickles.

Local name : Kair, Karil.

Flowers and fruits : March-April. Stray flowers are found throughout the year.

Bhatinda, 27808; Choudriwas, *V. J. Nair* 21520; Faridkot, 36536; Hansi, 25040; Hissar, 18791; *Duthie* 3842 (DD), 4512 (DD); *V. J. Nair* 19207; Jind, 16118; Kurukshetra, *J. N. Vohra* 9883; Loharu, 16325, 20094; Mahendragarh, 20603; Mohra (Rohtak), *V. J. Nair* 23101; Patiala, *T. A. Rao* 10953; Sirsa, *V. J. Nair* 21561; Sohna, *T. A. Rao* 11066.

2. *C. sepiaria* Linn. Syst. Nat. 10 ed. 2 : 1071, 1759; Sp. Pl. 2 ed. 720, 1762; FBI 1 : 177; Bamber 73; Sabnis 132; Parkar 20; Duthie 51; Maheshw. 65; Puri 23. Jacobs 489.

A much-branched shrub often climbing. Branches stout, zig-zag. Spines stout and recurved. Leaves coriaceous. Flowers white in terminal umbellate clusters. Gynophore 5-10 mm long. Stamens many. Fruit 8 mm in diameter.

Common along road sides, in scrubs and jungles, and near canals. Often gregarious. Sheds leaves during the hot season.

Local name : Hingarna, Hins.

Flowers and fruits : April-Aug.

Daber, 15872; Fatehbad, 16241; Gohana, *V. J. Nair* 23152; Hissar, 24878; *Duthie* 3841 (DD), 3843 (DD); *V. J. Nair* 19946, 21636; Karnal, *Parker* 1254 (DD); Ludwa, 26427; Ottobridge, *V. J. Nair* 21606.

3. *C. zeylanica* Linn. Sp. Pl. 2 ed. 720, 1762 (non Hook. et Thoms.); *C. horrida* Linn. f. Suppl. 264, 1781; FBI 1 : 178; Bamber 590; Sabnis 132; Parker 20; Puri 23; Duthie 52.

Climbing shrubs. Spines recurved. Leaves subcoriaceous. Flowers white developing along young branches before the leaves. Stamens many, white, turning reddish. Gynophore 2-6 cm long, glabrous. Fruit globular to ellipsoid, woody.

Frequent in jungles.

Local name : Hins.

Flowers and fruits : April-May.

Hoshiarpur, *Aitchison* 565 (DD); Ludwa, 26430.

3. CLEOME Linn.

- | | |
|--|--------------------------|
| 1. Stamens more than six | 4. <i>C. viscosa</i> |
| 1. Stamens six only: | |
| 2. Gynophore present | 2. <i>C. gynandra</i> |
| 2. Gynophore absent: | |
| 3. Leaves simple; fruits more than 2 cm long | 3. <i>C. scaposa</i> |
| 3. Leaves usually 3 or sometimes 5-foliolate; fruits less than 2 cm long | 1. <i>C. brachycarpa</i> |

1. *C. brachycarpa* Vahl ex DC. Prodr. 1 : 240, 1824; FBI 1 : 169; Bamber 389; Sabnis 131; Maheshw. 63; Puri 22; Duthie 48.

Erect strongly scented herbs with woody base. Leaves and stem covered with glandular hairs. Flowers pale yellow. Capsules oblong, beaked. Styles persistent. Seeds minute, smooth.

Common in hard soil.

Flowers and fruits : Aug.-Jan.

Barwala, *V. J. Nair* 19295; Hissar, *Duthie* 3837 (DD); *Raizada* 20970 (DD); Tosham, 23079.

2. *C. gynandra* Linn. Sp. Pl. 671, 1753; Iltis in *Brittonia* 12; 284, 1960; Puri 22. *Gynandropsis pentaphylla* (Linn.) DC. Prodr. 1 : 238, 1824; FBI 1 : 171; Bamber 390; Sabnis 131, *Duthie* 49. *G. gynandra* (Linn.) Briq. in *Ann. Cons. Jard. Bot. Genève* 17 : 382, 1914; Maheshw. 64.

A glandular pubescent annual up to 95 cm tall and with repelling odour. Leaves 5-foliolate. Flowers purplish white, viscid. Stamens at about the middle of the gynandrophore. Stigma sessile. Fruit up to 7.5 cm. Seeds reniform, black.

Common in waste lands and cultivated places during the rainy season.

Local name : Kathal, Hullul.

Flowers and fruits : July-Sept. Stray fruits even up to Jan.

Badopal, 24939; Fatehbad, 16240, 18874; Hissar, *Duthie* 3839 (DD); Kurukshetra, *J. N. Vohra* 9889; Loharu, 16323; Mahendragarh, 16280; Narnaul 18874, 25204.

3. *C. scaposa* DC. Prodr. 1 : 239, 1824. *C. papillosa* Steud. Nomen. Bot. ed. 2, 1 : 382, 1840; FBI 1 : 168; Bamber 275; Sabnis 131.

A strongly scented glandular pubescent herb. Leaves ovate, or ovate cordate, papillose. Flowers small, pinkish becoming yellow. Capsule subsessile, up to 5 cm long, slender. Seeds granulate.

Common in hilly places. A lithophyte.

Flowers and fruits : Aug.-Sept.

Khanak, 16256, 16259; Tosham, 25082.

4. *C. viscosa* Linn. Sp. Pl. 672, 1753; FBI 1 : 170; Bamber 389; Sabnis 131; Maheshw. 63; Puri 22; Duthie 48.

A glandular pubescent herb up to 1 m high. Leaves 3-5-foliate. Petals yellow, clawed. Stamens 12-24. Capsules up to 9 cm long, glandular pubescent. Seeds smooth, black.

A weed of cultivated areas.

Local name : Higul, Bugra.

Flowers and fruits : July.-Oct.

Badopal, 24940; Bhiwani, 16333; Hissar, 16195; Raizada 21024 (DD).

4. CRATAEVA Linn.

C. odora Buch.-Ham. Trans. Linn. Soc. 15 : 118, 1827; Jacobs Fl. Mal. Ser. 1, 6 : 66, 1960. *C. religiosa* Forst. f. Prodr. 35, 1786; FBI 1 : 172; Bamber 40; Sabnis, 132; Parker 20; Duthie 50.

A small tree (planted ?). Leaves deciduous, appearing with the flowers. Leaflets 3, subcoriaceous, red brownish when dry. Flowers yellowish white becoming purplish. Stamens many, longer than the petals. Fruits 4-5 cm long, red-brownish when dry.

Local name : Barna.

Flowers : April-May. Fruits : August.

Hissar, V. J. Nair 19947; Jind, 26513; Sonpet, V. J. Nair 23363; Yamunanagar, 27596.

5. MAERUA Forsk.

- 1. Branches and leaves glabrous
- 1. Branches and leaves pubescent

- 1. *M. oblongifolia* var. *glabra*
- 2. *M. oblongifolia* var. *scabra*

1. *M. oblongifolia* (Forsk.) A. Rich var. *glabra* (Hook. f. et Thoms.) N. C. Nair comb. nov. *M. arenaria* Hook. f. et Thoms. var. *glabra* in Hook. f. Fl. Brit. Ind. 1 : 171, 1872; Duthie 50.

Woody climber with smooth grey bark. Flowers corymbose, greenish white. Calyx tube funnel-shaped, lobes 4, valvate, hairy on the margin. Petals 4, smaller than calyx lobes. Stamens many. Fruits moniliform, twisted and knotty, berry up to 8 cm long, each knot 1-seeded.

A common climber in jungles and waste places.

Flowers and fruits : Aug.-March.

Hissar, 18780, *M. A. Rau* 3506, *V. J. Nair* 14785; Sirsa, 18911.

2. *M. oblongifolia* (Forsk.) A. Rich. var. *scabra* (Hook. f. et Thoms.) N. C. Nair comb. nov. *M. arenaria* Hook. f. et Thoms. var. *scabra* Hook. f. et Thoms. in FBI 1 : 171, 1872; Duthie 50.

Like the last taxon but young branches, pedicels and calyx pubescent throughout.

Flowers and fruits : Aug.-March.

Between Bhiwani and Loharu, 20072; Hansi, 18723; Hissar, *Duthie* 3840 (DD); *Raizada* 20965 (DD); *M. A. Rau* 3527.

12. RESEDACEAE

OLIGOMERIS Camb.

O. linifolia (Vahl) Macbride in Contr. Gray Herb. (n.s.) 53 : 13, 1918; Cufodontis in Bull. Jard. Bot. Brux. Suppl. 24 : 161, 1954; Maheshw. 66. *Reseda linifolia* Vahl in Hornemann, Hort. Hafn. 2 : 501, 1814. *Oligomeris glaucescens* Camb. in Jacq. Voy. Bot. 24, t. 25, 1844; FBI 1 : 181; Bamber 223; Sabnis 132; Duthie 53.

Branched glabrous annual with linear leaves. Spike dense-flowered, elongate. Flowers bracteate, greenish yellow. Capsules 4-lobed. Seeds shining.

Common in waste places.

Local name : Bui.

Flowers and fruits : Sept.-March.

Bhatinda, 26285; Choudhriwas, *V. J. Nair* 19379; Hoshiarpur, *Aitchison* 697 (DD); Mahendragarh, 20574, 20615; Sirsa, *M. A. Rau* 3599; Talwandi, *V. J. Nair* 19357.

13. VIOLACEAE

VIOLA Linn.

V. serpens Wall. in Roxb. Fl. Ind. 2 : 449, 1824; FBI 1 : 184; Bamber 456; Sabnis 133.

Herbs with scattered hairs. Stem short with runners. Leaves ovate or cordate, toothed. Stipules fringed. Flowers lilac.

Local name : Banafsha.

Flowers : Cold months.

Hoshiarpur, *Aitchison* 541 (DD).

14. FLACOURTIACEAE

1. Style one, ovary 1-celled
 1. Styles more than 1; ovary 2 or more celled

2. *Xylosma*
 1. *Flacourtia*

1. FLACOURTIA Comm.

F. indica (Burm. f.) Merr. Interp. Herb. Amb. 377, 1917; Maheshw. 67.
Gmelina indica Burm. f. Fl. Ind. 132, t. 39, f. 5, 1768. *F. ramontchi*
 L'Herit. Stirp. Nov. 59, t. 30, 1786; FBI 1 : 193; Bamber 35; Sabnis 133;
 Parker 22; Duthie 57.

Thorny shrubs. Leaves simple, alternate, glabrous, puberulous on the
 veins. Flowers yellow. Petals absent.

Local name : Kukai, Kako, Khatai.

Flowers : Hot months.

Hoshiarpur, *Aitchison* 504 (DD).

2. XYLOSMA Forst.

X. longifolium Clos in Ann. Sc. Nat. Ser. 4, 8 : 231, 1857; FBI 1 : 194;
 Bamber 35; Sabnis 133; Parker 22; Duthie 57.

Small trees. Leaves alternate, exstipulate, simple, shining.

Flowers yellow in short racemes. Petals absent.

Local name : Chirunda.

Flowers : Nov.-Jan.

Hoshiarpur, *Aitchison* 597 (DD).

15. POLYGALACEAE

POLYGALA Linn.

1. Seeds with a strophiole
 1. Seeds without a strophiole

1. *P. erioptera*
 2. *P. irregularis*

1. **P. erioptera** DC. Prodr. 1 : 326, 1824; FBI 1 : 203; Bamber 284;
 Sabnis 134; Maheshw. 68; Puri 24; Duthie 60.

An erect or decumbent annual, variable in habit. Leaves variable,
 obovate to linear. Flowers pinkish yellow. Wings petaloid.

Common in Sandy places.

Flowers : Aug.-Oct.

Bakra-Nangal, *T. A. Rao* 10818; Bharian, 18814; Bhiwani, 16353; Dadri,
 16265; Fatehabad, 16239, 18858; Hissar, *Raizada* 21005 (DD); Hoshiarpur,
T. A. Rao 10747; Ludhiana, *Drummond* 1276 (DD); Narnaul, 25218; Otto-
 bridge (Sirsa), 18963; Rohtak, *V. J. Nair* 23218, 29724; Sirsa, 18963;
 Talwandi, 18755, 18774; Tosham (Hissar), *Drummond* 1288 (DD).

2. *P. irregularis* Boiss. Diagn. Ser. 1, 1, fasc. 1, 8, 1842 & Fl. Or. 1 : 469, 1867; Cooke, Fl. Bomb. Pres. 1 : 61, 1901; Mukherj. in Bull. bot. Soc. Beng. 12 : 42, 1958; Nair & Nair in Bull. bot. Surv. India 5 : 222, 1963; Puri 25.

Prostrate plants. Leaves variable, obovate-lanceolate. Racemes terminal often divaricate; persistent wing sepals with rounded apex, veins green. Corolla purple.

Not common. Found in sandy places.

Flowers and fruits : Oct.-Nov.; Feb.-May.

Kanana (Dadri), 20545; Loharu, 20086; Rohtak, V. J. Nair 23188; Siwani, 26567.

16. CARYOPHYLLACEAE

1. Stipules present, scarious:

2. Capsules 3-valved:

3. Style 1, tip 3-toothed; erect greyish herbs

3. Styles 3; weak herbs

2. Capsules 5-valved; styles 5, free

1. Stipules absent:

4. Calyx gamosepalous:

5. Petals clawed with an appendage near the base of the blade:

6. Styles 3(4); capsules dehiscent by apical teeth

6. Styles 2; capsules 4-valved

5. Petals clawed but without appendage near the base:

7. Calyx teeth long and leaf-like

7. Calyx teeth not long and leaf-like, epicalyx present

4. Calyx polysepalous; petals not clawed:

8. Petals deeply lobed

8. Petals entire

4. *Polycarphaea*

7. *Spergularia*

6. *Spergula*

5. *Silene*

9. *Vaccaria*

2. *Agrostemma*

3. *Dianthus*

8. *Stellaria*

1. *Arenaria*

1. ARENARIA Linn.

A. serpyllifolia Linn. Sp. Pl. 423, 1753; FBI 1 : 239; Bamber 530; Sabnis 136; Maheshw. 69; Duthie 63.

A small decumbent annual, glandular throughout. Leaves ovate or ovate-elliptic. Flowers white. Seeds black, tubercled.

Common in moist sandy places and in gardens during cold season.

Flowers : Feb.-March.

Badopal, 25925; Bhatinda, 26277; Kapurthala, 36311; Malerkotla, 36712.

2. AGROSTEMMA Linn.

A. githago Linn. Sp. Pl. ed. 2; 435, 1762. *Lychmis githago* (Linn.) Scop. Fl. Carn. (ed. 2) 1 : 310, 1772. *Githago segetum* Link. Diss. Bot. Suerin 62, 1795.

Annual herbs with simple or sparsely branched flowering stem 10-100 cm long, covered with adpressed white hairs. Leaves 3-12.5 cm long, linear lanceolate, acute with adpressed hairs. Flowers 3-5 cm diameter, usually solitary at the ends of branches. Pedicels hairy. Calyx tube

cylindrical, ovoid, coriaceous, hairy, 10-ribbed with long linear acute leaf-like teeth equalling the petals or longer. Petals pale reddish purple, long clawed, slightly notched with no coronal scales. Capsules ovoid, exceeding the calyx tube, opening by 5 \pm erect teeth. Seeds black, tubercled.

In wheat fields. Seeds said to be poisonous. In all probability a new introduction to this country.

Flowers and fruits : Jan.-April.

Barnala, 36597 A, B.

3. DIANTHUS Linn.

D. caryophyllus Linn. Sp. Pl. 410, 1753.

Cultivated in gardens from Dec.-April.

4. POLYCARPAEA Lamk.

P. corymbosa (Linn.) Lamk. Ill. 12 : 129, 1800; FBI 1 : 245; Bamber 133; Maheshw. 70; Puri 25; Duthie 65. *Achyranthes corymbosa* Linn. Sp. Pl. 203, 1753.

Erect annual herbs with dichotomous purplish-white branches and linear leaves. Bracts and calyx silvery.

Common in sandy places; one of the early pioneers on sand dunes.

Flowers and fruits : July-Dec.

Bankhandi, T. A. Rao 10774; Choudriwas, 25123; Gurgaon, 25245; Kanana, 20542; Narnaul, 25184; Panipat, 24711; Rewari, 20769; T. A. Rao 11140; Tosham, 25054.

5. SILENE Linn.

S. conoides Linn. Sp. Pl. 418, 1753; Royle, Ill. 79. 1834; FBI 1 : 218; Bamber 143; Sabnis 135; Puri 25; Duthie 62.

Annual, glandular pubescent herbs. Leaves lanceolate. Calyx conic ovoid. Petals pink or pinkish white, ornamental. Seeds tuberculate.

In wheat fields.

Flowers : Feb.-April.

Bhatinda, 26282; Dabwali, 26145; Hoshiarpur, Aitchison s. n. (DD); Lambi, 26217; Talwandi, 34519; Taran Taran, 36331.

6. SPERGULA Linn.

S. arvensis Linn. Sp. Pl. 440, 1753; FBI 1 : 243; Bamber 132; Sabnis 136; Duthie 63; Maheshw. 69; Puri 25.

Weak herbs. Branches slightly glandular. Leaves linear, grooved beneath, whorled. Stipules thin, dry, small. Flowers in dichasial umbellate cymes. Sepals 5, blunt. Petals 5, white, blunt. Stamens 10. Capsule longer than calyx. 5-valved. Seeds many narrowly winged.

Common in gardens and moist places during the cold season.

Flowers and fruits : Dec.-April.

Badopal, 25930; Binjhol (Panipat), 25832; Fatehbad, *M. A. Rau* 3567; Hoshiarpur, *Aitchison* 338 (DD); Karnal, 25293; Lambi, 26177; Mahendragarh, 20638; Narnaul, 20023.

7. SPERGULARIA (Pers.) J. et C. Presl

1. Petals sharply pointed; seeds winged
 1. Petals broad-tipped; seeds not winged

1. *S. fallax*
 2. *S. rubra*

1. ***S. fallax*** Lowe in Hook. Kew Jour. Bot. 8 : 289, 1856. *Spergula fallax* (Lowe) E. H. Krause in Sturm, Fl. Deutsch. (ed. 2) 5 : 19, 1901; Milne-Redhead in Kew Bull. 1950 : 338, 1950; Burtt & Lewis in Kew Bull. 1952 : 349, 1952.

Weak herbs. Leaves linear, not grooved beneath. Flowers white. Seeds flattened, smooth, broadly winged, black.

Common in gardens during cold season.

Flowers and fruits : Dec.-April.

Hissar, 25906; Hoshiarpur, *Aitchison* 577 (DD); Jhabua (Rewari), 20733; Khanna, 35983; Sangrur, 36706.

2. ***S. rubra*** (Linn.) Presl, Fl. Cech. 94, 1819. *Arenaria rubra* Linn. Sp. Pl. 423, 1753. *Spergula rubra* (Linn.) Dietr. Syn. Pl. 2 : 1958, 1840; FBI 1 : 244; Bamber 132; Duthie 64.

Small annual herbs. Stem up to 20 cm long. Leaves linear, fleshy, stipules split silvery. Flowers pinkish white. Petals shorter than sepals. Capsule ovoid, longer than calyx. Seeds many, brown, not winged.

Rare on field borders.

Flowers and fruits : Feb.

Karnal, 15801.

8. STELLARIA Linn.

S. media (Linn.) Villars, Hist. Pl. Dauph. 3 : 615, 1789; Willd. in Fl. Zamb. 1(2) : 349; Turrill in Fl. Trop. East Afr. Caryophyll. 24, 1956; FBI 1 : 230; Bamber 529; Sabnis 135; Maheshw. 68; Duthie 62.

Prostrate herbs. Lower leaves petioled, upper sessile. Flowers in axillary and terminal dichasia. Sepals 5, free to the base. Petals 5, white, some times absent. Stamens 3, 5 or 10. Capsules longer than sepals.

Common in gardens and shady places during the cold months.

Flowers and fruits : Dec.-March.

Hissar, *M. A. Rau* 3507; *V. J. Nair* 14767, 19368; Jind, 25871; Ludhiana, 35986.

9. VACCARIA Medik.

V. pyramidata Medik. Phil. Bot. 1 : 96, 1789; Cuffodontis in Bull. Jard. Bot. Brux. Suppl. 23 : 104, 1953; Maheshw. 68. *Saponaria vaccaria* Linn. Sp. Pl. 409, 1753; FBI 1 : 217; Bamber 133; Sabnis 135; Puri 25; Duthie 62.

Erect sparingly branched herbs up to 1 m high. Flowers in corymbs. Petals light pink. Seeds granulate.

Common in wheat fields.

Flowers and fruits : March-April.

Amritsar, *Vohra* 11272; Barnala, 36589; Binjhol, 25813; Chakka Jheel (Sirsa), *V. J. Nair* 21579; Dabwali, 26139; Jind, 25869; Ludwa, 26458; Taran Taran, 36330.

17. PORTULACACEAE

PORTULACA Linn.

- | | |
|--|--------------------------|
| 1. Flowers more than 2 cm across | 1. <i>P. grandiflora</i> |
| 1. Flowers less than 2 cm across: | |
| 2. Plants densely hairy, flowers red | 3. <i>P. pilosa</i> |
| 2. Plants not densely hairy, flowers yellow: | |
| 3. Flowers solitary, terminal | 4. <i>P. quadrifida</i> |
| 3. Flowers in terminal clusters | 2. <i>P. oleracea</i> |

1. **P. grandiflora** Hook. in Bot. Mag. t. 2885, 1829; Maheshw. 71.

A succulent prostrate herb. Leaves linear borne all round the stem. Flowers of various shades, yellow, pink and purple. Cultivated for its attractive flowers during the rainy season.

Local name : Lonja.

Hoshiarpur, Anonymous s. n. (DD).

2. **P. oleracea** Linn. Sp. Pl. 445, 1753; Roxb. Fl. Ind. 2 : 463, 1832; FBI 1 : 246; Bamber 544; Sabnis 136; Maheshw. 70; Puri 26; Duthie 66.

Glabrous annual herbs with succulent, alternate leaves. Stipules minute. Flowers sessile. Sepals persistent. Petals yellow. Stamens 8-12. Styles 3-fid. Seeds several.

Common weed in cultivated places and gardens. Cooked as vegetable and used as a cooling, demulcent and diuretic medicine.

Local name : Kufra, Choulai.

Flowers : July-Nov.; March-April.

Barwala, *V. J. Nair* 19262; Chakka Jheel, 21594; Fatehbad, 18853; Hissar, 24846; Jhabua, 20712; Karnal, *J. N. Vohra*, 8867; Khansala, *V. J. Nair* 23248; Loharu 16320; Ludwa, 26453; Mahendragarh, 20604, 20634; Rewari, 20789; Talwandi, 16213.

3. *P. pilosa* Linn. Sp. Pl. 639, 1753.

Prostrate woolly herbs. Stems terete, joints hairy. Leaves linear lanceolate, subulate, convex on the back, smooth, equalling or little longer than the axillary hairs; floral leaves in whorls. Flowers 2-6 in a head, sessile, crowded at the tips of branches and surrounded by long hairs, open about mid-day. Petals brick red or purplish red, slightly exceeding the calyx, ovate, obtuse to retuse. Stamens 15 or more. Ovary 1-celled, stigmas 5. Capsules subglobose, dehiscent transversely about the middle. Seeds many.

On dry slopes and on hard ground.

Flowers : Oct.-March.

Dhauj, *T. A. Rao* 11078; Hissar, 24891; Jhabua (Rewari), 20711; Khanak, 25101; Sirsa 18909.

4. *P. quadrifida* Linn. Mant. 73, 1767; Roxb. Fl. Ind. 464, 1832; FBI 1 : 247; Bamber 521; Maheshw. 70; Puri 26; Duthie 66.

Prostrate succulent herbs rooting at nodes. Stipules formed by a ring of long white hairs. Flowers yellow, solitary, surrounded by a whorl of 4 leaves and hairs. Calyx of 2 sepals united below; free part caducous. Petals 4, caducous. Stamens 8. Seeds twice the size of *P. oleracea*.

Weed. Used as pot herb. Flowers open at noon.

Local name : Choulai, Lunak.

Flowers : July-Dec.

Panipat, 18628, 24650.

18. TAMARICACEAE

TAMARIX Linn.

1. Flowers in paniced racemes or spikes, bisexual or monoecious, purplish white; bract shorter than flowers;

2. Trees; twigs articulate at the base of leaf sheath; bracts sheathing

2. Shrubs; twigs not articulate; bracts not sheathing

1. Flowers in dense cylindrical spikes, dioecious, bright purple; bracts as long as the flowers or nearly so

1. *T. aphylla*

3. *T. troupis*

2. *T. dioica*

1. *T. aphylla* (Linn.) Karst. Deutsch. Fl. 641, 1880; Maheshw. 72; Puri 27. *Thuya aphylla* Linn. Cent. Pl. 1 : 32, 1756; *Tamarix articulata* Vahl, Symb. Bot. 2 : 48 t. 32, 1791; FBI 1 : 249, Bamber 29; Sabnis 136; Parker 26; Duthie 68.

The sheathing leaves have punctate glands. Sepals and petals 5; stamens 5; disk 10-lobed; capsules 3-5-valved; seeds with a tuft of hairs.

Common in saline areas; planted on canal banks and road sides.

Local name : Faras.

Flowers : Aug.-Oct. *Fruits* : Dec.

Firozpur Jhirka, *T. A. Rao* 11154; Hansi, 16135; Nilokheri, 15837; Ottobridge, 18911.

2. *T. dioica* Roxb. Fl. Ind. 2 : 101, 1832. FBI 1 : 249; Bamber 112; Parker 26; Sabnis 136; Maheshw. 72; Puri 27; Duthie 68.

A shrub with drooping branches. Flowers purple-pink, pentamerous, stamens 5; styles 3, as long as the ovary. Fruits oblong.

Common on river beds, lowlying sandy areas, and canal banks.

Local name : Pilchi, Jhau.

Flowers and fruits : June-Oct.

Hansi, 18739; Ratal, 16129.

3. *T. troupii* Hole in Indian For. 45 : 247, 1919; Santapau, Fl. Sour. 28, 1962; Maheshw. 71; Puri 27. *T. gallica* Dyer in FBI 1 : 248 (non Linn.); Bamber 112; Parker 26; Duthie 67.

Shrubs with slender pendulous branches, flowers pentamerous, stamens 5.

Rare. Known only under cultivation.

Local name : Pilchi, Jhau.

Flowers : Rainy season.

Hoshiarpur, *Aitchison* 625 (DD); Ludhiana, *Duthie* 10791 (DD).

19. ELATINACEAE

BERGIA Linn.

1. Plants of dry habitat; woody but weak; stamens 10; pleasantly scented when fresh:

2. Plants glandular pubescent

2. Plants glabrous

1. Plants of semi-aquatic situations; herbaceous; stamens 5; not aromatic

2. *B. suffruticosa*

3. *B. aestivosa*

1. *B. ammannioides*

1. *B. ammannioides* Roxb. Hort. Beng. 34, 1814; Roth Nov. Pl. Sp. 219, 1821; FBI 1 : 251; Bamber 136; Maheshw. 72; Puri 27.

Slender herbs; stems green or reddish. glandular pubescent. Leaves serrate in the upper region and entire in the lower. Flowers red or reddish white.

Common on edges of pools, canals and cultivated fields.

Flowers : Jan.-April.

Dadri, 20511; Fatehbad, 18882, 25975; Hansi 25894; Hissar, 19013; Rewari, 20786; Tohana, 25009.

2. *B. suffruticosa* (Del.) Fenzl. in Denkschr. Baier Bot. Ges. 3 : 183, 1841. *Lancretia suffruticosa* Del. Fl. Egypte 213 t. 25, 1813. *B. odorata* Edgew. in Jour. Asiatic Soc. Beng. 7 : 765, 1838; FBI 1 : 251; Bamber 47; Parker 27; Puri 27; Duthie 69.

Prostrate, spreading on the ground. Bark papery. Leaves fascicled, hispid, glandular. Flowers in axillary fascicles. Petals white.

Local name : Gandhru.

Flowers and fruits : Oct.-Jan.

Chakka Jheel, 18978; Fatehbad, 18844, 18872, 18873, 18904, 16570; Kera, V. J. Nair 21564; Ottobridge, 18965.

3. *B. aestivosa* Steud. Nom. ed. 2, 1: 198, 1840; FBI 1: 251; Bamber 47; Parker 28; Duthie 69.

Like the last species, but nearly glabrous. Flowers pink. Sepal margins membranous.

Flowers : April.

This plant is mentioned on the authority of Bamber and Parker. It is common in the adjoining areas.

20. HYPERICACEAE

HYPERICUM Linn.

H. cernuum Roxb. Fl. Ind. 3: 400, 1832; FBI 1: 253; Bamber 51; Parker 30.

A shrub much branched from the base. Leaves ovate-lanceolate, decussate, dotted with glands. Flowers yellow, 5 cm across, pentamerous; stamens 5-adelphous at the base.

This is a Himalayan plant. Only one specimen of this has been seen from the area.

Local name : Pinli.

Flowers and fruits : March-May.

Kasauli (Ambala Dist.), B. L. Gupta s.n. (DD).

21. DIPTEROCARPACEAE

SHOREA Roxb.

S. robusta Gaertn. f. Fruct. 3: 48, 1805; FBI 1: 306; Bamber 8; Parker 32; Duthie 71.

Deciduous trees. Leaves ovate oblong 10-30 cm long and 6-18 cm broad, acuminate; base cordate, lateral nerves 12-15 pairs. Flowers yellowish in axillary racemes. Calyx accrescent, unequal in fruit. Stamens many. Ovary 3-celled.

One of the commonest trees in Sub-Himalayan tract and Siwalik Hills.

Local name : Sal.

Flowers and fruits : April-June.

Hoshiarpur Siwaliks, Aitchison 539 (DD).

22. MALVACEAE

- 1. Trees; staminal tube dividing into 5 branches 6. *Kydia*
- 1. Shrubs or herbs; stamens monadelphous into a staminal tube:
 - 2. Bracteoles absent:
 - 3. Carpels 1-seeded 10. *Sida*
 - 3. Carpels more than 1-seeded 2. *Abutilon*
 - 2. Bracteoles present as epicalyx:
 - 4. Fruits capsular:
 - 5. Bracteoles 3; stigmas connate 4. *Cossypium*
 - 5. Bracteoles more than 3; stigmas free:
 - 6. Calyx persistent 5. *Hibiscus*
 - 6. Calyx deciduous 1. *Abelmoschus*
 - 4. Fruit non capsular:
 - 7. Epicalyx of three bracteoles:
 - 8. Leaves orbicular, palmately veined; stigmas linear 7. *Malva*
 - 8. Leaves lanceolate, pinnately veined; stigmas capitate 8. *Malvastrum*
 - 7. Epicalyx of five or more bracteoles:
 - 9. Styles twice as many as the carpels; flowers under 5 cm in diameter:
 - 10. Ripe carpels glochidiate 11. *Urena*
 - 10. Ripe carpels not glochidiate 9. *Pavonia*
 - 9. Styles as many as the carpels; flowers more than 5 cm in diameter 3. *Althaea*

1. ABELMOSCHUS Medic.

- 1. Involucral bracts more than 5, linear:
 - 2. Involucral bracts equalling the calyx 1. *A. esculentus*
 - 2. Involucral bracts shorter than calyx 2. *A. moschatus*
- 1. Involucral bracts four or six, broad, leafy 3. *A. ficulneus*

1. **A. esculentus** (Linn.) Moench. Method. 617, 1794; Maheshw. 81; Puri 32. *Hibiscus esculentus* Linn. Sp. Pl. 696, 1753; FBI 1: 343; Bamber 246; Duthie 87.

Erect annuals with stiff hairs. Leaves variable in shape and size. Petioles often reddish. Involucral bracts deciduous. Corolla yellow with purple centre. Fruits up to 25 cm long, ribbed, hairy at first, becoming more or less glabrous.

The fruit is used as a vegetable; cultivated during summer and rainy season.

Local name: Bindi.

Bhatinda, 27760; Hissar, V. J. Nair 19960.

2. **A. moschatus** Medic. Malv. Fam. 46, 1787; Santapau Fl. Saurashtra 1: 49, 1962; Puri 32. *Hibiscus abelmoschus* Linn. Sp. Pl. 697, 1753; FBI 1: 342; Bamber 245; Duthie 87.

A tall annual with very variable leaves, lower shallowly lobed, upper deeply divided. Involucral bracts 8-12, hairy. Calyx connate, splitting on one side. Corolla yellow, showy, with purple centre. Capsules hairy. Cultivated.

This plant is given on the authority of Bamber. I have seen no specimen.

Local name : Kasturi bindi.

Flowers and fruits : Rainy season.

3. *A. ficulneus* (Linn.) Wt. et Arn. Prodr. 53, 1834; Santapau, loc. cit. 50. *Hibiscus ficulneus* Linn. Sp. Pl. 695, 1753; FBI 1: 350; Bamber 245; Duthie 86.

Tall herbs with variable leaves. Involucral bracts 4-6, caducous; calyx spathaceous, splitting on one side. Corolla pale yellow with purple centre. Cultivated for fibre.

This plant is mentioned on the authority of Bamber. I have seen no specimen.

Local name : Dula.

Flowers : Rainy season.

2. ABUTILON Linn.

- | | |
|---|---------------------------|
| 1. Carpels 10 or less: | |
| 2. Carpels not beaked or awned | 2. <i>A. fruticosum</i> |
| 2. Carpels awned | 6. <i>A. ramosum</i> |
| 1. Carpels more than 10: | |
| 3. Carpels truncate: | |
| 4. Carpels without awns | 4. <i>A. glaucum</i> |
| 4. Carpels in fruit 2-awned | 5. <i>A. theophrastii</i> |
| 3. Carpels mucronate or pointed: | |
| 5. Stems with spreading hairs | 7. <i>A. hirtum</i> |
| 5. Stems with smooth close tomentum: | |
| 6. Ripe carpels less than 8 mm long, and dehiscing before breaking away from the central axis | 1. <i>A. bidentatum</i> |
| 6. Ripe carpels more than 8 mm long and break away before dehiscing | 3. <i>A. indicum</i> |

1. *A. bidentatum* Hochst. in A. Rich. Fl. Abyss. 1: 68, 1847; FBI 1: 326, 1874; Bamber 239; Parker 36; Sabnis 138; Maheshw. 76; Puri 30.

Erect, shrubby, up to 3 m or more in height. Flowers yellow. Common along road sides and Jungles.

Flowers : Aug.-Dec.

Chakka jheel, 34554; Fatehbad, 18864, 18876; Hansi, 18733; Hissar, 18749, 18796; Duthie 3875 (DD); Rajpura, T. A. Rao 10931; Rewari, 20757; Rohtak, 16368; V. J. Nair 23208.

2. *A. fruticosum* Guill., Perr. et Rich. Fl. Senegamb. 1: 70, 1830; FBI 1: 328; Sabnis 138; Parker 37; Puri 30.

A branched undershrub. Leaves deeply cordate. Pedicels jointed almost near the top. Flowers yellow. Carpels 10, grey tomentose, little longer than calyx. Seeds covered with hooked hairs. Not common.

Flowers : July-Nov.

Hissar, 24857; Raizada 20994 (DD); Gurdaspur, Drummond 4630 (DD).

3. *A. indicum* (Linn.) Sweet, Hort. Brit. 1 : 54, 1827; FBI 1 : 326; Bamber 239; Parker 36; Sabnis 138; Maheshw. 75; Puri 29; Duthie 78.

Erect shrubs upto 1.5 m high, tomentose. Leaves cordate pubescent on both surfaces. Flowers solitary in axils. Pedicels jointed near the tip. Corolla orange yellow. Carpels 20 or more, tomentose becoming glabrescent, longer than the sepals. Common on road sides.

Flowers : July-Dec.

Hansi, 25887; Hissar, *Raizada* 21045 (DD); *V. J. Nair* 18748; Jind, 15888, 26526; Lambi 26334; Mahra (Rohtak Dist.), *V. J. Nair* 21696; Murthal forest (Sonpet), *V. J. Nair* 29742; Rewari, 20751; Yamunanagar, 26414.

4. *A. glaucum* (Cav.) Sweet, Hort. Brit. 54, 1827; Santapau, Fl. Sour. 1 : 40, 1962; Maheshw. 76; Puri 30. *Sida glauca* Cav. Icon. 5 : 8, t. 11, 1791. *Abutilon muticum* G. Don, Gen. Syst. 1 : 502, 1831; FBI 1 : 327; Parker 36.

Velvety undershrub. Leaves ovate-cordate, densely velvety on both sides. Flowers yellow. Calyx villous. Carpels densely villous, not beaked. Seeds with minute shining hairs.

Flowers : Oct.-May.

Fatehbad, 25949; Lambi, 27840; Ottobridge, 18952, 18961.

5. *A. theophrastii* Medic. Malv. Fam. 28, 1787; Blatt. in JBNHS. 34 : 630, 1931. *A. avicennae* Gaertn. Fruct. 2 : 251, t. 135, 1791; FBI 1 : 327; Bamber 226.

A downy annual. Leaves sub-orbicular acuminate, dentate, velvety on both surfaces. Stipules large, obliquely ovate-lanceolate. Inflorescence terminal. Pedicels axillary shorter than the petiole. Petals yellow. Carpels 15-20 with two spreading awns, 3-seeded. In waste places.

Local name : Chota barkhangi.

Only one specimen has been seen from the area.

Daryapur (Hissar Dist.), *M. A. Rau* 3570.

6. *A. ramosum* Guill. Perr. & Rich. Fl. Senegamb. 1 : 68, 1830. FBI 1 : 327; Parker 38; Maheshw. 76; Duthie 79.

Erect shrubs up to 2 m high. Leaves cordate sub-trilobate, clothed on both sides with scattered pubescence. Flowers yellow. Carpels 8-10, hairy, dehiscent but remain attached to the axis, the whole fruit breaking off at the joint in the peduncle.

Local name : Barkangi.

Flowers : Oct.-Dec.

Karnal, 24608; Murthal (Sonpet), *V. J. Nair* 29737.

7. *A. hirtum* (Lamk.) G. Don, Gen. Syst. 1 : 503, 1831; Santapau, Fl. Saur. 1 : 41, 1962. *Sida hirta* Lamk. Encycl. 1 : 7, 1783. *A. graveolens* Wt. et Arn. Prodr. 56, 1834; FBI 1 : 327; Puri 30; Duthie 78. *A. graveolens* var. *hirtum* Mast. in FBI 1 : 327, 1874.

Unpleasantly smelling perennial. Leaves long-pointed, velvety on both surfaces, roundish, cordate, toothed. Peduncle equal to or a little longer than the petiole. Flowers orange yellow. Carpels about 20, 2-seeded.

Local name : Barkangi.

Flowers : Oct.-Dec.

Ottobridge (Sirsa), 18953, 18961.

3. ALTHAEA Linn.

1. Flowers 1.25-2 cm across; weak, generally prostrate herbs

1. *A. ludwigii*

1. Flowers more than 2 cm across; ornamental, erect herbs

2. *A. rosea*

1. *A. ludwigii* Linn. Mant. 98, 1767; FBI 1 : 319; Bamber 551; Duthie 73.

Flowers white. Common along road sides.

Flowers : Feb.-March.

Barwala, 34531; Chakka jheel (Sirsa), 26030; Fatehbad, 25977, 26573.

2. *A. rosea* Cav. Diss. 2 : 91, t. 28, f. 1, 1786; FBI 1 : 319; Sabnis 137; Duthie 73.

Tall herb up to 2.5 m high. Flowers showy. The common garden Hollyhock.

Local name : Holyok.

Flowers : March-May.

Hissar, V. J. Nair 19977, 19978.

4. GOSSYPIUM Linn.

1. Bracteoles laciniate; free

3. *G. hirsutum*

1. Bracteoles not laciniate, united:

2. Plants hairy; corolla yellow with purple centre; capsules ovate

2. *G. herbaceum*

2. Plants pilose; corolla purple; capsules oblong

1. *G. arboreum*

1. *G. arboreum* Linn. Sp. Pl. 693, 1753; FBI 1 : 347 pp; Maheshw. 82; Duthie 90.

Shrubs. Leaves 5-7 lobed. Capsule pointed. Cultivated extensively during the rainy season.

Local name : Bari.

Flowers and fruits : Oct.-Nov.

Mahra village (Rohtak Dist.), V. J. Nair 21692-21695.

2. **G. herbaceum** Linn. Sp. Pl. 693, 1753; FBI 1 : 346 pp; Maheshw. 82; Duthie 91.

Shrubs. Leaves 5-7 lobed, cordate at base. Flowers large. Bracteoles entire or slightly toothed. Calyx spotted with black, glands.

Cultivated as a rainy season crop.

Local name : Bari.

Flowers and fruits : Oct.-Nov.

Badopal, 24942.

3. **G. hirsutum** Linn. Sp. Pl. 975, 1753; Hutchinson, Silow & Stephen, Evol. Gossyp. 30, t. 4, 1947; Santapau, Fl. Saur. 1 : 56, 1962; Maheshw. 82. *G. herbaceum* var. *hirsutum* Mast. in FBI 1 : 347, 1874.

Undershrub. Leaves simple to 5-lobed. Flowers yellow. Bracteoles cordate, cut into 8-12 long teeth. Capsules large rounded.

Extensively cultivated.

Local name : Bada Bari.

Flowers and fruits : Sept.-Nov.

Between Hansi and Jind, 24838; Mahra village (Rohtak Dist.), V. J. Nair 21693; Tohana, 25011.

5. HIBISCUS Linn.

- | | |
|---|----------------------------|
| 1. Calyx fleshy and red | 7. <i>H. sabdariffa</i> |
| 1. Calyx not fleshy, green: | |
| 2. Plants not deciduous: | |
| 3. Fruits not produced: | |
| 4. Petals deeply laciniate; bracteoles minute; calyx shortly toothed at the apex | 1. <i>H. schizopetalus</i> |
| 4. Petals not laciniate; bracteoles half as long as or equalling the calyx; calyx divided half way down | 2. <i>H. rosa-sinensis</i> |
| 3. Fruits produced: | |
| 5. Capsules membranous, inflated | 3. <i>H. trionum</i> |
| 5. Capsules not inflated: | |
| 6. Involucral bracts absent | 4. <i>H. lobatus</i> |
| 6. Involucral bracts present: | |
| 7. Bracteoles with a spoon like appendage | 10. <i>H. surattensis</i> |
| 7. Bracteoles without appendage: | |
| 8. Seeds cottony: | |
| 9. Leaves ovate, never lobed | 6. <i>H. micranthus</i> |
| 9. Leaves 3-lobed | 11. <i>H. hirtus</i> |
| 8. Seeds not cottony, either smooth or hairy: | |
| 10. Bracteoles curving over the calyx | 12. <i>H. caesius</i> |
| 10. Bracteoles not curving over the calyx: | |
| 11. Capsules winged | 13. <i>H. vitifolius</i> |
| 11. Capsules not winged | 5. <i>H. cannabinus</i> |
| 2. Plants deciduous: | |
| 12. Corolla 6 cm across or less; leaves rhomboid ovate or ovate, less than 5 cm long | 8. <i>H. syriacus</i> |
| 12. Corolla more than 6 cm across; leaves cordate, 5-7 lobed, more than 6 cm across | 9. <i>H. mutabilis</i> |

1. **H. schizopetalus** Hook. f. in Bot. Mag. t. 6524, 1880; Parker 39; Bor & Raizada, Beaut. Indian Clim. 236, f. 36, 1954; Maheshw. 80; Duthie 82.

Large shrubs. Branches drooping with pendulous light pink to red flowers on long peduncles. Staminal tube much exerted.

Coral Hibiscus of gardens.

Local name : Gulhar.

Flowers : Most of the year.

Patiala, *Anonymous* s.n. (DD).

2. *H. rosa-sinensis* Linn. Sp. Pl. 694, 1753; FBI 1 : 344; Bamber 82; Parker 39; Bor & Raizada 237, f. 137 & t. 88, 1954; Maheshw. 80; Puri 31; Duthie 82.

Large shrub. Flowers red or scarlet. Bracteoles 7-10, linear. Staminal column exerted.

Cultivated Shoe-flower of gardens. Double flowered variety is occasionally cultivated.

Local name : Gulhar.

Flowers : Most of the year.

Panipat, 24669.

3. *H. trionum* Linn. Sp. Pl. 697, 1753; FBI 1 : 334; Bamber 243; Duthie 83.

Annual undershrub, more or less hairy; bracteoles 8-12, linear subulate; calyx inflated with many nerves with purplish tint.

Flowers : Aug.-Nov.

This plant is mentioned on the authority of Bamber. I have seen no specimen from the area.

4. *H. lobatus* (Murr.) Kuntze, Rev. Gen. Pl. 3 : 19, 1898; Santapau, Fl. Saur. 1 : 43, 1962. *Solandra lobata* Murr. in Comm. Goett. 6 : 21, t. 1, 1785. *Hibiscus solandra* L'Her. Stirp. 1 : 103, t. 49, 1788; FBI 1 : 336; Bamber 244; Duthie 84.

Herbaceous. Flowers white with a pale purplish centre. Fruit small. Authority: Bamber.

5. *H. cannabinus* Linn. Syst. ed. 10, 1149, 1759; FBI 1 : 339; Sabnis 139; Maheshw. 79; Puri 31; Duthie 85.

Erect shrubs up to 2 m; stems some times prickly. Lower leaves undivided, upper divided into narrow lobes. Bracteoles free. Calyx longer than the fruit. Corolla pale yellow with crimson centre. Cultivated for fibre used in making ropes.

Local name : San.

Flowers and fruits : Sept.-Nov.

Between Hansi and Jind 24837; Panipat, 24705; Rohtak, V. J. Nair 29703.

6. *H. micranthus* Linn. f. Suppl. 308, 1781; FBI 1 : 335; Blatter in JBNHS. 34 : 632, 1931; Parker 39; Maheshw. 80; Puri 31; Duthie 84.

Erect shrubs. Young branches with stellate hairs. Leaves scabrid on both surfaces. Peduncles axillary often longer than the leaves, joined near the top. Corolla white fading to pink. Capsule globose. Seeds cottony. Common on rocky hill slopes and in scrub jungles.

Flowers and fruits : Aug.-Dec.

Hansi, 18730; Hissar, 16202; Kanana, 25143; Khanak, 16254; Mahendragarh, 16291; Tosham, 25084, 25085.

This is some times treated as a synonym of *H. ovalifolia* Vahl

7. *H. sabdariffa* Linn. Sp. Pl. 695, 1753; FBI 1 : 340; Bamber 244; Maheshw. 79; Puri 31; Duthie 86.

Large shrubs. Leaves 5-7-lobed. Stem, leaves and calyx often purple-tinted. Flowers yellow with a crimson base. Capsules shorter than the fleshy cup-like calyx, hairy.

Native of W. Indies. Cultivated for its succulent edible calyx. The stem yields a good fibre.

Local name : Lal San.

Flowers and fruits : Aug.-Nov.

Karnal, Drummond s.n. (DD).

8. *H. syriacus* Linn. Sp. Pl. 695, 1753; FBI 1 : 344; Bamber 89; Parker 41; Bor & Raizada 238, f. 138 t. 90, 91, 1954; Maheshw. 81.

Deciduous shrubs. Leaves cuneate, ovate or ovate-rhomboid, upper 3-lobed. Peduncles axillary. Corolla large, blue or white. Cultivated in gardens.

Flowers : June-Aug.

Authority : Bamber, Parker.

9. *H. mutabilis* Linn. Sp. Pl. 694, 1753; FBI 1 : 344; Parker 40; Bor & Raizada 234, f. 135, t. 86, 1954; Maheshw. 81.

Large shrubs, deciduous. Leaves about 12 cm across, cordate, 5-7-lobed or irregularly angled. Peduncles axillary, 7-13 cm long, jointed near the flower. Bracteoles linear lanceolate, shorter than the pubescent calyx. Corolla white or pink.

Cultivated in gardens. Propogated by cuttings.

Local name : Bada Golhar.

Flowers : Sept.-Oct.

Khanna, 35982.

10. *H. surattensis* Linn. Sp. Pl. 696, 1753; FBI 1 : 334; Bamber 551; Maheshw. 79; Duthie 83,

Small, weak, trailing or ascending undershrubs with scattered recurved prickles. Leaves 3-5-fid, toothed, long stalked. Stipules leafy. Flowers yellow with dark centre on stalks equalling the leaf stalks; calyx persistent. Capsules hairy; seeds downy.

Authority : Bamber.

11. *H. hirtus* Linn. Sp. Pl. 694, 1753; FBI 1 : 335; Bamber 89; Parker 39; Duthie 83.

Shrubs. Leaves variable in size and shape. Lower ones lobed, upper entire. Bracteoles filiform, shorter than sepals. Corolla pure white.

Authority : Bamber, Parker.

12. *H. caesius* Garcke in Bot. Zeit. 7 : 850, 1849; Cooke Fl. Pres. Bombay 1 : 109, 1901. *H. gibsoni* Stocks ex Harv. & Sond. Fl. Cap. 2 : 587, 1894; FBI 1 : 339; Bamber 244.

Branches bristly or prickly. Leaves deeply lobed. Flowers yellow with a purple centre, solitary axillary. Bracteoles prickly.

Authority : Bamber.

13. *H. vitifolius* Linn. Sp. Pl. 695, 1753; FBI 1 : 338; Bamber 244; Duthie 85.

Erect undershrubs. Leaves 3-7-lobed, toothed. Flowers yellow with a purple centre. Fruits 5-winged with accrescent and membranous calyx.

Local name : Jungli Bindi.

Flowers and fruits : July-Dec.

Gohana, V. J. Nair 29733; Jind, 16114.

6. KYDIA Roxb.

K. calycina Roxb. Pl. Cor. 3 : 12, t. 215, 1819; FBI 1 : 348; Bamber 21; Parker 40; Sabnis 140; Duthie 92.

A small to middle-sized tree. Young parts tomentose. Leaves stiff, strongly nerved. Flowers white in axillary panicles. Bracteoles greatly enlarged in fruit.

Rare. Known only as planted.

Local name : Pulia.

Flowers and fruits : July-Nov.

Ottobridge (Sirsa), 17188.

7. MALVA Linn.

- | | |
|---|---|
| 1. Petals 20-45 mm, 3-4 times as long as the sepals | 2. <i>M. sylvestris</i> |
| 1. Petals 4-12 mm (rarely up to 20 mm), up to $2\frac{1}{2}$ times as long as the sepals; | |
| 2. Flowers in dense axillary clusters; pedicels even in fruit not more than twice as long as the sepals; nutlets obscurely reticulate | 3. <i>M. verticillata</i> |
| 2. Flowers not in dense axillary clusters; pedicels in fruits many times as long as sepals; nutlets distinctly reticulate | 1. <i>M. verticillata</i> var. <i>chinensis</i> |

1. *M. verticillata* L. var. *chinensis* (Mill.) Hu in Fl. China fam. 153: 6, 1955; Maheshw. 76. *M. chinensis* Mill. Dict. (ed. 8) 670, 1768. *M. parviflora* auct. (non Linn.); FBI 1: 321; Duthie 74.

A weak herb. Leaves sub-orbicular. Bracteoles 3. Flowers white.

Common in moist waste places.

Flowers and fruits: Feb.-April.

Badopal, V. J. Nair 19833; Chakka jheel (Sirsa), 26015; Kapurthala, 36310; Khanna, 35984; Taiwandi, V. J. Nair 19343, 19862; Taran Taran, 36354.

2. *M. sylvestris* Linn. Sp. Pl. 689, 1753; FBI 1: 320, Bamber 243; Maheshw. 76; Duthie 74.

Erect annuals, glabrous or with few scattered hairs. Leaves lobed, base cordate. Flowers showy, pink, streaked with purple on axillary peduncles; bracteoles shorter than the calyx. Petals notched.

Often cultivated as an ornamental.

Local name: Kangai.

Flowers and fruits: Dec.-April.

Ferozpur, 36394.

3. *M. verticillata* Linn. Sp. Pl. 689, 1753; FBI 1: 320, Bamber 242; Duthie 74.

Annual with downy branches. Leaves nearly orbicular. Flowers small, pale pink, crowded in almost sessile axillary clusters.

In moist waste places. Rare.

Flowers: Spring.

Narnaul, 20667.

8. MALVASTRUM A. Gray

M. coromandelianum (Linn.) Garcke in Bonplandia 5: 295, 1857; Santapau, Fl. Saur. 1: 54, 1962; Maheshw. 77. *Malva coromandeliana* Linn. Sp. Pl. 687, 1753. *Malvastrum tricuspidatum* A. Gray, Pl. Wright. 1: 16, 1852; FBI 1: 321; Parker 35; Bamber 238; Duthie 75.

Undershrubs. Young branches with simple and stellate hairs. Leaves ovate or ovate elliptic, coarsely serrate. Flowers yellow, solitary, axillary. Carpels reniform with two spines about the middle and a stiff persistent style.

An American weed, abundant along road sides, canal banks and as undergrowth in road side jungles.

Flowers throughout the year.

Amritsar, J. N. Vohra 11310; Bhiwani, 19011; Dabwali, 26170; Faridkot, 36552; Hissar, V. J. Nair 19011, 19203, 19807; Karnal, 24638; Panipat, 18612; Yamunanagar, 27589.

9. PAVONIA Cav.

- | | |
|--|------------------------|
| 1. Involucral bracts leaf-like; flowers yellow;
carpels with a typical serrulate crest | 1. <i>P. patens</i> |
| 1. Involucral bracts subulate; flowers pink or pinkish white;
carpels without serrulate crest | 2. <i>P. zeylanica</i> |

1. *P. patens* (Andr.) Chiov. in Ann. Bot. 13 : 409, 1915. *Sida patens* Andr. Bot. Rep. 9 : t. 57, 1809. *Lebretonia glechomifolia* A. Rich. Tent. Fl. Abyss. 1 : 54, 1847. *Pavonia glechomifolia* (A. Rich.) Garcke in Schweinf. Beitr. F. Aeth. 1 : 54, 1867; FBI 1 : 330. *Pavonia procumbens* sensu Wt. et Arn. Prodr. 1 : 47, 1834; Gamble, Fl. Pres. Madras (repr.) 1 : 67, 1957.

A variable plant. Procumbent, erect or spreading undershrubs. Stems often wiry. Leaves ovate, pentagonal in outline, 3-5-lobed. Stipules setaceous. Flowers yellow to pale white yellow, solitary in the leaf axils. Bracts 5. Calyx campanulate. Corolla pubescent outside. Carpels obliquely triquetrous, dorsally keeled, mucronate. Seeds glabrous, angular.

Common among bushes along road sides at Hansi in sandy loamy soil, under shade; never seen in open.

Flowers and fruits : Aug.-Nov.

Hansi, 25034, 25035.

2. *P. zeylanica* Cav. Diss. 3 : 134, t. 48, f. 2, 1787; FBI 1 : 331; Maheshw. 77; Puri 31.

Shrubs. Leaves small. Bracts twice as long as the calyx. Carpels rounded on the back, narrowly winged.

Flowers : Aug.-Nov.

Rohtak, M. B. Raizada s.n. (DD).

10. SIDA Linn.

- | | |
|--|----------------------------|
| 1. Weak herbs with spreading branches; hairs on stem simple, scattered and radiating | 6. <i>S. veronicifolia</i> |
| 1. Small erect shrubs; hairs minute, stellate: | |
| 2. Flowers corymbose, fasciculate or subpaniculate | 3. <i>S. cordifolia</i> |
| 2. Flowers axillary, solitary or 1-2 together: | |
| 3. Calyx glabrous | 1. <i>S. acuta</i> |
| 3. Calyx pubescent: | |
| 4. Carpels 5 or less | 2. <i>S. spinosa</i> |
| 4. Carpels more than 5: | |
| 5. Leaves rhomboid lanceolate or obovate, hoary beneath; peduncles longer than the petioles, jointed near the base | 5. <i>S. rhombifolia</i> |
| 5. Leaves elliptic or obovate; downy on both sides; peduncles shorter than the petioles; pedicels jointed near calyx | 4. <i>S. ovata</i> |

1. *S. acuta* Burm. f. Fl. Ind. 147, 1768; Puri 29; Duthie 76. *S. cecropinifolia* Mast. in FBI 1 : 323 (non Linn.); Bamber 238; Parker 33.

Erect undershrub; leaves glabrous or nearly so, lanceolate, base rounded; carpels 6, rarely 5. Flowers yellow.

This plant is mentioned here on the authority of Parker and Bamber. I have seen no specimen from the area.

Local name : Bariara, Kareta (cf. Bamber).

2. *S. spinosa* Linn. Sp. Pl. 683, 1753; FBI 1 : 323; Bamber 238; Parker 33; Sabnis 138; Maheshw. 74; Duthie 76; Robyns in Ann. Miss. Bot. Gardn. 52 : 563, 1965. *Sida alba* Linn. Sp. Pl. (ed. 2) 960, 1763.

Erect undershrubs; often with 1-3 tubercles at the base of the petioles. Peduncles clustered (very rarely solitary), jointed close below the flowers. Corolla white or whitish yellow. Carpels 5 or sometimes 3 only, 2-awned.

Frequently seen in waste places and on canal banks.

Local name : Gulsakari.

Flowers and fruits : July-Nov.

Between Jind and Hansi, 24829; Hansi, 25033; Jind, 16120, 16123; Panipat, 18675, 24687.

3. *S. cordifolia* Linn. Sp. Pl. 684, 1753; FBI 1 : 324; Bamber 239; Parker 34; Maheshw. 75; Puri 29; Duthie 77.

Erect undershrubs, stellately hairy. Leaves ovate, the lower cordate, crenate. Pedicels few together (very rarely solitary), jointed below the calyx. Corolla yellow. Carpels 10, strongly reticulated, 2-awned, scabrid hairy.

In hard ground. Frequent.

Local name : Bala, Kharenti, Kowor.

Flowers and fruits : Sept.-Oct.

Hoshiarpur, Aitchison 296 (DD), T. A. Rao 10727; Jullundur, Parker s.n. (DD); Mahendragarh, 16275.

4. *S. ovata* Forsk. Fl. Aeg.-Arab. 124, 1775; Santapau, Fl. Saur. 1 : 36; Raizada in Indian For. 92(5) : 323, 1966. *S. grewioides* Guill. & Perr. in Guill. Perr. & Rich. Fl. Senegamb. Tent. 1 : 71, 1831; FBI 1 : 323; Park. 34; Sabnis 138; Duthie 77.

Erect undershrubs. Branches grey tomentose. Leaves crenate, pubescent. Corolla yellow, slightly longer than calyx. Carpels reticulate.

Common in dry places.

Flowers and fruits : Most part of the year.

Bheriam, V. J. Nair 19258; Fatehbad, 18862; Hissar, Harsukh 20698 (DD); M. A. Rau 3523; Loharu, 20100; Narnaul, 20660, 25215; Rewari, 20759; Rohtak, V. J. Nair 23192, 29712; Sirsa, 18924; Talwandi, 16208.

5. *S. rhombifolia* Linn. Sp. Pl. 684, 1753; FBI 1 : 323; Bamber 239; Parker 33; Puri 29; Duthie 76.

Erect shrubs with stellately hairy branches. Leaves very variable, lower rhomboid serrate on the upper half, entire towards the cuneate base. Stipules long, slender. Corolla yellow or white. Carpels 8-10.

Local name : Swetbala.

Flowers and fruits : Aug.-Dec.

Karnal, *J. N. Vohra* 8874; Panipat, 18620, 18645.

6. *S. veronicaefolia* Lamk. *Encycl.* 5, 1783; Parker 33; Duthie 75; Maheshw. 74; Puri 28. *S. humilis* Cav. *Diss.* 5 : 277, 1785; FBI 1 : 322; Bamber 544; Sabnis 137.

A trailing or rarely erect undershrub. Branches long villous, stellately hispid and scabrid. Leaves cordate; petiole as long or longer than the leaves. Pedicels jointed above the middle. Flowers yellow. Carpels common in shade and as undergrowth among bushes.

Flowers and fruits : August onwards.

Between Jind & Hansi, 24801; Karnal, *J. N. Vohra* 8896, 24619; Sangrur, 36704.

11. URENA Linn.

U. lobata Linn. *Sp. Pl.* 692, 1753; FBI 1 : 329; Parker 37; Sabnis 138; Maheshw. 77; Duthie 80. *U. sinuata* Linn. *Sp. Pl.* 692, 1753; FBI 1 : 329.

Erect shrubs up to 1 m high. Leaves variable. Corolla pink. Fruits covered with blunt spines, each having two stout bristles pointing downwards. Undergrowth in jungles and on canal banks. Not very common.

Flowers : Aug.-Nov.; April-May.

Hissar, *V. J. Nair* 14764, 19998; Jind, 26534; Panipat, 24665.

23. BOMBACACEAE

BOMBAX Linn.

B. ceiba Linn. *Sp. Pl.* 511, 1753 (pro parte); A. Robyns in *Taxon* 10 : 6 & 160, 1961. *Salmalia malabarica* (DC.) Schott. & Endl. *Melet.* 35, 1832; Maheshw. 83. *B. malabaricum* DC. *Prodr.* 1 : 479, 1824; FBI 1 : 349; Bamber 24; Parker 40; Duthie 92.

Large trees. Stems covered with stout conical prickles. Leaves glabrous; leaflets 3-7. Flowers numerous appearing when the tree is completely leafless, red in colour. Fruits capsular, 5-valved, lined with silky hairs.

Planted as an avenue tree in most places. Wood useful in match industry.

Local name : Salmal.

Flowers and fruits : Feb.-March.

Khanna, 35972; Nizampur, 20684.

24. STERCULIACEAE

- | | |
|---|------------------------|
| 1. Fruits spirally twisted capsules | 1. <i>Helicteres</i> |
| 1. Fruits not spirally twisted: | |
| 2. Petals present: | |
| 3. Seeds winged | 5. <i>Pterospermum</i> |
| 3. Seeds not winged: | |
| 4. Stamens alternating with staminodes: | |
| 5. Flowers in axillary 1-few-flowered peduncles | 3. <i>Melhania</i> |
| 5. Flowers in panicles | 2. <i>Dombeya</i> |
| 4. Stamens not alternating with staminodes | 4. <i>Melochia</i> |
| 2. Petals absent | 6. <i>Sterculia</i> |

1. HELICTERES Linn.

H. isora Linn. Sp. Pl. 963, 1753; FBI 1 : 365; Bamber 73; Parker 46; Maheshw. 84; Duthie 96.

A shrub; flowers irregular. Fruit typical consisting of 5 long slender follicles, spirally twisted and stellately tomentose.

Local name : Marorphali.

This plant is included on the authority of Parker and Bamber.

2. DOMBEYA Cav.

D. mastersii Hook. f. in Bot. Mag. 93, t. 5639, 1867; Parker 46; Maheshw. 86.

Large shrubs. Leaves serrate, acuminate. Flowers white in axillary clusters. Ovary villous.

Grown in gardens.

Flowers : March-April.

Fazilka, 36505.

3. MELHANIA Forsk.

1. Leaves up to 7 cm long, thick

1. *M. futteyporensis*

1. Leaves longer, thin

2. *M. abutiloides*

1. *M. futteyporensis* Munro ex Mast. in FBI 1 : 373, 1874; Bamber 74; Parker 47; Maheshw. 85; Puri 33; Duthie 100. *M. tomentosa* Stocks ex Mast. in FBI 1 : 373, 1874; Bamber 74.

Shrubs. Epicalyx of 3 broad segments. Flowers orange-yellow. Stamens 5, long, staminodes 5, half as long as fertile stamens. Style 1, stigmas 5.

This is mentioned on the authority of Parker and Bamber.

2. *M. abutiloides* Arn. ex Wight. Ic. t. 23, 1838. *M. hamiltoniana* Wall. var. *abutiloides* (Arn. ex Wight.) Mast. in FBI 1 : 373, 1874; Bamber 74; Duthie 100.

Felted shrubs. Leaves ovate, base 5-nerved, unequally toothed. Flowers yellow.

Rare. Only a few plants were seen on the dry hill at Khanak.

Flowers: Oct.

Khanak, 25097.

4. MELOCHIA Linn.

M. corchorifolia Linn. Sp. Pl. 675, 1753; FBI 1: 374; Maheshw. 86; Duthie 100.

An undershrub, branches glabrous. Leaves acute, serrate, glabrous or nearly so, base rounded or truncate. Flowers pinkish white or yellow. Capsules 5-valved. Seeds many.

Common along road sides and canal banks.

Flowers and fruits: Sept.-Dec.

Chandigarh, T. A. Rao 10851; Jind, 24777; Panipat.

5. PTEROSPERMUM Schreb.

- 1. Leaves orbicular peltate
- 1. Leaves lanceolate

- 1. *P. acerifolium*
- 2. *P. lanceaefolium*

1. *P. acerifolium* Willd. Sp. Pl. 3: 729, 1800; Parker 46; Maheshw 85; Duthie 97.

A large tree. Leaves orbicular peltate, green above, tomentose beneath. Fruits up to 15 cm long, woody, oblong. Seeds winged.

I have seen this planted in Patiala but not seen the flowers.

2. *P. lanceaefolium* Roxb. Fl. Ind. 163, 1832; Parker 45; Duthie 97. Small trees. Leaves tomentose beneath.

Parker states that this is grown in gardens of Hoshiarpur. He also mentions several species of *Sterculia*.

17. TILIACEAE

- 1. Fruits spinous
- 1. Fruits not spinous:
 - 2. Fruits capsular
 - 2. Fruits drupaceous

3. *Triumfetta*

- 1. *Corchorus*
- 2. *Grewia*

1. CORCHORUS Linn.

- 1. Prostrate undershrubs
- 1. Erect herbs:
 - 2. Capsules spherical or sub-spherical
 - 2. Capsules not spherical, elongate:
 - 3. Capsules less than 2 cm long
 - 3. Capsules more than 2 cm long:
 - 4. Capsules winged, stout
 - 4. Capsules not winged:
 - 5. Capsules ending in 3 spreading tips
 - 5. Capsules ending in a single beak, tip lobed:
 - 6. Capsules 3-angled, beak stout
 - 6. Capsules 10-ribbed, beak long

3. *C. depressus*

2. *C. capsularis*

4. *C. fascicularis*

1. *C. aestuans*

6. *C. tridens*

7. *C. trilocularis*

5. *C. olitorius*

1. *C. aestuans* Linn. Syst. (ed. 10), 1079, 1759; Maheshw. 89; Puri 36. *C. acutangulus* Lamk. Encyc. 2 : 104, 1786; FBI 1 : 398; Bamber 235; Sabnis 141; Duthie 114.

Annual, erect or suberect undershrubs, much-branched. Leaves membranous, base with two filiform appendages. Flowers yellow. Capsules short, stout, winged; beak bifid, spreading. Seeds many. Common weed.

Local name : Chanch.

Flowers and fruits : Aug.-Nov.

Bahadurgarh (Rohtak), *V. J. Nair* 21673; Bahmanwas, *V. J. Nair* 23126; between Jind and Hansi, 24831; Hissar, 24873; *Raizada* 21038 (DD); Jind 16122, 24753; Panipat, 18673, 24675.

2. *C. capsularis* Linn. Sp. Pl. 529, 1753; FBI 1 : 397; Bamber 234; Maheshw. 89; Puri 35; Duthie 113.

Erect undershrubs. Leaves serrate, the lowest serratures produced into filiform appendages. Flowers yellow. Capsules subglobose, without beak, muricated.

Weed of cultivated places.

Local name : Harrana.

Flowers and fruits : Aug.-Oct.

Jind, 24776; Murthal (Sonepet), *V. J. Nair* 23317.

3. *C. depressus* (Linn.) Stocks in Proc. Linn. Soc. 1 : 367, 1848; Blatt. in JBNHS 34 : 891, 1931; Maheshw. 88; Puri 35. *Antichorus depressus* Linn. Mant. 1 : 64, 1767. *Corchorus antichorus* Raensch. Nom. Bot. (ed. 3) 158, 1797; FBI 398; Bamber 544; Sabnis 141; Parker 54; Duthie 114.

Prostrate undershrubs. Branches twisted and arising from a woody base. Leaves small roundish oblong, plicate-crenate serrate. Cymes leaf-opposed many flowered. Petals yellow. Capsules 4-valved, beak entire. Seeds trigonous, black, septa present between seeds.

Common in hard clayey soil particularly near temporary ponds, canal banks etc. or gravelly soils and waste places. Said to be used for venereal diseases and in healing ulcers and wounds.

Local name : Bafali, Kurand.

Flowers and fruits : Almost round the year but profusely during the hot months.

Dadri, 20503; Hissar, *Harsukh* 20683 (DD); *M. A. Rau* 3529; Mahendragarh 20593, 20598; Narnaul, 25199; Sirsa, 18917; Talwandi, 16212; Tosham, 25076.

4. *C. fascicularis* Lamk. Encycl. 2 : 104, 1786; FBI 398; Bamber 235; Duthie 114.

Small erect, glabrous annuals. Leaves short petioled, elliptic-oblong. Cymes almost sessile, leaf-opposed. Capsules pubescent, septate partly between the seeds.

Rare. Found in hard sandy soil.

Flowers and fruits : Sept.-Oct.

Hissar, 24974.

5. *C. olitorius* Linn. Sp. Pl. 529, 1753; FBI 1 : 397; Bamber 234; Maheshw. 88; Puri 35; Duthie 113.

Shrubby, up to 1 m high. Leaves elliptic-lanceolate, acute or acuminate, serrate, the lower serratures drawn out into filiform appendages. Peduncles 1 to 3-flowered, shorter than the petiole. Capsule 10-ribbed, 5-valved, valves with transverse partitions between the seeds.

Local name : Banphal, Kosta.

Flowers and fruits : July-Nov.

Bahadurgarh (Rohtak Dist.), *V. J. Nair* 21673; Bahmanwas (Rohtak Dist.), *V. J. Nair* 23126; Hissar, 24868; *Raizada* 21038 (DD); Jind, 16122, 24753; Panipat, 18673, 24675.

6. *C. tridens* Linn. Mant. 566, 1771; FBI 1 : 398; Bamber 235; Maheshw. 89; Puri 35; Duthie 114.

Erect herb, glabrous. Leaves linear to lanceolate, crenate, the lowest crenature drawn out into filiform appendages. Cymes 1 to 4-flowered, subsessile. Corolla yellow. Capsules up to 5 cm long, cylindric, beak trifold, spreading. Seeds black truncate at ends.

Common in sandy waste places and irrigated soil.

Flowers and fruits : July-Nov.

Gurgaon, 25247, 25254; Jind, 24743; Kanana (Dadri), 25151; Khansala (Rohtak Dist.), *V. J. Nair* 23252; Narnaul, 25213; Panipat, 24713.

7. *C. trilocularis* Linn. Mant. 77, 1767; FBI 397; Bamber 234; Sabnis 141; Maheshw. 89; Puri 35; Duthie 113.

Erect pilose annuals. Leaves elliptic to oblong lanceolate, serrate, the lowest serratures often produced into appendages. Cymes short, leaf opposed. Corolla yellow. Capsules up to 6 cm scabrous, slightly curved, 3-angled, beak short, entire. Seeds trigonous, black, partition between seeds present.

Weed of cultivation.

Local name : Kaunti.

Flowers and fruits : July-Dec.

Bahuna, 18901; Barwala, 19282; Bhatinda, 27797; Bhiwani, 16335; Choudriwas, *V. J. Nair* 19243; Dadri, 16267; Gurgaon, *T. A. Rao* 11019; Hissar, *Duthie* 3885 (DD); *Raizada* 20991 (DD); Narnaul, 20657; Otto-bridge, 18948, 20657; Rohtak, *V. J. Nair* 23202, 29707.

2. GREWIA Linn.

1. Flowers white, solitary, leaf-opposed
 1. Flowers yellow, in cymes, axillary or leaf opposed:
 2. Leaves 3-nerved at base:
 3. Leaves finely serrulate, petiole 1 cm or less
 3. Leaves serrate, petiole more than 1 cm
 2. Leaves 3-nerved at base:
 1. Peduncles opposite the leaves (exceptionally sometimes axillary), 1-8 flowered
 4. Peduncles axillary, 1-3 flowered
5. *G. tenax*
 1. *G. elastica*
 4. *G. subinaequalis*
 3. *G. oppositifolia*
 2. *G. flavescens*

1. *G. elastica* Royle, III, 104, t. 22, 1839; Parker 49; Duthie 106; Narayanaswamy & Rao in Jour. Indian Bot. Soc. 29: 187, 1950. *G. asiatica* var. *vestita* Wall. ex Mast. in FBI 1: 387. *G. leptopetala* Brandis, Ind. Trees, fig. 49, 1906. *G. vestita* et *asiatica* Bamber 9.

Small trees. Young parts tomentose. Peduncles 2-5 together, axillary, 2 to 4-flowered. Staminal filaments orange. Fruits globose.

Cultivated.

Local name: Dhaman.

Flowers and fruits: Oct.-Nov.

Bankhandi (Hoshiarpur), T. A. Rao 10768; Hissar, V. J. Nair 21533.

2. *G. flavescens* Juss. in Ann. Mus. Par. 4: 91, 1804; Blatt. in JBNHS 34: 888, 1931; Narayanaswamy & Rao in Journ. Indian Bot. Soc. 29: 187, 1950; Maheshw. 87. *G. pilosa* Wt. et Arn. Prodr. 78: 1834; FBI 1: 388 (non Lamk.); Duthie 106.

A shrub, young parts with brown stellate hairs. Leaves oblong or ovate. Stipules subulate. Peduncles 3-flowered.

Not common in the area. Only one specimen was seen.

Ferozpur Jhirka, T. A. Rao 1150.

3. *G. oppositifolia* Roxb. Fl. Ind. 2: 583, 1832; FBI 1: 384; Bamber 8; Parker 48; Narayanaswamy & Rao in Journ. Indian Bot. Soc. 29: 187, 1950; Duthie 104.

Trees. Young parts stellately hairy; leaves in two rows along the branches, rough above, velvety beneath. Flowers in short clusters opposite the leaves. Fruits fleshy, thinly hairy.

Only in submontane forests.

Local name: Behel.

Flowers and fruits: Sept.-Oct.

Gurdaspore, Fane s.n. (DD); Hoshiarpur, Aitchison 273 (DD); Kasauli, B. L. Gupta 42347 (DD).

4. *G. subinaequalis* DC. Prodr. 1: 511, 1824; Santapau, Fl. Saur. 1: 68, 1962. *G. asiatica* auct. (non Linn.) Mast. in FBI 1: 389; Parker 55; Duthie 107.

A small tree. Leaves variable, ovate, acuminate, closely serrate. Peduncles 3-9 clustered, 3-flowered. Fruits hairy.

Cultivated for edible fruits.

Local name : Falsa.

Badopal, 34547.

5. *G. tenax* (Forsk.) Fiori, Bos. Piante Legn. Eritr. 246, 1909; Blatt. in RBSI 8 : 88, 1919; Maheshw. 87; Puri 33. *Chadara tenax* Forsk. Fl. Aeg.-Arab. 105, 1775. *Grewia populifolia* Vahl, Symb. 1 : 33, 1790; FBI 1 : 385; Brandis, Ind. Trees, fig. 46, 1906; Bamber 74; Sabnis 140; Parker 51; Duthie 104.

Shrubs or undershrubs, up to 2 m high. Leaves orbicular, long petioled. Fruits orange yellow when ripe, edible.

One of the common species in dry localities and scrub jungles of hill slopes.

Local name : Gungaran.

Flowers and fruits : Sept.-Jan.

Daber, 15870; Faridkot, 36537; Hansi, 25036; Hissar, 18782; Duthie 3881 (DD); Raizada 20993 (DD); Mahendragarh, 16295, 16305; Ratal, 16133; Sohna, T. A. Rao 11048.

3. TRIUMFETTA Linn.

1. Lower leaves 3 to 5-lobed;

2. Spines of capsules glabrous

2. Spines of capsules hispid on their lower edges

1. Leaves orbicular

2. *T. rhomboidea*

1. *T. pilosa*

3. *T. rotundifolia*

1. *T. pilosa* Roth, Nov. Pl. Sp. 223, 1821; FBI 1 : 394; Bamber 240; Parker 54; Puri 34; Duthie 111.

Erect herbs. Lower leaves 3-lobed, upper ovate lanceolate. Flowers yellow in axillary and leaf opposed clusters. Stamens 10. Spines on fruit hairy, hooked.

This plant is mentioned on the authority of Bamber and Parker. I have seen no specimen from the area.

2. *T. rhomboidea* Jacq. Enum. Pl. Carib. 22, 1760; FBI 1 : 395; Bamber 233; Parker 53; Santapau in Bull. bot. Surv. Ind. 3 : 21, 1961; Maheshw. 89; Duthie 111. *T. bartramia* Linn. Syst. Nat. ed. 10, 1044, 1759 (nom. illeg.); Puri 34, *Bartramia indica* Linn. Sp. Pl. 389, 1753 (non *Triumfetta indica* Lamk. 1791).

Undershrubs. Lower leaves 3 to 5-lobed, serrate. Flowers yellow in dense terminal and leaf opposed cymes. Stamens 8-15. Bristles on fruit short, glabrous.

Not very common. Occasionally found on road sides and canal banks.

Local name : Chikti.

Flowers and fruits : Aug.-Nov.

Hoshiarpur, *T. A. Rao* 10717; Jind, 24738; Kurukshetra, *J. N. Vohra* 9867; Tohana, 25015.

3. ***T. rotundifolia*** Lamk. Enc. Meth. 3 : 421, 1789; FBI 1 : 395; Bamber 75; Parker 53; Duthie 112.

Shrubs with orbicular leaves. Flowers yellow in interrupted racemes. Stamens 15-25. Spines of fruit pubescent with dilated bases, hooked.

This species is mentioned on the authority of Bamber and Parker. I have seen no specimen from the area.

26. LINACEAE

LINUM Linn.

L. usitatissimum Linn. Sp. Pl. 277, 1753; FBI 1 : 410, Bamber 275; Maheshw. 90; Duthie 115.

Erect herbs up to 1 m high. Leaves linear to lanceolate. Flowers blue, base pink, in terminal panicles; styles free. Capsules 5-celled.

Cultivated as a cold season crop. The fibre is useful. The seed is crushed for oil. Grown also as an ornamental plant. Often runs wild as a weed in cultivated fields, road-sides etc.

Local name : Alsi.

Flowers and fruits : Dec.-March.

Binjhol (Panipat), 25810; Hansi, 25903; Ratia, 25991; Rohtak, 26378, 29715; Taran Taran, 36348.

27. MALPIGHIACEAE

1. Flowers regular, styles 3
1. Flowers irregular, style 1

1. *Aspidopterys*
2. *Hiptage*

1. ASPIDOPTERYS A. Juss.

A. walllichii Hook. f. in FBI 1 : 421, 1874; Parker 57; Duthie 118. Climbing shrubs. Lower surface of leaf and inflorescence tomentose. Flowers in pendulous panicles. Flowers white creamy. Fruits samaroid.

Flowers : July-Sept.

Hoshiarpur, *Aitchison* s.n. (DD), *T. A. Rao* 10751.

2. HIPTAGE Gaertn.

H. benghalensis (Linn.) Kurz in Jour. Asiat. Soc. Bengal 14 : 36, 1879; Maheshw. 90; Duthie 117. *Banisteria benghalensis* Linn. Sp. Pl. 427, 1753.

Hiptage madablota Gaertn. Fruct. 2 : 169, t. 116, 1791; FBI 1 : 418 : Bamber 576; Parker 56.

Climbing shrubs, young parts tomentose. Flowers showy, fragrant. Ovary 3-celled. Fruits samaroid, wings obovate-oblongate, larger ones about 5 cm, other two about 2.5 cm.

Cultivated in gardens.

Local name : Kanti, Choppar.

Flowers and fruits : Feb.-March.

Hoshiarpur, Aitchison 600 (DD); Malerkotla 36729.

28. ZYGOPHYLLACEAE

1. Prickly or spiny plants:

2. Prostrate herbs with prickles, flowers yellow

2. Erect herbs; stipules spiny; flowers whitish pink

1. Plants not prickly or spiny:

3. Leaves multifid, alternate

3. Leaves simple, opposite

3. *Tribulus*

1. *Fagonia*

2. *Peganum*

4. *Zygophyllum*

1. FAGONIA Linn.

F. arabica Linn. Sp. Pl. 386, 1753; FBI 1 : 425; Bamber 139. Sabnis 142. *F. bruguieri* DC. Prodr. 1 : 704, 1874; FBI 1 : 425, Bamber 525. *F. cretica* sensu Parker 58 (non Linn.); Maheshw. 91; Puri 37; Duthie 120.

Erect or spreading undershrubs. Leaves 1 to 3-foliolate. Flowers solitary. Capsule deeply 5-lobed.

A very common plant in sandy open places as well as in dry and gravelly soil. The plant is said to be good for the treatment of various kinds of fevers.

This plant goes under the name of *F. cretica* in many Indian works. According to Hadidi, (Candollea 21 : 14, 1966) *F. cretica* Linn. is a mediterranean plant. In the light of the recent work of Hadidi, Indian plants need closer study.

Local name : Usturgar.

Flowers and fruits : All the year round but profusely during the cold season.

Barwala, V. J. Nair 19296, 19880; Beas, J. N. Vohra 11324; Chowdriwas, V. J. Nair 19238, 19390; Dabwali, 26143; Hansi, 16167; Hissar, Raizada 20972 (DD); Khanak, 16252; Lambi, 26198; Rewari, T. A. Rao 11108; Sirsa, 18923; Sonpet, V. J. Nair 23340; Tohana, 24993.

2. PEGANUM Linn.

P. harmala Linn. Sp. Pl. 444, 1753; FBI 1 : 486; Bamber 241; Sabnis 143; Maheshw. 92; Puri 37; Duthie 120.

Erect herbs up to 50 cm high. Petals white. Capsules lobed, glabrous. Common in dry waste places. Reputed medicinal plant.

Local name : Harmal.

Flowers and fruits : Sept.-March.

Abohar 36514; Barwala, *V. J. Nair* 19863; Beas, *J. N. Vohra* 11314; Bhiwani, 20052; Bhiwani Khera, 16346, 16347; Ferozapore, 36368; Lambi, 26243; Rohtak, *V. J. Nair* 23207.

3. TRIBULUS Linn.

1. Cocci winged without spines

1. *T. alatus*

1. Cocci not winged with 2 long and 2 short spines

2. *T. terrestris*

1. *T. alatus* Del. Fl. Aeg. 3 : 62, 1812; FBI 1 : 423; Bamber 527; Sabnis 142; Puri 36.

Prostrate annual herbs, densely silky villous. Flowers yellow. Stamens 5 or 10. Fruits 5-angled.

Rare. In sandy areas.

Local name : Gokhricalan.

Flowers and fruits : Rainy season, rarely March-April.

Badopal, 16233; Hissar, 16181; Lambi, 27847.

2. *T. terrestris* Linn. Sp. Pl. 387, 1753; FBI 1 : 423; Bamber 527; Sabnis 142; Maheshw. 91; Puri 36; Duthie 119.

Like last species; differs in fruit.

Common everywhere during the rainy season and up to November.

Fruits used in medicine.

Local name : Gokru.

Flowers and fruits : Aug.-Nov.

Bahadurgarh (Rohtak, Dist.), *V. J. Nair* 21659; Bhatinda, 27790; Hansi, 16172, 18732; Hissar, *Duthie* 3887a (DD); *Raizada* 20996 (DD); Jind, 24740; Lambi, 27848; Mahendragarh, 20588; Narnaul 25187; Panipat, 26506; Sonpet, *V. J. Nair* 23283; Yamunanagar, 27587.

4. ZYGOPHYLLUM Linn.

Z. simplex Linn. Mant. 1 : 68, 1867; FBI 1 : 424; Bamber 521; Puri 37. Annual succulent herbs, procumbent. Leaves simple, cylindric. Petals yellow.

In sandy localities. Rare.

Flowers : Feb.-March.

Hissar, *Raizada* 20985 (DD); *M. A. Rau* 3308.

29. OXALIDACEAE

1. Fruits berry; trees

1. *Averrhoa*

1. Fruits capsule; herbs

2. *Oxalis*

1. *AVERRHOA* Linn.

- | | |
|--|------------------------|
| 1. Fruits acutely 4-5 ridged; seeds arillate | 2. <i>A. carambola</i> |
| 1. Fruits with rounded lobes; seeds without aril | 1. <i>A. bilimbi</i> |

1. *A. bilimbi* Linn. Sp. Pl. 428, 1753; FBI 1 : 503; Bamber 41; Duthie 124.

Small trees with exstipulate compound leaves. Leaflets 5-12 pairs, velvety beneath. Flowers small, purplish white.

Cultivated.

Local name : Bilimbi.

This is mentioned on the authority of Bamber. I have seen the fruits being sold in the markets.

2. *A. carambola* Linn. Sp. Pl. 428, 1753; FBI 1 : 439; Bamber 41; Parker 58; Maheshw. 92; Duthie 124.

Like above but leaflets 2-5 pairs, smooth; fruits larger.

The sour fruit is used for making pickles.

Local name : Ambrak.

Flowers : Feb.-April. *Fruits* : Nov.-Dec.

Hoshiarpur, *Aitchison* 487 (DD).

2. *OXALIS* Linn.

- | | |
|---|--------------------------|
| 1. Flowers pink or purple | 2. <i>O. corymbosa</i> |
| 1. Flowers yellow: | |
| 2. Peduncles long, many flowered; flowers long pedicelled, pedicels up to 2 cm, corolla 1.5 to 2.5 cm long; stemless plants | 3. <i>O. pes-caprae</i> |
| 2. Peduncles small, few flowered; pedicels shorter, corolla shorter; stems creeping and subterranean | 1. <i>O. corniculata</i> |

1. *O. corniculata* Linn. Sp. Pl. 435, 1753; FBI 1 : 435; Bamber 552; Sabnis 143; Maheshw. 93; Puri 38; Duthie 122.

Procumbent. Branches pubescent. Capsules shortly beaked, 5-angled, tomentose.

Common in cultivated fields, gardens and other moist places.

Local name : Amboti, Omlika.

Flowers and fruits : Almost throughout the year.

Binghol (Panipat), 25824; Bhatinda 26266; Dabwali 26168; Fatehbad, 24920; Hissar, 18789; V. J. Nair 15774, 19814; Ismalia, 20036; Lambi 26330; Yamunanagar, 27526.

2. *O. corymbosa* DC. Prodr. 1 : 696, 1824, Sabnis 143. *O. martiana* Zucc. in Denkschr. Akad. Muench. 9 : 144, n. 6, 1824 & in Abh. Muench. 1 : 203, 1829-1830; Maheshw. 93.

Stemless herbs. Peduncles radical. Naturalized garden weed.

Flowers : Dec.-March.

Amritsar, *J. N. Vohra* 11311; Hissar, *V. J. Nair* 21540.

3. *O. pes-caprae* Linn. Sp. Pl. 434, 1753; Calder in Rec. Bot. Surv. Ind. 6(8) : 329, tab. 4 figs. 1-5, 1919.

Stemless herbs. Peduncles radical. Flowers 1.5 to 2.5 cm long and 1 to 1.5 cm across.

Native of Ethiopia, naturalized in many parts of the country. It has been observed as a weed in vegetable fields, orchards and waste places in Ferozpora. The plant produces a number of bulbils on the rootstock for propagation.

Flowers : Feb.-March.

Ferozpora, 36381, 36384.

30. RUTACEAE

1. Armed trees or shrubs:

2. Leaves trifoliolate, stamens many

1. *Aegle*

2. Leaves not trifoliolate, stamens 10-15:

3. Leaves unifoliolate

3. *Citrus*

3. Leaflets 5-9:

4. Fruits woody

5. *Feronia*

4. Fruits not woody

6. *Hesperethusa*

1. Plants unarmed:

5. Weak herbs; flowers nodding in compound terminal many flowered racemes

2. *Boenninghausenia*

5. Stout shrubs; flowers not nodding, in umbels or corymbs:

6. Styles short, anther filaments dilated below

4. *Clausena*

6. Styles long, anther filaments not dilated below

7. *Murraya*

1. AEGLE *Correa*

A. marmelos (Linn.) Corr. in Trans. Linn. Soc. 5 : 223, 1800; FBI 1 : 516; Bamber 42; Parker 60; Maheshw. 95; Puri 38; Duthie 134.

A deciduous tree armed with stout spines. Flowers greenish white. Fruit woody.

Cultivated in gardens and near temples. Natural regeneration by root suckers.

Local name : Bel.

Flowers : Feb.-March.

Hoshiarpur, *Aitchison* 520 (DD); Nabha, 36731.

2. BOENNINGHAUSENIA *Reichb.*

B. albiflora Reichb. Consp. 197, 1828; FBI 1 : 486; Bamber 390.

Perennial herbs. Leaves twice pinnate. Flowers white. Calyx very small, 4-5-lobed, persistent. Fruit papery.

Common in sub-Himalayan regions.

Flowers : September.

Kasauli, T. A. Rao 10904.

3. CITRUS Linn.

- | | |
|---|---------------------------|
| 1. Wings of petiole more than 1 cm broad; fruit over 13 cm across | 5. <i>C. grandis</i> |
| 1. Wings of petiole less than 1 cm broad or absent; fruit generally less than 13 cm across: | |
| 2. Petals white: | |
| 3. Fruits broader than long, orange or red-orange | 2. <i>C. aurantium</i> |
| 3. Fruits longer than broad, yellow or greenish yellow: | |
| 4. Pulp sweet | 3. <i>C. limetoides</i> |
| 4. Pulp very sour, acidic | 1. <i>C. aurantifolia</i> |
| 2. Petals purple or pink outside: | |
| 5. Petioles not winged; fruits with a blunt apical projection | 4. <i>C. limon</i> |
| 5. Petioles often winged; fruits without apical projection | 6. <i>C. medica</i> |

1. *C. aurantifolia* (Christm.) Sw. in Jour. Wash Acad. Sci. 3 : 465, 1913; Maheshw. 95. *Limonia aurantifolia* Christm. in Linn. Pflanzen. Syst. 1 : 618, 1777.

Shrubs. Fruits yellow, rind tight.

Cultivated.

Local name : Nimbu.

Flowers : March-April.

Badopal, 34551.

2. *C. aurantium* Linn. Sp. Pl. 782, 1753; FBI 1 : 515; Bamber 30; Parker 61; Maheshw. 95; Duthie 132.

Shrubs or small trees. Fruits globose. Rind loose.

Cultivated.

Local name : Santra.

Badopal, 34550.

3. *C. limetoides* Tanaka in Jour. Indian Bot. Soc. 16 : 236, 1937; Maheshw. 95.

Shrubs. Petioles winged. Flowers fragrant.

Cultivated.

Local name : Mitta-nimbu.

Flowers : March.

Taran Taran, 36339.

4. *C. limon* (Linn.) Burm. f. Fl. Ind. 173; 1768; Maheshw. 95. *C. medica* Linn. var. *limon* Linn. Sp. Pl. 2 : 782, 1753.

Thorny trees. Petioles winged. Fruits ovoid; yellow.

Cultivated in Ferozepore.

Specimens could not be collected.

5. *C. grandis* (Linn.) Osb. Dagbok. Ostind. Resa 98, 1757. *C. maxima* (Burm.) Merr. Int. Herb. Amb. 296, 1917; Maheshw. 94. *Aurantium maximum* Burm. Auct. Herb. Amb. 16, 1755. *C. decumana* Linn. Syst. 508, 1774; FBI 1 : 516; Bamber 30; Parker 62; Duthie 133.

Trees. Leaves ovate-oblong, emarginate. Flowers white. Rind thick. Cultivated.

Local name : Chakotra.

Flowers : March-April.

Bhiwani, 34581; Badopal, 34546.

6. *C. medica* Linn. Sp. Pl. 782, 1753; FBI 1 : 514; Bamber 113; Parker 31; Maheshw. 95; Duthie 131.

Shrubs. Glabrous. Flowers white inside purplish on the back. Cultivated.

Local name : Kattanimbu.

Flowers : March.

Bhatinda, 27824.

4. CLAUSENA Burm. f.

C. lansium (Lour.) Skeels in U. S. Dept. Agric. Bur. Pl. Ind. Bull. 168 : 31, 1909; Merr. Enum. 2 : 337, 1924; Maheshw. 96. *Quinaria lansium* Lour. Fl. Coch. 272, 1790. *Clausena wampi* Blanco, Fl. Filip. 358, 1837; FBI 1 : 505; Parker 64.

Small trees with pustular leaves and inflorescences. Flowers white in compound panicles. Fruits small.

Cultivated.

Local name : Wampi.

Flowers : Hot season.

Hoshiarpur, Aitchison 553 (DD).

5. FERONIA Correa

F. limonia (Linn.) Swingle in Jour. Wash. Acad. Sci. 4 : 328, 1914; Maheshw. 96. *Schinus limonia* Linn. Sp. Pl. 389, 1753. *Feronia elephantum* Correa in Trans. Linn. Soc. 5 : 225, 1800; FBI 1 : 516; Bamber 41; Parker 64; Duthie 134.

A middle sized tree, armed with straight spines. Leaves aromatic; petioles winged. Flowers small.

Hoshiarpur, Aitchison s. n. (DD); Kurukshetra, J. N. Vohra 9882.

6. HESPERETHUSA Roem.

H. crenulata (Roxb.) Roem. Syn. Hesper. 31 : 38, 1846. *Limonia crenulata* Roxb. Pl. Corem. 1 : 60, t. 86, 1795; Duthie 130. *Limonia acidissima* auct.; FBI 1 : 507; Bamber 130; Parker 59 (non Linn.).

Large thorny shrubs. Petioles and rachis joined and winged.

Local name : Bilan.

Flowers and fruits : Sept.-Nov.

Bankhandi (Hoshiarpur Dist.), *T. A. Rao* 10769; Hoshiarpur, *Aitchison* 416 (DD); Malerkotla, *Anonymous* (DD).

7. MURRAYA Linn.

M. paniculata (Linn.) Jack. in Mal. Misc. 1 : 31, 1820; Maheshw. 97. *Chalcas paniculata* Linn. Mant. 68, 1767. *Murraya exotica* Linn. Mant. 563, 1771; FBI 1 : 502; Parker 64; Duthie 128.

A large, evergreen shrub. Flowers white, fragrant.

Grown in gardens.

Flowers : Summer and rainy season.

31. BALANITACEAE

B. aegyptiaca (Linn.) Del. Fl. Eeg. 263, t. 28, f. 1, 1813; Puri 39; Duthie 136. *Ximenia aegyptiaca* Linn. Sp. Pl. 1194, 1753. *Balanites roxburghii* Planch. in Ann. Sc. Nat. Ser. 4 : 258, 1854; FBI 1 : 522; Parker 65; Maheshw. 98.

Small trees with stem-thorns. Leaves 2-foliolate, slightly mucronate, shortly petioled, leaflets elliptic obovate. Flowers greenish in axillary, few-flowered racemes. Ovary villous. Fruits 5-ribbed, woody.

This is one of the principal trees in the areas adjoining Rajasthan. In moist parts it is very rare. It spreads by suckers and therefore a group of trees are always found to grow together. A very useful tree for afforestation purposes. The fruits and barks are used as purgative.

Local name : Hingo, Hingota.

Flowers : April. *Fruits* : Nov.-Dec.

Hansi, 25903; Siwani, 26561.

32. SIMAROUBACEAE

AILANTHUS Desf.

A. excelsa Roxb. Pl. Corem. 1 : 24, t. 23, 1795; FBI 1 : 518; Bamber 42; Parker 66; Maheshw. 97; Puri 39; Duthie 136.

Large trees. Trunk pale white. Leaves pinnate 30-100 cm long; leaflets coarsely and irregularly serrate. Flowers small, unisexual, yellow; smell unpleasant. Fruits samara, one seeded.

Planted along roadsides and canal-banks.

Local name : Arua, Maharukka.

Flowers : Feb.-March. *Fruits* : June.

Between Pipli and Karnal, 26488; Nizampur, 20678.

33. BURSERACEAE

- | | |
|---------------------------------------|----------------------|
| 1. Fruits deliquescent | 1. <i>Boswellia</i> |
| 1. Fruits indehiscent | |
| 2. Armed trees, leaves 1 to 3-foliate | 2. <i>Commiphora</i> |
| 2. Unarmed, leaves pinnate | 3. <i>Garuga</i> |

1. BOSWELLIA Roxb.

B. serrata Roxb. ex Colebr. in As. Res. 9 : 379, t. 5 : 1807; FBI 1 : 528; Bamber 42; Parker 66; Maheshw. 98; Puri 39; Duthie 138.

A deciduous tree, bark ash-coloured and peeling off in flakes. Leaves imparipinnate, crowded at the ends of branches, alternate; leaflets serrate or crenate. Flowers in axillary racemes. Pyrenes separating at maturity.

On dry hills of S. E. Punjab. The gum of the tree is medicinal.

Local name : Salar, Salai, Sali.

Flowers and fruits : Hot season.

Khanak 25100, 34576.

2. COMMIPHORA Jacq.

C. roxburghii (Stocks) Engler in Pfam. (ed. 2) 19A : 436, 1931; Puri 39. *Balsamodendron roxburghii* Stocks in Jour. Asiat. Soc. Bombay Br. 2 : 391, 1848. *B. mukul* Hook. ex Stocks in Hook. Kew. Jour. Bot. 1 : 259, t. 8, 1849; FBI 1 : 529. *Commiphora mukul* Engl. in DC. Mon. Phan. 4 : 12, 1883; Parker 67; Duthie 139.

Dwarf trees; young parts glandular pubescent. Leaves 1 to 3 foliate; leaflets serrate towards the rounded apex, entire towards the cuneate base. Flowers sessile in fascicles, polygamous, reddish. Rind of fruits split irregularly exposing the pulp.

Local name : Gugul.

The plant is mentioned on the authority of Gurgaon Dist. Gaz. 17, 1883. I have seen no specimen from the area (cf. also Parker loc. cit.). While this plant is common in Rajasthan, its existence is doubtful in the Punjab.

3. GARUGA Roxb.

G. pinnata Roxb. Pl. Cor. 3 : t. 208, 1819; FBI 1 : 528; Parker 67; Duthie 139.

Large deciduous trees. Young shoots pubescent. Leaflets 11-21. Flowers yellow polygamous. Fruits black, globose drupes. Pyrenes tubercled.

Common on Ambala Siwaliks.

Local name : Kharpat.

Flowers : April-May.

Kalesar, Gupta s.n. (DD).

34. MELIACEAE

1. Stamens united into a tube:
2. Fruits drupe:
 3. Carpels 5; leaves bi- or tripinnate
 3. Carpels 3; leaves pinnate
2. Fruits capsule
1. Stamens free; fruits capsule

2. *Melia*
1. *Azadirachta*
4. *Scoletenia*
3. *Toona*

1. AZADIRACHTA A. JUSS.

A. indica A. Juss. in Mem. Mus. Par. 19 : 221, t. 13, f. 5, 1830; Parker 69; Maheshw. 99; Puri 39. *Melia azadirachta* Linn. Sp. Pl. 385. 1753; FBI 1 : 544; 1875; Bamber 42; Duthie 141. *M. indica* (A. Juss.) Brandis, For. Fl. N.W. & C. India 67 : 1874. *Antelaea azadirachta* (Linn.) Adeb. Blumea 6 : 315, 1948.

Large trees. Leaflets 9-12, sub-opposite, obliquely lanceolate, serrate. Flowers white, mildly fragrant. Stamens 10. Fruits 1-seeded.

Planted all over the area. Pulp of fruits is eaten some times.

Local name : Neem.

Flowers : March-April. *Fruits* : July.

Between Pipli and Karnal, 26484; Bhatinda. 27796; Hissar, V. J. Nair 19929; Yamunanagar, 27553.

2. MELIA Linn.

M. azedarach Linn. Sp. Pl. 384, 1753; FBI 1 : 544; Bamber 42; Sabnis 145; Parker 70; Maheshw. 99; Duthie 141.

Moderately sized trees. Leaflets 3-11 in each pinna, serrate, glabrous. Flowers fragrant, lilac, in long axillary panicles; staminal tube purple; stamens 10. Fruits 4 to 5-seeded.

This is the Persian Lilac. Not seen wild in the area. Frequently planted in gardens and as an avenue tree. The leaves are considered to be of high fodder value by the villagers.

Local name : Bakain, Draek.

Flowers : March-May. Fruits ripen after an year.

Beas, J. N. Vohra 11322; Hissar, V. J. Nair 19987; Kera (Sirsa), V. J. Nair 21576; Ludwa, 26476; Rewari, 20788; T. A. Rao 11141; Taran Taran, 36337; Yamunanagar, 27593.

3. TOONA Roem.

T. ciliata Roem. Syn. Hesper. 139, 1846; Santapau in Bull. Bot. Surv. Ind. 3 : 13, 1961; Maheshw. 100. *Cedrela toona* Roxb. ex Rottl. et Willd. in Ges. Naturf. Fr. Neue Schr. 4 : 198, 1803; Bamber 43; Sabnis 145; Parker 71; Duthie 143.

Large deciduous trees. Leaves paripinnate. Leaflets entire, oblique at the base. Flowers yellowish white in terminal panicles. Stamens 5. Capsules oblong, smooth.

A few trees are often seen planted near canal rest houses all over the area. A few naturally regenerated plants (3 to 4 years old) were seen near Badopal Canal Rest House.

Jind, 26510; Fazilka, 36504.

4. SWIETENIA Jacq.

S. mahagoni Jacq. Enum. Pl. Carib. 20, 1760; Parker 72; Maheshw 100, Duthie 140.

Evergreen trees. Leaves pinnate. Fruit a woody capsule.

Cultivated. A few trees are seen in parks and gardens at Patiala. I have not seen the flowers.

35. OLACACEAE

OLAX Linn.

O. nana Wall. ex Benth. in Trans. Linn. Soc. 18 : 678, 1840; FBI 1 : 576; Bamber 113; Parker 72; Duthie 145.

Undershrubs. Leaves subsessile, oblong lanceolate, entire, glabrous, deep green. Flowers white calyx accrescent. Petals 3, Stamens 3, anti-petalous. Ovary ovoid. Fruit a globose drupe.

Hoshiarpur Siwaliks.

Flowers : April-May.

Hoshiarpur, Aitchison 467 (DD); Parker 75 (DD).

36. CELASTRACEAE

1. Climbing shrubs; flowers in racemes
2. Erect thorny shrubs; flowers cymose

1. *Celastrus*
2. *Maytenus*

I. CELASTRUS Linn.

C. paniculatus Willd. Sp. Pl. 1 : 1125, 1797; FBI 1 : 617; Bamber 591; Parker 79; Duthie 148.

Twining shrubs; leaves alternate, broadly elliptic ovate, shortly acuminate, crenate-serrate. Flowers greenish, unisexual, in drooping panicles. Fruits capsular, seeds enclosed in scarlet aril.

Local name : Halkangni.

Flowers : Hot season.

Between Pipli and Karnal, 26486; Hoshiarpur, Aitchison s.n. (DD).

2. MAYTENUS Molina

1. Capsules turbinate, slightly lobed; thorns slender
 1. Capsules globose; thorns stout

2. *M. royleanus*
 1. *M. emarginata*

1. *M. emarginata* (Willd.) Ding Hou in Fl. Males. (Ser. 1) 6(2) : 241, 1962. *Celastrus emarginatus* Willd. Sp. Pl. 1 : 1128, 1798. *Gymnosporia montana* Benth. Fl. Austr. 1 : 400, 1863; FBI 1 : 621; Bamber 114; Parker 79. *Maytenus senegalensis* (Lamk.) Exell. in Bull. Soc. Brot. (Ser. 2) 26 : 223, 1952; Maheshw. 101; Puri 40.

Erect shrubs or small trees, young branches purple. Leaves and flowers usually on thorns. Flowers white. Fruits purple when ripe.

A very elegant plant when in bloom. Common in dry sandy places. The fruits are sometimes eaten.

Local name : Sherwane, Talkar.

Flowers : June-Oct. *Fruits* : May-June.

Bhiwani, 20069; Loharu, 16318; Mahendragarh, 16284, 20582; Sohna, T. A. Rao 11074; Toru (Rewari), T. A. Rao 11100.

2. *M. royleanus* (Wall. ex Lawson) Cufod. in Senck. Biol. 43 : 313, 1962. *Gymnosporia royleana* Wall. ex Lawson in FBI 1 : 620; Bamber 113; Parker 79. *Celastrus spinosus* Royle, Ill. 157, 1835; Duthie 149.

Shrubs. Leaves elliptic, ovate or obovate, glabrous. Flowers whitish in subsessile axillary often fascicled cymes. Fruits brown.

Hoshiarpur, Aitchison s. n. (DD).

37. RHAMNACEAE

1. Fruits baccate; stipules deciduous
 1. Fruits drupe; stipules spiny

1. *Rhamnus*
 2. *Zizyphus*

1. RHAMNUS Linn.

R. triquetra (Wall. ex Roxb.) Lawson in FBI 1 : 639; Bamber 78; Duthie 167; Parker 87. *Ceanothus triquetrus* Wall. ex Roxb. Fl. Ind. ed. Carey 2 : 376, 1832.

Small unarmed trees; young shoots tomentose. Leaves subcoriaceous. Flowers 5-merous in axillary racemes. Petals obovate. Stamens longer than the petals.

Common on Ambala Siwaliks.

Local name : Gudlei.

Kasauli, B. L. Gupta s. n. (DD).

2. ZIZYPHUS Juss.

- | | |
|---|-------------------------|
| 1. Leaves distichous, acute or acuminate; spines usually one at each node | 4. <i>Z. oenoplia</i> |
| 1. Leaves not distichous, rounded at both ends; | |
| 2. Leaves glabrous above; trees or large erect shrubs; | |
| 3. Leaves densely clothed with buff tomentum beneath | 2. <i>Z. mauritiana</i> |
| 3. Leaves glabrous or slightly pubescent beneath | 1. <i>Z. hysudrica</i> |
| 2. Leaves pubescent above; diffuse shrubs | 3. <i>Z. nummularia</i> |

1. *Z. hysudrica* (Edgew.) Hole in Indian For. 44 : 505, 1918; Sabnis 147; Parker 83. *Z. jujuba* Lamk. var. *hysudrica* Edgew. in Jour. Linn. Soc. 6 : 201, 1862; FBI 1 : 633.

Medium-sized trees. Branches erect. Stipular spines variable, often wanting. Leaves glabrous above, light tomentose below.

Planted.

Ottobridge (Sirsa), 18950.

2. *Z. mauritiana* Lamk. Encyl. 3 : 319, 1789; Maheshw. 101; Puri 40. *Z. jujuba* Lamk. Ibid. 318, 1789; FBI 1 : 632; Bamber 9; Sabnis 146; Parker 81; Duthie 152 (non *Z. jujuba* Mill. 1768).

Medium-sized trees or large shrubs. Leaves ovate to elliptic, rounded at both ends. Petals 5. Styles 2 connate to the middle. Drupes ovoid, reddish brown or yellow when ripe.

Commonly cultivated for its fruits.

Local name : Baer.

Flowers : Sept.-Oct. Fruits : Jan.

Hissar, 24863; Duthie 3908 (DD); V. J. Nair 14776; Hoshiarpur, T. A. Rao 10725; Sirsa, 18970; M. A. Rau 3597.

3. *Z. nummularia* (Burm. f.) Wt. & Arn. Prodr. 162, 1834; FBI 1 : 633; Bamber 76; Parker 82; Maheshw. 102; Puri 40. *Rhamnus nummularia* Burm. f. Fl. Ind. 61, 1768. *Z. rotundifolia* Lamk. Dict. 3 : 319, 1789; Duthie 153.

Straggling tomentose shrubs. Leaves orbicular, rounded at the apex and base; spines two, one straight, other curved. Drupe 10 mm in diameter, globose, edible.

Very common in dry areas, gregarious. One of the early pioneers on sand dunes. Leaves used as fodder for camels.

Local name : Jhar, Malla.

Flowers : Sept.-Oct. Fruits : Feb.-May.

Barwala, 26553; Bitmada, 25023; Hissar, 18781; V. J. Nair 19209; Jind, 15896, 24765; Karnal, 24634; Narnaul, 25226; Rohtak, V. J. Nair 23178; Sirsa, 26121, 26123.

4. **Z. oenopia** (Linn.) Mill. Gard. Dict. ed. 8, n. 3. 1768; FBI 1 : 634; Bamber 77; Parker 82; Duthie 154; Maheshw. 102. *Rhamnus oenopia* Linn. Sp. Pl. 194, 1753.

Scandent shrubs. Leaves oblique at the base, margins denticulate, more or less pubescent above, reddish-silky beneath; spines pubescent except the tip. Fruits small.

Local name : Makoh.

Flowers : Hot season. *Fruits* : Nov.

Kalka, T. A. Rao 10884.

38. VITACEAE

1. Leaves simple
1. Leaves trifoliate

2. *Vitis*
1. *Cayratia*

1. CAYRATIA Juss.

C. carnosa (Lamk.) Gagnep. in Not. Syst. 1 : 347, 1911; Maheshw. 102. *Cissus carnos*a Lamk. Encycl. 1 : 31, 1783. *Vitis carnos*a Wall. ex Wt. et Arn. Prodr. 127, 1834; FBI 1 : 654, (excl. syn. Linn.). *V. trifolia* auct. non Linn.

Slender climbers. Leaves 3-foliolate; leaflets broadly ovate to nearly orbicular, acute, crenate dentate, variable in size. Flowers in long peduncled cymes. Petals 4, hooded at the apex. Berry 2-4-seeded, black.

Local name : Amalbel.

Flowers : Rainy season. *Fruits* : Dec.-Jan.

Bitamada, 25021; Gohana, V. J. Nair 23146; Hissar, 16131; Duthie 3912 (DD); Raizada 20988 (DD); Hoshiarpur, Aitchison s.n. (DD); Karnal, 24644; Kurukshetra, J. N. Vohra 8861; Nilokheri, 15840, 15842; Sonpet; V. J. Nair 23302.

2. VITIS Linn.

V. vinifera Linn. Sp. Pl. 202, 1753; FBI 1 : 652; Bamber 592; Parker 94; Maheshw. 103; Puri 41; Duthie 160.

Large tendril climbers. Leaves cordate or orbicular cordate, 3-5-lobed, coarsely toothed. Inflorescence leaf-opposed. Flowers greenish yellow. Berry green.

Rarely cultivated.

Local name : Angur.

Sirsa, 26581.

39. SAPINDACEAE

- | | |
|---|-------------------------|
| 1. Slender climbing herbs; fruit an inflated capsule;
flowers slightly irregular | 1. <i>Cardiospermum</i> |
| 1. Shrubs or trees; fruits not inflated; flowers regular: | |
| 2. Evergreen shrubs; leaves simple; flowers unisexual,
fruits winged | 2. <i>Dodonaea</i> |
| 2. Trees; leaves compound; flowers polygamous; fruits not winged: | |
| 3. Fruits tubercled | 3. <i>Euphoria</i> |
| 3. Fruits smooth | 4. <i>Sapindus</i> |

1. *CARDIOSPERMUM* Linn.

C. halleacabum Linn. Sp. Pl. 366, 1753; FBI 1 : 670; Bamber 595; Sabnis 148; Maheshw. 103; Puri 41; Duthie 166.

Annuals. Branches pubescent, furrowed. Leaves biternate, deltoid; leaflets incise-serrate. Flowers in dichasial cymes with two cirrhose tendrils beneath. Flowers white. Seeds globose, black with a white reniform aril.

Common on hedges and in jungles. Roots and leaves medicinal

Local name : Fatkari, Latafatkari.

Flowers : Rainy season. *Fruits* : Oct.-Nov.

Hissar, 18752; Duthie 3915 (DD); Raizuda 20964 (DD); V. J. Nair 19213.

2. *DODONAEA* Linn.

D. viscosa Jacq. Enum. Pl. Carib. 19, 1760; FBI 1 : 697; Bamber 123; Sabnis 149; Parker 105; Maheshw. 103; Puri 41; Duthie 170.

Evergreen shrubs. Young parts glandular. Leaves oblanceolate, more or less viscid with a resinous exudation. Flowers greenish yellow in axillary cymes. Petals absent.

Often cultivated as a hedge plant.

Local name : Sanatta.

Flowers : Feb.-March. *Fruits* : April-May.

Hissar, V. J. Nair 19944; Hoshiarpur, Aitchison s.n. (DD); Jameson s.n. (DD); Mojukheda, 26074.

3. *EUPHORIA* Juss.

E. longana (Lour.) Steud. Nomencl. Bot. 328, 1821; Backer, Fl. Java 2: 136, 1965. *Dirmocarpus longan* Lour. Fl. Cochinch. 233, 1790. *E. longana* Lamk. Encycl. 3: 578, 1791. *Nepheium longanum* Camb. in Mem. Mus. Par. 18 : 30, 1829; FBI 1 : 688.

Trees; leaves compound. Flowers yellowish white. Calyx pubescent on both sides. Petals 5, pubescent.

Cultivated. Very rare.

Hissar, V. J. Nair 21532.

40. ANACARDIACEAE

- | | |
|--|---------------------|
| 1. Leaves trilobate or pinnate: | |
| 2. Leaves trifoliolate | 3. <i>Rhus</i> |
| 2. Leaves pinnate: | |
| 3. Intramarginal veins present in leaflets | 4. <i>Spondias</i> |
| 3. Intramarginal veins absent in leaflets | 1. <i>Lannea</i> |
| 1. Leaves simple | 2. <i>Mangifera</i> |

1. LANNEA A. Rich.

L. coromandelica (Houtt.) Merrill in Jour. Arn. Arb. 19 : 353, 1939; Puri 42. *Dialium coronandelicum* Houtt. Nat. Hist. 2 : 39, t. 5, f. 2, 1774. *Odina woodier* Roxb. Fl. Ind. 2 : 293, 1832; FBI 2 : 29; Bamber 44; Parker 115; Duthie 175.

Large deciduous trees. Leaves crowded at the ends of branches, alternate, leaflets 7-11, glabrous, shining. Flowers purplish, appearing when the tree is leafless, in fascicles, tetramerous, polygamodioecious. Fruits kidney-shaped, red when ripe.

Not common.

Local name : Kimlu, Jhingan.

Flowers : Feb.-March.

Gurdaspur, *Fane* s.n. (DD); Hoshiarpur, *Aitchison* 514 (DD).

2. MANGIFERA Linn.

M. indica Linn. Sp. Pl. 200. 1753; FBI 2 : 13; Bamber 30; Parker 112; Maheshw. 105; Puri 42; Duthie 176.

Large evergreen trees. Leaves coriaceous, oblong-lanceolate, alternate, simple, entire, shining. Inflorescence pubescent. Flowers yellow, polygamous, arranged in panicles; sepals and petals 4-5 each; stamen 1.

Very common but never wild. Several varieties are in cultivation.

Local name : Am.

Flowers : Jan.-March. *Fruits* : April-June.

Hissar, *V. J. Nair* 19991; Yamunanagar, 27558.

3. RHUS Linn.

R. mysorensis Heyne ex Wt. et Arn. Prodr. 172, 1834; FBI 2 : 9 (*mysorensis*); Bamber 131; Parker 110; Maheshw. 106; Puri 42; Duthie 174.

Large shrubs. Leaflets obovate, cuneate, sinuate, toothed or sublobed. Flowers in small terminal and axillary panicles, ploygamous. Drupes minute.

On dry hills in Mahendragarh district.

Local name : Danser.

Flowers : Sept.

S. E. Punjab, *Parker* s.n. (DD).

4. SPONDIAS Linn.

S. pinnata (Linn. f.) Kurz in Pegu Rep. A. 44, 1875; Maheshw. 105. *Mangifera pinnata* Linn. f. Suppl. 156, 1781. *Spondias mangifera* Willd. Sp. Pl. 2 : 751, 1799; Bamber 45; Parker 115; Duthie 177.

Deciduous trees. Leaves imparipinnate, leaflets 7-11. Flowers greenish white, in panicles. Fruits drupe.

Cultivated in gardens. The tender fruits are pickled.

Local name : Ambara.

Flowers : Hot season.

Hoshiarpur, Aitchison s.n. (DD); Kalesar, Gupta s.n. (DD).

41. MORINGACEAE

MORINGA Burm.

M. pterigosperma Gaertn. Fruct. 2 : 314, 1791; FBI 2 : 45; Bamber 44; Parker 117; van Steenis in Fl. Males. 1(5) : 554, 1958; Backer & Bakhuizen van den Brink Fl. Java 1 : 186, 1963; Duthie 179. *M. oleifera* Lamk. Encycl. 1 : 398, 1785; Bullock in Kew Bull. 14 : 44, 1960; Parker 553; Maheshw. 106; Puri 42.

Small trees with corky, white bark and very soft wood. Young branches tomentose. Leaves alternate 3-pinnate. Flowers white, tinted purple, in large panicles. Fruits capsular, up to 45 cm long, ribbed.

Cultivated. Leaves and young fruits used as vegetables. Leaves form good fodder for camels.

Local name : Sainjna.

Flowers : Jan.-March. Fruits : April-June.

Fatehbad, 25952; Gidderbha (Ferozpur dist.), 26244.

42. MIMOSACEAE

- | | |
|---|--------------------------|
| 1. Stamens more than 10: | |
| 2. Stamens monadelphous: | |
| 3. Pods straight, flat | 2. <i>Albizia</i> |
| 3. Pods twisted or curved | 3. <i>Plthecellobium</i> |
| 2. Stamens free | 1. <i>Acacia</i> |
| 1. Stamens 10 or less: | |
| 4. Stamens 10 : | |
| 5. Anthers gland crested; pods dehiscent; flowers in heads | 3. <i>Leucaena</i> |
| 5. Anthers not gland tipped: | |
| 6. Pods indehiscent; flowers in spikes | 6. <i>Prosopis</i> |
| 6. Pods dehiscent; flowers in peduncled heads | 4a. <i>Desmanthus</i> |
| 4. Stamens 8; anthers not gland-crested; flowers in globose heads | 4b. <i>Mimosa</i> |

I. ACACIA Mill.

- | | |
|---|---|
| 1. Climbing prickly shrubs: | |
| 2. Leaflets 14-30 pairs | 9. <i>A. torta</i> |
| 2. Leaflets 10-50 pairs | 7. <i>A. pennata</i> |
| 1. Erect trees or shrubs: | |
| 3. Flowers in globose heads; flowers yellow: | |
| 4. Heads axillary pedunculate: | |
| 5. Pods fleshy, cylindrical | 2. <i>A. farnesiana</i> |
| 5. Pods flat or moniliform: | |
| 6. Pods moniliform | 6. <i>A. nilotica</i> subsp. <i>tomentosa</i> |
| 6. Pods flat | 3. <i>A. jacquemontii</i> |
| 4. Heads in terminal panicles; flowers white or yellowish white | 4. <i>A. leucophloea</i> |
| 3. Flowers in spikes; spines shortly curved: | |
| 7. Spines 3 at each node; flowers white | 8. <i>A. senegal</i> |
| 7. Spines 2 at each node; flowers pale yellow: | |
| 8. Pods dehiscent | 1. <i>A. catechu</i> |
| 8. Pods indehiscent | 5. <i>A. modesta</i> |

1. *A. catechu* Willd. Sp. Pl. 4 : 1079, 1805; FBI 2 : 295; Bamber 27; Sabnis 358; Parker 192; Maheshw. 150; Duthie 290.

Trees with grey bark. Prickles below the leaves. Flowers creamy white. Pods thin, flat, 3 to 6-seeded.

Rare.

Local name : Khair.

Flowers : May-July.

Loharu-Dadri Road, 20098; Hoshiarpur, *Aitchison* s.n. (DD).

2. *A. farnesiana* (Linn.) Willd. Sp. Pl. 4 : 1083, 1805; FBI 2 : 292; Bamber 26; Sabnis 355; Parker 190; Duthie 288; Maheshw. 148. *Mimosa farnesiana* Linn. Sp. Pl. 521, 1753.

Erect shrubs. Leaves bipinnate; spines divaricate; pinnae 4-8 pairs; leaflets 10-20 pairs, subglabrous. Flowers in globose yellow heads, sweet-scented. Pods turgid, 5-8 cm broad.

This species differs from other species of *Acacia* in having two rows of seeds in the pod. On this account some authors remove it to a monotypic genus *Vachelia*.

Cultivated and self sown. Near Faridkot and Nabha this plant grows in extensively large areas.

Local name : Vilayathi Kikar.

Flowers : Feb.-April.

Binjhol (Panipat), 25806; Hissar, 18825; *V. J. Nair* 19911; Jind, 18693; Khanna, 35985; Nabha, 36748; Panipat 18656.

3. *A. jacquemontii* Benth. in Hook. Lond. Jour. Bot. 1 : 499, 1842; FBI 2 : 293; Bamber 27; Parker 191; Maheshw. 149; Puri 58; Duthie 289.

Shrubs 2-3 m high. Leaves bipinnate. Spines white, straight. Flowers yellow in globose heads, fragrant. Pods flat, thin, 5-8-seeded, reticulately veined.

A psammophyte. Common in the desert areas bordering Rajasthan.

Local name : Chota Babul.

Flowers and fruits : April-June.

Choudhriwas, 26558; Kanana (Dadri), 20543; Taiwandi, 34522.

4. *A. leucophloea* (Roxb.) Willd. Sp. Pl. 4 : 1083; 1805; FBI 2 : 294; Bamber 27; Sabnis 356; Parker 192; Duthie 290; Maheshw. 149; Puri 58. *Mimosa leucophloea* Roxb. Pl. Corem. t. 150, 1800.

Small deciduous trees with grey bark. Spines in pairs below the petioles; straight, dark brown. Leaves bipinnate, petioles and rachis with a gland between each pair of pinnae. Flowers white, arranged in heads collected on large panicles. Pods linear, flat, brown velvety when young.

Common in scrub forests. Often planted along road sides and canal banks.

Local name : Nimbar.

Flowers : Jan.-March. *Fruits* : Oct.-Nov.

Barnala, 36586; Bhiwani, 16362; Bankandi (Hoshiarpur Dist.), T. A. Rao 10758; Gurgaon, T. A. Rao 11028; Jhabua (Rewari), 20706; T. A. Rao 11126; Jind, 24747; Mahendragarh, 20555; Rohtak, 24728, 26353.

5. *A. modesta* Wall. Pl. As. Rar. 2 : 27, 1831; FBI 2 : 296; Bamber 27; Sabnis 356; Parker 193; Duthie 292.

Deciduous trees. Spines in pairs below the petioles, compressed, strongly recurved, dark brown. Flowers creamy white on axillary solitary and cylindrical spikes. Pods flat.

Not common in the area.

Local name : Phulahi.

Flowers and fruits : Sept.-Feb.

Hoshiarpur, T. A. Rao 10724; Kera (Sirsa), V. J. Nair 21575; Nabha, 36739.

6. *A. nilotica* (Linn.) Del. subsp. *tomentosa* (Benth.) Brenan in Kew Bull. 12 : 84, 1957; Puri 58. *A. nilotica* (Linn.) Del. var. *tomentosa* (Benth.) Hill in Bot. Mus. Leaflet. Harvard Univ. 8 : 98, 1940. *A. arabica* (Lamk.) Willd. var. *tomentosa* Benth. in Hook. Jour. Bot. 1 : 500, 1842. *A. arabica* auct. (non Willd.); FBI 2 : 293; Bamber 355; Sabnis 355; Parker 190; Maheshw. 148; Duthie 288.

Moderate sized evergreen trees. Spines in pairs below the petiole, straight, subulate, large, yellowish white, wanting in old plants. Flowers in globose heads, yellow. Pods, stipitate, moniliform, when young, rich in tannin.

The tree survives in all kinds of soils. Branches are lopped and leaves are used as fodder for Camels. From wounds in the bark a gum exudes which is used in place of gum arabic.

Local name : Kikar, Babul.

Flowers : Sept.-Nov. *Fruits* : Dec.-June.

Between Pipli and Karnal, 26483; Beas, *Vohra* 11313; Bhatinda, 27799; Jind, 26533; Nizampur, 20676; Panipat 24721; Phagwara, *T. A. Rao* 10711; Tikri (Rohtak), *V. J. Nair* 21639; Toru (Rewari), *T. A. Rao* 11094.

7. *A. pennata* Willd. Sp. Pl. 4 : 1090, 1806; FBI 2 : 297; Parker 194; Duthie 293.

Climbing shrubs. Leaves bipinnate with a large gland on the petiole and between the 2-4 uppermost pairs of pinnae. Flowers white, turning yellow. Pods flat.

Kalesar, *Parker* s.n. (DD).

8. *A. senegal* (Linn.) Willd. Sp. Pl. 4 : 1077, 1806; FBI 2 : 295; Bamber 27; Parker 193; Duthie 291; Maheshw. 150; Puri 58. *Mimosa senegal* Linn. Sp. Pl. 521, 1753. *A. rupestris* Stocks ex Boiss. Fl. Orient. 2 : 638, 1853; Brandis Ind. Trees. fig. 116, 1906.

Small trees. Bark greyish. Prickles in threes at the base of the petioles, lateral ones up-curved or straight, middle one recurved. Flowers white, fragrant, in cylindrical spikes. Pods thin, flat.

Common in scrub forests of dry hills. The gum of this tree forms the true gum Arabic.

Local name : Kunta.

Flowers : Aug.-Nov.

Khanak, 16248; Mahendragarh, 16298; Taoru, *T. A. Rao* 11097.

9. *A. torta* (Roxb.) Craib in Kew Bull. 410, 1915. *Mimosa torta* Roxb. Fl. Ind. 2 : 566, 1924. *A. caesia* auct. (non Willd.); Parker 193. *A. intsia* auct. (non Willd.); FBI 2 : 297; Bamber 604.

Large climbers. Prickles hooked, many. Leaves 2-pinnate; leaflets strap shaped. Flowers pale yellow, in dense round heads. Pods thin flat, 6 to 10-seeded.

Flowers and fruits : Sept.-Nov.

Hoshiarpur, *Aitchison* s.n. (DD); Kalka, *T. A. Rao* 10874.

2. ALBIZIA Dur.

A. lebbeck (Linn.) Benth. in Hook. Jour. Bot. 3 : 87, 1844; FBI 2 : 298; Bamber 28; Sabnis 357; Parker 187; Duthie 295; Maheshw. 151; Puri 58. *Mimosa lebbeck* Linn. Sp. Pl. 516, 1753.

Large deciduous trees; leaves bipinnate with a large sessile gland near the base of the petiole. Flowers in small heads in terminal panicles, fragrant, white; stamens long-exserted. Pods flat, glabrous. The strap-shaped fruits hang on the trees long after they are ripe. produce a rattling sound in wind.

Cultivated as avenue trees, occasionally self sown.

Local name : Siris.

Flowers : April-May.

Bhatinda, 27792; Hissar, *V. J. Nair* 19939; Kera (Sirsa), *V. J. Nair* 21577; Hoshiarpur, *T. A. Rao* 10722; Yamunanagar, 26406.

3. LEUCAENA Benth.

L. leucocephala (Lamk.) de Wit in *Taxon* 10 : 53, 1961 in obs; Maheshw. 146. *Mimosa leucocephala* Lamk. *Encycl.* 1 : 12, 1783. *L. glauca* Benth. in *Hook. Jour. Bot.* 4 : 416, 1842; *FBI* 2 : 290; Sabnis 355; Parker 199; Duthie 286.

Small trees. Leaves bipinnate ending in a weak bristle. Flowers in globose heads, yellowish white. Pods thin, flat.

Cultivated in gardens.

Flowers : Sept. onwards.

Hissar, *V. J. Nair* 21530.

4a. DESMANTHUS Willd.

D. virgatus Willd. *Sp. Pl.* 4 : 1047, 1805; *FBI* 2 : 290; Parker 198.

Erect shrubs. Rachis with a large gland at the base of the petiole, ends in a bristle above the last pair of pinnae. Flowers pale yellowish white, in axillary globose pedunculate heads.

Only one sheet seen from Amritsar.

Ram Bagh, *Parker* (?) s.n. (DD).

4b. MIMOSA Linn.

1. Sutures of fruit prickly

2. Sutures of fruit not prickly

1. *M. hamata*

2. *M. himalayana*

1. *M. hamata* Willd. *Sp. Pl.* 4 : 1033, 1806; *FBI* 2 : 291; Bamber 106; Sabnis 355; Parker 198; Maheshw. 147; Puri 57; Duthie 287.

Large shrubs. Branches prickly. Flowers pink, tetramerous. Stamens 8. Pods falcate, flat, 4-8-jointed.

Common in sandy places near Rajasthan Desert.

Local name : Ral.

Flowers : Aug.-Sept. *Fruits* : Dec.

Dadri, 16264; Hansi, 16165; Hissar, 18750; *Duthie* 396 (DD); *Raizada* 20955 (DD), 20992 (DD).

2. *M. himalayana* Gamble in *Kew Bull.* 1, 1920; Sabnis 355. *M. rubicaulis* Baker in *FBI* 2 : 291 (non Lamk.); Bamber 106; Parker 197; Maheshw. 147; Duthie 286.

Straggling deciduous; shrubs, branches reddish with numerous prickles. Flowers pink fading to white, tetramerous, in globose peduncled heads. Fruits flat.

Local name : Ral.

Flowers : July-Oct. *Fruits* : Dec.

Hansi, 25873; Hoshiarpur, *T. A. Rao* 10750; Jind, 16117, 24774; Panipat, 18678.

5. PITHECELLOBIUM Mart.

P. dulce (Roxb.) Benth. in Hook. Lond. Jour. Bot. 3 : 199, 1844; FBI 2 : 302; Bamber 28; Parker 201 (*Pithecolobium*); Duthie 241; Maheshw. 152. *Mimosa dulcis* Roxb. Corem. Pl. t. 99, 1798.

Small trees. Stipular thorns small. Leaves with one pair of pinnae, and each pinna with two leaflets; a gland present between each pair of leaflets; rachis ends in a weak spine. Pods twisted or falcate.

Cultivated.

Flowers : March.

Kapurthala, *J. N. Vohra* 11327.

6. PROSOPIS Linn.

1. Thorny plants, pods compressed :
2. Deciduous, leaflets falcate
2. Not deciduous, midrib central
1. Prickly plants, pods cylindric

1. *P. glandulosa*
2. *P. juliflora*
3. *P. cineraria*

1. *P. glandulosa* Torr. Ann. Lyc. N. York. 2 : 192, t. 2, 1828; Parker 200; Maheshw. 145.

Medium sized trees. Flowers creamy white in solitary axillary spikes. Pods compressed, distinctly constricted between the seeds.

This plant is mentioned on the authority of Parker. I have seen no specimen from the area.

2. *P. juliflora* DC. Prodr. 2 : 447, 1825; Sabnis 354; Parker 201; Maheshw. 145; Puri 56; Duthie 285.

A large shrub or small evergreen tree armed with scattered axillary thorns on zig-zag branches. Flowers yellow on pendulous spikes. Pods linear, compressed, often falcate, yellow; exocarp brittle; mesocarp pulpy, endocarp cartilaginous.

The plant figures prominently in all afforestation schemes of the area. It has been naturalised in several areas. The leaves and pods are very good fodder for cattle. The bark exudes a gum.

Flowers and fruits : Hot season.

Hissar, 18824; Raizada 21048 (DD); *M. A. Rau* 3542; *V. J. Nair* 19210, 21637; Muktesar, 36521.

3. *P. cineraria* (Linn.) Druce in Report Bot. Exch. Club, Br. Is. 1913, 3 : 422, 1914; Hutchins. Gen. Fl. Pl. 1 : 289, 1964. *Mimosa cineraria* Linn. Sp. Pl. 517, 1753. *Prosopis spicigera* Linn. Mant. 68, 1767; FBI 2 : 288; Bamber 26; Sabnis 354; Parker 200; Maheshw. 145; Puri 56; Duthie 284.

Evergreen trees. Young branches prickly. Flowers creamy white or yellow, in cylindrical spikes. Pods straight, slender, torulose, pendulous. Seeds 10-15.

One of the principal trees in arid areas. In irrigated places the plant is rare. The tree is often mutilated by lopping the foliage which is used as fodder for domestic animals in the arid areas. The pods are also valuable as fodder. The tender fruits are cooked and eaten as vegetable; the seeds are used during famine times in areas bordering Rajasthan.

Local name : Jand.

Flowers : March-April.

Bhatinda, 27802; Hissar, Duthie 3962 (DD); V. J. Nair 19995, 21534; Jhabua, 20705; Jind, 26529; Kera (Sirsa), V. J. Nair 21574; Siwani, 26562.

43. CAESALPINIACEAE

- | | |
|---|-----------------------|
| 1. Flowers apetalous: | |
| 2. Calyx small, non petaloid: | |
| 3. Leaflets 3-5 pairs | 4. <i>Ceratonia</i> |
| 3. Leaflets 1 pair | 6. <i>Hardwickia</i> |
| 2. Calyx large, petaloid | 8. <i>Saraca</i> |
| 1. Flowers with petals: | |
| 4. Leaves simple, bilobed or rarely 2-foliolate by fission | 1. <i>Bauhinia</i> |
| 4. Leaves compound: | |
| 5. Leaves simply pinnate: | |
| 6. Petals 5 | 3. <i>Cassia</i> |
| 6. Petals 3 perfect, 2 scaly | 9. <i>Tamarindus</i> |
| 5. Leaves bipinnate: | |
| 7. Primary rachis and stipules modified into spines; secondary rachis flattened; pod moniliform | 7. <i>Parkinsonia</i> |
| 7. Not as above: | |
| 8. Pods more than 25 cm long, 5 cm broad and 1 cm or more thick; sepals valvate | 5. <i>Delonix</i> |
| 8. Pods much smaller; sepals imbricate | 2. <i>Caesalpinia</i> |

1. BAUHINIA Linn.

- | | |
|--|------------------------|
| 1. Climbing shrubs; stamens only 3 fertile: | |
| 2. Leaves 10-50 cm long | 4. <i>B. vahlii</i> |
| 2. Leaves up to 4 cm long | 1. <i>B. corymbosa</i> |
| 1. Trees: | |
| 3. All ten stamens fertile; pods indehiscent | 2. <i>B. racemosa</i> |
| 3. Only 3-5 stamens fertile; pods dehiscent: | |
| 4. Calyx tube shorter than limb | 3. <i>B. purpurea</i> |
| 4. Calyx tube longer than limb | 5. <i>B. variegata</i> |

1. *B. corymbosa* Roxb. Fl. Ind. 2 : 329, 1824; Parker 181.

Slender climbers. Leaves 5-7-nerved. Flowers white, tinted pink

Staminodes 2-5. Styles short, stigmas large.

Cultivated in gardens.

2. **B. racemosa** Lamk. *Encycl.* 1 : 390, 1783; FBI 2 : 276; Bamber 22; Parker 178; Puri 55; Duthie 274.

Small trees with crooked branches. Flowers pale yellow. Pods 15-20 cm long, glabrous, 15-20-seeded.

In Siwalik forests.

Hoshiarpur, *Gupta* s.n. (DD).

3. **B. purpurea** Linn. *Sp. Pl.* 375, 1753; FBI 2 : 284; Bamber 22; Parker 179; Maheshw. 138; Puri 55; Duthie 276.

Small trees. Flowers showy in axillary and terminal racemes; calyx reddish pubescent; corolla rose to purple. Pods glabrous, flat, 12-16-seeded.

In Siwalik forests. Sometimes cultivated in gardens.

Local name : Kachnar.

Flowers : Sept.-Nov.

Hoshiarpur, *Aitchison* s.n. (DD).

4. **B. vablii** Wight et Arn. *Prodr.* 297, 1834; FBI 2 : 279; Bamber 594; Parker 180; Maheshw. 137; Duthie 276.

A large climber. Branchlets end in two tendrils which later become woody. Leaves large. Flowers white in terminal racemes. Calyx villous. Pods woody, 6-12-seeded.

Common in Siwalik forests.

Local name : Tour.

Hoshiarpur, *Aitchison* 517 (DD).

5. **B. variegata** Linn. *Sp. Pl.* 375, 1753; FBI 2 : 284; Bamber 22; Parker 180; Maheshw. 137; Duthie 277.

Small trees. Flowers white or purplish-white in racemes. Calyx grey tomentose. Stamens 5, no staminodes. Fruits 16 cm long, 10-15-seeded.

In Siwalik forests. Often planted in gardens.

Local name : Kachnar.

Flowers : Feb.-April.

Hissar, *V. J. Nair* 19993; Nizampur, 20689; Taran Taran, 36342.

2. CAESALPINIA Linn.

1. Erect shrubs, pods smooth
1. Climbing shrubs:
 2. Pods prickly on the face
 2. Pods smooth

3. *C. pulcherrima*

1. *C. crista*
2. *C. decapetala*

1. *C. crista* Linn. Sp. Pl. 380, 1753, pro majore parte (excl. Fl. Zeyl. 157); Santapau, Fl. Saur. 182, 1962; Maheshw. 144. *C. bonducella* (Linn.) Fleming in Asiat. Res. II : 159, 1810; FBI 2 : 254; Bamber 603; Parker 172; Duthie 278. *Guilandina bonducella* Linn. Sp. Pl. ed. 2, 545, 1762.

Large climbing shrubs armed with prickles. Flowers yellow in dense racemes which are terminal and supra-axillary; pedicels short. Filaments hairy at the base. Pods 1-2-seeded.

Cultivated as a hedge plant in many places.

Local name : Kanti Karangi.

Flowers : Sept. onwards.

Barnala, 35698; Rohtak, V. J. Nair 23230.

2. *C. decapetala* (Roth) Alston in Trim. Handb. Fl. Ceyl. 6 (suppl.) 89, 1931. *Reichardia decapetala* Roth, Nov. Pl. Sp. 212, 1812. *Caesalpinia sepiaria* Roxb. Fl. Ind. 2 : 360, 1832; FBI 2 : 256; Bamber 604; Parker 173; Duthie 279.

Large scandent shrubs armed with prickles. Flowers yellow in simple terminal and axillary racemes; pedicels jointed near the flower. Pods narrowly winged, somewhat woody. 4-8-seeded.

Found in the ravines of Siwalik hills.

Local name : Kanderi.

Hoshiarpur, Aitchison 601 (DD).

3. *C. pulcherrima* (Linn.) Swartz, Obs. Bot. 166, 1791; FBI 2 : 255; Bamber 25; Parker 179. *Poinciana pulcherrima* Linn. Sp. Pl. 380, 1753; Maheshw. 144; Puri 56; Duthie 279.

Large shrubs with beautiful orange yellow flowers in terminal corymbose racemes.

Cultivated in gardens.

Local name : Krishnachori.

Flowers : May-Oct.

Tohana, 25013.

3. CASSIA Linn.

1. Prostrate herbs; stamens 10, all fertile

2. Erect herbs, shrubs or trees:

2. Stipules foliaceous, auriculate

2. Stipules small, not foliaceous nor auriculate:

3. Pods cylindric 30-60 cm long

3. Pods flattened less than 30 cm long:

4. Leaf rachis without glands:

5. Herbs or small shrubs; pods flat, recurved with a crest on the middle of the valve opposite each seed

5. Trees; pod straight without crest

4. Leaf rachis with gland:

6. Glands present between pairs of leaflets:

3. *C. mimosoides*

1. *C. auriculata*

2. *C. fistula*

4. *C. italica*

7. *C. siamea*

- | | |
|---|---|
| 7. Rachis with 1 gland; sepals ciliate;
upper 3 stamens apiculate | 5. <i>C. obtusifolia</i> |
| 7. Rachis with 2 glands; sepals eciliate;
anthers without hood-like projection | 9. <i>C. tora</i> |
| 6. Glands absent between pairs of leaflets but
a gland present below the leaflets: | |
| 8. Leaflets 3-5 pairs, acuminate | 6. <i>C. occidentalis</i> |
| 8. Leaflets 6-10 pairs, obtuse | 8. <i>C. sophora</i> var. <i>purpurea</i> |

1. *C. auriculata* Linn. Sp. Pl. 379, 1753; FBI 2 : 263; Puri 54; Duthie 270.

Erect shrubs. Branches finely pubescent. Glands present in between each pair of leaflets. Stipules produced into a subulate point towards the petiole. Flowers yellow in terminal and axillary racemes. Stamens 10, three reduced to staminodes, rest unequal.

Cultivated in gardens and runs wild in open places.

Flowers : April-May.

Hissar, V. J. Nair 21621.

2. *C. fistula* Linn. Sp. Pl. 377, 1753; FBI 2 : 261; Bamber 25; Sabnis 352; Parker 175; Maheshw. 142; Puri 54; Duthie 268.

A deciduous tree. Flowers yellow in drooping axillary racemes. Pods cylindrical, smooth, pendulous, up to 80 cm long. Seeds immersed in sweet pulp.

Planted as an avenue tree in many places, very showy when in flower during March-June.

Local name : Amaltas.

Hissar, V. J. Nair 21512.

3. *C. mimosoides* Linn. Sp. Pl. 379, 1753; FBI 2 : 266; Bamber 561, Duthie 272.

Perennial with spreading branches. The midrib of the leaflets is near the upper margin. A gland is present between the lowest pair of leaflets. Stamens 10, all nearly equal. Pods flat, 3.5 cm long, 15-20-seeded.

Rare.

Pathankot, Drummond 6 (DD).

4. *C. italica* (Mill.) Lamk. ex F. W. Andr. Fl. Pl. A.—E. Sud. 2: 117, fig. 49, 1952. *Senna italica* Mill. Gard. Dict. ed. 8, 2, 1768. *C. obovata* Collad. Hist. Cass. 92, t. 15A, 1816; FBI 2 : 264; Bamber 266; Puri 54. *C. obtusa* Roxb. Fl. Ind. 2 : 344, 1824; Duthie 271.

Undershrubs. Branches herbaceous from a woody stock, glaucous. Flowers pale yellow in few-flowered stalked racemes. Fruit curved, 6-12-seeded.

E. Punjab, Anonymous s.n. (DD).

5. *C. obtusifolia* Linn. Sp. Pl. 377, 1753; Brenan in Kew Bull. 13: 248-252, 1958; Duthie 271. *Senna toroides* Roxb. Fl. Ind. 2 : 341, 1824. *Cassia tora* Baker in FBI 2 : 263, pro parte (non Linn.).

Annual herbs with bland odour. Leaflets obovate oblong, membranous. Flowers in sub-sessile pair in the axils of leaves, yellow. Pod cylindrical, elongate.

Common along canal banks and in moist places.

Flowers and fruits : Aug.-Nov.

Hissar, 19016; Jhabua, T. A. Rao 1123; Karnal, 24615; Rohtak, V. J. Nair 23120, 23166.

6. *C. occidentalis* Linn. Sp. Pl. 377, 1753; FBI 2 : 262; Bamber 105 Parker 175; Duthie 269; Maheshw. 141; Puri 55. *Senna occidentalis* (Linn.) Roxb. Fl. Ind. 2 : 343, 1832.

Foetid shrubs about 2 m high. Leaves paripinnate, leaflets 3-5 pairs with a globose sessile gland inserted on the petiole below the leaflets. Flowers in few-flowered racemes, yellow. Fruit-margins thickened, slightly falcate.

Common in waste places.

Local name : Kasunda.

Flowers : Aug. onwards.

Hissar, 17197; V. J. Nair 19994; Jind, 15884, 24771; Karnal, 24607; Panipat, 18615; Rohiak, 16365; Yamunanagar 26396.

7. *C. siamea* Lamk. Encycl. 1 : 648, 1785; FBI 2 : 264; Parker 176; Maheshw. 143.

A quick-growing tree with pyramidal panicle of yellow flowers. Stamens 7 perfect.

Cultivated.

E. Punjab, Parker s.n. (DD).

8. *C. sophera* Linn. var. *purpurea* (Roxb.) Baker in FBI 2 : 264; Puri 55; Duthie 269. *Senna purpurea* Roxb. Fl. Ind. 2 : 342, 1824.

Annual or perennial foetid shrubs with purplish branches. Leaves with a solitary gland near the base of the petiole. Flowers yellow. Pods subterete, slightly curved.

Cultivated as a hedge plant.

Local name : Kasunda.

Flowers : Aug.-Dec.

Dadri, 20515; Hissar, V. J. Nair 19996; Sirsa, 18985; Rohtak, 16363.

9. *C. tora* Linn. Sp. Pl. 376, 1753; FBI 2 : 263 (pro parte); Maheshw. 141 (excl. syn.); Puri 54.

Erect foetid herbs. Glands present between the lowest two pairs of leaflets. Flowers yellow, in pairs in the axils of leaves. Pods cylindric.

Flowers : After rainy season.

Jind, 24760.

4. CERATONIA Linn.

C. siliqua Linn. Sp. Pl. 1026, 1753; Parker 183.

Small trees. Flowers minute, green, in spike-like racemes. Stamens 5. Pods pulpy.

Cultivated. Fruit edible.

Fazilka, *Parker s.n.* (DD).

5. DELONIX Raf.

D. regia (Boj.) Raf. Fl. Tell. 2 : 92, 1836. *Poinciana regia* Boj. in Bot. Mag. t. 2884, 1829; FBI 2 : 260; Parker 182; Maheshw. 143; Duthie 279.

Large trees. Leaves up to 75 cm long, bipinnate. Flowers about 11 cm across, showy appearing when the tree is leafless, in terminal racemes; four of the petals are scarlet, the fifth is variegated yellow, red and white. Pods large, deep brown.

Cultivated in gardens.

Local name : Gulmohor.

Flowers : Hot season.

Hissar, *V. J. Nair* 19943.

6. HARDWICKIA Roxb.

H. binata Roxb. Pl. Corem. 3 : 6, t. 209, 1819; FBI 2 : 270; Parker 183; Maheshw. 138.

Trees. Leaflets oblique.

Ornamental trees in gardens (Patiala).

Flowers not seen.

7. PARKINSONIA Linn.

P. aculeata Linn. Sp. Pl. 375, 1753; FBI 2 : 260; Bamber 25; Sabnis 352; Parker 173; Maheshw. 138; Puri 56; Duthie 280.

Large shrubs. Branches glabrous, armed with three spines at each node. Flowers yellow in axillary racemes. Pods moniliform.

Cultivated in arid regions in sandy soil.

Flowers : Oct.-March.

Hissar, *V. J. Nair* 19336; Ludhiana, *Parker s.n.* (DD).

8. SARACA Linn.

S. asoca (Roxb.) De Wilde in *Blumea* 15 (2) : 383, 1967; Zuijderhoudt in *Blumea* 15 (2) : 422, 1967. *Jonesia asoca* Roxb. in *As. Res.* 4 : 355, 1795 et *Fl. Ind.* 2 : 218, 1832. *S. indica* auct. pl (non Linn.) *FBI* 2 : 271; Parker 183; Maheshw. 139; Duthie 273.

Small trees. Leaves paripinnate, 15-25 cm long with intrapetiolar stipules. Flowers conspicuous. Stamens 7-8, exserted.

Cultivated in gardens.

Flowers : April-May.

Patiala, Singh s.n. (DD).

9. TAMARINDUS Linn.

T. indica Linn. *Sp. Pl.* 34, 1753; *FBI* 2 : 273; Bamber 25; Parker 183; Maheshw. 139; Puri 55; Duthie 277.

Large trees. Leaflets 10-20 pairs closely set. Flowers in few flowered racemes at the ends of branches; corolla of 3 petals, yellow, striped red; stamens three. Pods pulpy. Seeds 3-6, large; brownish black, shining.

Cultivated for the fruit.

Local name : Imli.

Flowers : Feb. Fruits : March-April.

Muktesar, 36535.

44. PAPILIONACEAE

- | | |
|--|------------------------|
| 1. Fruits ripening under-ground | 5. <i>Arachis</i> |
| 1. Fruits not ripening under-ground: | |
| 2. Fruits jointed, constricted between the seeds, often breaking into 1-seeded bits: | |
| 3. Leaflets without stipels: | |
| 4. Armed; leaves simple | 3. <i>Alhagi</i> |
| 4. Unarmed; leaves not simple: | |
| 5. Stamens monadelphous | 41. <i>Zornia</i> |
| 5. Stamens diadelphous: | |
| 6. Fruits much exserted from the calyx | 2. <i>Aeschynomene</i> |
| 6. Fruits included within the calyx | 30. <i>Smithia</i> |
| 3. Leaflets with stipels: | |
| 7. Fruits included in the calyx, bent backwards | 38. <i>Urvaria</i> |
| 7. Fruits exserted from the calyx, not bent backwards: | |
| 8. Herbs or undershrubs: | |
| 9. Calyx dry; fruits not compressed | 4. <i>Alysicarpus</i> |
| 9. Calyx herbaceous; fruits compressed | 15. <i>Desmodium</i> |
| 8. Trees | 27. <i>Ougenia</i> |
| 2. Fruits not jointed: | |
| 10. Leaves without terminal leaflets, rachis ending in a tendril or bristle (some times the entire rachis is tendrillar without leaflets): | |
| 11. Twiners; rachis ending in a bristle: | |
| 12. Woody plants; seeds oblong, red with hilar end black | 1. <i>Abrus</i> |
| 12. Herbs; seeds compressed, grey with minute spots | 21. <i>Lens</i> |
| 11. Herbaceous tendril climbers: | |
| 13. Tip of rachis alone tendrillar | 39. <i>Vicia</i> |
| 13. Upper leaflets and tip of rachis tendrillar or the entire rachis tendrillar and without leaflets: | |
| 14. Wings adherent to keel, calyx teeth more or less leaf-like; stem terete | 32. <i>Pisum</i> |

14. Wings not adherent to keel; calyx teeth linear; stem winged or angled 20. *Lathyrus*
10. Leaves with terminal leaflets:
15. Stamens 9, monadelphous 14. *Dalbergia*
15. Stamens 10, monadelphous or diadelphous:
16. Stamens monadelphous:
17. Climbing plants:
18. Pods with silky long brown hairs 34a. *Pueraria*
18. Pods glabrous or nearly so 9a. *Canavalia*
17. Erect plants:
19. Styles bearded above; stigmas minute, oblique 12. *Crotalaria*
19. Styles not bearded; stigmas capitate 13. *Cyamopsis*
16. Stamens diadelphous, 9 + 1:
20. Large trees, leaflets 3:
21. Trunks armed with prickles; flowers red 17. *Erythrina*
21. Trunk unarmed:
22. Flowers less than 2 cm long, pinkish white or purplish white; fruits woody 33. *Derris*
22. Flowers more than 2 cm long, orange or salmon coloured; fruits not woody 8. *Butea*
20. Shrubs or herbs:
23. Erect or weak plants not climbing:
24. Leaves simple or 1-foliolate; flowers hidden by folded reniform bracts 25. *Moghania*
24. Leaves not simple; flowers not hidden by bracts (leaves simple in *Tephrosia strigosa*):
25. Pods more or less longitudinally divided by an ingrowth from the dorsal suture 6. *Astragalus*
25. Pods not divided as above:
26. Leaves trifoliolate:
27. Leaflets gland-dotted beneath:
28. Pods single seeded 34. *Psoralea*
28. Pods more than 1-seeded:
29. Erect shrubs up to 3 m 9. *Cajanus*
29. Weak herbs 7. *Atylosia*
27. Leaflets not gland-dotted beneath:
30. Leaves palmately 3-foliolate; flowers in globose heads; calyx often enlarged into a bladder in fruit 37. *Trifolium*
30. Leaves pinnately 3-foliolate; flowers not in globose heads, generally in racemes:
31. Pods strongly curved or spiral 23. *Medicago*
31. Pods not spiral:
32. Pods 1 or 2-seeded, indehiscent, globose 24. *Melilotus*
32. Pods elongated; (2-seeded in *Trigonella occulta*):
33. Leaflets less than 1.5 cm broad, serrate 36. *Trigonella*
33. Leaflets more than 1.5 cm broad, entire:
34. Stipules truncate at base; keels twisted; fruits not septate 31. *Phaseolus*
34. Stipules cordate or appendaged below; keels often straight; fruits septate 40. *Vigna*
26. Leaves not trifoliolate (trifoliolate in some species of *Indigofera*)
35. Pods flattened 35. *Tephrosia*
35. Pods not flattened:
36. Leaves with 5-leaflets, digitate 22. *Lotus*
36. Leaves usually with more than 5 leaflets, pinnate:
37. Leaflets toothed 10. *Cicer*
37. Leaflets entire; pods distinctly septate between the seeds:
38. Hairs medifixed; leaflets 3-13 18. *Indigofera*
38. Hairs not medifixed; leaflets 15-50 29. *Sesbania*
23. Climbing plants:
39. Leaves with 5-7 leaflets 11. *Clitoria*

39. Leaves trifoliate:
 40. Leaflets more than 10 × 6 cm; flowers more than 2.5 cm 26. *Mucuna*
 40. Leaflets and flowers smaller:
 41. Styles bearded down one side 19. *Lablab*
 41. Styles glabrous below:
 42. Ovules 2 28. *Rhynchosia*
 42. Ovules 3 or more:
 43. Leaflets gland-dotted beneath 7. *Atylosia*
 43. Leaflets not gland-dotted beneath 16. *Dolichos*

1. **ABRUS** Linn.

A. precatorius Linn. Syst. ed. 12 : 472, 1767; FBI 2 : 175; Bamber 596; Parker 157; Maheshw. 126; Puri 51; Duthie 241.

Leaflets 10-20 pairs. Racemes crowded. Seeds bright red.

Local name : Rathi.

Flowers : Sept.-Nov.

Hansi, 18722; Rohtak, *V. J. Nair* 29728.

2. **AESCHYNOMENE** Linn.

A. indica Linn. Sp. Pl. 713, 1753; FBI 2 : 151; Bamber 262; Maheshw. 122; Duthie 249.

Erect biennial herbs; the basal portion of the stem becomes pithy during the second year of growth, at which time it attains a diameter of 3-5 cm. Flowers in axillary racemes, peduncles and pedicels usually viscid. Pods narrow, straight or very lightly curved; upper suture straight, lower indented.

Common in marshy places and on canal banks, and other moist places. The basal pithy portion of the plant is used by fishermen as floats.

Local name : Chino.

Flowers : Sept.-Dec.

Sirsa, 18979, 18983c; between Jind and Hansi, 24798; Jind, 16110; Karnal, 24626.

3. **ALHAGI** Adans.

A. pseudalhagi (M. Bieb.) Dev. in Jour. Bot. 1 : 120, 1813; Puri 49; Maheshw. 122. *Hedysarum pseudalhagi* M. Bieb. Fl. Taur. Cauc. 2 : 174, 1808. *Alhagi camelorum* Fisch. Ind. Hort. Gorenk. 72, 1812; Sabnis 347; Parker 143; Duthie 257. *A. maurorum* Baker in FBI 2 : 145 (non Desv.); Bamber 79.

An erect shrub armed with long thorns. Leaves simple, obovate or elliptic oblong. Flowers 3-9 on the thorns. Pods contracted between the seeds.

Common in fallow lands and near river beds.

Local name : Javsa.

Flowers : April-May.

Fatehabad, 26572; Senipura forest (Rohtak), *V. J. Nair* 21567, 21572, 21600; Yamunanagar, 27559.

4. ALYSICARPUS Neck.

- | | |
|--|-----------------------------|
| 1. Calyx shorter or slightly longer than the first joint of the pod: | |
| 2. Pods moniliform | 2. <i>A. monilifer</i> |
| 2. Pods not moniliform: | |
| 3. Calyx shorter than the first joint of the pod | 3. <i>A. hamosus</i> |
| 3. Calyx equal to or slightly longer than the first joint of the pod | 4. <i>A. vaginalis</i> |
| 1. Calyx much longer than the 1st joint of the pod: | |
| 4. Pods transversely ribbed | 5. <i>A. rugosus</i> |
| 4. Pods not transversely ribbed, slightly moniliform | 1. <i>A. bupleurifolius</i> |

1. *A. bupleurifolius* DC. Prodr. 2 : 352, 1825; FBI 2 : 158; Maheshw. 125.

A suberect herb. Leaves 1-foliolate; stipules comparatively large, persistent.

Flowers : Monsoon.

Karnal, *J. N. Vohra* 9914; Pinjaur, *T. A. Rao* 10865.

2. *A. monilifer* (Linn.) DC. Prodr. 2 : 353, 1825; FBI 2 : 157; Bamber 545; Maheshw. 124; Puri 50; Duthie 254.

Slender prostrate herbs, densely tufted. Leaves simple, cordate or oblong. Flowers 4 to 8 on close racemes. Pods clothed with minute hooked hairs. In moist hard ground.

Flowers : Rainy season.

Chandigarh, *T. A. Rao* 10854; Faridkot, 36545; Hissar, *V. J. Nair* 14702; Karnal, 24613; Mahendragarh, 20559, 20624, 25160; Rohtak, *V. J. Nair* 23190; Sonpet, *V. J. Nair* 23351; Tohana, 25005; Tosham, 25047.

3. *A. hamosus* Edgew. in Jour. Asiat. Soc. Beng. 21 : 171, 1853; FBI 2 : 157; Bamber 545; Duthie 255.

Prostrate or succulent herbs. Leaves 1-foliolate, orbicular, broadly ovate or suborbicular. Flowers usually in pairs in the axils. Pods compressed; clothed with hooked hairs; joints 3 to 8.

Flowers : Rainy season.

This plant is mentioned on the authority of Bamber. I have seen no specimen from the area. From the general distribution of the taxon it is likely to be found in the area.

4. *A. vaginalis* (Linn.) DC. Prodr. 2 : 353, 1825; FBI 2 : 157 (excl. var. *stocksii*); Bamber 517; Duthie 255; Maheshw. 124; Puri 50. *Hedy-sarum vaginale* Linn. Sp. Pl. 746, 1753.

Prostrate pubescent herbs. Leaflets very variable on one and the same plant, lanceolate, oblong or ovate, obtuse or acute. Flowers flesh-coloured. Pods not moniliform, reticulately veined. Joints 4 to 8.

Flowers: Aug.-Nov.

Badopal, 24957; Bankhandi, *T. A. Rao* 10794; Karnal, 24636; Loharu, 16308; Panipat, 18648.

5. *A. rugosus* (Willd.) DC. Prodr. 2 : 353, 1825; Miq. Fl. Ind. Bat. 1 : 233, 1855; FBI 2 : 159; Bamber 546; van Meeuwen in Reinwardtia 6 : 88, 1961; Duthie 256; Maheshw. 125. *Hedysarum rugosum* Willd. Sp. Pl. 3(2) : 1172, 1803. *Alysicarpus violaceus* (non *Hedysarum violaceum* sensu Forsk) Schindl. in Fedde Repert. 21 : 13, 1925; Puri 50.

Erect or suberect herbs. Leaflets oblong or suborbicular. Pods turgid included in the calyx or scarcely exerted, joints 3 to 6, glabrous.

There are two sheets marked 'Punjab' in DD, without Collectors' name.

5. ARACHIS Linn.

A. hypogea Linn. Sp. Pl. 741, 1753; FBI 2 : 161, Maheshw. 125.

Stems herbaceous pilose. Leaves paripinnate, leaflets 2 pairs. Flowers axillary, solitary, yellow. Fruits buried underground, yellowish white, 1-3-seeded, indehiscent.

The common groundnut; cultivated extensively in Kapurthala and adjoining areas in sandy soil.

Local name : Mungfalli.

Flowers: Sept. *Fruits* : Nov.-Jan.

Kapurthala, 35999.

6. ASTRAGALUS Linn.

1. Pods more than 3 cm long
1. Pods up to 2.5 cm long

1. *A. ophiocarpus*
2. *A. tribuloides*

1. *A. ophiocarpus* Benth. ex Bunge, Astrag. 1 : 10, 2 : 6, 1869; FBI 2 : 122; Ali in Biologia 7 : 30, 1961. *A. aitchisonii* Baker in FBI 2 : 121; Bamber 257.

Prostrate pubescent herbs. Leaflets 17-25, alternate. Flowers white with purple tip in a loose head of 4-6 flowers. Fruits up to 6.5 cm, 9-20-seeded.

Common in sandy plains and at the base of the sand dunes at Muktesar. Not collected from any other place in the plains.

Flowers and fruits : March-April.

Muktesar, 36527.

2. *A. tribuloides* Del. Ill. Fl. Egypt. 696, t. 64, f. 17, 1813; FBI 2 : 122; Bamber 557; Sabnis 346; Ali 24.

Slender trailing herbs. Branches with white hairs. Leaflets 13-15, white hairy on both surfaces. Flowers pale yellow to pinkish white on 6 to 10-flowered sessile heads. Pods short, little curved 10-12-seeded.

Common in sandy places.

Flowers and fruits : Feb.-April.

Bahuna, 25985; Barwala, V. J. Nair 19275; Choudhriwas, V. J. Nair 19396; Dabwali, 26149, 26159; Lambi, 26181, 26208; Talwandi, V. J. Nair 19861.

7. ATYLOSIA Wt. & Arn.

A. scarabaeoides Benth. Pl. Jungh. 243, 1851; FBI 2 : 215; Bamber 602; Parker 162; Duthie 196.

Small climbers; pubescent. Leaflets 3-nerved, densely grey-tomentose beneath. Calyx densely pubescent. Corolla yellow. Pods furrowed between the seeds, brownish silky pubescent. Seeds 4-6.

Flowers and fruits : Nov.-Dec.

Bhakranagal, T. A. Rao 10813; Hoshiarpur Siwaliks, Aitchison 631 (DD); T. A. Rao 10748.

8. BUTEA Roxb.

B. monosperma (Lamk.) Taub. in Engler & Prantl. Pflanzenfam. 3 (3) : 366, 1894; Maheshw. 130; Puri 51. *Erythrina monosperma* Lamk. Encycl. 1 : 391, 1783. *Butea frondosa* Koenig ex Roxb. in Asiat. Res. 3 : 469, 1792; FBI 2 : 194; Parker 160; Bamber 24; Duthie 221.

An erect tree reaching up to 12 m high. Young branches tomentose or downy. Leaves trifoliate. Leaflets unequal-sided, strongly nerved, glabrous above, silky beneath. Flowers showy, red or orange. Calyx velvety outside, silky within. Corolla silky outside. Pods velvety.

Local name : Dhak, Palas.

Flowers and fruits : March-April.

Between Pipli and Karnal, 26483; Nabha. 36750, 36752.

9. CAJANUS DC.

C. cajan (Linn.) Millsp. in Field Columb. Mus. Bot. 2 : 53, 1900; Maheshw. 134. *Cytisus cajan* Linn. Sp. Pl. 739, 1853. *Cajanus indicus* Spreng. Syst. 3 : 248, 1826; FBI 2 : 217; Bamber 98; Sabnis 350.

Erect shrubs. Flowers yellow. Fruits purplish streaked transversely when young, 3-5-seeded.

Cultivated as a rainy season crop.

Local name : Thur.

Barnala 36585; Bitmada, 25029.

Regnum Veget. 36: 12, 1964 gives *Cajanus cajan* (Linn.) Huth, 1893. The author was unable to check this. *Index Kewensis* lists Huth's name as *Cajan cajan*.

9a. CANAVALIA DC.

C. gladiata DC. Prodr. 2: 404, 1825; Chatterjee in Jour. Ind. Bot. Soc. 28: 86, 1949; Santapau, Fl. Saur. 1: 166, 1962; Puri 51. *C. ensiformis* Baker in FBI 2: 195; Duthie 216.

An annual climber on bushes and hedges. Leaflets glabrous. Kalesar (Ambala Siwaliks), *Parker* s.n. (DD).

10. CICER Linn.

C. arietinum Linn. Sp. Pl. 738, 1753; FBI 2: 176; Bamber 262; Sabnis 349; Maheshw. 126; Duthie 236.

Small herbs. Flowers purple. Fruits 2-4-seeded. Extensively cultivated during the cold season.

Local name : Chana.

Dabwali, 26128; Jhabua, 20726; Lambi, 26221; Rohtak, 26348; Kapurthala, 36309; Yamunanagar, 25286.

11. CLITORIA Linn.

C. ternata Linn. Sp. Pl. 753, 1753; FBI 2: 208; Bamber 601; Maheshw. 131; Puri 52; Duthie 212.

Climber. Leaflets 5-7, glabrous or nearly so. Flowers axillary solitary. Bracteoles large. Corolla blue or white. Cultivated in gardens.

Hissar, *V. J. Nair* 19957.

12. CROTALARIA Linn.

- | | |
|---|--------------------------|
| 1. Leaves simple: | |
| 2. Pods less than 6-seeded | 3. <i>C. bushua</i> |
| 2. Pods more than 6-seeded: | |
| 3. Pods hairy: | |
| 4. Calyx 6 mm long or less | 2. <i>C. albida</i> |
| 4. Calyx more than 12 mm | 4. <i>C. juteuca</i> |
| 3. Pods smooth or nearly so: | |
| 5. Stipules distinct; erect plants: | |
| 6. Corolla not projecting beyond the calyx: | 6. <i>C. mysorensis</i> |
| 7. Calyx more than 12 mm long | 1. <i>C. alata</i> |
| 7. Calyx less than 10 mm long | 8. <i>C. spectabilis</i> |
| 6. Corolla projecting much beyond calyx | 7. <i>C. prostrata</i> |
| 5. Stipules indistinct; prostrate plants | 5. <i>C. medicaginea</i> |
| 1. Leaves not simple | |

1. *C. alata* Buch.-Ham. ex Roxb. Fl. Ind. 2: 274, 1824; FBI 2: 69; Bamber 78; Duthie 186.

Small densely hairy shrubs; stipules forming wings which run down the stem. Inflorescence 2-3-flowered. Calyx silky. Petals yellow. Pods 30-40-seeded.

Flowers and fruits : Oct.

Hoshiarpur, *Atchison* 532 (DD).

2. *C. albida* Heyne ex Roth, Nov. Pl. Sp. 333, 1821; FBI 2: 71; Bamber 114; Duthie 189.

Small shrubs. Branches many, sometimes slender, silky. Leaves sessile, gland-dotted. Corolla yellow, rarely tinged with lilac, hardly protruding above the calyx. Pods 6-12-seeded.

Flowers and fruits : Oct.-Nov.

Bankhandi (Hoshiarpur Dist.), *T. A. Rao* 10764; Bhakra Nangal, *T. A. Rao* 10815.

3. *C. burhia* Buch.-Ham. ex Benth, in Hook. Lond. Jour. Bot. 2: 474, 1843; FBI 2: 66; Bamber 114; Sabnis 343; Parker 124; Maheshw. 113; Puri 44; Duthie 186.

Erect small shrubs, adpressedly hairy. Flowers distant in elongated racemes, yellow. Pods as long as calyx, hairy.

Common in sandy areas. One of the pioneers on sand dunes. Fasciation of stem is very common. Flowers almost throughout the year.

Bhatinda, 26265, 27791; Bhiwani, 20061; Fatehbad, 16236; Fazilka, 36398; Jhabua, 20731; Loharu, 16316; Rohtak, *V. J. Nair* 23109, 23249.

4. *C. juncea* Linn. Sp. Pl. 714, 1753; FBI 2: 79; Bamber 115; Maheshw. 113; Puri 44; Duthie 190.

A tall annual herb or undershrub, young parts silky. Leaves distant. Flowers yellow.

Often cultivated for its fibre.

Local name : San.

Flowers and fruits : Sept.-Oct.

Bhatinda, 27745; Bhiwani, 16356; Bitmada, 25027; Gurgaon, 25263; Rohtak, *V. J. Nair* 24730, 29713; Yamunanagar, 26416.

5. *C. medicaginea* Lam. Encycl. 2: 201, 1786; FBI 2: 81; Bamber 552; Sabnis 343; Maheshw. 112; Puri 45; Duthie 190.

Perennial or annual herbs, very variable in height. Leaves trifoliate. Racemes 2-6-flowered, leaf-opposed. Pods 2-seeded, globose or subglobose.

Common in irrigated areas. Rare elsewhere.

Local name: Gulabi.

Flowers and fruits: July-Nov.

Bhiwani, 16340, 19007; Gurgaon, 25246; Hissar, 24967; Hashiarpur, Aitchison 532 (DD); Mahendragarh, 25161; Narnaul, 24190; Panipat, 18640, 24714; Talwandi, 15203.

6. *C. mysorensis* Roth, Nov. Pl. Sp. 338, 1821; FBI 2: 70; Bamber 224; Maheshw. 113; Duthie 188.

Branched annuals with silky hairs and alternate simple leaves. Bracteoles 10 to 16 cm long. Hairs of calyx up to 4 cm long. Pods 20-30-seeded.

Local name: Duia.

Flowers and fruits: Aug.-Nov.

Bhakra Nangal, T. A. Rao 10809; Karnal, J. N. Vohra 9911.

This plant is often mistaken to be *C. ferruginea* Grah. which is confined to Khasia hills.

7. *C. prostrata* Rottl. in Willd. Enum. Hort. Berol. 747, 1809; FBI 2: 67; Bamber 563; Duthie 186.

Annuals clothed with silky hairs. Leaves simple, hairy on both surfaces. Racemes 2-4-flowered. Pods inflated, 12-15-seeded.

Flowers: Oct.-Nov.

Hoshiarpur, Aitchison 567 (DD).

8. *C. spectabilis* Roth, Nov. Pl. Sp. 341, 1821; Ali in Biol. 2: 26, 1966. *C. sericea* Retz. Obs. 5: 26, 1789; FBI 2: 75; Bamber 78; Sabnis 343; Maheshw. 113; Duthie 189 (non Burm. 1768).

Erect shrubs. Leaves simple, glabrous above, silky beneath. Stipules leafy. Flowers 20-30, yellow, on long racemes. Pods inflated, 20-30-seeded.

Flowers and fruits: Oct.-Feb.

Local name: San, Sanni.

Binghol (Panipat), 25819; Hansi, 25875; Panipat, 18681.

13. CYAMOPSIS DC.

C. tetragonoloba (Linn.) Taub. in Engl. et Prantl, Nat. Pflanzenf. 3: 259, 1894; Maheshw. 116; Puri 45. *Psoralea tetragonoloba* Linn. Mant. 1: 104, 1767. *Cyamopsis psoralioides* DC. Prodr. 2: 216, 1825; Duthie 228.

Annuals, up to 125 cm tall, stem angled and clothed with adpressed hairs. Leaves trifoliate. Flowers pale purple or pink, in short axillary racemes. Pods subtetragonous, 8-12-seeded, septate in between the seeds. Cultivated for fodder. Tender pods used as vegetable. Often runs wild.

Local name : Guar.

Flowers : Rainy season.

Fatehabad, 18875; Sirsa, 27721; Talwandi, 18765.

14. DALBERGIA Linn.

D. sissoo Roxb. Fl. Ind. 3: 223, 1832; FBI 2: 231; Bamber 24; Sabnis 351; Parker 166; Maheshw. 135; Puri 53; Duthie 243.

Deciduous trees with zig-zag branches. Leaves imparipinnate, leaflets alternate. Flowers pale yellow, in short panicles. Pods strap-shaped, slightly reticulate, 1-4-seeded.

Planted on canal banks and road sides. Rarely self sown. Yields a valuable timber.

Local name : Sisham.

Hissar, *V. J. Nair* 19930; Faridkot, 36562; Ludwa, 26437; Nizampur, 20677; Yamunanagar, 26381.

15. DESMODIUM Desv.

- | | |
|--|--------------------------|
| 1. Leaves unifoliate; pods distinctly jointed; erect herbs or shrubs: | |
| 2. Petioles not winged: | |
| 3. Branches angled; joints of pod longer than broad; leaves entire, glabrescent above | 1. <i>D. gangeticum</i> |
| 3. Branches terete; joints of pod as long as broad; leaves repand, hispid above | 7. <i>D. velutinum</i> |
| 2. Petioles winged | 6. <i>D. triquetrum</i> |
| 1. Leave 3-foliolate; pods distinctly or indistinctly jointed, dehiscent or separating into 1-seeded bits, erect or prostrate herbs: | |
| 4. Leaflets moving in jerks in sun light; lateral leaflets very small or sometimes wanting; pods dehiscing along ventral suture | 2. <i>D. motorium</i> |
| 4. Leaflets not moving in jerks, lateral ones large; pods separating into 1-seeded bits: | |
| 5. Prostrate herbs; bracts deciduous: | |
| 6. Flowers pink or white, 1-3 in the axils of the leaves; pods 3-5-jointed, reticulate veined, pubescent | 5. <i>D. triflorum</i> |
| 6. Flowers purple, in 6-8-flowered racemes exceeding the leaves; pods 3-4-jointed, not reticulately veined, minutely pubescent | 3. <i>D. parvifolium</i> |
| 5. Erect plants, often shrubby; bracts persistent | 4. <i>D. pulchellum</i> |

1. *D. gangeticum* (Linn.) DC. Prodr. 2: 327, 1825; incl. var. *maculatum* Baker FBI 2: 168; Bamber 79; Parker 155; Knap-van Meeuwen in Reinwardtia 6: 249, 1962; Duthie 264; Maheshw. 123; Puri 51. *Hedysarum gangeticum* Linn. Sp. Pl. 746, 1753.

Up to 30 cm tall. Leaflets small, roundish cordate. Pods slightly falcate. Near canal banks and other moist places.

Flowers and fruits : July-Oct.

Hissar, *Raizada* 21032 (DD), *V. J. Nair* 21542; Hoshiarpur, *Aitchison* s. n. (DD); Karnal, *J. N. Vohra* 8888; Nangal, *T. A. Rao* 10810; Sonpet, *V. J. Nair* 23334.

2. **D. motorium** (Houtt.) Merr. in Jour. Arn. Arb. 15: 345, 1938. *Hedysarum motorium* Houtt. Nat. Hist. 2: 246, 1779. *Desmodium gyrans* DC. Prodr. 2: 326, 1825; FBI 2: 174; Bamber 97; Parker 156, Duthie 265.

Leaflets coriaceous, oblong-lanceolate. Flowers panicle, hidden by the bracts. Pods straight on the dorsal suture and indented on the ventral.

Flowers : Rainy season.

Bankhandi, T. A. Rao 10784; Hoshiarpur, Aitchison s. n. (DD).

3. **D. parvifolium** DC. Prodr. 2: 334, 1825; FBI 2: 174; Bamber 560; Duthie 263.

Weak herbs. Racemes 6-8-flowered. Corolla purple. Sutures of pod indented.

I have seen a few sheets from Punjab in DD without Collector's name.

4. **D. pulchellum** (Linn.) Baker in FBI 2: 162, 1786; Duthie 260. *Hedysarum pulchellum* Linn. Sp. Pl. 748, 1753.

Shrubby; leaflets coriaceous. Racemes large, compound, made up of umbels. Pods small.

Flowers : Dec.

Ambala Siwaliks, Parker s. n. (DD).

5. **D. triflorum** (Linn.) DC. Prodr. 2: 334, 1825; FBI 2: 173; Bamber 559; Maheshw. 123; Puri 51; Duthie 263. *Hedysarum triflorum* Linn. Sp. Pl. 749, 1753.

Diffuse herbs. Leaflets obovate or obcordate. Flowers purple. Pods curved.

Common in moist places.

Flowers and fruits : Hot season.

Badopal, 24958; Bhatinda, 27826; Hansi, 26545; Karnal, 24632; Yamunanagar, 27580.

6. **D. triquetrum** (Linn.) DC. Prodr. 2: 326, 1825; FBI 2: 163; Bamber 517; Duthie 263. *Hedysarum triquetrum* Linn. Sp. Pl. 746, 1753.

I have seen only one sheet in DD without collector's name and precise locality.

7. **D. velutinum** (Willd.) DC. Prodr. 2: 328, 1825. *Hedysarum velutinum* Willd. Sp. Pl. 3: 1174, 1803. *Desmodium latifolium* DC. Prodr. 2: 328, 1825; FBI 2: 168; Bamber 79; Parker 155; Duthie 264.

Leaflets broadly ovate or suborbicular, ciliate with fulvous hairs, densely hairy beneath and slightly hairy above. Bracts longer than calyx, hairy. Flowers purple. Pods 4-6-jointed with hooked hairs.

Flowers : Feb.

Ambala Siwaliks, Parker s. n. (DD).

16. DOLICHOS Linn.

D. uniflorus Lam. Encycl. 2: 299, 1786. *D. biflorus* auct. (non Linn.) FBI 2: 210; Bamber 602; Puri 52; Duthie 211.

Annual. Stipules basifixed, scarious. Flowers 1-3, axillary. Corolla yellow. Style persistent.

The common horse gram said to be cultivated but I have not seen any specimen. It is sold in markets.

Local name : Kulti.

Flowers and fruits : Sept.-Nov.

17. ERYTHRINA Linn.

1. Calyx 2-lipped, not splitting down on the back to the base; seeds 2-5

1. *E. suberosa*

1. Calyx not 2-lipped, splitting to the base, seeds 6-8

2. *E. variegata*

1. **E. suberosa** Roxb. Fl. Ind. 3: 253, 1832; FBI 2: 189; Bamber 24; Parker 159; Maheshw. 129; Duthie 219.

Small trees with stout prickles when young; bark smooth when old. Leaves 3-foliolate; leaflets 8-15 cm long and broad. Flowers in dense heads. Corolla scarlet. Fruits torulose.

Cultivated in gardens.

Local name : Dhaulohak.

Flowers and fruits : Feb.-April.

Malerkotla, 36730.

2. **E. variegata** Linn. in Stickm. Herb. Amb. 10, 1754 & Amoen. Acad. 4: 122, 1759; Bullock in Kew Bull. 20: 294, 1966. *E. corallodendrum* var. *orientalis* Linn. Sp. Pl. 706, 1753. *E. variegata* Linn. var. *orientalis* (Linn.) Merr. Inter. Herb. Amb. 276, 1917; Maheshw. 129; Puri 51.

Large trees. Corolla bright red. Stamens exserted. Pods torulose, glabrous.

Local name : Pangra.

Flowers : Feb.-March.

Hoshiarpur (?), Parker s. n. (DD).

18. INDIGOFERA Linn.

1. Leaves simple:

2. Prostrate plants:

3. Leaves cordate; pods 2-seeded (rarely 1-seeded)

5. *I. cordifolia*

3. Leaves linear; pods 1-seeded

9. *I. linifolia*

2. Erect plants; pods 6-8-seeded

11. *I. oblongifolia*

1. Leaves compound:

4. Leaflets alternate:

5. Flowers in racemes; pods 6-8-seeded

11. *I. oblongifolia*

5. Flowers in sessile or short peduncled axillary heads;

5. ***I. cordifolia*** Heyne ex Roth, Nov. Pl. Sp. 357, 1821; FBI 2: 93; Bamber 224; Ali 545; Maheshw. 117; Puri 46; Duthie 230.

Spreading annuals. Leaves sessile hairy. Corolla red. Pericarp with black dots inside.

Common in sandy places. One of the pioneers on sand dunes. Rare in rocky areas.

Flowers and fruits : June-Nov.

Bhakra Nangal, T. A. Rao 10816; Gurgaon, 25242; Hissar, Harsukh 20684 (DD); Khanak, 25096; Tohana, 25004; Tosham, 25063.

6. ***I. glabra*** Linn. Sp. Pl. 752, 1753; Ali 573. *I. pentaphylla* Murr. Syst. Veg. (ed. 13), 564, 1774; FBI 2: 95.

I have not seen any specimen from the area. Ali (loc. cit.) cites specimens from Ludhiana (*Edgeworth* 45) and Kapurthala (Thomson) deposited in Kew Herbarium.

Flowers : Oct.

7. ***I. heterantha*** Wall. ex Brandis, For. Fl. N. W. & C. India 135, 1874; Ali 567. *I. gerardiana* Wall. ex Baker in FBI 2: 100 (incl. var. *heterantha*); Bamber 99; Parker 131.

Deciduous shrubs. Flowers pale red or purple 0.5-1.5 cm long. Pods minutely hairy.

Flowers : June-July.

Kalesar (Ambata Siwaliks), Gupta s. n. (DD); Hoshiarpur Siwaliks, Parker s. n. (DD).

8. ***I. hochstetteri*** Baker in Oliv. Fl. Trop. Afr. 1871; Ali 552; Maheshw. 118. *I. anabaptista* Steud. ex Baker in FBI 2: 102; Bamber 254; Puri 47; Duthie 231.

Annual herbs, branches diffuse. Leaflets 5. Racemes 12-20-flowered, shorter than the leaves. Corolla brick-red.

Common in stabilized sandy areas.

Badopal, 24943; Mahendragarh, 25158; Talwandi, 16204, 16209; Tohana, 24989.

9. ***I. linifolia*** (Linn. f.) Retz, Obs. 4: 29, 1786; FBI 2: 92; Bamber 545; Ali 545; Maheshw. 117. *Hedysarum linifolium* Linn. f. Suppl. 331, 1781.

Annual herbs, parts silvery white hairy. Flowers 6-20 in axillary sessile or short peduncled racemes. Corolla bright red. Pods globose, apiculate.

Common in sandy areas and grassy fields.

Flowers and fruits : Aug.-Nov.

Badopal, 24956; Beas, J. N. Vohra 11320; Bhatinda, 26264, 27780; Hoshiarpur, T. A. Rao 10814, 10740; Loharu, 20085; Sonpet, V. J. Nair 23353; Talwandi, 16214, 16219.

10. **I. linnaei** Ali loc. cit. 111: 549, 1968; Puri 46. *I. enneaphylla* Linn. Mant. 2: 272, 1771 (nomen illegit.); FBI 2: 94; Bamber 556; Duthie 230.

Biennial trailing herbs. Leaves 7-9-11-foliolate. Stipules long cuspidate. Flowers bright red in compact heads; bracts persistent.

Common in sandy places.

Flowers and fruits : Almost round the year.

Badopal, 16226, 24959; Bhatinda, 27820; Bitmada, 25022; Fatehbad, 18847; Jind, 24762; Karnal, *J. N. Vohra* 8893; Loharu, 20081; Mahendragarh, 20592; Panipat, 18649, 18651; Rohtak, *V. J. Nair* 23260; Tosham, 25045.

11. **I. oblongifolia** Forsk. Fl.-Aeg.-Arab. 137, 1775; Ali 546; Duthie 233; Maheshw. 117; Puri 47. *I. paucifolia* Del. Fl. Aeg. 251, 1813; FBI 2: 97; Parker 127.

Shrubs up to 2 m tall; leaves 1-3-5-foliolate. Flowers small in 20-45-flowered spikes. Corolla red with a purplish tint. Pods torulose. Rare.

Flowers and fruits : Sept.-Oct.

Bhiwani, 16345, 16378; Hissar, *M. A. Rau* 3532.

12. **I. sessiliflora** DC. Prodr. 2: 228, 1825; Ali 549. *I. trigonelloides* auct. non Jaub. & Spach.; FBI 2: 94; Bamber 556.

Trailing herbs. Leaves 5-7-foliolate. Flowers small in 12-30-flowered, sessile, axillary heads. Corolla red.

Common in sandy places.

Flowers and fruits : Aug.-Nov.

Choudhriwas, 25117; Hissar, 16182; Jind, 15877; Nilokheri, 15845; Tosham, 25043, 25060.

13. **I. tenuifolia** Rottl. ex Wt. & Arn. Prodr. 200, 1834; FBI 2: 95; Ali 562; Puri 47.

I have seen no specimen from the area but it is very likely to be present since it is very common in adjoining places.

14. **I. tinctoria** Linn. Sp. Pl. 751, 1753; FBI 2: 99; Bamber 98; Sabnis 345; Parker 128; Ali 567; Maheshw. 118; Puri 47; Duthie 235.

Shrubs up to 1 m high. Leaflets 7-13. Racemes usually shorter than the leaves. Flowers pink or red. Pods cylindric, often slightly curved 10-12 seeded.

Common on road sides and waste places.

Local name : Niel.

Flowers : Sept.-Nov. *Fruits* : Oct.-Jan.

Bhiwani, 16337; Jind, 16113; Murthal forest (Rohtak), *V. J. Nair* 29730; Mahendragarh, 20570; Nilokheri, 15844; Patiala, *T. A. Rao* 10937; Rohtak, *V. J. Nair* 21687; Sonpet, *V. J. Nair* 23355.

15. *I. trifoliata* Linn. Cent. Pl. 2: 29, 1756; FBI 96; Bamber 556; Ali 552; Duthie 232.

This is given on the authority of Bamber.

16. *I. trita* Linn. f. Suppl. 335, 1781 var. *trita* FBI 2: 96; Bamber 92; Parker 128; Ali 558; Maheshw. 118; Duthie 232.

Erect shrubs. Flowers in racemes shorter than the leaves; corolla pink or red; standard hairy on the back. Pods deflexed.

Flowers: Feb.-March.

Punjab, Aitchison s. n. (DD).

17. *I. trita* Linn. f. car. *maffei* (Chiov.) Ali 559, 1958. *I. maffei* Chiov. in Atti. Inst. Bot. Univ. Pavia Ser. 4: 128, t. 5, 1936.

Like the last taxon, except for the stouter habit and longer inflorescence. Punjab, Drummond 23658 (DD).

19. LABLAB Adans.

L. niger Medic. in Vorles. Churpf. Phys. Ges. 2: 354, 1787. *Dolichos lablab* Linn. Sp. Pl. 725, 1753; FBI 2: 209; Bamber 601; Maheshw. 131; Duthie 210.

A climbing perennial herb. Flowers white, red-tinted or pink turning purple. Cultivated for fruits.

Local name: Saem.

Flowers and fruits: Sept.-Nov. and March-April.

Bhiwani, 34582.

20. LATHYRUS Linn.

- | | |
|---|-------------------------|
| 1. Rachis without leaflets and ending in a tendril; flowers dull yellow | 1. <i>L. aphaca</i> |
| 1. Rachis with a pair of leaflets and ending in 3 tendrils; flowers not dull yellow: | |
| 2. Stem winged: | |
| 3. Leaflets linear-lanceolate .5-.8 cm broad; flowers purple, standard pink on the back | 3. <i>L. sativus</i> |
| 3. Leaflets oval-oblong 1.8-2.9 cm broad; flowers variously coloured, fragrant | 2. <i>L. odoratus</i> |
| 2. Stem not winged | 4. <i>L. sphaericus</i> |

1. *L. aphaca* Linn. Sp. Pl. 729, 1753; FBI 2: 179; Bamber 645; Sabnis 349; Maheshw. 127; Duthie 239.

Annual herbs up to 25 cm high. Stipules foliaceous. Pods oblong, 4-6-seeded.

Weed in fields during the cold season and spring; abundant in mustard fields.

Local name: Rewan.

Gurgaon, 20815; Karnal, 25294; Ludwa, 26471; Lambi, 26324; Rohtak, 26357; Sampla, 20016; Sirsoudh, V, J, Nair 19317, 19897.

2. *L. odoratus* Linn. Sp. Pl. 732, 1753.

Stem broadly winged, hairy. Cultivated in gardens during cold season.
The sweet pea.
Barnala, 36595.

3. *L. sativus* Linn. Sp. Pl. 730, 1753; FBI 2: 180; Bamber, 558; Sabnis 349; Maheshw. 128; Duthie 240.

Glabrous annuals. Rachis winged. Corolla longer than calyx. Pods with a wing on either side of the dorsal suture, 4-6-seeded.

Cultivated as a cold season crop. Used as fodder, and pods and seeds for human consumption. Prolonged use of the pulse is not advisable.

Local name : Kisari.

Flowers and fruits : March-April.

Amritsar, *J. N. Vohra* 11299; Binghamol, 25817; Hissar, 25893, 25917; Hoshiarpur, *Aitchison* s. n. (DD); Rohtak, 26341; Sampla, 20015; Taran Taran, 36332.

4. *L. sphaericus* Retz. Obs. 3: 39, 1784; FBI 2: 180; Bamber 558; Duthie 240.

Like the last species but stem wingless. Corolla as long as the calyx. Pods linear and wingless, more than 6-seeded.

A cold season weed.

Patiala, *Ganga Singh* s. n. (DD); Hoshiarpur, *Aitchison* s. n. (DD).

Bamber reports *L. inconspicuous* Linn. from the plains. But this is doubtful. This taxon has no tendril and instead, a bristle is present.

21. LENS Mill.

L. culinaris Medic. in Vorles. Ch. Physic. Ges. 2: 361, 1787; Maheshw. 127. *L. esculenta* Moench. Meth. 131, 1794; FBI 2: 179; Bamber 264; Duthie 237.

Small erect softly pubescent herbs. Leaflets 4-6 pairs, mucronate. Rachis end in a short bristle. Flowers pale purple. Fruit 2-seeded. Seeds compressed, grey with minute dots.

Cultivated during the cold season. Often runs wild.

Local name : Masur.

Badopal, 25931; Ratia, 26004; Yamunanagar, 25282.

22. LOTUS Linn.

L. corniculatus Linn. var. *minor* Baker in FBI 2: 91, 1876.

Slender prostrate herbs. Leaflets 5. Flowers solitary, brownish red. In moist sandy localities.

Flowers : March-April.

Ferozpur, 36386; Yamunanagar, 27504.

Baker (loc. cit.) gives the distribution of the plant as Sind.

23. *MEDICAGO* Linn.

- | | |
|---|-------------------------|
| 1. Erect herbs; fruits not spinose: | |
| 2. Flowers blue or bluish purple | 6. <i>M. sativa</i> |
| 2. Flowers yellow | 1. <i>M. falcata</i> |
| 1. Procumbent or spreading herbs: | |
| 3. Coils of fruits flat with rugose margin and transverse reticulate nerves | 5. <i>M. rugosa</i> |
| 3. Coils of fruits otherwise: | |
| 4. Fruits single seeded | 3. <i>M. lupulina</i> |
| 4. Fruits not single seeded: | |
| 5. Peduncles 1-2-flowered; corolla scarcely exerted | 2. <i>M. laciniata</i> |
| 5. Peduncles 2-6-flowered; corolla much exerted | 4. <i>M. polymorpha</i> |

1. *M. falcata* Linn. Sp. Pl. 779, 1753; FBI 90; Bamber 252.

Leaflets narrowly oblong. Flowers 8 mm in long racemes. Cultivated as a fodder crop during the cold season.

Hissar, *Raizada* 21041 (DD).

2. *M. laciniata* Mill. Gard. Dict. ed. 8: 5, 1768; FBI 2: 90; Bamber 555; Puri 45.

Slender herbs; stem glabrous. Leaflets obovate, cuneate. Peduncles filiform, 1-2-flowered, awned. Flowers yellow.

I have seen only one specimen from the area.

Flowers and fruits: March.

Beas, *J. N. Vohra* 11325.

3. *M. lupulina* Linn. Sp. Pl. 779, 1753; FBI 2: 90; Bamber 555; Duthie 194.

Leaflets obovate, incisocrenate. Flowers yellow. Corolla slightly exerted. Pods unarmed, black at maturity, indehiscent.

Weed in moist places during cold months.

Flowers and fruits: Jan.-May.

Binghol, 25825; Taran Taran, 36362; Yamunanagar, 27511.

4. *M. polymorpha* Linn. Sp. Pl. 779, 1753; Roxb. Fl. Ind. 3: 390, 1832; van Steenis in *Blumea* 12: 15, 1963. *M. denticulata* Willd. Sp. Pl. 3: 1414, 1802; FBI 2: 90; Bamber 555; Maheshw. 114; Duthie 194.

Subglabrous annuals. Leaflets faintly toothed. Flowers yellow in clusters of 2-6. Pods of 2-4 spirals.

Common weed during cold season in moist places and fields.

Flowers and fruits: Nov.-March.

Amritsar, *J. N. Vohra* 11290; Binghol, 25807; Gurgaon, 20807; Ludwa, 26445; Ludhiana, 35987; Panipat, 18623, 18631.

5. *M. rugosa* Desr. in Lamk. *Encycl.* 3: 362, 1796. *M. elegans* Jacq. ex Willd. Sp. Pl. 1408, 1802; Boiss. Fl. Or. 2: 98, 1872; Nair in *JBNHS* 64: 134, 1967.

Annuals. Leaflets obovoid and pubescent on lower surface. Stipules laciniate. Peduncle 1-4-flowered. Pods dextrorse, glabrous.

Flowers and fruits : Feb.-March.

Ferozpur : 36373 A, 36373 B.

6. *M. sativa* Linn. Sp. Pl. 778, 1753; FBI 2: 90, Bamber 555; Maheshw. 114; Duthie 194.

Branches many from the base. Flowers in dense racemes.

Cultivated during cold months and spring as fodder.

Ottobridge, 27710; Talwandi, 34525.

24. MELILOTUS Adans.

- 1. Flowers white
- 1. Flowers yellow

- 1. *M. albus*
- 2. *M. indica*

1. *M. albus* Medikus Vorles. Churp. f. Ok. Ges. 2: 382, 1787; Bamber 251; Maheshw. 115; Duthie 192.

Erect annual herbs up to 1 m high. Flowers pendulous. Pods 1-seeded.

A cold season weed in fields and moist places.

Flowers and fruits : Jan.-May.

Bhatinda, 27710; Ferozpur, 36387; Sirsa, 26101, 27705, 34556; Yamunanagar, 27509.

2. *M. indica* All. Fl. Pedem. 1: 308, 1785; Bamber 251; Sabnis 344; Duthie 192; Maheshw. 116. *M. parviflora* Desf. Fl. At. 2: 192, 1800; FBI 2: 89.

Like the above species but generally smaller with denser racemes and yellow flowers.

A cold season weed in fields and gardens. Also cultivated as a fodder crop.

Local name : Methi.

Flowers and fruits : Dec.-May.

Barnala, 36581; Bhatinda, 26287; Bhiwani, 20051; Bhanghol, 25909; Dabwali, 26140; Hissar, *M. A. Rau* 3698; Mahendragarh, 20635, 20675; Panipat, 18630; Rohtak, 26369.

25. MOGHANIA St. Hil.

- 1. Leaves simple; flowers in small cymes, each enveloped by a large persistent bract
- 1. Leaves 3-foliate; flowers in axillary racemose clusters; bracts small, linear, caducous

- 1. *M. bracteata*
- 2. *M. macrophylla*

1. *M. bracteata* (Roxb.) Li in Amer. Jour. Bot. 31: 225, 1944. *Hedysarum bracteatum* Roxb. Fl. Ind. ed. 2, 3: 351, 1832. *Flemingia strobilifera* var. *bracteata* (Roxb.) Baker in FBI 2: 227.

Only one specimen was seen from Ambala Siwaliks.

Kalsar, *Parker* s. n. (DD).

2. *M. macrophylla* (Willd.) O. Kuntze, Rev. Gen. Pl. 1: 199, 1891. *Crotalaria macrophylla* Willd. Sp. Pl. 3: 982, 1803. *Flemingia semialata* Roxb. ex Ait. Hort. Kew. (ed. 2) 4: 349, 1812. *F. congesta* Roxb. var. *semialata* (Roxb.) Baker in FBI 2: 229, 1876. *F. prostrata* Roxb. Fl. Ind. 3: 318, 1832.

Petiole narrowly winged. Racemes lax.

Only one specimen seen from Ambala Siwaliks.

Kalesar, Parker s. n. (DD).

26. MUCUNA Adans.

M. prurita Hook. Bot. Misc. 2: 348, 1830-31; Duthie 218; Maheshw. 129. *M. pruriens* sensu Baker in FBI 2: 187, 1876 (non DC. 1825); Bamber 599; Parker 156.

A large annual climber. Leaves 3-foliolate. Flowers in large pendulous racemes, purple to nearly black. Calyx villous outside with stinging hairs. Fruit almost S-shaped, 5-6-seeded.

Flowers and fruits: Rainy season.

Hoshiarpur, Atchison s. n. (DD).

27. OUGENIA Benth.

O. oojeinensis (Roxb.) Hochr. in Bull. Soc. Bot. Genev. 13: 51, 1909. *Dalbergia oojeinensis* Roxb. Fl. Ind. 3: 220, 1832. *Ougenia dalbergioides* Benth. Pl. Jungh. 216, 1852; FBI 2: 160, Duthie 258.

Deciduous trees known only from Hoshiarpur Siwaliks.

Hoshiarpur, Jameson 337 (DD), Holland, s. n. (DD), Murdanati s. n. (DD).

28. RHYNCHOSIA Lour.

- | | |
|--|-----------------------|
| 1. Trailing herbs; seeds with arillus | 1. <i>R. capitata</i> |
| 1. Twining herbs; seeds without arillus: | |
| 2. Leaflets almost glabrous, small, obtuse; pods less than 2 cm long | 2. <i>R. minima</i> |
| 2. Leaflets pubescent, large, acute; pods more than 2 cm long | 3. <i>R. sericea</i> |

1. *R. capitata* DC. Prodr. 2: 386, 1825; Duthie 204. *R. aurea* in FBI 2: 221 (pro parte); Bamber 603; Maheshw. 134.

Annuals with widely trailing branches. Racemes becoming twisted forming heads of yellow flowers. Pods marked with close transverse veins, 2-seeded.

Common in moist waste places and along canal banks.

Flowers: Sept.-Dec.

Bhiwani, 16354; Gurgaon, 25243; Tohana, 24999.

2. *R. minima* DC. Prodr. 2: 385, 1825; FBI 2: 223; Bamber 603; Sabnis 351; Maheshw. 133; Puri 53; Duthie 204.

Twining herbs with slender stem. Stipules caducous. Racemes 6-12-flowered, exceeding the leaves. Corolla yellow. Pods flattened, curved. 2-seeded.

Flowers and fruits: Almost round the year.

Badopal, 16244; between Hansi and Jind, 24814; Choudhriwas, 25124; Daber, 15864; Hissar, 24852, *Duthie* 2908 (DD), 3953 (DD), *M. A. Rao* 3501, 3530; Hoshiarpur, *T. A. Rao* 10737; Mahendragarh, 205661; Panipat, 26508; Rohtak, *V. J. Nair* 21681, 23135, 23201; Sirsa, 27712.

3. *R. sericea* Spanoghe in *Linnaea* 15, 195, 1841; FBI 2: 225; Bamber 603; Duthie 205.

Stem woody. Stipules subpersistent. Flowers dark-red, in lax racemes. Only one specimen seen from Hoshiarpur Siwaliks. Hoshiarpur, *Aitchison* 465 (DD).

29. SESBANIA Linn.

- | | |
|---|--|
| 1. Branches and leaf rachis not prickly: | |
| 2. Small trees; flowers 5-7 cm long, cream-coloured or white | 2. <i>S. grandiflora</i> |
| 2. Annual herbs or shrubs; flowers up to 18 mm long, not cream-coloured or white: | |
| 3. Flowers not dotted on the back: | |
| 4. Flowers yellow | 3a. <i>S. sesban</i> |
| 4. Flowers dark purple | 3b. <i>S. sesban</i> var. <i>bicolor</i> |
| 3. Flowers dotted ochre or brown on the back of the corolla | 3c. <i>S. sesban</i> var. <i>picta</i> |
| 1. Branches and leaf rachis prickly | 1. <i>S. bispinosa</i> |

1. *S. bispinosa* (Jacq.) Faw. & Rendle, *Fl. Jam.* 4: 24, 1920; Puri 49; Maheshw. 119. *Aeschynomene bispinosa* Jacq. *Icon. Pl. Rar.* 3: t. 564, 1793. *Sesbania aculeata* Pers. *Syn. Pl.* 2: 316, 1807; FBI 2: 114; Bamber 255; Parker 128; Duthie 224.

A weak stemmed plant up to 3 m high, sparsely branched, branches with weak prickles. Flowers in pendulous 3-6-flowered racemes. Corolla yellow, generally mottled with purplish dots on the back of the standard. Pods cylindric, 20-30-seeded.

Common in irrigated fields.

Local name: Jainta.

Flowers and fruits: Sept.-Dec.

Hissar, *Raizada* 21042 (DD); Jind, 24778; Panipat, 18639, 18684; Rohtak, *V. J. Nair* 23165, 29706.

2. *S. grandiflora* Pers. *Syn. Pl.* 2: 316, 1807; FBI 2: 115; Parker 128; Duthie 224.

A large shrub with white or cream coloured flowers; individual flowers may be up to 7.5 cm long. Cultivated in gardens.

Local name : Jaint.

Flowers and fruits : Oct.-Dec.

I have seen the flowers sold in markets.

3a. *S. sesban* (Linn.) Merr. in Philip. Jour. Sc. Bot. 7: 235; 1912; Puri 49. *Aeschynomene sesban* Linn. Sp. Pl. 714, 1753. *Sesbania aegyptiaca* Poir. in Lamk. Encycl. 7: 128, 1806; FBI 114 (ex parte); Bamber 100; Sabnis 346; Parker 125; Duthie 223.

Large shrubs. Rachis produced above the level of the last pair of leaflets. Flowers yellow in axillary racemes. Pods slightly torulose, septate between the seeds.

Cultivated as a hedge plant.

Local name : Jaint.

Flowers and fruits : Sept.-Dec.

Hansi, 18741; Hissar, *V. J. Nair* 19949; Karnal, *J. N. Vohra* 9926; Rohtak, *V. J. Nair* 29171; Sirsa, 24965; Taran Taran 36351.

3b. *S. sesban* (Linn.) Merr. var. *bicolor* (Wight et Arn.) F. W. Andrews in Kew Bull. 1953: 93, 1953; Maheshw. 120. *S. aegyptiaca* var. *bicolor* Wight et Arn. Prodr. 214, 1834.

Shrubs cultivated as hedge.

Flowers and fruits : Oct.-Dec.

Badopal, 24965; Barnala, 36594; Mojukheda (Sirsa), 26107; Taran Taran, 36352.

3c. *S. sesban* (Linn.) Merr. var. *picta* (Prain) Santapau Pl. Saur. 263, 1953; Maheshw. 120. *S. aegyptiaca* var. *picta* Prain in Jour. Asiat. Soc. Beng. 66: 367, 1898.

Shrubs cultivated as hedge plants. Rare.

Flowers and fruits : Oct.-Dec.

Barnala, 36593.

4. *Sesbania* sp.

A specimen of *Sesbania* 26584, collected from Sirsa does not agree with any of the above taxa. It has torulose, shorter and thicker pods, non spinulose leaves and axillary single flowers.

30. SMITHIA Ait.

S. sensitiva Ait. Hort. Kew 3: 496, 1789; FBI 2: 148; Bamber 261; Duthie 248.

Annuals. Branches slender. Mid-rib bristly. Stipules with basal processes. Leaflets sensitive. Flowers yellow in short axillary racemes. Pods 4-6-jointed, folded inside the calyx.

Considered to be a good fodder. Sometimes eaten as pot herb. Weed of moist places and field.

Sirsa, *Drummond* s. n. (DD).

31. PHASEOLUS Linn.

- | | |
|---|----------------------------|
| 1. Terminal leaflet three-lobed; generally prostrate plants: | |
| 2. Lobes of terminal leaflets narrow; lateral leaflets lobed like terminal one; stipules lanceolate | 1. <i>P. aconitifolius</i> |
| 2. Lobes of terminal leaflet broad; lateral leaflets entire (very rarely lobed); stipules cordate | 5. <i>P. trilobus</i> |
| 1. Terminal leaflet not lobed; erect or climbing plants: | |
| 3. Pods compressed: | |
| 4. Pods flat, curved, 2-4-seeded | 4. <i>P. lunatus</i> |
| 4. Pods linear, straight, 4-6-seeded | 6. <i>P. vulgaris</i> |
| 3. Pods cylindrical: | |
| 5. Pods hairy, flowers in capitate racemes | 2. <i>P. angularis</i> |
| 5. Pods glabrous, flowers not in capitate racemes | 3. <i>P. calcaratus</i> |

1. *P. aconitifolius* Jacq. Obs. 3 : 2, t. 52, 1768; FBI 2 : 202; Bamber 559; Maheshw. 132; Puri 52; Duthie 207.

Diffuse. Branches hairy. Flowers yellow in axillary capitate racemes. Pods almost glabrous, almost cylindric.

Often cultivated along with *Pennisetum typhoides* Stapf ex Hubb. during the rainy season. Frequently runs wild in sandy places.

Local name : Mot.

Flowers and fruits : Aug.-Nov.

Choudhriwas, 25111; Tosham, 25062.

2. *P. angularis* (Willd.) W. F. Wight in U. S. Dept. Agric. Bur. Pl. Ind. Bull. 137, 17, 1909. *Dolichos angularis* Willd. Sp. Pl. 3 : 1051, 1803. *Phaseolus aureus* Roxb. Fl. Ind. 3 : 297, 1832; Maheshw. 132; Puri 52. *P. mungo* sensu Roxb. Fl. Ind. 3 : 292, 1832 (non Linn.). *P. radiatus* auct. pl. (non Linn.); Duthie 207.

Hirsute herbs. Flowers yellow on capitate racemes. Seeds green or greenish black.

Commonly cultivated as a rainy season crop for the edible seeds.

Local name : Mung.

Flowers and fruits : Sept.-Dec.

Tohana, 5000.

3. *P. calcaratus* Roxb. Fl. Ind. 3 : 289, 1832; FBI 2 : 203; Bamber 600. Flowers not on capitate racemes, yellow. Pods glabrous, 8-12-seeded. Said to be cultivated. But I have not seen any specimen. This plant is mentioned on the authority of Bamber.

4. *P. lunatus* Linn. Sp. Pl. 724, 1753; FBI 2 : 200; Bamber 600; Maheshw. 133; Duthie 206.

Twiner. Flowers greenish yellow in elongated racemes; corolla hairy outside. Pods 2-4-seeded. Seeds white or mottled.

Cultivated for the pods which when tender, are cooked and eaten; when old, seeds are taken out and cooked.

Local name : Lobyā.

Flowers : After the rains.

I have seen the pods being sold in markets.

5. *P. trilobus* Ait. Hort. Kew 3: 30, 1789; FBI 2: 201; Bamber 558; Maheshw. 132; Puri 52; Duthie 209.

Middle lobe of leaflets spatulate. Flowers yellow in axillary capitate racemes. Pods almost glabrous, 6-12-seeded.

Cultivated in sandy soil for fodder; often a weed during the rainy season.

Flowers : After the rains.

Toshām, 25053.

6. *P. vulgaris* Linn. Sp. Pl. 723, 1753; FBI 2 : 200; Bamber 600; Duthie 206; Maheshw. 133.

Twining annuals. Flowers white, pink or lilac. Pods 4-6 seeded.

Cultivated for the tender pods.

Local name : French bean.

Flowers and fruits : Sept.-Dec.

Barnālā 36592a.

32. PISUM Linn.

1. Flowers pink (standard) and purple (wings); seeds compressed
1. Flowers white; seeds globose

1. *P. arvense*
2. *P. sativum*

1. *P. arvense* Linn. Sp. Pl. 727; 1753; FBI 2 : 181; Bamber 597; Maheshw. 128; Duthie 240.

The common field pea. Cultivated during the cold season for the seeds, which are eaten, and the straw, which forms a good fodder.

Local name : Kālā mattar, Desī mattar.

Flowers : Spring.

Amritsar, Gupta s. n. (DD).

2. *P. sativum* Linn. Sp. Pl. 727, 1753; FBI 2 : 181; Bamber 597; Maheshw. 128; Duthie 241.

The common garden pea. Cultivated during the cold season.

Local name : Mattar.

Flowers : Feb.-March.

Badopal, 25929; Binghol, 25839.

33. DERRIS Lour.

D. indica (Lamk.) Bennet in Jour. Bombay Nat. Hist. Soc. 68: 303, 1971. *Galedupa indica* Lamk. Encycl. 2: 594, 1788-1789. *Pongamia pinnata* (Linn.) Pierre, Fl. For. Coch. sub t. 385, 1900; Maheshw. 135. *Cytisus pinnatus* Linn. Sp. Pl. 741, 1753 (non *Derris pinnata* Lour. 1790). *Pongamia glabra* Vent. Jard. Malm. 28, 1803; FBI 2: 240; Bamber 25; Parker 165; Duthie 246.

A middle sized tree. Leaves imparipinnate; leaflets 5. Flowers in axillary racemes, pink or white.

Local name: Papar, Pongami.

Flowers and fruits: April-June.

Hoshiarpur, *Holland* s.n. (DD); *Aitchison* 478 (DD).

34. PSORALEA Linn.

P. plicata Del. Fl. Eg. 252, t. 37, fig. 3, 1812; FBI 203; Bamber 92; Sabnis 345; Parker 125; Maheshw. 119.

Low undershrubs; young branches dotted with glandular tubercles. Flowers yellow. Corolla slightly exerted.

Common in waste places. Liked by camels.

Flowers and fruits: Feb.-April.

Choudhriwas, *V. J. Nair* 19388, 19393, 21529; Hissar, *Duthie* 5234 (DD); Mahendragarh, 20575, 20619; Rohtak, 26355.

34a PUERARIA DC.

P. tuberosa (Roxb.) DC. in Mem. Leg. 6: 97, 1825 et Prodr. 2: 240, 1825; FBI 2: 197; Duthie 216.

Large woody climber. Root tuberous, large. Leaves 3-foliolate. Flowers bluish or lilac in large panicles on leafless branches. Pods flat, clothed with brownish hairs.

Common in Siwalik forests.

Kalesar (Ambala Siwaliks), *Lace* 33 (DD).

35. TEPHROSIA Pers.

- | | |
|--|---|
| 1. Leaves simple; pods less than 25 mm long; pedicels filiform | 3. <i>T. strigosa</i> |
| 1. Leaves not simple; pods not more than 25 mm long; pedicels not filiform; | |
| 2. Inflorescence 1-2-flowered | 4. <i>T. uniflora</i> subsp. <i>petrosa</i> |
| 2. Inflorescence many flowered: | |
| 3. Pods covered with villous tomentum | 5. <i>T. villosa</i> |
| 3. Pods not villous but pilose: | |
| 4. Stems and branches zig-zag, angled, hairy, flowers more than 8 mm long, rose or scarlet | 1. <i>T. hamiltonii</i> |
| 4. Stems and branches not zig-zag, glabrescent, flowers less than 8 mm long, bluish purple | 2. <i>T. purpurea</i> |

1. **T. hamiltonii** Drumm. in Gamb. Fl. Madras Presid. 320, 1918; Sabnis 346; Parker 131. *T. purpurea* Baker in FBI 2: 112 (pro parte).

Racemes leaf-opposed and terminal. Flowers in pairs on the inflorescence. Pods upcurved near the tip, 5-7-seeded.

Flowers and fruits: Aug.-Oct.

Fatehabad, 24915; Loharu, 16315; Mahendragarh, 16272; Makra, V. J. Nair 21693; Khansala (Rohtak), V. J. Nair 23244; Talwandi, 16221, 16315.

2. **T. purpurea** Pers. Syn. Pl. 2 : 329, 1807; FBI 2 : 112; Bamber 255; Parker 131; Maheshw. 121; Puri 48; Duthie 225.

Very like the last species and difficult to distinguish.

Flowers and fruits: Aug.-Oct.

Bhundsia, T. A. Rao 11029; Mahendragarh, 16277; Patiala, T. A. Rao 10934; Rewari, T. A. Rao 11105.

3. **T. strigosa** (Dalz.) Santapau et Maheshw. in JBNHS 54; 805, 1957, Maheshw. 121; Puri 48. *Macronyx strigosus* Dalz. in Hook. Jour. Bot. 2 : 35, 1850. *Tephrosia tenuis* Wall. in Dalz. et Gibs. Bomb. Pl. 1861; FBI 2 : 111; Bamber 457; Sabnis 345; Duthie 225.

Annuals with filiform branches. Leaves subsessile. Flowers one or two in the axils of leaves. Pods 6-10-seeded.

Rare, in sandy places.

Flowers and fruits: Sept.-Dec.

Hissar, 17189; Tosham, 25059.

4. **T. uniflora** subsp. **petrosa** (Blatt. et Hallb.) Gill. et Ali in Kew Bull. 13 : 114, 1958. *T. petrosa* Blatt. et Hall. in JBNHS 26 : 239, 1918; Puri 49. *T. pauciflora* Grah. ex Baker in FBI 2 : 114 (pro minore parte).

Procumbent or suberect. Branches zig-zag, white, hairy. Leaflets usually 5 rarely 3 or 7, terminal largest. Flowers 1 or 2 in the leaf axils. Corolla pink. Pods flat, slightly curved.

Flowers and fruits: Sept.-Nov.

On dry hills.

Kanana, 25128; Karnal, 24620; Khanak, 16247, 25093; Mahendragarh, 16299.

5. **T. villosa** Pers. Syn. Pl. 2 : 329, 1807; FBI 2 : 113; Bamber 255; Parker 131; Maheshw. 121; Duthie 226.

This plant is mentioned on the authority of Parker and Bamber. I have not seen any specimen.

36. TRIGONELLA Linn.

1. Pods 2-3-seeded, short

1. Pods more than 3-seeded:

2. Pods more than 10-seeded:

4. *T. occulta*

- | | |
|--|-----------------------------|
| 3. Pods beaked, more than 5 cm long | 2. <i>T. foenum-graecum</i> |
| 3. Pods not beaked, up to 5 cm long | 5. <i>T. incisa</i> |
| 2. Pods less than 10-seeded: | |
| 4. Racemes exceeding the leaves, pods linear | 1. <i>T. corniculata</i> |
| 4. Racemes equalling or shorter than the leaves; pods turgid | 3. <i>T. hamosa</i> |

1. ***T. corniculata*** Linn. Syst. 1180, 1759; FBI 2 : 88; Bamber 251; Maheshw. 115; Puri 45; Duthie 193.

Suberect herbs. Flowers yellow in compact racemes. Pods recurved. *Flowers and fruits* : Feb.-April.

Badopal, 25926; Kanana, 35978; Taran Taran, 36340.

2. ***T. foenum-graecum*** Linn. Sp. Pl. 77, 1753; FBI 2 : 87; Bamber 250; Maheshw. 115; Puri 45; Duthie 192.

Erect annuals. Flowers yellow on axillary peduncles. Pods 4-9 cm long with a persistent beak.

Cultivated as a fodder plant. Leaves used as a vegetable, seeds as spice and carminative. The dried plants have a characteristic odour.

Local name : Methi.

Flowers and fruits : Feb.-April.

Barnala, 36590; Binghol, 25808; Ismaila, 20028; Rohtak, 26371.

3. ***T. hamosa*** Linn. Syst. 1180, 1759; FBI 2 : 88; Duthie 193.

Glabrous diffuse annuals. Flowers in short-peduncled and bristle tipped racemes. Pods 1 cm long, much curved.

Flowers and fruits : Feb.-April.

Fatehbad, 25973; Mojukheda, 26042.

4. ***T. occulta*** Del. Fl. Aeg. Ill. 71, 1812; FBI 2 : 87; Duthie 193.

Diffuse herbs. Flowers in axillary sessile clusters.

Generally found on margins of canals and ponds. Sometimes in moist sand.

Flowers and fruits : Feb.-April.

Fatehbad, 18843, 25937.

5. ***T. incisa*** Benth. in Royle Ill. 197, 1835; Sirjaev. in Publ. Fac. Sc. Univ. Masaryk No. 136: 11, 1931; Maheshw. 115. *T. polycerata* auct. (non Linn. 1753); FBI 2 : 87; Bamber 554; Duthie 193.

Diffuse herbs. Pods long, falcate.

Common in sandy soil.

Flowers and fruits : Jan.-April.

Bhiwani, 20050; Bhatinda, 27819; Lambi, 26206; Mahendragarh, 20633; Narnaul, 20674; Rohtak, 26343; Sarsoudh, V. J. Nair 19312; Talwandi, V. J. Nair 19860.

37. TRIFOLIUM Linn.

- | | |
|---------------------------------------|---------------------------|
| 1. Corolla white or yellowish white | 1. <i>T. alexandrinum</i> |
| 1. Corolla pink or tinted pink: | |
| 2. Perennial herbs; fruits 3-4-seeded | 3. <i>T. hybridum</i> |
| 2. Annual herbs; fruits 1-2-seeded | 2. <i>T. fragiferum</i> |

1. ***T. alexandrinum*** Linn. Cent. Pl. 1 : 25, 1755; Maheshw. 113.
Annual herbs up to 60 cm high. Flowers in globular heads.

Egyptian clover. Native of Egypt and Syria. Cultivated as a fodder crop during the cold season. The branches are removed two to three times during the same season. This plant is said to improve the fertility of the soil very quickly.

Flowers : Nov.-March.

Bhatinda, 27756; Hansi, 26537; Kapurthala, 36312; Malerkotla, 36718; Yamunanagar, 27574.

2. ***T. fragiferum*** Linn. Sp. Pl. 772, 1753; FBI 2 : 86; Bamber 553.
Small herbs. Flowers in long-stalked round heads. The enlarged calyx in fruit becomes a red bladder. Corolla pink.

Flowers : November.

Sirsa, *M. A. Rau* 3592.

3. ***T. hybridum*** Linn. Sp. Pl. 766, 1753.

Flowers pinkish white. Cultivated as a fodder crop during the cold season.

Flowers and fruits : Feb.-April.

Sirsa, 26019; Ludhiana, 35995.

4. ***T. resupinatum*** Linn. with pinkish flowers is also said to be cultivated as a fodder crop.

38. URARIA Desv.

U. picta Desv. in Jour. Bot. 1 : 123, t. 5, f. 19, 1813; FBI 2 : 155; Bamber 262; Duthie 252.

Small shrubs or undershrubs; leaflets white on the upper side, green below. Flowers blue or purple.

Rare.

Karnal, *J. N. Vohra* 9916.

39. VICIA Linn.

- | | |
|---|-------------------------|
| 1. Pods 2-seeded | 3. <i>V. hirsuta</i> |
| 1. Pods more than 2-seeded: | |
| 2. Pods 4-6-seeded: | |
| 3. Flowers solitary axillary | 4. <i>V. peregrina</i> |
| 3. Flowers in racemes: | |
| 4. Pods above 3.5 cm long, downy | 1. <i>V. faba</i> |
| 4. Pods less than 3.5 cm long, glabrous | 2. <i>V. griffithii</i> |
| 2. Pods 8-10-seeded | 3. <i>V. sativa</i> |

1. *V. faba* Linn. Sp. Pl. 737, 1753; FBI 2 : 179; Bamber 264; Maheshw. 126; Duthie 239.

This plant is given on the authority of Bamber. I have not seen the plant in the area.

2. *V. griffithii* Baker in FBI 2 : 178, 1876.

Slender perennial herbs. Racemes 2-4-flowered. Corolla lilac. Pods flat, 4-6-seeded.

Common weed in wheat fields.

Flowers and fruits : Cold season.

Hissar, 25913.

3. *V. hirsuta* (Linn.) S. F. Gray, Nat. Arrang. Brit. Pl. 2 : 614, 1821; Bamber 596; Sabnis 349; Maheshw. 126; Duthie 238.

Slender climbing annuals. Inflorescence 3-6-flowered. Corolla bluish white. Pods hairy. Common in fields.

Flowers and fruits : Feb.-April.

Binghol, 25816; Karnal, 25296; Rohtak, 26350; Yamunanagar, 25281.

4. *V. peregrina* Linn. Sp. Pl. 737, 1753; FBI 2 : 178; Bamber 263. Diffuse herbs. Leaflets 10-12. Corolla purplish red. Weed of cultivation.

Flowers and fruits : Feb.-May.

Bhatinda, 27823; Hissar. *V. J. Nair* 19364.

5. *V. sativa* Linn. Sp. Pl. 736, 1753; FBI 2 : 178; Bamber 263; Sabnis 349; Maheshw. 127; Duthie 238.

Annuals with suberect stems. Corolla bluish red. Usually weed of cultivation. At times cultivated for fodder.

Local name : Akra, Ankra.

40. VIGNA Savi

r. Annual herbs; keels not beaked; pods 12-30 cm long; corolla yellow or reddish yellow; flowers on short peduncled subcapitate racemes

1. *V. unguiculata*

l. Perennial herbs; keels beaked; pods less than 10 cm long; corolla reddish purple; flowers on long-peduncled racemes

2. *V. vexillata*

1. *V. unguiculata* (Linn.) Walp. Repert. 1 : 779, 1842; Andrews, Fl. Pl. Angl. Egypt. Sudan 2 : 246, 1952. *Dolichos unguiculatus* Linn. Sp. Pl. 725, 1753. *Vigna catjang* Walp in Linnaea 13 : 533, 1839; FBI 2 : 205; Bamber 601; Duthie 209. *V. sinensis* (Linn.) Savi. ex Hassak. Cat. Hort. Bogor. 279, 1844; Maheshw. 133. *Dolichos sinensis* Linn. Cent. pl. 2 : 28, 1756.

Cultivated with millets as a Kharif crop. Fruit eaten as vegetable, seed as food; stalk and leaves used as fodder.

Local name : Lobia.

Flowers and fruits : Aug.-Nov.

Ludhiana, *Anonymous* (DD).

2. *V. vexillata* (Linn.) Benth. in Mart. Fl. Bras. 15 : 194, 1845; FBI 2 : 206; Bamber 601; Duthie 210. *Phaseolus vexillatus* Linn. Sp. Pl. 1753. This is given on the authority of Bamber.

41. ZORNIA Gmel.

Z. gibbosa Span. in Linnaea 15 : 192, 1841; Wagh in JBNHS 61 : 214, 1964. *Z. diphylla* auct. pl. (non Pers, 1807); Maheshw. 122; Duthie 247.

Prostrate herbs with zig-zag branches. Racemes 3-12-flowered. Pods jointed, prickly.

Flowers and fruits : Sept.-Oct.

Karnal, 24621.

45. ROSACEAE

1. Trees; leaves simple:

2. Fruits 1-seeded; endocarp very hard

2. Fruits 2-5-seeded; endocarp thin

1. Shrubs or herbs; leaves compound:

3. Prostrate herbs; flowers less than 2 cm across

3. Prickly shrubs; flowers more than 2 cm across

3. *Prunus*

1. *Eriobotrya*

2. *Potentilla*

4. *Rosa*

1. ERIOBOTRYA Lindl.

E. japonica Lindl. in Trans. Linn. Soc. 13 : 102, 1822; FBI 2 : 372; Bamber 12; Parker 228; Maheshw. 153; Duthie 303.

Small evergreen trees. Leaves 13-22 cm long and 3-8 cm broad, oblanceolate. Flowers white, fragrant. Fruit succulent, yellow.

Cultivated for its edible fruits.

Local name : Loquat, Lokat.

Flowers and fruits : March-May.

Bhiwani, 34587.

2. POTENTILLA Linn.

P. supina Linn. Sp. Pl. 497, 1753; FBI 2 : 359; Bamber 468; Maheshw. 155; Puri 59; Duthie 301.

Common herb in marshy places and dried up temporary ponds. Leaves hairy. Flowers axillary; yellow. Achenes many, smooth.

Flowers and fruits : Feb.-April.

Radia, 26006; Ottobridge, 27708.

3. PRUNUS Linn.

P. persica (Linn.) Stokes in Bot. Mag. Med. 3 : 100, 1812; FBI 2 : 313; Bamber 10; Parker 205; Maheshw. 154; Duthie 299. *Amygdalus persica* Linn. Sp. Pl. 472, 1753.

Small trees. Leaves lanceolate, serrate. Flowers pink appearing with the leaves.

Cultivated for its fruits.

Local name : Adu.

Flowers : Feb. Fruits : Nov.-Dec.

Hansi, 25892.

4. ROSA Linn.

Several varieties are cultivated in public and private gardens.

46. CRASSULACEAE

KALANCHOE Adans.

K. spathulata DC. Me. Fam. Crassul. 2, 1828; FBI 2 : 414; Bamber 185; Duthie 306.

Perennial fleshy herbs. Leaves fleshy, toothed. Flowers yellow on terminal panicles; corolla tubular, flask-shaped, persistent.

Flowers : Nov.

Kalka, T. A. Rao 10872.

47. COMBRETACEAE

- | | |
|---|----------------------|
| 1. Climbing shrubs; petals present: | |
| 2. Styles free from the upper receptacle | 2. <i>Combretum</i> |
| 2. Styles adnate to the upper receptacle | 3. <i>Quisqualis</i> |
| 1. Trees; petals absent: | |
| 3. Flowers and fruits crowded into dense heads | 1. <i>Anogeissus</i> |
| 3. Flowers in spikes or racemes, never in heads | 4. <i>Terminalia</i> |

1. ANOGEISSUS (DC.) Wall.

- | | |
|---|------------------------|
| 1. Trees with pendulous branches; calyx tube shorter than the fruit | 2. <i>A. pendula</i> |
| 1. Trees with non pendulous branches; calyx tube longer than fruit: | |
| 2. Flower heads in fascicles or short racemes | 1. <i>A. latifolia</i> |
| 2. Flower heads in long solitary penduncles | 3. <i>A. sericea</i> |

1. *A. latifolia* Wall. ex Brand. For. Fl. 227, 1874; FBI 2 : 450; Bamber 36; Parker 240; Duthie 312.

Young parts rusty pubescent, bark greyish. Leaves broadly elliptic, turn red in cold season and shed in hot weather. Flower heads yellow 6-7 mm diameter. Fruit orbicular, shining and glabrous.

Local name : Bakli, Dhao.

Flowers : May-June.

Ambala Siwaliks, *Gupta* s. n. (DD); Hoshiarpur, *Aitchison* s. n. (DD).

2. *A. pendula* Edgew. in Jour. As. Soc. Beng. 21 : 171, 1853; FBI 2 : 451; Parker 241; Maheshw. 157; Puri 60; Duthie 312.

Gregarious trees. Leaves lanceolate, turning dull brown in cold season. Flower heads yellow, less than 6 mm in diameter. Fruit orbicular, slightly hairy at the tip.

Common in southern parts of the area. Often cultivated for the valuable timber and leaves, which are used as camel fodder.

Local name : Dhau.

Flowers : Aug.

Gurgaon. *Parker* s. n. (DD).

3. *A. sericea* Brand. in Indian For. 25 : 287, 1889; Duthie, Fl. Upp. Gang. Pl. (rep. ed.) 1 : 313, 1960; Duthie 313; Puri 60. *A. acuminata* Wall. ex Clarke in FBI 2 : 450, 1878 (pro parte).

Leaves elliptic, shortly acuminate. Flower heads 2 cm in diameter, often with numerous leafy bracts, yellow. Fruit tomentose.

Common in the south-eastern part of the region.

Local name : Dhokra.

Flowers : March-April.

Dadri, 20509; Loharu, 20093; Rewari, 20774.

2. COMBRETUM Linn.

C. decandrum Roxb. Pl. Cor. 1 : 49, t. 59, 1795; FBI 2 : 452; Bamber 577; Parker 242; Duthie 311.

Large climbing shrubs. Leaves large, opposite. Flowers greenish white. Ovary villous. Fruit oblong with 5 broad membranous wings.

This is given here on the authority of Bamber and Duthie (Fl. Upp. Gang. Pl.). I have not seen any specimen from the area. It is likely to be met with in the Siwaliks.

3. QUISQUALIS Linn.

Q. indica Linn. Sp. Pl. 556, 1753; FBI 2 : 459; Bamber 577; Parker 242; Maheshw. 157; Duthie 313.

Perennial climbers. Flowers in showy spikes, from red to rose or white.

Flowers : Feb.-Oct.

Badopal, 24929; Hissar, *V. J. Nair* 19979.

4. TERMINALIA Linn.

- | | |
|---|------------------------|
| 1. Fruits fleshy, without wings: | |
| 2. Leaves alternate crowded at ends of branches | 1. <i>T. bellerica</i> |
| 2. Leaves subopposite | 4. <i>T. chebula</i> |
| 1. Fruits coriaceous, distinctly winged: | |
| 3. Fruits with 3 wings: | |
| 4. Bark smooth, greenish grey; wings of fruit narrow | 2. <i>T. arjuna</i> |
| 4. Bark rough, dark grey or black; wings of fruit broad | 3. <i>T. tomentosa</i> |
| 3. Fruits with 2 narrow wings | 5. <i>T. catappa</i> |

1. *T. bellerica* Roxb. Pl. Cor. 2 : 54, t. 198, 1798; FBI 2 : 445; Bamber 35; Parker 238; Maheshw. 155; Duthie 308.

Large deciduous trees. Spikes axillary. Flowers foetid. Drupe grey tomentose, obscurely angled when dry.

Flowers : April-May. *Fruits* : Cold season.

Hoshiarpur, *Aitchison* 488 (DD).

2. *T. arjuna* (Roxb. ex DC.) Wt. et Arn. Prodr. 312, 1834; Bedd. Fl. Sylv. t. 28, 1869; FBI 2 : 447; Bamber 36; Parker 239; Puri 60; Maheshw. 156. *Pentaptera arjuna* Roxb. ex. DC. Prodr. 3 : 14, 1828. *Pentaptera glabra* Roxb. Fl. Ind. 2 : 440, 1832. *Terminalia glabra* (Roxb.) Wt. et Arn. Prodr. 314, 1834; Duthie 309.

Large trees with usually subopposite oblong leaves. Flowers yellowish white. Often planted.

Local name : Arjan.

Flowers : Hot season.

Nizampur, 20687; Yamunanagar, 27562.

3. *T. tomentosa* Wt. et Arn. Prodr. 314, 1834; FBI 2 : 446; Bamber 36; Parker 240; Maheshw. 156; Duthie 310.

Deciduous trees. Flowers dull yellow, bisexual.

Local name : Sain.

Flowers : June-Aug.

Hoshiarpur, *Aitchison* 538 (DD); Kafesar, *Wright* s. n. (DD).

4. *T. chebula* Retz. Obs. 5 : 31, 1789; FBI 2 : 446; Bamber 36; Parker 239; Duthie 309.

Deciduous trees. Flowers yellowish white. Fruits more or less 5-angled.

Fruits used in medicine and tanning.

Local name : Harard.

Flowers : April-June.

Hoshiarpur Siwaliks, *Anonymous* s. n. (DD).

5. *T. catappa* Linn. Mant. Pl. 519, 1771; FBI 2 : 444; Bamber 35; Duthie 310.

Cultivated in gardens.

The Indian almond.

Local name : Badain.

Punjab, *Anonymous* (DD).

48. MYRTACEAE

- | | |
|--|-----------------------|
| 1. Leaves mostly alternate in older and opposite in young plants; with characteristic eucalyptus aroma | 1. <i>Eucalyptus</i> |
| 1. Leaves opposite: | |
| 2. Calyx lobes valvate, closed in bud; ovary more than 4-celled | 3. <i>Psidium</i> |
| 2. Calyx lobes free; ovary 2-4-celled: | |
| 3. Leaves more than 2.5 cm broad; flowers yellowish white | 2. <i>Syzygium</i> |
| 3. Leaves less than 2 cm broad; flowers crimson | 4. <i>Callistemon</i> |

1. EUCALYPTUS L'Herit.

- | | |
|---|----------------------------|
| 1. Bark on the stem and branches hard and fissured | 1. <i>E. crebra</i> |
| 1. Bark on the stem and branches smooth: | |
| 2. Top of the calyx tube concave leaving a space between the edge of the calyx tube and the slightly exerted valves | 3. <i>E. saligna</i> |
| 2. Top of the calyx tube convex, valves completely exerted: | |
| 3. Operculum long, conical | 4. <i>E. tereticornis</i> |
| 3. Operculum short, abruptly pointed | 2. <i>E. camaldulensis</i> |

All the species are in cultivation only.

1. *E. crebra* F. v. M. in Jour. Linn. Soc. 3: 87, 1859; Parker 248.

Cultivated successfully in Amritsar.

Flowers : Dec.-Jan.

Rambagh (Amritsar), *Parker* s.n. (DD).

2. *E. camaldulensis* Dehnh. Cat. Pl. Hort. Camald. 20, 1832; Maheshw. 159. *E. rostrata* Schl. in Linnæa 20: 655, 1847; Parker 251.

Flowers : May-June.

Kalka, *Parker* s. n. (DD).

3. *E. saligna* Sm. in Trans. Linn. Soc. 3 : 285, 1797; Parker 251.

Flowers : May-June.

Jabli, *Parker* s. n. (DD); Amritsar, *Parker* s. n. (DD).

4. *E. tereticornis* Sm. in Bot. N. Holl. 41, 1793; Parker 251; Maheshw. 159.

Flowers : Jan.-April.

Attari, 36329.

2. SYZYGIUM Gaertn.

S. cumini (Linn.) Skeels in U. S. Dept. Agric. Bur. Pl. Ins. Bull. 248 : 2, 1912; Maheshw. 160; Puri 61. *Myrtus cumini* Linn. Sp. Pl. 471, 1753. *Eugenia jambolana* Lamk. Encycl. 3 : 198, 1823; FBI 2 : 499; Bamber 12; Sabnis 363; Parker 243; Duthie 314.

Large trees. Planted along canal banks and road sides; also cultivated in gardens for the sake of dark purple edible fruits.

Local name : Jamun.

Flowers : Hot season.

Faridkot, 36553; Hissar, *V. J. Nair* 21511; Karnal, 26492; Yamunanagar, 27527.

3. PSIDIUM Linn.

P. guajava Linn. Sp. Pl. 470, 1753; FBI 2 : 469; Parker 245; Maheshw. 160; Duthie 317.

Cultivated for the sake of its fruits.

Local name : Amrut.

Flowers : Oct. onwards but profusely in April-May.

Jind, 26511.

4. CALLISTEMON R. Br.

C. lanceolatus DC. Prodr. 3 : 223, 1828; Parker 245; Maheshw. 158.

Large shrubs with evergreen drooping branches and crimson terminal spikes.

Cultivated in gardens for its brush-like inflorescence.

Local name : Bottalbrash.

Flowers : Oct.-Feb.

Amritsar, *Parker* s. n. (DD).

49. LYTHRACEAE

1. Herbs:

2. Capsules indehiscent or bursting irregularly

2. Capsules dehiscing through valves

1. *Ammannia*

1. *Rotala*

1. Shrubs or trees:

3. Stamens indefinite; flowers hexamerous

3. Stamens definite; flowers hexamerous or not:

4. Flowers not red, tetramerous, stamens eight

4. Flowers red, hexamerous, stamens 12

2. *Lagerstroemia*

3. *Lawsonia*

5. *Woodfordia*

1. AMMANNIA Linn.

1. Styles distinct, petals distinct

1. Styles absent or nearly so; petals absent or nearly so:

2. Cymes distinctly peduncled

2. Cymes sessile or subsessile

3. *A. multiflora*

2. *A. auriculata*

1. *A. baccifera*

1. *A. baccifera* Linn. Sp. Pl. 120, 1753; FBI 2: 569; Bamber 179; Blatt. et Hallb. in JBNHS 26 : 215, 1917; Duthie 319; Maheshw. 161; Puri 61. *A. salicifolia* Hiern in Oliv. Fl. Trop. Afr. 2 : 278, 1871 (excl. syn.); FBI 2: 569; Bamber 179.

Glabrous erect herbs in moist places. Capsules depressed globose.

Flowers : June-Nov.

Chakkajheel (Sirsa), 18982; Fatehbad, 18885; Hoshiarpur, *Aitchison* 611 (DD); Karnal, 24617; Panipat, 18671; Rewari, 20781; Sidravali (Rewari), 20802; Tohana, 25008.

2. *A. auriculata* Willd. Hort. Berol. 1: 7, t. 7, 1806; FBI 2: 570; Bamber 179. *A. senegalensis* auct.; FBI 2: 570; Maheshw. 161; Duthie 322.

Erect herbs. Branches quadrangular. Petals caducous, red.

Common in moist places.

Flowers : June-Dec.

Bharian, 18886; Chakkajheel, 18981; Chandigarh, *T. A. Rao* 10853; Fatehbad, 18838, 18879; Hansi, 25900.

3. *A. multiflora* Roxb. Fl. Ind. 1 : 447, 1820; FBI 2 : 570; Bamber 179; Puri 61; Duthie 321.

Erect herbs. Petals caducous red. Common in moist places.

Flowers : Sept.-Dec., June.

Hissar, 17190.

2. LAGERSTROEMIA Linn.

1. Shrubs; flowers white, pink or purple

1. Trees; flowers mauve coloured

2. *L. indica*

1. *L. speciosa*

1. *L. speciosa* (Linn. ex Murray) Pers. Syn. Pl. 2 : 72, 1807; Maheshw. 162. *Muenchhausia speciosa* Linn. ex Murray, Prodr. Stirp. Gotting. t. 2, 1770. *Lagerstroemia flos-reginae* Retz. Obs. Bot. 5 : 25, 1789; FBI 2 : 577, 1879; Bamber 3; Parker 255; Duthie 325.

Small trees. Cultivated in gardens for the beautiful flowers.

Flowers : June-Aug. *Fruit* : Oct.-Nov.

Badopal, 34548.

2. *L. indica* Linn. Syst. 1076, 1759; FBI 2 : 575; Bamber 53; Parker 255; Maheshw. 162; Duthie 325.

A deciduous shrub. Capsules woody.

Grown in gardens as an ornamental shrub.

Punjab, *Anonymous* (DD).

3. LAWSONIA Linn.

L. inermis Linn. Sp. Pl. 349, 1753; Puri 62; Maheshw. 162. *L. alba* Lamk. Encycl. 3 : 106, 1789; FBI 2 : 573; Bamber 53; Sabnis 364; Parker 255; Duthie 323.

Glabrous shrubs. Branches quadrangular ending in thorns.

Flowers white, in panicles. Capsules depressed, globose, covered with persistent calyx and tipped with persistent style.

Cultivated as a hedge plant in gardens. Leaves are used to colour palms, feet and nails of ladies.

Local name : Mendhi.

Flowers : Summer.

Bahmanwas, *V. J. Nair* 23172; Hissar, *V. J. Nair* 19988; Sirsa, 18986.

4. ROTALA Linn.

1. Capsules 2-valved

2. *R. indica*

1. Capsules more than 2-valved:

2. Capsules 3-valved; flowers in spikes

3. *R. rotundifolia*

2. Capsules 4-valved; flowers solitary, sessile

1. *R. densiflora*

1. *R. densiflora* (Roth) Koehne in Engl. Bot. Jahrb. 1: 164, 1880. *Ammannia densiflora* Roth ex Roem. et. Schult. Syst. Veg. 3: 304, 1818. *A. pentandra* Roxb. Fl. Ind. 1: 448, 1820; FBI 2: 568; Bamber 179; Duthie 321.

2. *R. indica* (Willd.) Koehne in Engl. Bot. Jahrb. 1: 172, 1880. *Peplis indica* Willd. Sp. Pl. 2: 244, 1799. *Ammannia peploides* Spreng. Syst. Veg. 1: 444, 1825; FBI 2: 566; Bamber 532.

3. *R. rotundifolia* (Roxb.) Koehne in Engl. Bot. Jahrb. 1: 175, 1880. *Ammannia rotundifolia* Ham. ex Roxb. Fl. Ind. 1: 446, 1820; FBI 2: 566; Bamber 532; Duthie 320.

These three taxa are given on the authority of Bamber. I have seen no specimen from the area; they are abundant in adjoining places, and hence it is likely that they occur in the region. There are some sheets marked *Punjab* in DD but it can not be ascertained whether they are from the Indian side of the Punjab.

5. WOODFORDIA Salisb.

W. fruticosa (Linn.) Kurz in Jour. Asiat. Soc. Beng. 40: 56, 1871; Maheshw. 161. *Lythrum fruticosum* Linn. Sp. Pl. (ed. 2) 1: 641, 1762. *Woodfordia floribunda* Salisb. Parad. Lond. t. 42, 1806; FBI 2: 572; Bamber 53; Parker 254; Duthie 323.

Large shrubs. Flowers numerous in few-flowered cymes from the axils of fallen leaves; calyx tube bright red; stamens reddish yellow. The leaves of this plant turns bright red before falling.

Common in hilly areas.

Local name : Dhawi.

Flowers : Jan.-June.

Kalka, *M. A. Rau* 14547; Kalesar, *Gupta* s.n. (DD).

50. PUNICACEAE

PUNICA Linn.

P. granatum Linn. Sp. Pl. 676, 1753; FBI 2 : 581; Bamber 53; Parker 254; Maheshw. 163; Puri 62; Duthie 325.

Shrubs or trees armed with axillary thorns. Petals wrinkled, red. Stamens numerous. Ovary inferior. Fruits woody, tipped with persistent calyx.

Cultivated for its fruits. A variety is grown in gardens for its beautiful flowers.

Local name : Anar.

Flowers : April-May.

Bhatinda, 27768; Hissar, *V. J. Nair* 21513.

51. ONAGRACEAE

LUDWIGIA Linn.

- | | |
|--|-------------------------|
| 1. Floating or creeping plants in semi-aquatic conditions and when floating stem supported by vesicles | 1. <i>L. adscendens</i> |
| 1. Erect herbs: | |
| 2. Flowers more than 1 cm in diameter | 2. <i>L. octovalvis</i> |
| 3. Flowers less than 1 cm in diameter | 3. <i>L. perennis</i> |

1. *L. adscendens* (Linn.) Hara in Jour. Jap. Bot. 28 : 291, 1953; Raven in Reinwardtia 6 : 387, 1963. *Jussiaea repens* Linn. Sp. Pl. 1 : 388, 1753; FBI 2 : 587; Bamber 634; Duthie 326; Maheshw. 163. *J. adscendens* Linn. Mant. Pl. 1 : 69, 1767.

Common in canals and ponds. Capsule 4-cornered.

Flowers : Sept.-Dec.

Punjab, *Anonymous* (DD); Hoshiarpur, *Parker* s. n. (DD); Sirsa, *Drummond* s. n. (DD).

2. *L. octovalvis* (Jacq.) Raven in Kew Bull. 15 : 476, 1962. *Jussiaea suffruticosa* Linn. Sp. Pl. 1 : 388, 1753; FBI 2 : 587; Bamber 634; Puri 62; Duthie 327. *Oenothera octovalvis* Jacq. Enum. Syst. Pl. 19, 1760.

Perennial herbs. Flowers yellow. Capsule 8-ribbed.

Punjab, *Anonymous* (DD).

3. *L. perennis* Linn. Sp. Pl. 1 : 119, 1753; Raven in Reinwardtia 6 : 367, 1963. *L. parviflora* Roxb. Fl. Ind. 1 : 440, 1820; FBI 2 : 588; Bamber 634; Duthie 327. *Jussiaea perennis* (Linn.) Brenan in Kew. Bull. 163, 1953; Maheshw. 164.

Erect herbs; corolla yellow. Fruits obscurely 4-angled.

Common near canals, pools etc.

Flowers and fruits : Sept. onwards.

Between Jind and Hansi, 24792; Karnal, 24629; Ottobridge (Sirsa), 18935.

52. TRAPACEAE

TRAPA Linn.

T. natans Linn. var. *bispinosa* (Roxb.) Makino in In. Som. Dzus. (ed. 3) 1 : 137, 1907. *T. bispinosa* Roxb. Pl. Cor. 234, 1815; FBI 590; Bamber 630; Maheshw. 164; Puri 62; Duthie 329.

Aquatic annual herbs with leaves often broader than long. Flowers solitary from upper axils, white. Fruit 1-seeded, top-shaped, 2-horned.

Cultivated in stagnant waters for its starchy fruits.

Local name : Singhada.

Flowers : August. *Fruits* : Oct.-Nov.

Gurgaon, 25268; Hoshiarpur, Aitchison 422 (DD).

53. CUCURBITACEAE

- | | |
|---|--------------------------|
| 1. Corolla campanulate; 5-partite, tube longer than lobes: | |
| 2. Flowers white | 3. <i>Coccoloba</i> |
| 2. Flowers yellow | 5. <i>Cucurbita</i> |
| 1. Corolla 5-partite to the base, mostly rotate: | |
| 3. Tendrils simple: | |
| 4. Bracts present, large: | |
| 5. Bracts stipuliform in the axils of leaves: | |
| 6. Seeds planoconvex smooth; anther thecae straight | 4. <i>Ctenolepis</i> |
| 6. Seeds irregularly oblong truncate; anther thecae duplicate | 7. <i>Dactyliandra</i> |
| 5. Bracts on the peduncle | 10. <i>Momordica</i> |
| 4. Bracts absent or minute: | |
| 7. Style surrounded by an annular or cupular disk | 11. <i>Muhia</i> |
| 7. Disk absent | 6. <i>Cucumis</i> |
| 3. Tendrils divided: | |
| 8. Sepals foliaceous | 1. <i>Benincasa</i> |
| 8. Sepals not foliaceous: | |
| 9. Leaves deeply 3-5-lobed; panicle without glands: | |
| 10. Middle lobe of leaves elongated and sinuately pinnatifid; flowers yellow; fruits fleshy when ripe | 2. <i>Citrullus</i> |
| 10. Middle lobe of leaves not elongate; flowers yellow or white; fruits dry when ripe and usually circumsciss near the apex | 9. <i>Luffa</i> |
| 9. Leaves ovate, cordate or orbicular, petiole with two glands at the apex; flowers white: | |
| 11. Petals entire | 8. <i>Lagenaria</i> |
| 11. Petals fimbriate | 12. <i>Trichosanthes</i> |

1. BENINCASA Savi.

B. hispida (Thunb.) Cogn. in DC. Mon. Phan. 3: 513, 1881; Chakrav. in RBSI 17(1): 84, 1959; Duthie 338; Maheshw. 168. *Cucurbita hispida* Thunb. Fl. Jap. 322, 1784. *Benincasa cerifera* Savi in Bibl. Ital. 9: 158, 1818; FBI 2: 616; Bamber 617.

Fruits fleshy, oblong, with ash-coloured bloom. Cultivated for the fruits which are sold in market. Used in focal confectionery and as vegetable. The fruits can be stored for a long time without being damaged.

Local name: Paetta.

Hissar, 21789.

2. CITRULLUS Forsk.

- | | |
|---|--------------------------|
| 1. Stem fistulous; fruits depressed at each end | 3. <i>C. fistulosus</i> |
| 1. Stem not fistulous; fruits not depressed at each end: | |
| 2. Stem villous with soft woolly hairs; leaves thin, pinnately partite, denticulate; fruits sweet, edible | 2. <i>C. lanatus</i> |
| 2. Stem scabrid; leaves thick and rough, deeply and variously divided; fruits bitter, not edible | 1. <i>C. colocynthis</i> |

1. **C. colocynthis** (Linn.) Schrad. in Linnaea 12: 414, 1838; FBI 2: 620; Bamber 616; Sabnis 360; Duthie 344; Maheshw. 170; Puri 64. *Cucumis colocynthis* Linn. Sp. Pl. 1011, 1753. *Colocynthis vulgaris* Schrad. Ind. Sem.-Hort. Gotting 2: 1833; Chakrav. in RBSI 17(1): 113, 1959.

Perennial herbs with long trailing branches which remain green throughout the year. Stem angular, scabrous. Tendrils 2-fid. Fruits yellow when ripe. Common in sandy areas.

The colocynth. The fruits and seeds are medicinal. A good sand binder.

Local Name: Makal.

Flowers: Throughout the year, more profusely after the rains.

Bharian, 18819; Bhatinda, 27776; Faridkot, 36558; Fatehbad, 18866; Hansi, 16177; Mahendragarh, 20626; Narnaul, 25229; Rohtak, V. J. Nair 23182; Talwandi, 26550.

2. **C. lanatus** (Thunb.) Matsumura et Nakai in Cat. Sem. Hort. Bot. Univ. Tokyo 1920: 38, 1920; Hara in Taxon 18: 346, 1969. *Momordica lanata* Thunb. Prodr. Fl. Cap. 13, 1794. *Citrullus vulgaris* Schrad. ex Eckl. et Zeyher, Enum. 279, 1834, var. *vulgaris*: FBI 2: 621; Bamber 616; Maheshw. 171; Puri 64; Duthie 344.

Trailing annuals. Fruits large mottled green and white. Cultivated for the refreshing fruits.

Local name: Tarbuza.

Flowers: Sept.-Nov. *Fruits*: March-May.

Bahadurgarh (Rohtak Dist.), V. J. Nair 21661; Panipat, 26495; Sirsa, 27703.

3. *C. fistulosus* Stocks in Hook. Kew Jour. Bot. 3 : 74, t. 3, 1851. *C. vulgaris* Schrad. var. *fistulosus* (Stocks) Stewart, Punj. Pl. 56, 1869; Duthie & Fuller, Field Gard. Crops N. W. P. 11 : 46, t. 47, 1893; Duthie 344; Maheshw. 171. *Colocynthis citrullus* (Linn.) Kuntze var. *fistulosus* (Stocks) Chakrav. RBSI 17 (1) : 166, 1959.

Fruits much smaller than the above. Cultivated during the rainy season for the fruits which are sold in local markets.

Local name : Tinda.

I have seen only the fruits in markets from Oct.-Dec.

Sometimes this taxon is treated under *Praecitrullus* Pang.

3. COCCINIA Wt. & Arn.

C. grandis (Linn.) Voigt, Hort. Suburb. Calc. 59, 1845. *Bryonia grandis* Linn. Mant. 1 : 126, 1767. *Cephalandra indica* Naud. Ann. Sc. Nat. Ser. 5 : 16, 1859; FBI 2 : 621; Bamber 619; Sabnis 367. *Coccinia cordifolia* Cogn. in DC. Mon. 3 : 529 (pro parte, non *Bryonia cordifolia* Linn.); Maheshw. 171; Puri 64.

Perennial climbers. Flowers white.

Common in jungles.

Local name : Kanduri.

Flowers : March-Oct. *Fruits* : Nov.-Dec.

Fatehbad, 24916; Hissar, V. J. Nair, 21503; Jind, 24773; Ludwa, 26433; Yamunanagar, 27552.

4. CTENOLEPIS Hook. f.

C. garcini (Linn.) Clarke in FBI 2 : 629, 1879; Maheshw. 166. *Sicyos garcini* Linn. Mant. 297, 1771. *Blastania garcini* Cogn. in DC. Mon. Phan. 3 : 629, 1881; Puri 65; Duthie 348.

Weak climbers. Flowers very small. Fruits when young, spotted white, brick red at maturity, globose.

Flowers and fruits : Aug.-Nov.

Hissar, 18746, 24901.

5. CUCURBITA Linn.

- | | |
|--|-----------------------|
| 1. Fruiting peduncles enlarged beneath the fruit, pentangular; sepals terminated by a broad foliaceous tip | 2. <i>C. moschata</i> |
| 1. Fruiting peduncles not enlarged beneath the fruits; sepals not terminated by foliaceous tip; | |
| 2. Peduncles grooved; petioles with prickly hairs; lobes of leaf acute | 3. <i>C. pepo</i> |
| 2. Peduncles striated not grooved; petioles without prickly hairs; lobes of leaf rounded | 1. <i>C. maxima</i> |

1. *C. maxima* Duch. in Lamk. Encycl. 2 : 151, 1786; FBI 2 : 622; Chakrav. in RBSI 17(1) : 123, 1959; Puri 64; Duthie 346.

Fruits large. Cultivated from the fruits.

Local name : Sitaphal.

Flowers and fruits : Sept.-Dec.

Ferozapore, 36377.

2. *C. moschata* (Duch.) Poir. Dict. Sci. Nat. 7 : 234, 1818; FBI 2 : 622; Bamber 619; Chakrav. in RBSI 17(1) : 123, 1959; Duthie 346. *C. pepo* Linn. var. *moschata* Duch. in Lamk. Encycl. 2 : 152, 1786.

Local name : Mittakaddu.

I have seen only the fruits being sold in markets.

3. *C. pepo* Linn. Sp. Pl. 1010, 1753; FBI 2 : 622; Bamber 619; Chakrav. 120; Maheshw. 172; Puri 64; Duthie 346.

Creeping. Stems furrowed. Fruits large.

Cultivated during the hot season and the rains for the fruits, which can be kept for months without decaying. The tender branches and leaves are used as vegetables.

Local name : Kaddu.

Flowers : Aug.-Nov.; March-May.

Hissar, 24973; Sirsa, 26598.

6. CUCUMIS Linn.

1. Leaves scabrid; fruit smooth:

2. Leaves scarcely lobed:

3. Fruits long cylindrical:

4. Fruits dehiscent

4. Fruits indehiscent

3. Fruits ovoid elongate or spherical

2. Leaves palmately 3-5-lobed

1. Leaves membranous, hairy; fruits hispid

3. *C. melo* var. *momordica*

4. *C. melo* var. *utilissimus*

2. *C. melo* var. *melo*

1. *C. callosus*

5. *C. sativus*

1. *C. callosus* (Rottl.) Cogn. in Pflanzenr. 88 : 129, 1924; Chakrav. 100; Puri 64. *Bryonia callosa* Rottl. in New Schrift Ges. Nat. Freund Berol. 4 : 210, 1803. *C. trigonus* Roxb. Fl. Ind. 2 : 619, 1824; FBI 2 : 619 (excl. syn.); Bamber 615; Duthie 342.

Climbing annuals. Branches scabrid. Flowers often solitary in axils. Calyx densely hairy. Fruits ovoid, very bitter.

Common climber in Jungles.

Local name : Bilambi, Indrayan.

Flowers and fruits : Aug.-Nov.

Hissar, 24869; Khanak, 25089.

2. *C. melo* Linn. Sp. Pl. 1011, 1753 var. *melo* FBI 2 : 620; Bamber 615; Sabnis 365; Chakrav. 102; Puri 63; Duthie 340.

Fruits spherical to ovoid. Commonly cultivated during the rainy season.

Local name : Karbusa.

Hissar, 16128.

3. *C. melo* Linn. var. *momordica* (Roxb.) Duthie et Fuller, Field Gard. Cr. 2 : 50, t. 49, 1882; Duthie 342; Maheshw. 170. *C. momordica* Roxb. Fl. Ind. 3 : 720, 1832.

Annuals; cultivated during the rainy season for its fruits.

Local name : Phut khira.

Sirsa, 26599.

4. *C. melo* Linn. var. *utilissimus* (Roxb.) Duthie et Full, Field Gard. Cr. 2 : 55, tt. 53, 54, 1893; Duthie 341; Maheshw. 170. *C. utilissimus* Roxb. Fl. Ind. 721, 1832.

Like the last species, but the fruit is elongated and cylindric reaching up to 1 m. The colour of the fruit varies from dark green to white. The raw fruit is eaten during the hot season. Cultivated extensively.

Local name : Kakdi.

Hissar, V. J. Nair 19936; Sirsa, 26596.

5. *C. sativus* Linn. Sp. Pl. 1012, 1753; FBI 2 : 620; Chakrav. 105; Maheshw. 170; Duthie 341.

Extensively cultivated in the area for the fruits, which are eaten raw as well as cooked.

Local name : Khira Kakdi.

I have seen the fruits being sold in bazzars.

7. DACTYLIANDRA Hook.

D. welwitschii Hook. f. in Oliver Fl. Trop. Afr. 2 : 557, 1871; Bhandari & Singh in Kew Bull. 19 : 133, fig. 1 & 2, 1964; Nair & Nair in Bull. bot. Surv. India 8 : 351, 1966.

Climbing herbs easily mistaken for *Ctenolepis cerasiformis* (Stocks) Hook. f., but the seeds are very different.

Flowers and fruits : Aug.-Oct.

Hissar, 24973.

8. LAGENARIA Seringe

L. siceraria (Molina) Standl. in Publ. Field. Mus. Nat. Hist. Bot. Ser. 435, 1930; Exell in Bull. Brit. Mus. 3(3) : 101, 1963. *Cucurbita siceraria* Molina, Sagg. Stor. Nat. Chil 133 : 355, 1782. *Lagenaria vulgaris* Seringe, Mem. Soc. Phys. Hist. Nat. Genev. 3 : 25, t. 2, 1825; FBI 2 : 613; Bamber 614; Duthie 336; Maheshw. 167. *L. leucantha* sensu Chakrav. 66.

Softly pubescent climbing herbs. Flowers white. Fruits flask or bottle-shaped. Seeds compressed, white, cultivated during the rainy season. Tender fruits used as vegetables.

Local name : Giya.

Ferozpur, 36376.

9. LUFFA Cav.

1. Fruits rigid; stamens 3

1. Fruits not rigid; stamens 5

1. *L. cylindrica*

2. *L. acutangula*

1. *L. cylindrica* (Linn.) Roem. Syn. Pepon. 63, 1846. *Momordica cylindrica* Linn. Sp. Pl. 1753; Maheshw. 168; Puri 63. *L. aegyptiaca* Mill. Gard. Dict. (ed. 8) 1768; FBI 2: 614; Bamber 614; Duthie 336.

Commonly cultivated for the fruits.

Local name : Giya Tori.

Flowers and fruits : Aug.-Oct.

Punjab, Duthie s. n. (DD).

2. *L. acutangula* (Linn.) Roxb. Fl. Ind. 3 : 713, 1832; FBI 2 : 615; Duthie & Fuller, Field Gard Cr. 2 : 60, 1893; Bamber 615; Maheshw. 168; Puri 63; Duthie 337.

Like the last species but the fruits are angular. Cultivated.

Local name : Tori.

Flowers and fruits : Rainy season.

Hissar, Duthie s. n. (DD).

10. MOMORDICA Linn.

1. Plants dioecious; bracts enclosing the flower

1. Plants monoecious; bracts not enclosing the flower:

2. Bracts on the peduncle variegated

2. Bracts on the peduncle not variegated

3. *M. dioica*

1. *M. balsamina*

2. *M. charantia*

1. *M. balsamina* Linn. Sp. Pl. 1009, 1753; FBI 2 : 617; Bamber 618; Chakrav. 90; Puri 63; Duthie 338.

Bracts of the peduncle immediately below the flower. Female peduncles ebracteate. Fruits less than 3 cm long.

Common on hedges and on bushes.

Local name : Jungli Karela.

Flowers : Aug.-Oct. *Fruits* : Up to May.

Bahuna, 18897; Bhatinda, 26299; Fatehbad, 18861; Gidderbha, 26250; Hissar, 18759; Loharu, 20096; Mahendragarh, 20637.

2. *M. charantia* Linn. Sp. Pl. 1009, 1753; FBI 2 : 616; Bamber 618; Chakrav. 90; Maheshw. 169; Puri 63; Duthie 339.

Bracts of the male peduncles about the middle of the peduncle or below. Female peduncles usually with a bract. Fruits much larger than the above species.

Cultivated extensively during the rainy season for its bitter fruits which are used as vegetables.

Local name : Karela.

Flowers and fruits : Aug.-Oct.

Hissar, *V. J. Nair* 19936; Sirsa, 27702.

3. *M. dioica* Roxb. ex Willd. Sp. Pl. 4: 605, 1805; FBI 2: 617 (excl. syn.); Bamber 618; Chakrav. 92; Maheshw. 169; Puri 63; Duthie 339.

Perennial herbs. Male peduncle with a large cuculate bract. Female peduncles usually with a basal bract.

The tuberous root is used in medicine and the tender fruits are used as vegetable.

Local name : Jungli Kanturi.

Flowers : Sept.-Oct.

Hissar, *Duthie* 4036 (DD); Rohtak, *V. J. Nair* 16169, 16381; Sonpet, *V. J. Nair* 16376, 23326, 23329.

11. MUKIA Arn.

M. maderaspatana (Linn.) Roem. Syn. 2: 47, 1846. *Cucumis maderaspatanus* Linn. Sp. Pl. 1912, 1753. *Bryonia scabrella* Linn. f. Suppl. 424, 1781; *Mukia scabrella* (Linn. f.) Arn. in Hook. Lond. Jour. Bot. 3: 276, 1844; FBI 2: 623; Bamber 620. *Melothria maderaspatana* (Linn.) Cong. in DC. Mon. Phan. 3: 623, 1881; Chakrav. 141; Maheshw. 166; Puri 65; Duthie 347.

Annuals with scabrous climbing branches. Male flowers in clusters; female usually solitary, rarely in fascicles. Fruits small, globose bright red when mature.

Common on hedges as well as on bushes in forest.

Flowers and fruits : Sept.-Jan.

Barian, 18818; Fatehbad, 18836; Jind, 16106; Nilokheri, 15839; Panipat, 18621.

12. TRICHOSANTHES Linn.

1. Male flowers in racemes:

2. Male racemes ebracteate; fruits elongate, cylindrical

2. Male racemes bracteate; fruits elongate, cylindrical

1. Male flowers solitary; fruits oblong, red

2. *T. cucumerina*

1. *T. anguina*

3. *T. dioica*

1. *T. anguina* Linn. Sp. Pl. 1008, 1753; FBI 2: 610; Bamber 617; Maheshw. 167; Duthie 334.

Fruits striped green and white; up to 1 m or more long. Cultivated for the fruits which are used as vegetables.

Local name : Chichinda.

Flowers : Aug.-Oct.

Bhatinda, 27782a.

2. *T. cucumerina* Linn. Sp. Pl. 1008, 1753; FBI 2 : 609; Bamber 617; Sabnis 365; Maheshw. 167; Duthie 333.

Climbing herbs; flowers white; seeds in red pulp.

Local name : Jungli Chichinda.

Hoshiarpur, Aitchison 509 (DD).

3. *T. dioica* Roxb. Fl. Ind. 701, 1832; FBI 2 : 609; Bamber 616; Duthie 334; Maheshw. 166.

Dioecious plants. Anthers free. Fruit 5-8 cm long, red when ripe.

Both wild and cultivated. The fruit is considered a wholesome vegetable.

Local name : Palwal, Parwal.

Flowers and fruits : Aug.-Nov.

Karnal, J. N. Vohra 9909.

In addition to the above species Bamber cites *T. palmata* Wall. but I have not seen any specimen from the area.

54. SAMYDACEAE

CASEARIA Jacq.

C. elliptica Willd. Sp. Pl. 2: 628, 1800. *C. tomentosa* Roxb. Fl. Ind. 2: 421, 1832; FBI 2 : 593; Bamber 83; Parker 256; Duthie 330.

Large shrubs or small trees. Flowers greenish white in axillary fascicles; petals absent; stamens 8, alternating with staminodes.

Common.

Local name : Chilla.

Flowers : April-May.

Hoshiarpur, Aitchison 503 (DD); Ludwa, 26426.

55. CACTACEAE

1. Flowers funnel-shaped; stems angular or ribbed

1. Flowers not funnel-shaped; stems usually flat

1. *Cereus*

2. *Opuntia*

1. CEREUS Mill.

1. Erect and arboreous; flowers 15-18 cm long

1. Succulent climbers; flowers 20-25 cm long

1. *C. pterogonus*

2. *C. triangularis*

1. *C. pterogonus* Lemaire, Cact. Gen. Nov. Sp. 59, 1839; Parker 260.
Flowers white cultivated in gardens.

2. *C. triangularis* Mill. Gard. (ed. 8) 9, 1768; Parker 260.
Stems 3-angled; angles undulate.
Parker states that it is cultivated in gardens for flowers.

2. OPUNTIA Mill.

Key after Parker

- | | |
|---|-----------------------------|
| 1. Not prickly; perianth erect; stamens and styles exerted | 1. <i>O. coccinellifera</i> |
| 1. Prickly; perianth spreading; styles and stamens included: | |
| 2. Joints bright grass green, prickles in tufts of 1-few on young joints increasing up to 10 in older stems | 4. <i>O. monacantha</i> |
| 2. Joints dull bluish or greyish green, prickles in tufts of 4-6: | |
| 3. The largest prickles stout, subulate, usually curved and horny; joints undulate | 2. <i>O. dillenii</i> |
| 3. Prickles slender, straight, grey and opaque except when young; joints not undulate | 3. <i>O. elatior</i> |

1. *O. coccinellifera* Mill. Gard. Dict. (ed. 8) 6, 1768; Burkill in RBSI 4: 287, 1911; Parker 258.

Shrubs. Probably introduced as a food plant for the Cochineal insect. Burkill reports this from Hoshiarpur.

2. *O. dillenii* Haw. Suppl. Pl. Succ. 79, 1819; FBI 2: 657 (pro parte); Bamber 115 (pro parte); Parker 259; Maheshw. 172; Parker 66; Duthie 352.

Flowers yellow.

Common in waste places. Probably a very early introduction to the area.

Local name : Nagfani.

Flowers and fruits : April-May.

Bhatinda 26308, 27785; Yamunanagar, 27599.

3. *O. elatior* Mill. Gard. Dict. (ed. 8) 4, 1768; Burkill in RBSI 4: 288, 1911; Maheshw. 173. *O. nigricans* Haw. Syn. Pl. Succ. 189, 1812.

O. dillenii auct. Pl.; FBI 2: 657 (pro parte); Bamber 115 (pro parte).

Abundant in S. E. Punjab (*vide* Parker).

4. *O. monacantha* Haw. Suppl. Pl. Succ. 81, 1819; Burkill in RBSI 4: 290, 1911; Parker 259.

Corolla yellow. Common shrubs forming thick clumps.

Flowers and fruits : March-May.

Nizampur Khetri Road, 18685.

56. CARICACEAE

CARICA Linn.

C. papaya Linn. Sp. Pl. 1036. 1753; FBI 2: 599; Maheshw. 164; Puri 62; Duthie 351.

Cultivated for the sake of edible fruits.

Local name: Papita, Papaya.

The fruits are sold in markets.

57. AIZOACEAE

- | | |
|---|-----------------------|
| 1. Petaloid stamens absent: | |
| 2. Tepals free or nearly so: | |
| 3. Fruits of 5 separate indehiscent 1-seeded carpels | 1. <i>Gisekia</i> |
| 3. Fruits 3-5-celled capsule: | |
| 4. Seeds strophiolate; flowers in axillary fascicles | 2. <i>Glinus</i> |
| 4. Seeds estrophiolate; flowers in terminal cymes or umbels | 3. <i>Mollugo</i> |
| 2. Tepals united: | |
| 5. Operculum of capsule 1-valved; ovary unilocular; style 1 | 4. <i>Trianthema</i> |
| 5. Operculum of capsule 2-valved; ovary 2-locular; styles 2 | 5. <i>Zaleya</i> |
| 1. Petaloid stamens present | 6. <i>Corbichonia</i> |

1. GISEKIA Linn.

G. pharnaceoides Linn. Mant. 562, 1767; FBI 2: 664; Bamber 542; Duthie 356; Maheshw. 173; Puri 67.

Succulent, glabrous herbs with several prostrate or ascending branches. Stem pinkish. Leaves opposite or falsely whorled. Flowers sessile and pedicelled in dense axillary cymes. Fruits 1-seeded.

Common in sandy areas. Well reputed for anthelmintic properties.

Flowers and fruits: July-Oct.; March-April.

Barwala, 24913; Gurgaon, 25253; Hansi, 16179; Loharu, 16314; Muktesar, 36532.

2. GLINUS Linn.

G. lotoides Linn. Sp. Pl. 463, 1753; Maheshw. 173. *Mollugo hirta* Thunb. Prodr. Fl. Cap. 24, 1794; FBI 2: 662; Bamber 522; Sabnis 366; Duthie 354.

Densely hairy, prostrate annuals. Leaves opposite or falsely whorled, downy on both surfaces. Carpels 3 or generally 5. Capsules enclosed in persistent sepals.

Common in driedup ponds and canals.

Flowers and fruits: Dec.-April.

Agrua, 18829; Dadri, 16270; Fatehbad, 18849; Hoshiarpur, Aitchison 605 (DD); Lambi, 26242; Rewari, 20780; Rohtak, 20039; Yamunanagar, 26411.

3. MOLLUGO Linn.

- | | |
|---|-------------------------|
| 1. Cauline leaves absent, leaves all radical, persistent up to 6 cm long and 2 cm broad; seeds minutely and closely muricate, black or dark reddish brown | 2. <i>M. nudicaulis</i> |
| 1. Cauline leaves present; radical leaves disappearing, up to 1.5 cm long; seeds smooth, pale brown | 1. <i>M. cerviana</i> |

1. *M. cerviana* (Linn.) Seringe in DC. Prodr. 1 : 391, 1824; FBI 2 : 663; Duthie 355; Puri 68; Maheshw. 174. *Pharnaceum cervianum* Linn. Sp. Pl. 272, 1753.

An erect glabrous annual. Flowers long-pedicelled on trichotomous umbellate cymes. Capsules many-seeded.

Common in exposed sandy places, river banks etc.

Flowers and fruits : July-Dec.

Badopal, 16231; Bawal, *T. A. Rao* 11132; Bahadurgarh, *V. J. Nair* 21644; Loharu, 16312; Mahendragarh, 16274; Narnaul, 25206; Rewari, 20772.

2. *M. nudicaulis* Lamk. Encyc. 4 : 234; 1794; FBI 2 : 664; Bamber 407; Sabnis 366; Maheshw. 174; Puri 68; Duthie 356.

An erect glabrous annual. Leaves tufted, spatulate. Capsules many-seeded.

Common in sandy areas and waste places.

Flowers and fruits : Aug.-Nov.

Badopal, 16231; Choudhriwas, 25125; Loharu, 16310, 16311; Narnaul, 25205; Tosham, 25066.

4. TRIANTHEMA Linn.

- | | |
|--|-----------------------------|
| 1. Stamens 5; flowers clustered; leaves papillate | 2. <i>T. triquetra</i> |
| 1. Stamens 10-15; flowers solitary; leaves not papillate | 1. <i>T. portulacastrum</i> |

1. *T. portulacastrum* Linn. Sp. Pl. 223, 1753; Maheshw. 176. *T. monogyna* Linn. Mant. Pl. 1 : 69, 1767; FBI 660; Bamber 541; Duthie 353.

Prostrate, glabrous herbs. Flowers white or pinkish white.

Common during the rainy season in waste places.

Bhiwani, 16359; Bahadurgarh, *V. J. Nair* 21677; Fatehbad, 18851; Jind, 15900; Karnal, *J. N. Vohra* 8863; Loharu, 16330; Narnaul, 25186.

2. *T. triquetra* Willd. ex Rottb. in Gesellsch. Naturf. Fr. Neue Schr. 4 : 181, 1803; Puri 67. *T. crystallina* auct. (non Vahl); FBI 2 : 660; Bamber 541; Sabnis 366; Duthie 354.

Glabrous prostrate herbs. Leaves succulent. Flowers in pairs or in threes or rarely solitary. Seeds black with raised lines.

Common in dry places. In extreme dryness the plant turns red.

Flowers and fruits : Sept.-March.

Hissar, 24854, 24876; *V. J. Nair* 19208; Murthal forest, *V. J. Nair* 23333; Panipat, *J. N. Vohra* 9904; Sonpet, *V. J. Nair* 23344; Tohana, 24986.

5. ZALEYA Burm. f.

1. Stems and petioles green; fruits yellow
 1. Stems and petioles red; fruits red

1. *Z. govindia* var. *flava*
 2. *Z. govindia* var. *rubra*

1. ***Z. govindia*** (Buch.-Ham. ex G. Don) N. C. Nair var. ***flava*** (Blatt. et Hallb.) N. C. Nair in Bull. bot. Surv. India 8 : 86, 1966. *Trianthema pentandra* var. *flava* Blatt. et Hallb. in JBNHS 26 : 531, 1919; Puri 67.

Glabrous prostrate herbs. Flowers in axillary sessile clusters. Stamens 5 or 10. Seeds puberulous.

Common during the rainy season.

Flowers and fruits : Aug.-Nov.

Badopal, 16245; Choudhriwas, *V. J. Nair* 19384; Fatehbad, 18854; Sarsoudh, *V. J. Nair* 19301; Sirsa 18939.

2. ***Z. govindia*** (Buch.-Ham. ex G. Don) N. C. Nair var. ***rubra*** (Blatt. et Hallb.) N. C. Nair in Bull. bot. Surv. India 8 : 86, 1966. *T. pentandra* var. *rubra* Blatt. et Hallb. in JBNHS 26 : 530, 1919; Puri 67.

A distinct variety in nature. Common during the rainy season.

Flowers and fruits : Aug.-Nov.

Bahuna, 18892; Barwala, *V. J. Nair* 19272; Fatehbad, 18877; Hansi, 16166.

6. CORBICHONIA Scop.

C. decumbens (Forsk.) Exell in Jour. Bot. 73 : 80, 1935; Santapau & Wagh in Bull. bot. Surv. India 5 : 106, 1963. *Orygia decumbens* Forsk. Fl. Aeg.-Arab, 103, 1775; FBI 2 : 661; Bamber 542; Puri 68.

Undershrubs. Leaves fleshy ovate. Flowers purplish green. Petals none. Staminodes many, petaloid, purple. Capsules enclosed in persistent calyx. Seeds black with many concentric raised lines.

Common in rocky places and hills. A typical lithophyte.

Local name : Tambreswari.

Flowers and fruits : Aug.-Oct.

Mahendragarh. 16293, 16296.

58. UMBELLIFERAE

1. Leaves undivided;
 2. Leaves orbicular or reniform
 2. Leaves linear

4. *Centella*
 3. *Bupleurum*

- | | |
|--|--------------------------|
| 1. Leaves divided: | |
| 3. Fruits compressed: | |
| 4. Fruits glabrous: | |
| 5. Flowers yellow | 2. <i>Anethum</i> |
| 5. Flowers white: | |
| 6. Bracts of involucre nil or linear | 10. <i>Trachyspermum</i> |
| 6. Bracts of involucre several or dissected | 1. <i>Ammi</i> |
| 4. Fruits hirsute: | |
| 7. Bracts pinnate | 7. <i>Daucus</i> |
| 7. Bracts linear | 9. <i>Psammogeton</i> |
| 3. Fruits not compressed: | |
| 8. Corolla purplish white or white: | |
| 9. Fruits globose or sub-globose, ridges obscure | 5. <i>Coriandrum</i> |
| 9. Fruits narrowly oblong, ridges terete | 6. <i>Cuminum</i> |
| 8. Corolla yellow; fruit oblong, ridged | 8. <i>Foeniculum</i> |

1. AMMI Linn.

A. majus Linn. Sp. Pl. 243, 1753.

Subglaucous herb up to 1 m high. Stem terete. Leaves pinnatisect, all lobes with cartilaginous acutely serrulate margins. Umbells compound of many primary and secondary rays; primary rays up to 5 cm long; secondary rays a little shorter, equalling the linear acute bracteoles. Bracts of involucre 3-cut. Calyx teeth obsolete. Petals widely obovate with a long inflected acumen, and 2 lateral rounded lobes above, white. Stamens do not exceed the petals. Stylopods shortly conical. Styles long. Fruits long-ovoid, slightly compressed laterally, mericarp pentagonal in transection; primary ridges prominent, blunt; vittae solitary alternate with the primary ridges; carpophore bipartite. Seeds sub-reniform.

Weed in wheat fields. Perhaps a recent introduction along with grains from the Mediterranean region.

Flowers and fruits : Feb.-April.

Malerkotla, 36749; Nabha, 36753.

2. ANETHUM Linn.

A. graveolens Linn. Sp. Pl. 263, 1753. *Pucedanum graveolens* (Linn.) Benth. in Gen. Pl. 1 : 919, 1867; FBI 2 : 709; Sabnis 367; Maheshw. 177.

Glabrous annuals up to 1.5 m high. Leaves 3-pinnate, segments filiform. Fruits winged narrowly.

Cultivated as a cold season crop. Also as a weed in irrigated fields. Fruits some times used for flavouring curries.

Local name : Sowa.

Flowers and fruits : Feb.-June.

Badopal, 34540; Bhiwani, 20054; Ferozpur, 36369; Narnaul, 20665; Rewari, 20750; Sirsa, 26597.

3. BUPLEURUM Linn.

B. falcatum Linn. Sp. Pl. 237, 1753; FBI 2 : 676; Bamber 280; Duthie 359.

Leaves stem-clasping or sessile. Ridges in fruit distinct. Furrows with 3 oil canals.

In rocky places of the sub-Himalayan tracts.

Flowers and fruits : Aug.-Nov.

Bankhandi, *T. A. Rao* 10763; Bakra-Nangal, *T. A. Rao* 10820.

4. CENTELLA Linn.

C. asiatica (Linn.) Urban in Mart. Fl. Bras. 11 : 287, 1879; Maheshw. 176; Puri 69. *Hydrocotyle asiatica* Linn. Sp. Pl. 234, 1753; FBI 2 : 669; Bamber 546; Duthie 358.

Creepers. Leaves long-petioled. Stipules adnate. Flowers 3-6 in each head, sessile. Petals minute. Fruits oblong, reticulate rugose.

Common in moist places and canal banks.

Local name : Brahmi.

Flowers and fruits : May-Oct.

Badopal, 24955; Barnala 36583; Bitmada, 25017; Hansi, 16158; Rohat (Rohtak), *V. J. Nair* 23261.

5. CORIANDRUM Linn.

C. sativum Linn. Sp. Pl. 256, 1753; FBI 2 : 717; Bamber 401; Maheshw. 178; Puri 69; Duthie 364.

Aromatic annuals. Leaves decomposed. Peripheral flowers of compound umbels zygomorphic. Petals purplish white. Fruits yellow when ripe.

Cultivated throughout the area during January to May for its fruits and leaves which are used as condiment.

Local name : Dhaniya.

Badopal, 34541; Ratia, 25995.

6. CUMINUM Linn.

C. cyminum Linn. Sp. Pl. 269, 1753; FBI 2 : 718; Bamber 401; Maheshw. 179; Puri 69; Duthie 364.

Annuals with much divided filiform leaf segments. Flowers white. Fruits cylindrical.

Cultivated for the medicinal seeds.

Local name : Zira; Jira.

Flowers and fruits : Feb.-April.

Jhabua, 20735.

7. DAUCUS Linn.

D. carota Linn. Sp. Pl. 242, 1753; FBI 2: 718; Bamber 401; Maheshw. 178; Puri 69; Duthie 365.

Hispid herbs up to 1.5 m high with conical tap root and 2-3 pinnate leaves. Bracteoles many, 3-fid and simple. Petals white. Bristles on the secondary ridges of the fruit long, on primary ridges small.

Extensively cultivated as a cold season crop. The tuberous roots are used in various ways.

Local name : Gajar.

Hissar, *V. J. Nair* 19959; Malerkotla, 36723; Talwandi, 34529.

8. FOENICULUM Adans.

F. vulgare Mill. Gard. Dict. n. 1, 1768; FBI 2: 695; Bamber 396; Duthie 361; Puri 69; Maheshw. 177.

Glabrous herbs. Leaves 2-4-pinnate, segments linear, aromatic.

Cultivated during January to May for its fruits which are used as a condiment.

Local name : Somph.

Flowers : Feb.-March.

Ratia, 25994.

9. PSAMMOGETON Edgew.

P. canescence (DC.) Vatke in App. and Ind. Sem. Hort. Berol. 3, 1876; Schischkin Fl. U. R. S. S. 16: 165, 1956; Hiroe, Umbellif. Asia 1: 37, 1958. *P. biternatum* Edgew. in Trans. Linn. Soc. 20: 57, 1846; FBI 2: 719; Bamber 402; Sabnis 367.

Small pubescent annuals with divaricate branches. Leaves pinnatifid. Flowers purplish white.

Common in loose sandy soil.

Local name : Garjira.

Flowers and fruits : Feb.-April.

Barwala, *V. J. Nair* 19865; Bhatinda, 26269; Bhiwani, 20055; Dabwali, 26132; Loharu, 20079; Muktesar, 36513, 36533.

10. TRACHYSPERMUM Link.

T. ammi (Linn.) Sprague in Kew Bull. 228, 1929; Maheshw. 177. *Sison ammi* Linn. Sp. Pl. 252, 1753 (pro parte). *Carum copticum* Hiern in Oliver, Fl. Trop. Afr. 3: 12, 1871; FBI 2: 682; Bamber 392; Duthie 361.

Erect annuals. Leaves 2-3-pinnate, aromatic. Flowers white.

Cultivated for the fruits, which are used as a spice and as medicine.

Local name : Ajwan.

Flowers and fruits : Feb.-April.

Hansi, 25895.

59. ARALIACEAE

- | | |
|--|----------------------|
| 1. Seeds with ruminant endosperm; leaves simple | 1. <i>Hedera</i> |
| 1. Seeds without ruminant endosperm; leaves digitate | 2. <i>Schefflera</i> |

1. HEDERA Linn.

H. nepalensis K. Koch, Hort. Dendr. 284, 1853. *H. helix* auct. pl. (non Linn.); FBI 2: 739; Duthie 367.

Climbing by means of extra axillary rootlets. Flowers polygamodioecious. Fruit yellow, turning black.

Patiala State, *Jannujee* 10 (DD).

2. SCHEFFLERA Forst.

S. elliptica Harm. in Engl. & Prantl, Pflanzenfam. 3, 8: 39, 1898. *Heptapleurum venulosum* auct. pl. (non Seem) FBI 2: 729; Duthie 366.

Climbing by adventitious roots. Flowers cream coloured, polygamous. Fruit yellow.

Hoshiarpur, *Aitchison* s. n. (DD).

60. RUBIACEAE

- | | |
|--|-------------------------|
| 1. Herbs: | |
| 2. Fruits almost 2-lobed covered with hooked bristles | 3. <i>Galium</i> |
| 2. Fruits otherwise: | |
| 3. Fruits of 2 coriaceous mericarps; seeds one in each carpel | 2. <i>Borreria</i> |
| 3. Fruits a loculicidal capsule; seeds many in each carpel | 8. <i>Oldenlandia</i> |
| 1. Shrubs or trees: | |
| 4. Flowers and fruits in globose heads: | |
| 5. Fruits capsular: | |
| 6. Flowers greenish yellow; lateral nerves of leaves 6-8 pairs | 6. <i>Mitragyna</i> |
| 6. Flowers orange; lateral nerves of leaves 8-12 pairs | 1. <i>Anthocephalus</i> |
| 5. Fruits a syncarpium formed by the enlarged calyx | 7. <i>Morinda</i> |
| 4. Flowers and fruits not in globose heads: | |
| 7. Flowers 4-5 cm in diameter, stipules sheathing | 4. <i>Gardenia</i> |
| 7. Flowers smaller; stipules not sheathing: | |
| 8. Flowers solitary; leaves foetid when bruised | 9. <i>Serissa</i> |
| 8. Flowers in umbellate or cymose branches | 5. <i>Ixora</i> |

1. ANTHOCEPHALUS A. Rich.

A. indicus Rich. in Mem. Soc. Hist. Nat. Paris. 5 : 237, 1834 ; Duthie 397. *A. cadamba* Miq. Fl. Ind. Bat. 2 : 135, 1856 ; FBI 3 : 23 ; Parker 285. Large trees.

I have seen only one tree cultivated in Amritsar.

2. BORRERIA G. F. W. Mey

1. Both mericarps dehiscing ventrally; seeds shining, polished
 1. One mericarp only ventrally dehiscing; seeds finely granulate

2. *B. stricta*
 1. *B. articularis*

1. **B. articularis** (Linn. f.) F. N. Will. in Bull. Herb. Boiss. 5: 956, 1905. *Spermacoce articularis* Linn. f. Suppl. 119, 1781. *S. hispida* Linn. Sp. Pl. 102, 1753; FBI 3: 200; Bamber 522; Sabnis 370. *Borreria hispida* (Linn.) K. Schum. in Pflanzenfam. 4(4): 144, 1891 (non Spruce ex K. Schum. 1888); Maheshw. 181; Puri 70; Duthie 395.

Procumbent, hispid hairy herbs. Flowers bluish white. Corolla hairy outside, funnel-shaped.

Common weed during the rains; in loose sandy soil.

Flowers and fruits: Aug.-Nov.; rarely March.

Bankhandi, T. A. Rao 10778; Dadri, 16263; Hoshiarpur, Aitchison 606 (DD); Mahendragarh, 20609; Narnaul, 20663; Siwani, 26564; Tosham, 25046.

2. **B. stricta** (Linn.) Schum. in Eng. & Prantl, Pflanzenfam. 4 (4): 143, 1891; Duthie 395; Puri 70; Maheshw. 180. *Spermacoce stricta* Linn. f. Suppl. 120, 1781; FBI 3: 200; Bamber 135. *Borreria pusilla* (Wall.) DC. Prodr. 4: 543, 1830. *Spermacoce pusilla* Wall. in Roxb. Fl. Ind. 1: 379, 1820.

Erect herbs with scabrid angular stem. Leaves much narrower than the preceding species. Flowers white in heads surrounded by a whorl of leaves.

Flowers and fruits: Rainy season.

Siwani, 26564.

3. GALIUM Linn.

G. aparino Linn. Sp. Pl. 108, 1753; FBI 3: 205, Bamber 579; Nair & Nair in Bull. bot. Surv. India 8: 351, 1966.

Scabrid climbing herbs. Leaves sessile in whorls of 6-8. Peduncles axillary, 3-flowered.

This is a common temperate herb of the Himalayas. In the plains it is very rarely found.

Flowers and fruits: Feb.-March.

Hoshiarpur, Aitchison 353 (DD); Laroha (Jullunder Dist.), T. S. Bakshi 12 A (DD), 12 B (DD); Taran Taran, 36341.

4. GARDENIA Linn.

G. jasminoides Ellis in Phil. Trans. Li. 2: 935, 1761; Parker 285; Maheshw. 183.

Evergreen shrubs. Leaves opposite. Stipules united into a membranous sheath split on one side. Flowers white, solitary.

Said to be cultivated in gardens in plains. I have seen no specimen from the area.

5. IXORA Linn.

I. coccinea Linn. Sp. Pl. 110, 1753; FBI 3: 145; Bamber 48; Maheshw. 183; Puri 70.

Shrubs with sessile leathery leaves. Flowers scarlet, in dense clusters. Flowers throughout the year when under cultivation; in the wild forms during the rains.

Without precise locality collectors name or number (DD).

6. MITRAGYNA Korth.

M. parvifolia (Roxb.) Korth. Obs. Naocl. Ind. 19, 1839; Duthie 376; Maheshw. 181; Puri 69. *Nauclea parviflora* Roxb. Pl. Cor. t. 52, 1795. *Stephegyne parvifolia* Korth. Verh. Nat. Ges. Bot. 161, 1840; FBI 3: 25; Bamber 1; Parker 277.

Trees with buttressed trunks. Leaves ovate or rounded, leathery. Flower heads 2.5 cm diameter. Seeds winged, minute.

Local name: Kaem.

Flowers: May, also in Aug.

Jind, 26532; Mochra (Rohtak Dist.), V. J. Nair 23364.

7. MORINDA Linn.

M. tomentosa Heyne ex Roth Nov. Pl. Sp. 147, 1821. *M. tinctoria* Roxb. Fl. Ind. 1: 543, 1820 (non Noronha, 1790); FBI 3: 156; Bamber 1; Duthie 392.

Shrubs with 4-angled stems. Flowers in heads, white. Fruit of many drupes joined together.

Common in scrub jungles of Ambala and Hoshiarpur Siwaliks.

Local name: Al, Ach.

Flowers and fruits: May-July.

Kalsar, Gupta s. n. (DD); Hoshiarpur, Aitchison s. n. (DD).

8. OLDENLANDIA Linn.

1. Diffuse herbs, glabrous

1. Herbs often not diffuse, pubescent or scabrid:

2. Peduncles 1-4-flowered, leaves opposite

2. Flowers solitary or in pairs; leaves whorled

3. *O. diffusa*

2. *O. corymbosa*

1. *O. aspera*

1. *O. aspera* (Heyne ex Roth) DC. Prodr. 4: 428, 1830; FBI 3: 68; Bamber 134; Maheshw. 180; Puri 69; Duthie 382. *Hedyotis aspera* Heyne ex Roth, Nov. Pl. Sp. 94, 1821; Rao et Hemadri in Indian Forest. 99, 375; 1973.

Annual herbs with long internodes, scabrid. Leaves with recurved margins, needle-like. Flowers white or pale lilac in terminal cymes.

In grassy and sandy places.

Flowers and fruits: Aug.-Nov.

Badopal, 24938; Choudhriwas, 25122.

2. *O. corymbosa* Linn. Sp. Pl. 119, 1753; FBI 3: 64; Bamber 134; Maheshw. 180; Puri 69. *Hedyotis corymbosa* (Linn.) Lamk. Tab. Encycl. 15272, 1791; Rao et Hemadri in Indian Forest. 99: 375; 1973.

Slender pubescent herbs. Flowers white on slender pedicels. Capsules glabrous.

Local name: Papara.

Flowers and fruits: Sept.-March.

Dadri, 20502; Karnal, 24623.

3. *O. diffusa* Roxb. Fl. Ind. 1: 423, 1820; FBI 3: 65; Bamber 134; Duthie 381.

This is given on the authority of Bamber.

9. SERISSA JUSS.

S. japonica Thunb. Nov. Gen. 132, 1781; Backer, Fl. Jav. 2: 347, 1965. *S. foetida* (Linn. f.) Willd. Sp. Pl. 1, 2: 1061, 1798. *Lycium foetidum* Linn. f. Suppl. 150, 1781.

Small shrubs. Leaves elliptic oblong.

Cultivated as hedge or borderline plants in gardens.

61. VALERIANACEAE

VALERIANA Hall.

V. sclerocarpa Fisch. et Mey, Ind. Sem. Hort. Petrop. 2: 53, 1835. Garden weed at Hoshiarpur, Aitchison 628 (DD).

62. COMPOSITAE

- | | |
|--|------------------------|
| 1. Heads more than 15 cm in diameter | 24a. <i>Helianthus</i> |
| 1. Heads less than 15 cm in diameter: | |
| 2. Involucral bracts spiny: | |
| 3. Heads heterogamous | 3. <i>Oligochaeta</i> |
| 3. Heads homogamous: | |
| 4. Heads 1-flowered collected into globose balls | 18. <i>Echinops</i> |
| 4. Heads many-flowered, separate; | |

5. Pappus hairs present:
 6. Receptacle densely bristly 14. *Cirsium*
 6. Receptacle naked pitted 17. *Dicoma*
 5. Pappus hairs absent 9. *Carthamus*
2. Involucral bracts not spiny:
 7. Heads with either rayed or tubular flowers:
 8. Heads with only ligulate flowers:
 9. Achenes beaked or narrowed:
 10. Achenes fusiform 42. *Youngia*
 10. Achenes ovoid 27. *Lactuca*
 9. Achenes not beaked:
 11. Flowers blue; rigid herbs 12. *Cicharium*
 11. Flowers yellow or whitish yellow:
 12. Annual erect herbs with milky latex 34. *Sonchus*
 12. Perennial herbs with yellow latex 29. *Launaeu*
8. Heads with only tubular florets:
 13. Large shrubs or small trees 30. *Leucomeris*
 13. Plants not as above:
 14. Female flowers apetalous; involucral bracts enclosing the fruits and covered with hooked bristles 41. *Xanthium*
 14. Female flowers with petals; involucral bracts not enclosing the fruit and not covered with bristles:
 15. Pappus present:
 16. Pappus scaly:
 17. Pappus of 5 mucronate scales 2. *Ageratum*
 17. Pappus of 2 ovate scales 8. *Caesulia*
 16. Pappus hairy:
 18. Creeping herbs; leaves pinnatifid or pinnatisect 15a. *Cotula*
 18. Herbs not creeping:
 19. Herbs with bisexual flowers only:
 20. Receptacle bristly 33. *Saussurea*
 20. Receptacle naked:
 21. Leaves radical, crowded and lyrate pinnatifid, cauline amplexicaul 20. *Emilia*
 21. Leaves all cauline, not lyrate pinnatifid or amplexicaul:
 22. Pappus consisting of an inner and an outer series of hairs 39. *Vernonia*
 22. Pappus of 1 series of hairs only 11. *Centratherum*
19. Heads with female and bisexual flowers:
 23. Style arms of bisexual flowers truncate 23. *Gnaphalium*
 23. Style arms of bisexual flowers filiform:
 24. Shrubs or undershrubs; involucral bracts dry 31. *Pluchea*
 24. Herbs; involucral bracts narrow, herbaceous:
 25. Anthers tailed 7. *Blumea*
 25. Anthers not tailed 28. *Laggera*
15. Pappus scanty or absent:
 26. Stems winged 35. *Sphaeranthus*
 26. Stems not winged:
 27. All flowers in a head fertile 10. *Centipeda*
 27. Only the female flowers in a head fertile:
 28. Leaves pinnatisect:
 29. Pappus cupular 24. *Grangea*
 29. Pappus absent:
 30. Anther bases truncate; bracts 2-seriate, achenes smooth 16. *Cyathocline*
 30. Anther bases entire; bracts many seriate; achenes faintly striate 4. *Artemisia*
28. Leaves not pinnatisect, entire, linear and often clustered:
 31. Pappus plumose 25. *Iflogu*
 31. Pappus simple 22. *Filago*
7. Heads with both rayed and tubular flowers:
 32. Upper leaves opposite:
 33. Achenes with a pair of horn-like spines 1. *Acanthospermum*

- 33. Achenes not armed with spines:
 - 34. Leaves simple:
 - 35. Weak herbs; leaves less than 1.5 cm broad 19. *Eclipta*
 - 35. Erect herbs; leaves more than 1.5 cm broad:
 - 36. Pappus of 2-3 barbellate awns 6. *Blainvillea*
 - 36. Pappus absent 43. *Zinnia*
 - 34. Leaves pinnatisect (upper leaves simple in *Bidens pilosa*):
 - 37. Receptacle paleate:
 - 38. Achenes turbinate or oblong, silky; pappus of many leathery bristles 37. *Tridax*
 - 38. Achenes 4-angular; pappus of 2-4 hispid bristles 5. *Bidens*
 - 37. Receptacle not paleate:
 - 39. Involucre cylindrical; pappus of 4-5 unequal paleae 36. *Tagetes*
 - 39. Involucre campanulate; pappus absent or of hyaline cupular palea 13. *Chrysanthemum*
- 32. Upper leaves alternate:
 - 40. Leaves lyrate 38. *Verbesina*
 - 40. Leaves not lyrate:
 - 41. Heads yellow:
 - 42. Anthers not tailed; achenes compressed 15. *Conyza*
 - 42. Anthers tailed; achenes subterete or terete:
 - 43. Pappus in 2 rows, outer scales, inner hairs 32. *Pulicaria*
 - 43. Pappus in a single row, of ray flowers scanty or absent, of tubular flowers of a few slender hairs:
 - 44. Peduncle woolly 40. *Vicoa*
 - 44. Peduncle not woolly 26. *Inula*
 - 41. Heads not yellow 21. *Erigeron*

1. ACANTHOSPERMUM Schr.

A. hispidum DC. Prodr. 522, 1825; Mayuranath. in Bufl. Madr. Govt. Mus. 2: 151, 1929; Nair & Deshpande in JBNHS 56: 146, 1960.

Herbaceous weed; branches dichotomous, terete, hairy. Leaves simple, opposite, sessile, ovate or nearly so. Heads in forks of stems, solitary radiating, 5-6 mm across, heterogamous, involucre 5-7; flowers yellow, corolla of peripheral female flowers strap-shaped, of disc florets tubular. Cypsella 5 mm long, bristly.

Flowers and fruits: Aug.-Nov.

Pinjaur, T. A. Rao 10860.

This is a native of S. America and has spread all over India during the last two decades.

2. AGERATUM Linn.

A. conyzoides Linn. Sp. Pl. 839, 1753; FBI 3: 243; Bamber 186; Duthie 405; Puri 73; Maheshw. 190.

Erect hairy herbs. Heads blue or white in terminal corymbs. Achenes black.

Weed in moist places.

Flowers and fruits: Sept.-March.

Badopal, 25932; Hissar, V. J. Nair 21628; Ismalia 20029; Jind, 26536; Jullunder, T. S. Bakshi, s. n. (DD); Kera, V. J. Nair 21563; Panipat, 26496; Rohtak, V. J. Nair 23263; Yamunanagar, 27551.

3. OLIGOCHAETA C. Koch

O. ramosa (Roxb.) Wagen in Veroff. Geobot. Inst. Rubel 37: 323, 1962. *Carduus ramosus* Roxb. Fl. Ind. 3: 407, 1832. *Volutarella divaricata* Benth. et Hook. f. Gen. Pl. 2: 476, 1873 (excl. syn. *Centaurea patula* & *Serratula divaricata*); FBI 3: 383; Bamber 371; Sabnis 374; Duthie 442. *Volutarella ramosa* (Roxb.) Santapau, Pl. Saour Prel. dist. 22, 1953; Maheshw. 202; Puri 78.

Annuals. Flowers purplish in conical heads. Involucral bracts with spreading recurved spines. Achenes angled.

Common in sandy areas, rarely in moist places.

Flowers and fruits: Almost round the year.

Barwala, 18777; Bharian, 18815; Beas, J. N. Vohra 11323; Choudhriwas, V. J. Nair 18386; Dhauj, T. A. Rao 11082; Fatehbad, 18887, Hissar, Raizada 21012 (DD); Jhabua, 20715; Loharu, 20084; Mahendragarh, 20583; Narnaul, 20654; Rewari, T. A. Rao 11139; Rohtak, 26345, V. J. Nair 23198.

4. ARTEMISIA Linn.

A. scoparia Wald. et Kit. Descr. et Icon. Pl. Rar. Hung. 1: 66, t. 65, 1802; FBI 3: 323; Maheshw. 200; Puri 77; Duthie 435.

Erect herbs up to 2 m high, slightly aromatic. Heads yellowish white. Common in sandy places.

Local name: Danti, Pila-jau.

Flowers and fruits: Sept.-Dec.

Bawal, T. A. Rao 11133; Choudhriwas, 25118; Gurgaon, 25241; Hissar, 18756; Lambi, 26326; Tosham, 25118.

5. BIDENS Linn.

1. Branches sparsely hairy; leaves glabrous, top leaves simple; involucral bracts hispid at the base; achenes tuberculate and strigose above

2. *B. pilosa*

1. Branches glabrous; leaves scattered hairy; top leaves pinnate partite; involucral bracts glandular hairy; achenes hispid

1. *B. biternata*

1. **B. biternata** (Lour.) Merr. et Sherff in Bot. Gaz. 88: 293, 1929; Santapau in Bull. bot. Surv. India 3: 12, 1961; Maheshw. 197; Puri 77. *Coreopsis biternata* Lour. Fl. Cochinch. 508, 1790. *Bidens wallichii* DC. Prodr. 5: 598, 1836.

Erect herbs up to 1 m high. Rays white or yellowish white.

Flowers and Fruits: Rainy season and after.

Hissar, V. J. Nair 14759, 21543.

2. **B. pilosa** Linn. Sp. Pl. 832, 1753; FBI 3: 309; Bamber 219; Duthie 430.

Erect herbs about 1 m high. Heads yellowish white. Rare.

Flowers and fruits: Sept.-Oct.

Panipat, 24689.

6. BLAINVILLEA Cass.

B. acmella (Linn.) Philip. in *Blumea* 6: 350, 1950. *Verbesina acmella* Linn. Sp. Pl. 901, 1753. *Blainvillea latifolia* (Linn. f.) DC. ex Wight Contrib. 17, 1834 & Prodr. 5: 492, 1836; FBI 3: 305; Bamber 187; Maheshw. 198; Puri 76. *Eclipta latifolia* Linn. f. Suppl. 378, 1871.

Erect herbs with dichotomous branches. Ray florets white, disc florets yellow. Achenes with 2-5 aristate or bristly pappus.

Flowers and fruits: Sept.-Nov.

Gurgaon, 25244; Khanak, 25203.

7. BLUMEA DC.

- | | |
|---|--|
| 1. Receptacle hairy; achenes ribbed, silky | 1. <i>B. laciniata</i> |
| 1. Receptacle glabrous; achenes not ribbed: | |
| 2. Heads purple; branches villous; achenes sparsely hairy | 2. <i>B. mollis</i> |
| 2. Heads yellow: | |
| 3. Corolla lobes hairy | 4. <i>B. obliqua</i> var. <i>tenella</i> |
| 3. Corolla lobes glabrescent | 3. <i>B. lacera</i> |

1. **B. laciniata** (Roxb.) DC. Prodr. 5: 436, 1836; FBI 3: 264; Bamber 361; Maheshw. 196; Duthie 415. *Conyza laciniata* Roxb. Fl. Ind. 3: 427, 1832.

Aromatic herbs; branches pubescent or tomentose. Leaves runcinate, lyrate or subpinnatifid and toothed. Heads in corymbs; bracts villous. Corolla yellowish.

Flowers and fruits: March-May.

Between Bhiwani and Loharu, 20071; Yamunanagar, 27538.

2. **B. mollis** (Don) Merr. in Phil. Jour. Bot. 5: 256, 1910; Maheshw. 195. *Erigeron mollis* Don, Prodr. 172, 1825. *Blumea wightiana* DC. in Wight Contrib. 14, 1834; FBI 3: 261; Bamber 326; Duthie 413.

Woolly herbs, sticky with glandular hairs. Heads purple. Achenes minutely angled.

Flowers and fruits: Dec.-March.

Between Bhiwani and Loharu, 20070; Bhatinda, 36573; Dadri, 20508; Sampla, 20007; Yamunanagar, 27536.

3. **B. lacera** (Burm. f.) DC. in Wight, Contrib. 14, 1834; FBI 3: 263; Bamber 327; Maheshw. 195; Duthie 414. *Conyza lacera* Burm. f. Fl. Ind. 180, t. 59, f. 1, 1768.

Aromatic herbs with scent of turpentine. The root is medicinal and is used as an astringent and febrifuge.

Local name : Jungli Muli, Kakronda.

Flowers and fruits : Dec.-April.

Sirsa, *Drummond* s. n. (DD), E. Punjab, without collector's name (DD).

4. *B. obliqua* (Linn.) Druce var. *tenella* (Hook. f.) Maheshw. in JBNHS 54: 805, 1957. *B. amplexens* var. *tenella* Hook. f. in FBI 3: 260, 1881; Bamber 326.

Subglabrous herbs. Achenes oblong.

I have seen only one sheet of the taxon in DD and it bears no collector's name and precise locality.

8. CAESULIA Roxb.

C. axillaris Roxb. Pl. Cor. 1: 64, t. 93, 1795; FBI 3: 291; Bamber 566; Maheshw. 192; Puri 75; Duthie 422.

Small annuals prostrate or erect. Heads sessile in axils; each head consists of several one-flowered minor heads.

Common after the rains in moist situations.

Flowers and fruits : Sept.-March.

On Cho bed (Hoshiarpur Dist.), *T. A. Rao* 10796; Hoshiarpur, *Aitchison* 609 (DD).

9. CARTHAMUS Linn.

- | | |
|--|-------------------------|
| 1. Upper leaves unarmed or spinulose serrate; head orange red up to 2.6 cm in diameter | 2. <i>C. tinctorius</i> |
| 1. Upper leaves very spinous; heads orange yellow, smaller in diameter than above | 1. <i>C. oxyacantha</i> |

1. *C. oxyacantha* Bieb., Fl. Taur. Cauc. 2: 283, 1808; FBI 3: 386; Bamber 332; Sabnis 375; Maheshw. 200; Puri 78.

Shrubby, erect with white branches. Heads spinescent. Pappus absent. Very common as a weed in fields and in waste places.

Local name : Kantiari.

Flowers and fruits : Feb.-May.

Bawal, *T. A. Rao* 11114; Bhatinda, 27739; Fazilka, 36396; Hissar *V. J. Nair* 19969; Ludwa 26431; Yamunanagar, 27517.

2. *C. tinctorius* Linn. Sp. Pl. 830, 1753; FBI 3: 386; Bamber 332; Duthie 451; Maheshw. 201.

This is said to be cultivated in several parts for the dye that is extracted from the flowers. I have seen no specimen from the area although there are sheets from adjoining places in DD.

10. CENTIPEDA Lour.

C. minima (Linn.) A. Br. et Asch. Ind. Sem. Hort. Berol 6, 1867.
Artemisia minima Linn. Sp. Pl. 849, 1753. *Centipeda orbicularis*
 Lour. Fl. Cochinch. 493, 1790; FBI 3: 317; Bamber 566; Sabnis 373;
 Duthie 406.

Annual prostrate herbs; branches sparsely woolly. Head solitary in axils, yellowish. Achenes 4-angled.

Common in moist places from Nov.-March.

Dadri, 20506, 20513; Hissar, *V. J. Nair* 19358; Hoshiarpur, *Aitchison* 637 (DD); Karnal, 24645; Ludwa, 26473; Rupar, *T. A. Rao* 10842.

11. CENTRATHERUM Cass.

C. anthelmenticum (Willd.) O. Kuntze, Rev. Gen. Pl. 320, 1891.
Vernonia anthelmentica Willd. Sp. Pl. 3: 1634, 1800; FBI 3: 236;
 Bamber 325; Duthie 402.

Large erect annuals. Flowers in corymbose heads. Achenes hairy, 10-ribbed, pappus reddish.

The plant when powdered and thrown about the floor, is believed to expel fleas and hence called "purple flea-bane."

Flowers: Aug.

Amritsar, *P. N. Mehra* s.n. (DD).

12. CICHORIUM Linn.

C. intybus Linn. Sp. Pl. 813, 1753; FBI 3: 391; Bamber 376; Sabnis 375; Maheshw. 188; Duthie 451.

Perennial herbs. Tap root fleshy. Stem angled, grooved. Flowers blue. Head homogamous. Achenes crowned with pappus scales.

A weed of cold season. Common wild chicory.

Local name: Kasni, Gue, Suchal.

Flowers and fruits: Feb.-May.

Hissar, *V. J. Nair* 19940, 21515; Ludwa, 26436; Malerkotla, 36716; Nizampur, 20682, 20683; Rewari, 20747; Sirsa, *V. J. Nair* 21554.

13. CHRYSANTHEMUM Linn.

C. indicum Linn. Sp. Pl. 889, 1753.

Grown in gardens for its flowers during Feb.-May.

14. CIRSIUM Adans.

1. Heads dioecious
1. Heads bisexual

1. *C. arvense*
2. *C. wallichii*

1. **C. arvensis** (Linn.) Scop. Fl. Carn. (ed. 2), 126, 1772; Maheshw. 201. *Serratula arvensis* Linn. Sp. Pl. 820, 1753. *Cnicus arvensis* Hoffm. Deutsch. Fl. (ed. 2) 1: 130, 1791; FBI 3: 362; Bamber 368; Sabnis 374; Duthie 438. *Breca arvensis* (Linn.) Less. Syn. Comp. 9, 1832.

Erect herbs with spinescent, pinnatifid or sinuate leaves tomentose below. Heads purple; male flowers in round heads, female ones in longer heads with loose bracts. Pappus brownish white.

Common on road sides and waste places.

Local name: Bhur-bhur.

Flowers and fruits: Jan.-May.

Binghol, 25822; Hissar, *V. J. Nair* 19925, 21630; Jind, 26518; Lambi, 26331; Nabha, 36740; Sampla, 20027; Yamunanagar, 27519.

2. **C. wallichii** DC. Prodr. 6: 643, 1838; Maheshw. 201. *Cnicus wallichii* Hook. f. FBI 3: 363; Bamber 369; Duthie 438.

Like last species but the inner bracts dilated and occupying a large part of the yellow head.

This is a Himalayan plant. I have seen only one plant in the area.

Yamunanagar, 26397. An unusual locality.

15. CONYZA Less.

C. stricta Willd. Sp. Pl. 3: 1922, 1804; FBI 3: 258; Bamber 335; Duthie 410.

Herbaceous but with thick woody root-stock. Leaves various, upper filiform gradually becoming broader downwards. Heads yellow.

Hoshiarpur Siwaliks, *T. A. Rao* 10742.

15a. COTULA Linn.

1. Leaf segments awned; disc achenes winged
1. Leaf segments not awned; disc achenes not winged

1. *C. anthemoides*
2. *C. hemisphaerica*

1. **C. anthemoides** Linn. Sp. Pl. 891, 1753; FBI 3: 316; Bamber 362; Duthie 434.

Prostrate herbs. Leaves divided. Heads solitary yellow.

Common in moist places.

Flowers and fruits: Dec.-April.

Amritsar, *J. N. Vohra* 11297; Badopal, *V. J. Nair* 19825; Bhatinda, 26267; Fatehbad, 25936; Gola, 25852; Hissar, *M. A. Rau* 3541; Rewari, 20779; Sampla, 20020; Sirsa, *V. J. Nair* 21560; Talwandi, *V. J. Nair* 19855.

2. **C. hemisphaerica** (Roxb.) Hook. f. FBI 3: 316; Bamber 363; Duthie 434; Puri 77; Maheshw. 199. *Artemisia hemisphaerica* Roxb. Fl. Ind. 3: 422, 1832.

Erect annual. Leaves much divided. Heads solitary, peduncles erect but drooping later.

Flowers : Jan.-March.

Hoshiarpur, *Aitchison* s.n. (DD); E. Punjab, without Collector's name (DD).

16. CYATHOCLINE Cass.

C. purpurea (Don) Kuntze, Rev. Gen. Pl. 338, 1891; Puri 73. *Tanacetum purpureum* Don, Prodr. 181, 1825. *Cyathocline lyrata* Cass. in Ann. Sci. Nat. Ser. 17: 420, 1829; Duthie 407.

Delicate herbs, leaves pinnatifid. Heads purplish. Pappus absent. Weed in moist places.

Flowers and fruits : Aug.-March.

Amritsar, *J. N. Vohra* 11303; Hansi, 16152.

17. DICOMA Cass.

D. tomentosa Cass. Dict. Sci. Nat. 7: 110, 1817; FBI 3: 387; Bamber 289; Maheshw. 202; Puri 78; Duthie 443.

Annuals, covered with white cottony wool. Heads white or pale yellow, solitary, axillary and terminal. Bracts spinous. Achenes silky. Pappus pale brown.

Rare; in hilly places.

Flowers : Feb.-March.

Kanana (Dadri), 20535.

18. ECHINOPS Linn.

E. echinatus Roxb. Fl. Ind. 3: 647, 1832; FBI 3: 358; Bamber 366; Sabnis 374; Maheshw. 200; Puri 78; Duthie 437.

Erect herbs up to 1 m high with wide spreading branches. Leaves pinnately lobed, spinous, pubescent. Flowers in double heads; each head 1-flowered and surrounded by strong white bristles; some of the outer involucrel bracts develop into strong spines. Achenes silky, pappus yellowish.

Common. The plant begins to appear from November onwards and flowers during March-April. Sometimes large areas are covered by these spiny herbs during the summer months.

Barwala, *V. J. Nair* 19884; Bhawanikheda, 16332; Bhatinda, 2774; Dhauj, *T. A. Rao* 11076; Hansi, 16170; Hissar, *M. A. Rau* 21008; Kanana (Dadri), 20529; Mahendragarh, 20595; Panipat, 26494; Rohtak, *V. J. Nair* 23197; Sohna, *T. A. Rao* 11059.

19. ECLIPTA Linn.

E. prostrata (Linn.) Linn. Mant. 2: 286, 1771; Maheshw. 197; Puri 76. *Verbesina prostrata* Linn. Sp. Pl. 902, 1753. *Cotula alba* Linn. Syst. 2: 564, 1767. *Eclipta alba* (Linn.) Hassk. Pl. Jav. Rac. 528, 1848; FBI 3: 304; Sabnis 373.

Stem prostrate or erect, often rooting at nodes. Leaves very variable, linear to oblong-lanceolate. Achenes without pappus.

Common in moist places.

Flowers: Throughout the year.

Bhatinda, 27828; Choudhriwas, V. J. Nair 19224, 21526; Daber, 15867; Hissar, M. A. Rau 3482; Ludwa, 26472; Mahendragarh, 20557; Rajpura, T. A. Rao 10923; Talwandi, 18767.

20. EMILIA Cass.

E. sonchifolia (Linn.) DC. in Wight, Contrib. 24, 1834; FBI 3: 336; Bamber 506; Duthie 436. *Cachalia sonchifolia* Linn. Sp. Pl. 835, 1753.

Annual herbs. Radical leaves pinnatifid, cauline stem-clasping and pinnately divided. Heads purple. Pappus white. Achenes 5-angled, bristly.

Flowers: Sept.

Pathankot, P. N. Mehra s. n. (DD).

21. ERIGERON Linn.

1. Leaves lanceolate, entire or toothed here and there

1. Leaves ovate-oblong, toothed or lobulate

2. *E. bonariensis*

1. *E. asteroides*

1. **E. asteroides** Roxb. Fl. Ind. 3: 422, 1832; FBI 3: 254; Bamber 334; Duthie 408.

A coarse pubescent or villous annual. Ligulate florets violet blue; disc florets yellow. Achenes minute, compressed.

Flowers: Sept.

Chopalia bir (Hissar), Raizada 26957 (DD).

2. **E. bonariensis** Linn. Sp. Pl. 863, 1753; Burt in Kew Bull. 371, 1948; Maheshw. 192. *E. linifolius* Willd. Sp. Pl. 3: 1955, 1803; FBI 3: 254; Bamber 334; Sabnis 371.

Hairy annuals with small purplish heads. Achenes flattened, beaked. Common in moist places.

Flowers and fruits: Nov.-May.

Bahuna, 18896; Bhiwani, 16339; Daryapur, M. A. Rau 3568; Taran Taran, 36346; Yamunanagar, 27537.

22. *FILAGO* Linn.

F. germanica Linn. Sp. Pl. (ed. 2) 1311, 1763; FBI 3: 277; Bamber 285; Duthie 419.

Small woolly annuals often prostrate. Heads yellow, clustered. Achenes minute, crowned by pappus, rough.

In sandy soils.

Flowers: Feb.-March.

Hoshiarpur, *Aitchison* 346 (DD); Kapurthala, 36302.

23. *GNAPHALIUM* Linn.

- | | |
|--|---|
| 1. Heads bright golden yellow in leafless corymbs | 2. <i>G. luteo-album</i> subsp. <i>affine</i> |
| 1. Heads not golden yellow in leafy spikes or axillary or terminal clusters, often woolly: | |
| 2. Branches prostrate; heads clustered and embedded in woolly appendages | 4. <i>G. pulvinatum</i> |
| 2. Branches ascending; heads in leafy spikes: | |
| 3. Heads 6 mm or more in diameter; pappus free | 3. <i>G. peregrinum</i> |
| 3. Heads less than 6 mm in diameter; pappus free | 1. <i>G. indicum</i> |

1. **G. indicum** Linn. Sp. Pl. 852, 1753; FBI 3: 289; Bamber 287; Duthie 421; Maheshw. 194.

Woolly herbs. Leaves variable, linear ovate or spatulate. Heads pale yellow. Achenes rough.

Common during the rains and abundant during the cold season as a weed in moist places.

Barnala, 36592; Gola, 25854; Karnal, 25803; Larooha (Jullunder), *T. S. Bakshi* 8 (DD); Rewari, 20777; Sampla, 20003.

2. **G. luteo-album** Linn. subsp. *affine* (D. Don) Koster in *Blumea* 4: 484, 1941; Maheshw. 194; Duthie 421. *G. affine* D. Don, *Prodr.* 173, 1825. *G. luteo-album* Linn. var. *multiceps* Hook. f. FBI 2: 288; Bamber 286.

Woolly herbs leaves oblong or spatulate, nearly amplexicaul. Achenes papillose.

Common along canal banks and temporary ponds during the cold season and spring.

Amritsar, *J. N. Vohra* 11270; Rewari, 20785; Rohtak, 26375; Sirsa, 26744; Yamunanagar, 26387.

3. **G. peregrinum** Fernald in *Rhodora* 45: 479, 1943; Munz. & Keck *Calif. Fl.* 1259, 1959; Nair in *JBNHS* 63: 777, 1966. *G. purpureum* auct. pl.* (non Linn.); Duthie 421.

Annual herbs with spatulate leaves. Heads 3-4 mm long; involucre almost completely covered in wool except the tip.

Flowers: Oct.-March.

Badopal, 25928; Hoshiarpur, *Aitchison* s. n. (DD); Kapurthala, 36206; Mahendragarh, 20596; Sampla, 20012; Talwandi, 34526; Yamunanagar, 25284.

4. **G. pulvinatum** Desf. Descr. Eg. 266, t. 44, 1812; FBI 3: 289; Bamber 565; Puri 74; Duthie 422.

Prostrate woolly herbs with yellowish heads buried in wool. Near canals, ponds and marshy places during Dec.-March. Chakka Sheel, 26024; Mojukheda 26058; Ratia, 25999.

24. GRANGEA Adans.

G. maderaspatana (Linn.) Poir. Encycl. Suppl. 2: 825, 1811; FBI 3: 243; Bamber 574; Maheshw. 191; Puri 73. *Artemisia maderaspatana* Linn. Sp. Pl. 849, 1753.

Prostrate herbs with multifid leaves. Heads yellow.

Flowers and fruits: Aug.-May.

Ferozapore, 36385; Hansi, 26538; Ludwa, 26454; Sonpet, *V. J. Nair* 23348; Yamunanagar, 26494.

24a. HELIANTHUS Linn.

H. annuus Linn. Sp. Pl. 904, 1753; Duthie 450.

Erect hispid herbs up to 3 m high. Heads up to 25 cm across, yellow.

The sun-flower of gardens. Grown during Sept.-March.

Local name: Surajmukhi.

Mojukheda, 26071.

25. IFLOGA Cass.

I. fontanesii Cass. Dict. Sc. Nat. 23, 24, 1823; FBI 3: 277; Bamber 285; Sabnis 372; Duthie 420.

Annual much branched herbs, branches densely leafy. Heads nestling among leaves.

Flowers: Feb.-March.

Badopal, *V. J. Nair* 19818; Barwala, *V. J. Nair* 19867; Bhatinda, 26271, 26293, 36566; Bhiwani, 20056; Choudhriwas, *V. J. Nair* 19804; Fatehbad, 25967; Jhahua (Rewari), 20716; Lambi, 26207; Loharu, 20080; Mahendragarh, 20617; Talwandi, *V. J. Nair* 19844.

26. INULA Linn.

1. Branches leaves beneath and corymbs densely villous woolly
1. Branches leaves and corymbs glabrous or softly pubescent when young only

1. *I. cappa*
2. *I. cuspidata*

1. **I. cappa** DC. Prodr. 5: 469, 1836; FBI 3: 295; Bamber 117; Duthie 423.

Shrubs with yellow heads.

Found only in the sub-Himalayan foothills.

Flowers: November.

Hoshiarpur, Aitchison s. n. (DD); Kalka, T. A. Rao 10878.

2. **I. cuspidata** (DC.) Clarke, Comp. Ind. 125, 1876; FBI 3: 296; Bamber 117. *Amphiraphis cuspidata* DC. Prodr. 5: 343, 1836.

Shrubs. Leaves membranous, acute at both ends. Heads yellow.

Flowers: Oct.-Nov.

Bhakra-Nangal, T. A. Rao 10821; Kasauli, T. A. Rao 10901.

27. LACTUCA Linn.

1. Heads yellow; leaves entire or lightly pinnatifid

2. *L. sativa*

1. Heads blue; leaves lyrate or runcinate pinnatifid

1. *L. dissecta*

1. **L. dissecta** D. Don, Prodr. 164, 1825; FBI 3: 405; Bamber 378; Duthie 446.

Glabrous herbs. Heads narrow cylindrical, few-flowered. Achenes rugose.

Rare, weed in wheat fields during Feb.-April.

Bhatinda, 36576; Bhiwani, 34584; Kapurthala, 36303; Lambi, 26314.

2. **L. sativa** Linn. Sp. Pl. 795, 1753; Duthie 447; Maheshw. 188. *L. scariola* var. *sativa* (Linn.) Clarke, Comp. Ind. 263, 1876; FBI 3: 404; Bamber 377.

Cultivated lettuce.

Local name: Salad.

I have seen this in markets.

28. LAGGERA Sch.-Bip.

1. Whole plant aromatic; heads pinkish white

1. *L. aurita*

1. Plants not aromatic; heads bright yellow

2. *L. flava*

1. **L. aurita** (Willd.) Sch. Bip. in Schweinf. Beitr. Fl. Aeth. 151, 1867; FBI 3: 271; Bamber 328; Duthie 417; Maheshw. 196. *Conyza aurita* Willd. Sp. Pl. 3: 1929, 1804.

Flowers: After the rains.

Hansi, 34511; Hissar, V. J. Nair 19967; Ottobridge, V. J. Nair 21611.

2. **L. flava** (DC.) Benth. Gen. Pl. 2: 290, 1873; FBI 3: 270; Bamber 327; Duthie 417. *Blumea flava* DC. Prodr. 5: 439, 1836.

East Punjab, without collector's name (DD).

29. LAUNAEA Cass.

- | | |
|--|---------------------------|
| 1. Heads on stout dichotomously branched panicles | 2. <i>L. resedifolia</i> |
| 1. Heads on racemose fascicles: | |
| 2. Achenes winged | 4. <i>L. glomerata</i> |
| 2. Achenes not winged: | |
| 3. Heads in panicles; leaves without cartilagenous teeth | 1. <i>L. asplenifolia</i> |
| 3. Heads in racemes; leaves with cartilagenous teeth | 3. <i>L. fallax</i> |

1. *L. asplenifolia* (DC.) Hook. f. FBI 3: 415; Bamber 381; Duthie 449; Puri 79; Maheshw. 189. *Microhynchus asplenifolius* DC. Prodr. 7: 181, 1838.

Stems glabrous. Heads yellow. Achenes angled, ribs 4-5, stout. This plant is given on the authority of Bamber.

2. *L. resedifolia* (Linn.) Druce in Rep. Bot. Exch. Cl. Brit. Isles 1913: 420, 1914. *Scorzonera resedifolia* Linn. Sp. Pl. 1198, 1753. *Launaea chondrilloides* (DC.) Hook. f. FBI 3: 415; Bamber 381; Sabnis 376; Puri 79. *Zollikoferia chondrilloides* DC. Prodr. 7: 183, 1838.

Leaves radical and cauline, runcinate pinnatifid. Involucral bracts 3-4-seriate. Heads yellow; achenes truncate at both ends.

A common undergrowth among bushes in sandy areas.

Local name: Brahmadandi.

Flowers and fruits: Feb.-April, Sept.-Oct.

Abohar, 36507; Agrua, 18827; Badopal, 16223; Bahuna, 18903; Bharian, 18813; Bhatinda, 26127; Hansi, 16178; Hissar, *V. J. Nair* 19362.

3. *L. fallax* (Jaub. & Spach.) Kuntze, Rev. Gen. Pl. 351, 1891; Kitam. Fl. Afghan. 431, 1960. *Microhynchus fallax* Jaub. & Spach. Pl. Or. t. 276, 1849. *Launaea nudicaulis* (Linn.) Hook. f. FBI 3: 416 (non Lessing 1832); Maheshw. 189; Puri 79; Duthie 450.

Glabrous prostrate herbs. Leaves mostly radical, pinnatifid. Involucral bracts with membranous margins. Heads yellow. Inner achenes 4-ribbed, outer flattened and curved.

Very common in sandy areas. One of the pioneers on dunes.

Flowers: Sept.-April.

Bahuna, 18900; Barwala, *V. J. Nair* 19268; Bhatinda, 26286; Bhiwani, 20058; Choudhriwas, *V. J. Nair* 19240; Dabwali, 16141; Fatehabad, 18869; Hissar, *M. A. Rau* 3520; Jhabua, 20724; Jind, 25858; Kapurthala, 35997; Mahendragarh, 20566; Panipat, 18642; Rohtak, *V. J. Nair* 23183; Taran Taran, 36364; Yamunanagar, 27547, 27568.

4. *L. glomerata* (Cass.) Hook. f. FBI 3: 417; Bamber 382. *Lomatolepis glomerata* Cass. in Dict. Sc. nat. 48: 422, 1827.

Glabrous herbs with perennial rootstock. Branches several. Leaves sinuately lobed, pinnatifid with cartilagenous teeth. Heads sessile yellow. Achenes truncate at ends.

Rare in sandy areas.

Flowers: Feb.-March.

Barwala, 26338; *V. J. Nair* 19864.

30. LEUCOMERIS Don

L. spectabilis Don, Prodr. 170, 1825; FBI 3: 386; Duthie 443.

Large shrubs, leaves coriaceous. Heads in corymbs. Achenes silky. In sub-Himalayan tracts.

Flowers: December.

Ambala Siwaliks, *Parker* 21676 (DD); Kalesar, *Parker* 21677 (DD).

31. PLUCHEA Cass.

- | | |
|---|-------------------------|
| 1. Branches slender, hoary pubescent; heads corymbose; involucre bracts short, rounded obtuse | 2. <i>P. lanceolata</i> |
| 1. Branches stout, glandular pubescent; heads hardly corymbose; involucre bracts subulate-lanceolate, rigid | 1. <i>P. arguta</i> |

1. *P. arguta* Boiss. Diagn. Ser. 2, 3: 5, 1853; FBI 3: 273; Bamber 116; *Parker* 289; Puri 75.

I have seen no specimen of this taxon from the area; it is common in the adjoining places.

2. *P. lanceolata* (DC.) Oliv. & Hiern, Fl. Trop. Afr. 3: 329, 1877; FBI 3: 272; Bamber 116; *Parker* 288; Puri 74; Maheshw. 196; Duthie 418. *Berthelotia lanceolata* DC. Prodr. 5: 376, 1836.

Erect shrubs up to 1 m high. Heads purple. Pappus distinctly connate at the base. Propagated vegetatively by suckers.

Flowers and fruits: Almost round the year.

Chakka Jheel area (Sirsa), *V. J. Nair* 21578; Rewari, 20768, 20776; Sonpet, 23349.

32. PULICARIA Gaertn.

- | | |
|---|---------------------------|
| 1. Softly pubescent perennials; leaves narrowed at the base nearly entire | 1. <i>P. angustifolia</i> |
| 1. Cottony tomentose perennials; leaves cottony beneath, half amplexicaul, undulate, coarsely dentate | 2. <i>P. crispa</i> |

1. *P. angustifolia* DC. Prodr. 5: 479, 1834; FBI 3: 299; Bamber 293; Maheshw. 193; Puri 75; Duthie 425.

Leaves linear oblong, tips blunt. Heads yellow, achenes smooth.

Flowers and fruits: Dec.-March.

Dhauj, *T. A. Rao* 11083; Jhabua (Rewari), 20717; Ottobridge (Sirsa), 18940; Siwani, 26563; Toru (Rewari), *T. A. Rao* 11092.

2. ***P. crispa*** (Forsk.) Oliv. in Trans. Linn. Soc. 29: 96, 1873; FBI 3: 299; Bamber 336; Sabnis 373; Parker 292; Duthie 425; Maheshw. 193; Puri 75. *Aster crispus* Forsk. Fl. Aeg.-Arab. 150, 1775.

Branches many from a woody base; leaves sessile. Heads solitary, yellow. Achenes glabrate.

Common near water.

Local name: Barna, Bui.

Flowers: Throughout the year, profusely from Feb.-April.

Bhawanikheda, 16348; Bhatinda, 26260; Bawal, *T. A. Rao* 11117; Fatehbad, 18846, 18888; Fazilka, 36397; Hansi, 16156; Hissar, 16193; Raizada 20976(DD); Larot, *T. S. Bakshi* 10 (DD); Mahendragarh, 20553, 20585; Narnaul, 20655; Pataudi, *T. A. Rao* 11143.

33. SAUSSUREA DC.

S. candicans Clarke, Comp. Ind. 232, 1876; FBI 3: 373; Bamber 370; Duthie 440.

Large pubescent annuals. Leaves pinnately lobed, white cottony beneath. Heads pale red. Achenes 5-angled, smooth.

Rare, along road sides.

Flowers: Cold months.

Attari Road (Amritsar), 36320; Hoshiarpur, *Aitchison* s. n. (DD).

34. SONCHUS Linn.

- | | |
|--|-------------------------|
| 1. Peduncles and involucrel bracts not glandular; achenes papery | 1. <i>S. asper</i> |
| 1. Peduncles and involucrel bracts densely or sparsely glandular; achenes not papery: | |
| 2. Peduncles and involucrel bracts densely glandular; achenes broader in the middle | 2. <i>S. brachyotus</i> |
| 2. Peduncles and involucrel bracts sparsely glandular; achenes broadest above the middle | 3. <i>S. oleraceus</i> |

1. ***S. asper*** (Linn.) Gars. Fig. Pl. Anim. Med. 4: 332, t. 565, 1767; FBI 3: 414; Bamber 380; Maheshw. 190; Puri 79; Duthie 448.

Erect annuals. Leaves half-amplexicaul, runcinate-pinnatifid, spinous; heads yellow; achenes many, papery.

Common in moist waste places.

Local name: Pila Dhuti.

Flowers and fruits: Feb.-May.

Binghol, 25815; Ismalia, 20031, 20032; Sarsoudh, *V. J. Nair* 19901; Yamunanagar, 27525.

2. **S. brachyotus** DC. Prodr. 6: 186, 1838; Boulos in Bot. Notis. 114: 57, 1961. *S. arvensis* auct (non Linn.); FBI 3: 414; Bamber 381; Maheshw. 190; Duthie 449.

Perennial erect herbs. Stems hollow. Heads yellowish-white. Achenes wrinkled but not tubercled.

Rare. In moist places.

Local name: Pila Dhuti, Sahadevi Bari.

Flowers and fruits: Jan.-March.

Dabwali, 26162a; Nabha, 36741.

3. **S. oleraceus** Linn. Sp. Pl. 794, 1753; FBI 3: 414; Bamber 380; Sabnis 376; Maheshw. 190; Puri 79; Duthie 448.

Erect herbs with hollow stems. Achenes with three longitudinal ribs, transversely tuberculate.

Common in cultivated fields.

Local name: Pili Dhuti, Dodak.

Flowers: Sept.-Dec.; March-April.

Bhatinda, 27749; Dabwali, 26164; Hissar, 26162; *M. A. Rau* 3558, *V. J. Nair* 19809; Jhabua, 20745; Lambi, 26213, 26323; Malerkotla, 36711.

35. SPHAERANTHUS Linn.

S. senegalensis DC. Prodr. 5: 370, 1836; Robyns in Kew Bull. 1924: 197, 1924; Stella Ross-Craig in Hook. Icon. Pl. 6(1): 25, t. 3502 B, 1955. *S. indicus* auct. pl. (pro parte, non Linn.); Duthie 419.

Villous, glandular, prostrate, aromatic annuals. Stems with toothed wings. Flowers purplish in globose heads. Achenes subcompressed, pappus absent.

Common in moist places and paddy fields.

Flowers and fruits: Dec.-March.

Fatehbad, 18880, 25978; Sirsa, *V. J. Nair* 21562.

36. TAGETES Linn.

T. erecta Linn. Sp. Pl. 887, 1753; Duthie 451.

Pungent herbs grown in gardens for their flowers. Also self-sown.

Local name: Marigold.

Mojukheda, 26072.

37. TRIDAX Linn.

T. procumbens Linn. Sp. Pl. 900, 1753; FBI 3: 311; Bamber 543; Puri 77; Maheshw. 199; Duthie 433.

Perennial hairy herbs; leaves lanceolate, irregularly toothed. Ray florets white, disc florets yellow.

Along road sides and crevices of rocks on hills.

Flowers: Almost round the year.

Bahadurgarh (Rohtak), *V. J. Nair* 21647; Bhakra-Nangal, *T. A. Rao* 10808; Gurgaon, *T. A. Rao* 11013; Kanana (Dadri), 25134; Khana, 16257; Sangrur, 36702.

38. VERBESINA Linn.

V. encelioides (Cav.) A Grey in Bot. Calif. 1: 350, 1876; Maheshw. 199. *Ximenesia encelioides* Cav. Icon. 2: 60, 1793; Nair in Bull. bot. Surv. India 3(1): 43, 1961.

A much branched erect cannescent herb. Leaves shortly auricled at the base. Heads yellow in panicles, large. Pappus of two subulate awns.

Common in sandy areas; poisonous to cattle.

Flowers: Aug.-Nov., stray flowers throughout the year.

Bahadurgarh (Rohtak), *V. J. Nair* 21664; Dabwali, 26124; Loharu, 16271, 20586; Malerkotla, 36724; Narnaul, 2583; Rewari, 20794.

39. VERNONIA Schreb.

1. Involucral bracts long, tapering, acute; heads about 5 mm broad; leaves broadly ovate, obtuse, crenate dentate, abruptly narrowed to the petiole

2. *V. cinerea*

1. Involucral bracts abruptly triangular tipped; heads about 5-8 mm broad; leaves ovate-oblongate, subentire, rounded at the apex, tapered at the base, gland-dotted beneath

1. *V. cinerascens*

1. ***V. cinerascens*** Sch.-Bip. in Schweinf. Beitr. Fl. Aeth. 162, 1867; FBI 3: 237; Bamber 116; Parker 287; Puri 73; Duthie 403.

This is given on the authority of Bamber and Parker. I have not seen any specimen from the area.

2. ***V. cinerea*** (Linn.) Less. in Linnæa 4: 291, 1829; FBI 3: 233; Bamber 325; Maheshw. 190; Puri 73; Duthie 404.

Heads reddish purple. Common weed.

Local name: Sahadevi.

Flowers: Almost round the year.

Amritsar, *P. N. Mehra* s. n. (DD); Jhabua, 20721; Kanana (Dadri), 20525; Karnal, *J. N. Vohra* 9915, 9929; Loharu, 16322; Mahendragarh, 20607.

40. VICOA Cass.

1. Viscid and pubescent herbs; leaves scabrid above; tips of involucral bracts erect

1. *V. indica*

1. Woolly herbs; leaves softly hairy; tips of involucral bracts recurved and thread-like

2. *V. vestita*

1. *V. indica* (Linn.) DC. in Wight, Contrib. 10, 1834; Maheshw. 193; Puri 75. *Inula indica* Linn. Sp. Pl. ed 2: 1236, 1762; Willd. Sp. Pl. 3: 2092, 1804; Duthie 423. *Vicoa auriculata* Cass. in Ann. Sc. Nat. Ser. 1, 17: 418, 1829; FBI 3: 297; Bamber 293.

Erect annuals. Leaves lanceolate, stem-clasping, auriculate, auricles round or hastate. Heads yellow, leaf-opposed. Achenes silky. Pappus hairs scanty.

Common in fields and farms.

Flowers and fruits: Sept.-March.

Amritsar, P. N. Mehra s.n (DD); Barwala, V. J. Nair 19270; between Jind and Hansi, 24834; Bitmada, 25031; Fatehbad, 18883; Gurgaon, 25239; Hoshiarpur, T. A. Rao 10738; Panipat, 18635, 24704.

2. *V. vestita* Benth. ex Hook. f. FBI 3: 297; Bamber 336; Maheshw. 193.

Low herbs in sugarcane fields. Heads yellow. Achenes as above.

Flowers: March-May.

Hansi, 26543; Subhanpur, J. N. Vohra 1133; Taran Taran, 36344; Yamunanagar, 27510, 27518.

41. XANTHIUM Linn.

X. strumarium Linn. Sp. Pl. 987, 1753; FBI 3: 308; Bamber 362; Sabnis 373; Maheshw. 196; Puri 80; Duthie 426.

Annual shrubs up to 1.5 m high. Heads white with two mucronate beaks, clothed with hooked prickles. Achenes compressed; pappus absent. The fruits are dispersed by cattle and sheep and the hooked prickles of the involucre help in the process.

Common on road sides and in waste places.

Local name: Chota Dhatura.

Flowers: Sept.-March.

Hissar, 24874; Jind, 24769; Narnaul, 25211; Panipat, 18622, 24693; Tikri (Rohtak), V. J. Nair 21642; Yamunanagar, 27512.

42. YOUNGIA Cass.

Y. japonica (Linn.) DC. Prodr. 7: 194, 1838. *Premnanthes japonica* Linn. Mant. Pl. 1: 107, 1767. *Crepis japonica* (Linn.) Benth. Fl. Hongk. 194, 1861; FBI 3: 395; Bamber 377; Sabnis 375; Duthie 445.

* Annuals. Leaves runcinate pinnatifid. Heads yellow. Achenes ribbed, 3 to 5 ribs stronger. Outer achenes dorsiventrally flat.

Flowers: April.

Hoshiarpur, Aitchison 496 (DD).

43. ZINNIA Linn.

Z. elegans Jacq. Coll. 3: 152, 1790.

Ornamental. Grown in gardens.

63. CAMPANULACEAE

1. Flowers in a dense spike, fruits circumsciss
1 Flowers not in a dense spike; fruits berry

2. *Sphenoclea*
1. *Campanula*

1. CAMPANULA Bl.

C. canescens Wall. ex DC. Prodr. 7: 473, 1838; FBI 3: 439; Bamber 341; Duthie 454.

Small hairy herbs. Leaves oblong lanceolate, round-toothed. Flowers complete or sometimes stamens wanting. Capsules smooth; seeds many.

Flowers: Sept.

Hoshiarpur, *Aitchison* s. n. (DD).

2. SPHENOCLEA Gaertn.*

S. zeylanica Gaertn. Fruct. 1: 113, t. 24, f. 5, 1788; FBI 3: 438; Bamber 296; Maheshw. 203; Duthie 453.

Erect glabrous herbs. Stems spongy. Flowers greenish white. Common in cultivated fields and on canal banks.

Flowers: Sept.-Oct.

Between Jind and Hansi, 24790, 24795; E. Punjab, *Sharma* s. n. (DD); Kurukshetra, *J. N. Vohra* 9866; Patiala, *T. A. Rao* 10935.

64. PLUMBAGINACEAE

P. zeylanica Linn. Sp. Pl. 151, 1753; FBI 3: 480, 1882; Bamber 226; Parker 301; Maheshw. 203; Duthie 457.

Rambling shrubs. Young branches glandular. Calyx clothed with gland-tipped hairs. Corolla white.

Common as undergrowth among bushes.

Local name: Chitrak.

Flowers: Sept.

Bhunds, *T. A. Rao* 11040; Hissar, 18747, 24864.

* Airy Shaw in Fl Malesiana Ser. 1, 4: 27, 1948 treats it as a family Sphenocleaceae. While there are sufficient reasons for separating it from Campanulaceae allying it with Phytolaccaceae seems unjustified.

65. PRIMULACEAE

- | | |
|--|---------------------|
| 1. Corolla with distinct tube, lobes imbricate | 2. <i>Androsace</i> |
| 1. Corolla divided nearly to the base, lobes contorted | 1. <i>Anagallis</i> |

1. ANAGALLIS Linn.

A. arvensis Linn. Sp. Pl. 148, 1753; FBI 3: 506; Bamber 154; Sabnis 377; Maheshw. 203; Puri 80; Duthie 461.

Small annuals with quadrangular stems and opposite sessile cordate leaves. Flowers blue with red base. Seeds 3-angled.

Common in moist places during the cold season.

Local name: Jonkmari.

Flowers and fruits: Jan.-May.

Badopal, V. J. Nair 19839; Barnala, 36582; Bingham, 25811; Dabwali, 26151; Hissar, 25910; Jhabua, 20740; Kapurthala, J. N. Vohra 11335; Lambi, 26227; Ludwa, 26470; Rohtak, 26370; Sampla, 20006; Talwandi, V. J. Nair 19854.

2. ANDROSACE Linn.

A. saxifragaefolia Bunge. Enum. Pl. Chin. Bor. 53, 1833; FBI 3: 496; Bamber 420; Sabnis 377; Duthie 460.

Annuals with rounded crenate leaves. Flowers pink to white in umbels surrounded by bracts.

Flowers: Sept.

Hoshiarpur, Aitchison 500 (DD).

66. MYRSINACEAE

MYRSINE Linn.

M. africana Linn. Sp. Pl. 196, 1753; FBI 3: 511; Bamber 118; Parker 302.

An evergreen shrub. Flowers minute in axillary clusters.

On Siwaliks.

Local name: Shamshad, Berbang.

Ambala Siwaliks, Gupta 42350 (DD), 42348 (DD).

67. SAPOTACEAE

- | | |
|-------------------------------------|---------------------|
| 1. Sepals 3+3; corolla with 6 lobes | 1. <i>Manilkara</i> |
| 1. Sepals 4+4; corolla with 8 lobes | 2. <i>Mimusops</i> |

1. MANILKARA Adans.

M. hexandra (Roxb.) Durb. in Ann. Mus. Col. Marseille, Ser. 3, 3: 6, 1915; Baehni in Boissiera 11: 92, 1965; Maheshw. 205; Puri 81. *Mimusops hexandra* Roxb. Pl. Cor. 1: 16, t. 15, 1795; FBI 3: 549; Bamber 32; Parker 306; Duthie 467.

Large trees cultivated in gardens and parks for shade. Flowers white. Berry 1-seeded, edible. Seeds black.

Flowers: Hot months.

Local name: Khirni, Kirni.

Bhiwani, 34580.

2. MIMUSOPS Linn.

M. elengi Linn. Sp. Pl. 349, 1753; FBI 3: 548; Bamber 32; Parker 306; Duthie 467; Maheshw. 205.

Large trees cultivated in gardens and parks for shade and very fragrant flowers. Flowers white. Berry edible.

Local name: Malsari.

Flowers: Cold season.

Amritsar, 36319; Bawal, *T. A. Rao* 11138.

68. EBENACEAE

DIOSPYROS Linn.

1. Leaves opposite or subopposite; staminodes less than 12;
albumen ruminant in seed

2. *D. exculpta*

1. Leaves alternate; staminodes 12; albumen not ruminant

1. *D. cordifolia*

1. **D. cordifolia** Roxb. Pl. Cor. 38, t. 50, 1795; Sabnis 378; Parker 309; Maheshw. 206; Duthie 471. *D. montana* Clarke in FBI 3: 555, 1882 (pro parte).

Large deciduous shrubs or small trees with hard spinescent branches. Leaf bases cordate or rounded. Flowers dioecious, greenish white. Fruits 2.5 cm in diameter, reddish brown when ripe. Seeds arillate.

Common in dry places. Esteemed as firewood.

Flowers: March-May. *Fruits*: Oct.-Dec.

Local name: Kaindu.

Between Jind and Hansi, 24815; Hansi, 18720; Hissar, *V. J. Nair* 19947; Karnal, 24604, 26490; Ludwa 26460; Murthal forest, *V. J. Nair* 23322; Nabha, 36736, 36744; Patiala, *Kiratram* s.n. (DD); Sidrawli (Rewari), 20804, 20805; Sohna, *T. A. Rao* 11075.

2. *D. exculpta* Buch.-Ham. in Trans. Linn. Soc. London. 15: 110, 1827. *D. tomentosa* Roxb. Fl. Ind. 2: 532, 1832 (non Poir.); FBI 3: 564; Parker 309; Duthie 469.

A deciduous tree. Leaf bases rounded. Stamines 8-10. Fruits 2.7-3.5 cm in diameter, yellow when ripe.

Rare.

Flowers: May-June. *Fruits*: Nov.

Bankhandi, T. A. Rao 10754.

69. OLEACEAE

- | | |
|--|----------------------|
| 1. Corolla lobes imbricate in bud, usually more than four; scandent shrubs or a large shrub; leaves simple or compound; corolla usually salver-shaped: | |
| 2. Fruit a flattened capsule; large shrubs; corolla tube orange limb white | 2. <i>Nyctanthes</i> |
| 2. Fruit a berry; scandent shrubs; corolla white or yellow | 1. <i>Jasminum</i> |
| 1. Corolla lobes valvate in bud, usually not more than four; leaves simple; petals connate in tubes or some times absent | 3. <i>Olea</i> |

1. JASMINUM Linn.

- | | |
|---|--------------------------|
| 1. Flowers yellow; leaves alternate, compound | 1. <i>J. humile</i> |
| 1. Flowers not yellow; leaves opposite: | |
| 2. Leaves simple: | |
| 3. Calyx densely vilious | 2. <i>J. multiflorum</i> |
| 3. Calyx pubescent | 4. <i>J. sambac</i> |
| 2. Leaves compound imparipinnate | 3. <i>J. officinale</i> |

1. *J. humile* Linn. Sp. Pl. 7, 1753; FBI 3: 602; Bamber 131; Parker 317; Maheshw. 207; Duthie 477.

Glabrous shrubs. Leaflets 3-5. Flowers in terminal corymbose panicles.

Cultivated in gardens.

Flowers: April-June.

Local name: Pila Chameli.

Hoshiarpur, Aitchison s. n. (DD).

2. *J. multiflorum* (Burm. f.) Andr. Bot. Rep. t. 496, 1801; Kobuski in Jour. Arn. Arb. 13: 172, 1932; Maheshw. 208; Puri 81. *Nyctanthes multiflora* Burm. f. Fl. Ind. 5, t. 3, f. 1, 1768. *Jasminum pubescens* Willd. Sp. Pl. 1: 37, 1797; FBI 3: 592; Bamber 579; Parker 316; Duthie 475.

Scandent shrubs. Leaves ovate. Flowers white, fragrant.

Cultivated in gardens.

Flowers: March-April.

Local name: Kund Phul, Kunda.

Hoshiarpur, Aitchison 596 (DD); Malerkotla, 36726.

3. **J. officinale** Linn. Sp. Pl. 7, 1753; FBI 3: 603; Bamber 71; Parker 316; Maheshw. 208; Duthie 477.

Twining shrubs. Leaves imparipinnate; leaflets 3-7. Flowers white, fragrant, in terminal clusters.

Grown in gardens.

Flowers: March-May.

Local name: Malthi, Chamba.

Barnala, 36596.

4. **J. sambac** (Linn.) Ait. Hort. Kew 1: 8, 1789; FBI 3: 591; Bamber 579; Maheshw. 208; Duthie 477. *Nyctanthes sambac* Linn. Sp. Pl. 8, 1753.

Woody scandent shrubs. Leaves ovate. Flowers white fragrant.

Cultivated in gardens.

Local name: Mugra, Motia.

Flowers: March-May.

E. Punjab, *Sharma* s. n. (DD).

2. NYCTANTHES Linn.

N. arbor-tristis Linn. Sp. Pl. 6: 1753; FBI 3: 603; Bamber 58; Parker 319; Maheshw. 279; Puri 81; Duthie 477.

Large deciduous shrubs. Leaves opposite, ovate, rough. Flowers white fragrant.

Grown in gardens but wild in sub-Himalayan tracts.

Local name: Harsingar.

Flowers: More or less throughout the year.

Bankhandi, *T. A. Rao* 10776.

3. OLBA Linn.

O. europaea Linn. Sp. Pl. 8, 1753; Parker 322; Maheshw. 209; Duthie 480.

This is the olive tree. Parker (*loc. cit.*) states that this was introduced in the Punjab long before 1870. I have seen only one sheet from the area.

Hoshiarpur, *Parker* 14377 (DD).

70. SALVADORACEAE

SALVADORA Linn.

1. Leaves 1.2 cm broad or more; flowers pedicelled
1. Leaves less than 1.2 cm broad; flowers sessile

2. *S. persica*
1. *S. oleoides*

1. **S. oleoides** Decne., in Jacq. Voy. Bot. 140, t. 144, 1844; FBI 3: 619; Bamber 59; Sabnis 533; Parker 323; Maheshw. 210; Puri 82; Duthie 481.

Small trees with crooked branches. Leaves fleshy, linear lanceolate, glaucous. Flowers in panicles, yellowish white. Drupes yellow when ripe, edible.

Common throughout the drier parts of the area and along with *Prosopis cineraria*, *Capparis decidua* and *Maytenus emarginatus* forming the typical scrub jungle of those places.

Local name : Jhal, Peelu.

Flowers and fruits : Feb.-May.

Between Bhiwani and Loharu, 20068; Bhatinda, 27805; Faridkot, 36539; Ferozapore, 36393; Hissar, *Duthie* 4191 (DD); *V. J. Nair* 19352, 19915; Kanana, 20536; Siwani, 26565.

2. **S. perisca** Linn. Sp. Pl. 122, 1753; FBI 3: 619; Bamber 59; Parker 323; Maheshw. 209; Puri 81; Duthie 481.

Small trees very like the last species except for the narrower leaves, sessile flowers and red ripe fruits.

Rare.

Local name : Kaindu.

Flowers : Feb.-March; rarely in Dec.

Binghol, 25838; Nuh, *T. A. Rao* 11146.

71. APOCYNACEAE

- | | |
|--|---------------------------|
| 1. Leaves spirally arranged: | |
| 2. Flowers white or reddish white with yellow centre; branches fleshy; leaves oblong lanceolate with an intramarginal vein | 6. <i>Plumeria</i> |
| 2. Flowers yellow; branches not fleshy; leaves linear without intramarginal vein | 8. <i>Thevetia</i> |
| 1. Leaves not spirally arranged: | |
| 3. Climbing plants: | |
| 4. Stamens exserted | 10. <i>Vallisneria</i> |
| 4. Stamens included: | |
| 5. Corolla lobes deflexed | 4. <i>Ichnocarpus</i> |
| 5. Corolla lobes obliquely truncate | 9. <i>Trachelospermum</i> |
| 3. Plants not climbing: | |
| 6. Leaves not whorled, opposite: | |
| 7. Corolla with scales at throat | 11. <i>Wrightia</i> |
| 7. Corolla without scales at throat: | |
| 8. Flowers in axillary pairs | 3. <i>Catharanthus</i> |
| 8. Flowers in terminal or pseudoaxillary paniculate cymes: | |
| 9. Spinous shrubs | 2. <i>Carissa</i> |
| 9. Shrubs without spines | 7. <i>Tabernaemontana</i> |
| 6. Leaves whorled: | |
| 10. Trees; flowers small, less than 1 cm across | 1. <i>Alstonia</i> |
| 10. Shrubs; flowers more than 1 cm across | 5. <i>Nerium</i> |

1. ALSTONIA R. Br.

A. scholaris (Linn.) R. Br. in Mem. Wern. Soc. 1: 76, 1811; FBI 3: 642; Parker 335; Maheshw. 215; Puri 82; Duthie 486. *Echites scholaris* Linn. Mant. 1: 53, 1767.

Large trees. Flowers greenish white or greenish yellow, very fragrant. The Satan tree.

I have seen only one tree cultivated in Patiala. Flowers could not be collected from the high branches.

2. CARISSA Linn.

- | | |
|---|-----------------------|
| 1. Leaves 1-4 cm long; berries less than 1 cm across; flowers pure white | 2. <i>C. spinarum</i> |
| 1. Leaves 3-8 cm long; berries more than 1 cm across; flowers pinkish white | 1. <i>C. congesta</i> |

1. *C. congesta* Wight, Icon. 1289, 1848. *C. carandas* auct. (non Linn.); FBI 3: 630 (pro parte); Bamber 59; Parker 328; Duthie 483; Puri 82; Maheshw. 213.

Variable spiny shrubs. Leaves broadly ovate, subacute or obtuse, occasionally slightly emarginate at the apex. Berry purple, four-seeded.

Cultivated for the fruits which are used for pickles and jams.

Local name : Karunda.

Flowers : Dec.-March. *Fruits* : April-June.

Patiala, Kiratram s. n. (DD); Taran Taran 36338.

2. *C. spinarum* Linn. Mant. 559, 1771; FBI 3: 631; Bamber 59; Parker 327; Maheshw. 213; Duthie 483.

Spiny bushes. Leaves ovate-elliptic or orbicular. Flowers scented. Fruit purple.

Common in wayside jungles. Sometimes cultivated as a hedge plant in gardens.

Local name : Jungli Karunda.

Flowers and fruits : July-Dec.; March-April.

Hoshiarpur, Aitchison 286 (DD); T. A. Rao 10732; Jind, 18689, 24757; Karnal, 24602; Panipat, 26499.

3. CATHARANTHUS Don

- | | |
|---|-----------------------|
| 1. Erect annual herbs; leaves lanceolate; flowers less than 2 cm across; follicles 3-5 cm long | 1. <i>C. pusillus</i> |
| 1. Perennial shrubs, leaves obovate; flowers more than 3 cm across; follicles less than 3 cm long | 2. <i>C. roseus</i> |

1. *C. pusillus* (Murr.) G. Don, Gen. Syst. 4: 95, 1836; Maheshw. 211. *Vinca pusilla* Murr. in Comm. Gotting. 3: 66, t. 2, b.1, 1773; FBI 3: 640. *Lochnera pusilla* K. Scum. in Engl. & Prantl, Pflanzenfam. 4 (2): 145, 1895; Duthie 485.

Much branched herbs: branches 4-angled. Flowers white: mouth of corolla hairy.

A weed of cultivation.

Flowers and fruits: Aug.-Dec.

Gurgaon, 25240; Narnaul, 25232; Panipat, 24712; Sonpet, V. J. Nair 23295.

2. *C. roseus* (Linn.) G. Don, Gen. Syst. 4: 95, 1837; Santapau in Bull. Bot. Surv. India 3: 15, 1961. *Vinca rosea* Linn. Syst. (ed. 10) 944, 1759; FBI 3: 640; Parker 334. *Lochnera rosea* Reichb. Consp. Reg. 134, 1828; Puri 83.

Leaves slightly foetid. Flowers white or pink, axillary, solitary. Cultivated in gardens.

Flowers: All round the year.

Bhatinda, 36564; Hissar, V. J. Nair 19958; Karnal, 24624a.

4. ICHNOCARPUS R. Br.

I. frutescens (Linn.) R. Br. in Mem. Wern. Soc. 1: 62, 1809; FBI 3: 669; Bamber 581; Parker 333; Maheshw. 213; Duthie 492. *Apocynum frutescens* Linn. Sp. Pl. 213, 1753.

Evergreen twining shrubs with milky sap. Flowers small, greenish white. Carpels hairy.

Common on hedges.

Flowers: Aug.-Dec.

Local name: Bakkar Bael.

Binghol, 25840; Hoshiarpur, Aitchison 501 (DD); Karnal, 24643; Panipat, 18680.

5. NERIUM Linn.

N. indicum Mill. Gard. Dict. (ed. 8) no. 2, 1786; Merrill, Enum. 3: 336, 1923; Parker 556; Maheshw. 215; Puri 83. *Nerium odorum* Solander in Ait. Hort. Kew. 1: 297, 1789; FBI 3: 655; Bamber 120; Sabnis 534; Parker 331; Duthie 491.

Erect glabrous shrubs with colourless sap. Leaves linear lanceolate, midrib stout. Flowers pink, red or white. Corolla with appendages at the throat. Anthers spurred at the base, connective prolonged and feathery.

Cultivated in gardens.

Flowers: April-Oct.

Local name: Kaneer, Ganeer.

Firozpur jhirka, *T. A. Rao* 11151; Hissar, *V. J. Nair* 19980.

6. PLUMBRIA Linn.

P. acuminata Ait. Hort. Kew. (ed. 2) 2: 70, 1811; Merrill, Enum. 3: 321, 1923. *P. acutifolia* Poir. Encycl. Meth. Suppl. 2: 667, 1811; FBI 3: 641; Bamber 33; Parker 334; Duthie 493. *P. rubra* Linn. forma *acutifolia* (Poir.) Woodson in Ann. Miss. Bot. Gard. 25: 211, 1938; Maheshw. 214.

Small trees, with fleshy branches and milky sap. Leaves spiral, oblong lanceolate, acute at both ends. Flowers white with a yellow centre and externally tinged pink; fragrant.

Flowers: April-May.

Local name: Champa.

Hoshiarpur, *Aitchison* s.n. (DD).

7. TABERNAEMONTANA Linn.

T. divaricata (Linn.) R. Br. in Roem. & Schult. Syst. 4: 427, 1819; Parker 556; Maheshw. 215. *Nerium divaricatum* Linn. Sp. Pl. 209, 1753 (quoad syn. Fl. Zey. excl. syn. Hermann). *Tabernaemontana coronaria* Willd. Enum. Hort. Berol. 275, 1809; FBI 3: 646; Bamber 59; Parker 329.

Dichotomously branched shrubs with milky latex. Leaves glabrous, elliptic lanceolate. Flowers white solitary or in cymes; corolla single or double, fragrant at night.

Grown in gardens.

Local name: Chandni.

Flowers: Most of the year.

Hissar, *V. J. Nair* 19955; Panipat 24652; Talwandi 26556.

8. THEVETIA Linn.

T. peruviana (Pers.) K. Schum. in Engl. et Prant. Pflanzfam. 4(2): 159, 1895; Merrill in Phil. Jour. Sci. 9: 130, 1925; Maheshw. 214; Puri 83. *Cerbera peruviana* Pers. Syn. 1: 267, 1805. *T. nerifolia* Juss. ex Steud. Nom. (ed. 2) 2: 680, 1841; Parker 325; Duthie 492.

Large evergreen shrubs with linear lanceolate leaves. Flowers yellow. Drupes angular, poisonous.

Grown in gardens.

Local name: Pila Kaneer.

Flowers: Most of the year.

Dadri, 20514; Hissar, *V. J. Nair* 19985.

9. TRACHELOSPERMUM Lem.

T. lucidum (D. Don) K. Sch. in Engl. et Prant. Pflanzenfam. 4: 173, 1895. *Alstonia lucida* D. Don, Prodr. 131, 1825. *Trachelospermum fragrans* (Wall. ex DC.) Hook. f. FBI 3: 667; Bamber 580; Parker 333; Duthie 491. *Ichnocarpus fragrans* Wall. ex DC. Prodr. 8: 835, 1844.

Evergreen twining shrubs resembling *Ichnocarpus* but distinguished by the corolla tube which is inflated at the top (in *Ichnocarpus* it is inflated in the middle).

Grown in gardens.

Flowers: April-July.

Amritsar, P. N. Mehra s. n. (DD).

10. VALLARIS Burm.

V. solanacea (Roth) O. Ktze. Rev. Gen. 417, 1891; Maheshw. 212; Puri 83. *Peltanthera solanacea* Roth, Nov. Sp. 132, 1821. *Vallaris heynei* Spreng. Syst. 1: 635, 1825; FBI 3: 650; Bamber 580; Parker 331; Duthie 488.

Perennial twiners. Flowers white, fragrant, in axillary drooping clusters. Anthers protruding, meeting in a cone touching stigma.

Local name: Chameri ki Bael.

Flowers: Oct.-June.

Yamunanagar 24652.

11. WRIGHTIA R. Br.

1. Flowers white; sepals half the length of the corolla; follicles of individual flowers distinct
 1. Flowers scarlet; sepals equalling the corolla; follicles of individual flowers united

2. *W. tinctoria*

1. *W. coccinea*

1. **W. coccinea** Sims in Bot. Mag. t. 2696, 1826; FBI 3: 654; Parker 331.

Small deciduous trees. I have seen only one tree cultivated at Amritsar.

2. **W. tinctoria** R. Br. in Mem. Wern. Soc. 1: 74, 1811; FBI 3: 653; Parker 300; Sabnis 534; Maheshw. 216; Puri 82; Duthie 489.

Small deciduous trees. Flowers fragrant. Corolline corona inserted with the filaments.

Found only on hills.

Local name: Dhuti.

Flowers: July-Sept.

Gurgaon, Holland 54325 (DD); Khanak 16255, 34572.

72. ASCLEPIADACEAE

1. Pollen in waxy masses (pollinia):
 2. Corona lobes with a conspicuous horn arising from the base of inner face 1. *Asclepias*
 2. Corona lobes without the above horn:
 3. Pollen masses pendulous in the anther loculi, suspended by caudicles from horny reddish-brown to black, corpuscular carriers, the latter with dorsal suture;
 4. Twining climbers:
 5. Flowers about 3 cm across, saucer-shaped; corona simple, of 5 erect lanceolate lobes with a wrinkled gibbosity in the basal part 6. *Oxystelma*
 5. Flowers not exceeding 1.5 cm across, generally very small:
 6. Corona double, the outer membranous with denticulate lobes; inner corona fleshy and adnate to staminal column; corolla tube cylindric, lobes spreading 8. *Pergularia*
 6. Corona simple laterally compressed, adnate to the staminal column with a free triangular apex; corolla lobed almost to the base 7. *Pentstemon*
 4. Erect shrubs, often tree-like; corona lobes laterally flattened with a conspicuous curved basal spur 2. *Calotropis*
 3. Pollen masses horizontal ascending or erect in the anther loculi attached by caudicles to horny dark or light coloured sutured carriers:
 7. Corolla lobes imbricate or contorted, never valvate:
 8. Corolla tubular campanulate inflated at the base, densely hairy in the throat; corona lobes with the free part expanded and with a linear appendage arising from its inner face 9. *Telosma*
 8. Corolla with short cylindrical tube, lobes spreading; corona lobes without an appendage on the inner face 4. *Dregea*
 7. Corolla lobes valvate:
 9. Corolla tubular, inflated at the base then elongate 2a. *Ceropegia*
 9. Corolla tube short, scarcely longer than broad or almost none 5. *Leptadenia*
 1. Pollen granular carried on glandular spatulate carriers:
 10. Flowers 6-12 cm across, pink or lilac 3a. *Cryptostegia*
 10. Flowers less than 4 cm across, greenish yellow 8. *Cryptolepis*

1. ASCLEPIAS Linn.

A. curassavica Linn. Sp. Pl. 215, 1753; FBI 4: 18; Parker 352; Puri 84; Duthie 514.

Erect glabrous herbs. Leaves lanceolate acuminate. Corolla red-orange, the lobes reflexed. Corona yellow.

Grown as ornamental, often naturalised.

Flowers: Most part of the year.

Hoshiarpur, *Aitchison* s. n. (DD).

2. CALOTROPIS R. Br.

1. Corolla lobes spreading; coronal process hairy not bifid at the apex, shorter than staminal column 1. *C. gigantea*
1. Corolla lobes erect; coronal process not hairy bifid at the apex equalling or longer than staminal column 2. *C. procera*

1. *C. gigantea* (Linn.) R. Br. in Ait. Hort. Kew (ed. 2) 2: 78, 1811; FBI 4: 17; Bamber 60; Parker 341; Puri 84; Duthie 497. *Asclepias gigantea* Linn. Sp. Pl. 214, 1753.

Punjab, *Anonymous* s. n. (DD).

2. *C. procera* R. Br. in Ait. Hort. Kew (ed. 2) 2: 78, 1811; FBI 4: 18; Bamber 60; Parker 341; Maheshw. 218; Puri 84; Duthie 498.

A large shrub or small tree with glaucous leaves. Flowers in umbelliform extra axillary cymes, purplish white. Follicles bladderlike. Seeds with dense coma.

Abundant in the arid areas. One of the early pioneers on sand dunes.

Local name: Ak, Madar.

Flowers: Almost round the year but profusely from January to April.

Choudhriwas, *V. J. Nair* 21519; Fatehbad, 18845; Hansi, 16147; Hissar, 18754, 18806; Jind, 15875; Kapurthala 35998; Lambi, 26215; Loharu, 20090; Mahendragarh, 20569; Narnaul, 25219; Panipat, 26497; Patiala, *T. A. Rao* 10940; Rewari, 20761; Rohtak, *V. J. Nair* 23229.

2a. CEROPEGIA Linn.

C. bulbosa Roxb. Pl. Cor. t. 7, 1795; FBI 4: 67; Bamber 585; Sabnis 536; Maheshw. 220; Duthie 514.

Twiner, roots tuberous. Flowers greenish white.

Punjab, *Anonymous* s. n. (DD).

3. CRYPTOLEPIS R. Br.

(This genus and *Cryptostegia* are sometimes treated under a family Periplocaceae due to the granular pollen carried on spathulate glandular carriers).

C. buchananii Roem. & Sch. Syst. 4: 409, 1819; FBI 4: 5; Bamber 581; Parker 337; Duthie 495.

A large climbing shrub with milky sap and exorticating bark. Leaves large. Flowers in short axillary cymes. Calyx with 5 scale-like glands within. Corolla segments linear. Follicles divaricate. Seeds black. Coma about 2.5 cm long.

Common along the Siwaliks.

Local name: Karanta.

Flowers: May-June.

Hoshiarpur, *Holland* s. n. (DD).

3a. CRYPTOSTEGIA R. Br.

C. grandiflora R. Br. in Bot. Reg. t. 435, 1819; FBI 4: 6; Bamber 581; Parker 339; Maheshw. 216; Puri 83; Duthie 514. *Nerium grandiflorum* Roxb. Fl. Ind. 2: 100, 1824.

Large climbers with milky sap. Flowers showy, pale pink or light purple. Follicles woody.

Cultivated and naturalized. Flowers: Almost round the year.

Hansi 16163; Hissar, *V. J. Nair* 21535; Panipat, 26502.

4. DREGEA E. Mey.

D. volubilis (Linn. f.) Benth. ex Hook. f. in FBI 4: 46, 1883; Parker 348; Maheshw. 219. *Asclepias volubilis* Linn. f. Suppl. 170, 1781. *Marsdenia volubilis* Cooke, Fl. Pres. Bombay 2: 166, 1904; Duthie 505.

Stout climbers. Flowers greenish yellow.

Not very common. Found in way side jungles.

Flowers: April-June. Fruits: Aug.-Oct.

Jind, 16102, 18695, 26531; between Pipli and Karnal, 26487; Sohana, *T. A. Rao* 11055; Yamunanagar, 27557.

5. LEPTADENIA R. Br.

- | | |
|--|---------------------------|
| 1. Erect shrubs leafless or with very narrow linear leaves; flowers 3.2 mm across; follicles not woody | 1. <i>L. pyrotechnica</i> |
| 1. Climbing shrubs; leaves large, ovate cordate; flowers 6.5 mm across; follicles woody | 2. <i>L. reticulata</i> |

1. **L. pyrotechnica** (Forsk.) Decne. in Ann. Sci. Nat. ser. 2, 9: 269, 1838; Maheshw. 221; Puri 85. *Cynanchum pyrotechnicum* Forsk. Fl. Aeg.-Arab. 53, 1775. *Leptadenia spartium* Wight, Contrib. 48, 1834; FBI 4: 64; Bamber 61; Sabnis 536; Parker 350; Duthie 511.

Flowers in umbellate cymes, yellow. Corolline corona minute. Follicles reflexed, smooth.

Common in sandy tracts. One of the pioneers on sand dunes. The tender follicles are collected and cooked as vegetables by the villagers.

Local name: Khimp.

Flowers: July-Nov. Fruits: April-May.

Choudhriwas, *V. J. Nair* 19232; Hansi, 16173; Hissar, *Raizada* 21003 (DD), 18758, 18809, *V. J. Nair* 19333; Loharu, 20088, 20089; Mahendragarh, 20581; Rathal, 16130; Rewari, *T. A. Rao* 11106; Rohtak, *V. J. Nair* 23177; Sohna, *T. A. Rao* 11060.

2. **L. reticulata** (Retz.) Wight et Arn. in Wight, Contrib. 47, 1834; FBI 4: 63; Bamber 585; Parker 351; Maheshw. 221; Puri 85; Duthie 511. *Cynanchum reticulatum* Retz. Obs. Bot. 2: 15, 1781.

Twining shrubs. Leaves coriaceous. Cymes solitary or in pairs. Flowers greenish yellow.

Common in jungles.

Flowers: June-Sept.

Jind, 15878, 16105, 18699, 24736, 25857; Nabha, 36737; Rohtak, 16383; Sonpet, *V. J. Nair* 23360; Yamunanagar, 27557.

6. OXYSTELMA R. Br.

O. secamone (Linn.) K. Schum. in Engl. & Prantl, Pflanzenfam. 4(2): 229, 1895; Maheshw. 218. *Periploca secamone* Linn. Mant. 216, 1771. *Oxystelma esculentum* (Linn.) R. Br. in Mem. Vern. Soc. 1: 40, 1811; FBI 4: 17; Bamber 582; Puri 84; Duthie 500. *Periploca esculenta* Linn. f. Suppl. 168, 1781. *Sarcostemma secamone* (Linn.) Bennet in Indian Forest. 95: 10, 1969.

Twining perennials. Leaves linear lanceolate. Flowers white with rosy or purplish veins. Follicles up to 7 cm long.

Local name: Dhootlata, Makhanvel.

Flowers: July-Aug. *Fruits*: Dec.-Jan.

Hissar, 24865; Ottobridge (Sirsa), 17189, 27717; Panipat, J. N. Vohra 9903.

7. PENTATROPIS R. Br.

P. spiralis (Forsk.) Decne. in Ann. Sc. Nat. ser. 2, 9: 327, 1838; FBI 4: 19; Bamber 582; Sabnis 536; Parker 341; Maheshw. 219; Puri 84. *Asclepias spiralis* Forsk. Fl. Aeg.-Arab. 49, 1775. *Pentatropis cynanchoides* R. Br. in Salt. Voy. Abyss. Append. 64, 1820; Duthie 501.

Slender twining shrubs with tuberous roots. Leaves linear oblong or ovate elliptic. Cymes 3-6-flowered. Flowers greenish, 5-cornered at the base.

Flowers: July-Sept.

Between Jind and Hansi, 24816; Bhawanikheda, 16350; Hansi, 24816; Hissar, Duthie 4204 (DD); Raizada 20966; V. J. Nair 19948; Kera, V. J. Nair 21555; Nilokheri, 15865; Ottobridge (Sirsa), V. J. Nair 21603; Panipat, 24724; Rathal, 16130; Rohtak, 16372; Sangrur, 26703.

8. PERGULARIA Linn.

P. daemia (Forsk.) Chiov. Res. Sci. Miss. Stefan.-Paoli Somal. Ital. 1: 115, 1916; Maheshw. 218; Puri 85. *Asclepias daemia* Forsk. Fl. Aeg.-Arab. 51, 1775. *Daemia extensa* R. Br. in Mem. Wern. Soc. 1: 50, 1811; FBI 4: 20; Bamber 582; Sabnis 536; Parker 341; Duthie 501. *Pergularia extensa* (R. Br.) N. E. Br. in Dyer Fl. Cap. 4(5): 758, 1908; Parker 556.

A high climbing semiwoody shrub. Flowers sweet-scented, greenish-white, tinted pink. Follicles divaricate, echinate with soft spine-like emergences.

Local name: Aksan.

Flowers: Dec.-April.

Faridkot, 36541; Hissar, 18744, 26559; *Duthie* 4194 (DD), 5233 (DD); *M. A. Rau* 3480, 3497; *V. J. Nair* 19922, 19942; Hoshiarpur, *Aitchison* 439 (DD); Jind, 15889; Mahendragarh, 20602; Ottobridge, 18946.

9. TELOSMA Coville

T. pallida (Roxb.) Craib in Kew Bull. 418, 1911; Parker 556; Maheshw. 219. *Asclepias pallida* Roxb. Fl. Ind. 2: 48, 1832. *Pergularia pallida* Wight et Arn. in Wight, Contrib. 42, 1834; FBI 4: 38; Bamber 584; Sabnis 535; Parker 348; Duthie 508.

Twining shrubs with pubescent branches and ovate acuminate leaves. Flowers greenish yellow, faintly fragrant in umbellate cymes. Follicles straight, smooth.

Rare.

Flowers: July-Sept. *Fruits*: Jan.-March.

Hissar, 16200, 18787.

73. LOGANIACEAE

- 1. Flowers in elongated spikes; leaves ovate to lanceolate; fruit a capsule
- 1. Flowers in umbels; leaves suborbicular, coarsely sinuate; fruit a berry

1. *Buddleja*

2. *Nicodemia*

1. BUDDLEJA Linn.

- 1. Flowers white leaves lanceolate
- 1. Flowers not white; leaves not lanceolate:
 - 2. Flowers violet; leaves ovate
 - 2. Flowers orange; leaves ovate-oblong

1. *B. asiatica*

2. *B. lindleyana*

3. *B. madagascarensis*

1. **B. asiatica** Lour. Fl. Cochinch. 72, 1790; Parker 353; Maheshw. 222; Puri 86; Duthie 516.

A large evergreen shrub. Young branches and leaves beneath covered with white tomentum. Flowers mildly fragrant, in drooping panicles.

Grown in gardens or as a hedge plant.

Flowers and fruits: Jan.-June.

Patiala, *Ganga Singh* s. n. (DD).

2. **B. lindleyana** Fort. in Lindl. Bot. Recg. Misc. 25, 1844; Parker, 353; Maheshw. 222.

Leaves pale beneath, dark green above. Spikes erect. Corolla granular pubescent outside.

Grown in gardens.

Flowers: March-Sept.

Amritsar, 36318.

3. *B. madagascarensis* Lamk. Encycl. 1: 513, 1785; Parker 353; Maheshw. 222.

Flowers in terminal panicles.

Grown in gardens.

Flowers: Jan.-March.

Hoshiarpur, Aitchison 547 (DD).

2. NICODEMIA Tenore

N. diversifolia Tenore. Cat. Ort. Napol. 88, 1845; Parker 354; Maheshw. 222.

This plant is mentioned on the authority of Parker. I have seen no specimen from the area.

74. GENTIANACEAE

- | | |
|---|----------------------|
| 1. Aquatic herbs; corolla induplicate-valvate in bud | 7. <i>Nymphoides</i> |
| 1. Terrestrial plants; corolla twisted or imbricate; | |
| 2. Ovaries two celled | 4. <i>Exacum</i> |
| 2. Ovaries one celled: | |
| 3. Corolla irregular, bulged on one side or bilipped: | |
| 4. Stigmas 2; corolla nearly bilipped | 1. <i>Canscora</i> |
| 4. Stigma 1; corolla bulged on one side | 6. <i>Hoppea</i> |
| 3. Corolla regular: | |
| 5. Flowers in terminal dichotomous cymes: | |
| 6. Styles linear | 2. <i>Centaurium</i> |
| 6. Styles short or absent | 5. <i>Gentiana</i> |
| 5. Flowers in dense axillary or terminal clusters | 3. <i>Encostemma</i> |

1. CANSCORA Lamk.

- | | |
|--|------------------------|
| 1. Calyx 1 cm long; corolla half as much long again as calyx; flowers few, pedicels winged | 1. <i>C. decussata</i> |
| 1. Calyx 0.5 cm long; corolla as long or little exceeding the calyx; flowers very many; pedicels liliform not winged | 2. <i>C. diffusa</i> |

1. *C. decussata* (Roxb.) Roem. & Schult. Syst. Mant. 3: 229, 1827; FBI 4: 104; Bamber 158; Duthie 523. *Pladera decussata* Roxb. Fl. Ind. 1: 418, 1820.

Erect much branched herbs with small white flowers.

E. Punjab, *Anonymous* s. n. (DD).

2. *C. diffusa* (Vahl) R. Br. Prodr. 451, in Obs. 1810; Roem. & Schult. Syst. 3: 301, 1820; FBI 103; Bamber 158; Puri 87; Duthie 522. *Gentiana diffusa* Vahl, Symb. 3: 47, 1794.

Erect herb. Flowers white or lilac.

E. Punjab, *Anonymous* s. n. (DD).

2. CENTAURIUM Hill.

- | | |
|----------------------------|---------------------------|
| 1. Flowers sessile | 1. <i>C. pulchellum</i> |
| 1. Flowers long-pedicelled | 2. <i>C. centauroides</i> |

1. **C. pulchellum** (Sw.) Krause in Sturm. Fl. Deutsch. (ed. 2) 10: 14, 1903; P. Taylor in Hutchins. et Dalz. Fl. W. Tr. Afr. 2: 300, 1963. *Gentiana pulchella* Sw. in Vet. Acad. Handl. Stockh. 84, t. 3, figs. 8 & 9, 1783. *G. ramosissima* Vill. Fl. Delph. 23, 1787; Maheshw. 223. *Erythraea ramosissima* (Vill.) Pers. Syn. 1: 283, 1805; FBI 4: 101; Bamber 157; Duthie 520.

Erect branched annuals; leaves narrowly lanceolate-oblong; flowers in terminal cymes; corolla tube 8 mm long, pink; anthers twisted.

Herb of moist situations.

Flowers: March-June.

Amritsar, J. N. Vohra 11266; Bhatinda 27831; Sirsa 27704; Yamunanagar, 27502, 27677.

2. **C. centauroides** (Roxb.) N. C. Nair, comb. nov. *Chironia centauroides* Roxb. Fl. Ind. 1: 584, 1820. *Erythraea roxburghii* G. Don, Syst. 4: 206, 1837; FBI 4: 102; Bamber 157. *Centaurium roxburghii* (Don) Druce in Rep. Bot. Exch. Club Brit. Isl. 4: 614, 1916; Duthie 520.

Rare herb. Cymes repeatedly dichotomous. Pedicels in the forks. Flowers pink or pinkish white.

Flowers: March.

Gurgaon, 20809.

3. ENICOSTEMMA Bl.

E. hyssopifolium (Willd.) Verdoon in Bothalia 7: 462, 1961. *Exacum hyssopifolium* Willd. Sp. Pl. 1: 640, 1798. *Enicostemma littorale* Bl. Bijdr. 848, 1826; FBI 4: 101, Bamber 157; Duthie 519. *E. verticillatum* (Linn.) Engl. Pflanzenr. Ost. Afr. C. 313, 1895; Maheshw. 223; Puri 86.

Erect herbs with angled stems. Leaves decussate, ovate lanceolate to linear. Flowers white in axillary clusters all along the stem, sessile. Calyx margin sub-membranous.

Rare.

Flowers and fruits: June-Sept.

Ludhiana, without collector's name (DD); Hoshiarpur, Thomson s.n. (DD).

4. EXACUM Linn.

Wings of calyx lobes distinct; leaves 3-nerved
Calyx lobes keeled; leaves 5-nerved

1. *E. pedunculatum*
2. *E. tetragonum*

1. **E. pedunculatum** Linn. Sp. Pl. 112, 1753; FBI 4: 97; Bamber 156; Duthie 519.

This species and the next are given on the authority of Bamber.

2. *E. tetragonum* Roxb. Fl. Ind. 1: 398, 1820; FBI 4: 95; Bamber 156; Duthie 518.

5. GENTIANA Linn.

G. aprica Decne. in Jacq. Voy. Bot. 112, t. 118, 1844. *G. demicifida* var. *aprica* (Decne.) Clarke in FBI 4: 112. *G. demicifida* sensu Bamber 159; Duthie 521.

Small herbs. Leaves silvery shining. Flowers blue. On grassy slopes. Hoshiarpur, *Aitchison* 531 (DD).

6. HOPPEA Willd.

H. dichotoma Willd. in Ges. Nat. Fr. Berl. Neue Schrift. 3: 435, 1810; FBI 4: 100; Bamber 157; Puri 87; Duthie 522.

Very small annual herbs with 4-angled stems. Flowers white in 2-3-flowered clusters. Seeds black.

Flowers: Nov.

Hoshiarpur, *Aitchinson* s.n. (DD); On Choe bed, *T. A. Rao* 10795.

7. NYMPHOIDES Hill.

1. Corolla lobes entire; seeds rough
1. Corolla lobes fimbriate; seeds smooth

1. *N. cristatum*
2. *N. indicum*

1. *N. cristatum* (Roxb.) O. Kuntze, Rev. Gen. Pl. 429, 1891; Santapau in Bull. Bot. Surv. Ind. 3: 20, 1961; Maheshw. 224. *Menyanthes cristata* Roxb. Pl. Cor. 2: 3, t. 105, 1798. *Limnanthemum cristatum* (Roxb.) Griseb. Gen. & Spec. Gent. 342, 1839; FBI 4: 131; Bamber 635; Puri 87; Duthie 525.

Floating herbs rooting at joints. Leaves orbicular deeply notched at the base. Flowers white, yellow at the base.

Local name: Ghainchi.

Flowers: March-Sept.

Ferozapore 36389; Subhanpur, *J. N. Vohra* 11340.

2. *N. indicum* (Linn.) O. Kuntze, ibid. 429, 1891; Santapau in Bull. Bot. Surv. Ind. 3: 20, 1961. *Menyanthes indica* Linn. Sp. Pl. 145, 1753. *Limnanthemum indicum* Griseb. emend Thw. Enum. 205, 1850; FBI 4: 131; Bamber 635; Duthie 525.

Like the last species but flowers and capsules larger.

East Punjab, *Anonymous* (DD).

75. BORAGINACEAE

1. Styles terminal, ovary not vertically lobed:
2. Styles two, separate; annual procumbent herbs densely setose all over; flowers axillary solitary, tetramerous; fruits laterally 4-lobed 1. *Coldenia*
2. Style single; flowers in scorpioid cymes, pentamerous; fruits entire or slightly ribbed 4. *Heliotropium*
1. Styles inserted between the lobes of the ovary; ovary vertically lobed:
3. Anthers connivant in a cone 7. *Trichodesma*
3. Anthers not connivant in a cone:
4. Flowers in bracteate racemes or cymes:
5. Calyx conspicuous, accrescent in fruit 5. *Nonnea*
5. Calyx rather small, not or slightly accrescent:
6. Nutlets depressed globose, covered with glochidiate bristles 2. *Cynoglossum*
6. Nutlets ovoid without glochidiate bristles:
7. Roots red; flowers yellow; densely hispid herbs 8. *Arnebia*
7. Roots not red; flowers not yellow, hispid or strigose herbs:
8. Strigose branched shrubs; upper flowers in bracteate racemes 6. *Sericostoma*
8. Hispid herbs; upper flowers in dense axillary racemes 3. *Gastrocotyle*
4. Flowers axillary solitary:
9. Strigose branched shrubs 6. *Sericostoma*
9. Hispid herbs, diffuse 3. *Gastrocotyle*

1. COLDENIA Linn.

C. procumbens Linn. Sp. Pl. 125, 1753; FBI 4: 144; Maheshw. 225; Puri 88; Duthie 532.

Annual procumbent densely setose herbs. Leaves dentately lobulate. Flowers white solitary. Fruits glandular pubescent.

In wet places on muddy banks of canals and ponds.

I have seen only one specimen from the area in DD and it bears no collector's name.

2. CYNOGLOSSUM Linn.

1. Nutlets not at all or obscurely margined 1. *C. lanceolatum*
subsp. *lanceolatum*
1. Nutlets prominently margined:
2. Calyx lobes oblong in fruit, narrow 3. *C. wallichii*
2. Calyx lobes ovate 2. *C. zeylanicum*

1. *C. lanceolatum* Forsk. Fl. Aeg.-Arab. 41, 1775 subsp. *lanceolatum*. *C. lanceolatum* Forsk. subsp. *eulanceolatum* Brand in Engl. Pflanzenr. 72: 139, 1921. *C. lanceolatum* sensu FBI 4: 156; Bamber 343; Maheshw. 227; Duthie 540.

Erect herbs. Leaves broadly lanceolate, scabrid above, sparingly so beneath. Cymes long and slender when in fruit. Flowers blue. Nutlets cohering at the apex with the style, and not separated from it at maturity.

Flowers: April-May.

Yamunanagar, 27592.

2. *C. zeylanicum* (Hornem.) Thunb. ex Lehm. Neue Schriftn Naturf. Ges. Halle 3: 20, 1817; Kazmi in Journ. Arn. Arb. 52: 344, 1971. *Anchusa zeylanica* Vahl ex Hornem. Enum. Hafn. 3, 1807. *C. meeboldii* Brand in Fedde Rept. 14: 323, 1916 & Engl. Pflanzenr. 72: 134, 1921. *C. denticulatum* var. *zeylanica* Clarke in FBI 4: 157; Duthie 540.

I am not very much convinced about the distinctness of this species and the next one. The characters of these intergrade.

Jind, 24761.

3. *C. wallichii* G. Don, Syst. 4: 354, 1838; FBI 4: 157; Bamber 343. *C. glochidiatum* Wall. ex Lindl. in Bot. Reg. 27: t. 15, 1842; FBI 4: 156, *C. denticulatum* DC. Prodr. 10: 150, 1846; FBI 4: 156; Bamber 343.

Annual herbs. Flowers blue. Rare.

Flowers: July-Sept.

Kurukshetra, J. N. Vohra 8900; Nilokheri 15857.

3. GASTROCOTYLE Bunge

G. hispida (Forsk.) Bunge in Mem. Sav. Etr. Petersb. 7: 405, 1854; FBI 4: 168; Bamber 309. *Anchusa hispida* Forsk. Fl. Aeg.-Arab. 40, 1775.

Prostrate hispid herbs. Flowers blue, pinkish white or bluish white, axillary solitary, short pedicelled.

In sandy areas. Typical psammophyte.

Flowers and fruits: Feb.-June.

Bhatinda 26292, 27787; Dabwali, 27729; Fatehbad, 25941, 26574; Lambi, 26183, 26235; Muktesar, 36529.

4. HELIOTROPIUM Linn.

- | | |
|---|---------------------------|
| 1. Plants glabrous | 2. <i>H. curassavicum</i> |
| 1. Plants not glabrous: | |
| 2. Leaves ovate more or less angular pointed at the apex, cuncate at the base; petioles winged; fruits ovoid glabrous | 4. <i>H. indicum</i> |
| 2. Leaves obovate, elliptic, lanceolate or linear (never ovate): | |
| 3. Corolla lobes with long linear filiform points; stems long, slender, pilose or setose; fruits slightly rugose | 6. <i>H. subulatum</i> |
| 3. Corolla lobes without filiform points: | |
| 4. Leaves broadly obovate or elliptic: | 3. <i>H. ellipticum</i> |
| 5. Fruits not enclosed by calyx | 7. <i>H. supinum</i> |
| 5. Fruits enclosed by calyx | |
| 4. Leaves linear lanceolate or linear: | |
| 6. Leaves with strongly undulate margins, scabrid on both surfaces; fruits glabrous | 1. <i>H. bacciferum</i> |
| 6. Leaves not undulate, pilose or setose; fruits not glabrous, hispid or scabrid; flowers pedicelled or sessile: | |
| 7. Lower flowers pedicelled: | |
| 8. Erect herbs upto 75 cm high with many rigid ascending and rigid branches | 8. <i>H. zeylanicum</i> |
| 8. Procumbent herbs | 5. <i>H. strigosum</i> |
| 7. Lower flowers sessile | 9. <i>H. ramosissimum</i> |

1. **H. bacciferum** Forsk. Fl. Aeg.-Arab. 38, 1775; Burt in Kew Bull. 1949: 138, 1950. *H. undulatum* Vahl Symb. Bot. 1: 13, 1790; FBI 4: 150 (pro parte); Bamber 342; Sabnis 538.

Perennial herbs with white bulbous-based hairs. Flowers white. Nutlets 4, equal, free.

Local name : Pipatbhuti.

Flowers : Almost round the year.

Badopal, 24960; Bhiwani, 20065; Choudhriwas, *V. J. Nair* 19244, 19400; Fatehbad, 16235; *M. A. Rau* 3572; Mojukheda, 26111; Talwandi, 18762; Tohana, 24994.

2. **H. curassavicum** Linn. Sp. Pl. 130, 1753; Gamble, Fl. Pres. Madr. (rep. ed.) 2: 630, 1957; Nair & Nair in Bull. bot. Surv. India 6: 69, t. 1, fig. 1-6, 1964.

Perennial diffuse herbs with woody base. Leaves glaucous, fleshy, alternate or subopposite. Flowers in terminal or leaf-opposed forked cymes, white. Fruits of 4 nutlets, which are smooth on the back and corky at the margins.

This is a species of W. Indies and has now spread in several parts of India (chiefly along the coasts). Rare in the area.

Flowers : Aug.-Nov.

Senipura forest (Gohana), *V. J. Nair* 23130; Sonpet, *V. J. Nair* 23290.

3. **H. ellipticum** Ladeb in Edb. in Eichwald Pl. Casp. 6: 10, 1831; Popov, Fl. S.S.S.R. 19: 147, 1953. *H. eichwaldii* Steud. Nomencl. (ed. 2) 1: 744, 1840; FBI 4: 149; Bamber 298; Sabnis 538; Maheshw. 226.

Erect greyish white hairy herbs, very variable in habit. Flowers white, 2-ranked on ebracteate spikes. Common everywhere.

Flowers : Usually from Nov. to April.

Badopal 16224; Bawal, *T. A. Rao* 11115; Bhatinda, 26272, 26281, 36572; Jhabua, 20709, 20741; Khansala, *V. J. Nair* 23231; Lambi, 26194; Mahendragarh, 20632; Rohtak, 20041; Yamunanagar, 27566.

4. **H. indicum** Linn. Sp. Pl. 130, 1753; FBI 4: 152; Bamber 342; Puri 89.

Hairy annuals. Flowers bluish white in dense curled spikes.

Local name : Hatabuti.

Flowers : Sept. onwards.

East Panjab, *Verma* s.n. (DD).

5. **H. strigosum** Willd. Sp. Pl. 1: 743, 1797; FBI 4: 151; Bamber 569; Sabnis 538; Maheshw. 226; Puri 90. *H. brevifolium* Wall. ex Roxb. Fl. Ind. 2: 2, 1832. *H. strigosum* Willd. var. *brevifolium* (Wall. ex Roxb.) Clarke in FBI 4: 151; Sabnis 538.

A small branched perennial herb. Flowers bracteate, white, small. Calyx lobed, enlarged in fruit. Corolla rotate. Nutlets hairy.

Common in sandy places.

Local name : Jhunkdi.

Flowers : Sept.-May.

Barwala, 26336; Bhatinda, 27777; Bhiwanikheda 16349; Hissar, *Duthie* 4219a (DD), *Raizada* 21026 (DD), *Harsukh* 20687 (DD); Mahendragarh, 20589, 20625; Sirsa, 18908; Sonpet, *V. J. Nair* 23285; Yamunanagar, 27595.

6. *H. subulatum* (Hochst. ex A. DC.) Vatke in *Linnaea* 43: 316, 1882; *Duthie* in *Fl. Upp. Gang. Pl.* 2: 91, 1917; *Maheshw.* 226; *Puri* 89. *Tournefortia subulata* Hochst. ex A. DC. in *DC. Prodr.* 9: 528, 1845. *Heliotropium zeylanicum* sensu *FBI* 4: 148 (non Lamk.); *Bamber* 298.

Hispid herbs. Flowers white in unilateral spikes. Nutlets hirsute. Frequent along canal banks.

Flowers : Oct.-April.

Badopal, *V. J. Nair* 19831; Fatehbad, 18868; Narnaul, 20651, 25228; Sirsa 18925; Sohna, *T. A. Rao* 11145.

7. *H. supinum* Linn. *Sp. Pl.* 130, 1753; *FBI* 4: 149; *Bamber* 569; *Maheshw.* 225; *Puri* 89; *Duthie* 535.

Prostrate herbs. All parts covered with soft hairs. Flowers white or bluish white on simple or forked spikes. Nutlets tuberculate on the back.

In dry clayey soil.

Flowers : Cold season.

Fatehbad, 18850; Mahendragarh, 20572; Rohtak, 20046.

8. *H. zeylanicum* Lamk. *Encycl. Method.* 3: 94, 1789; *Duthie Fl. Upp. Gang. Pl.* 2: 93, 1917 (non Clarke); *Gamble Fl. Madr. Pres. (rep. ed.)* 2: 630, 1957. *H. paniculatum* R. Br. *Prodr.* 494, 1810 (non Roxb.) *FBI* 4: 161; *Sabnis* 538; *Puri* 90; *Duthie* 535.

All parts covered with adpressed hairs. Leaves sessile, margins recurved. Flowers shortly pedicelled. Bracts hairy. Corolla hairy at the throat.

Rare. I have seen only one specimen from the area.

Hissar, *Harsukh* 20690 (DD).

9. *H. ramosissimum* Sieb. ex DC. *Prodr.* 9: 536, 1845. *H. undulatum* sensu Clarke in *FBI* 4: 150 (pro parte).

Suberect herbs. Flowers white.

Common in sandy places.

Flowers : July-May.

Abohar, 36519; Bhatinda, 26262; Bhiwani, 20065; Fatehbad, 16235, 18860; Fazilka, 36503; Hissar, *Agea Ram* s.n. (DD); Mahendragarh 20564; Sirsa, 18921, 18926.

5. NONNEA Medic.

N. pulla (Linn.) DC. Fl. Fr. (ed. 3) 626, 1805; FBI 4: 169; Bamber 303; Sabnis 539; Puri 91. *Lycopsis pulla* Linn. Syst. (ed. 10) 916, 1767.

Erect hispidly hairy herbs. Upper leaves amplexicaul, margins hispid. Flowers shortly pedicelled, bluish. Nuts obliquely curved inwards wrinkled.

In sandy places near canals.

Flowers: July-March.

Amritsar, *J. N. Vohra* 11280; Jhabua, 20739; Laroha (Jullunder), *T. S. Bakshi* 11 (DD); Narnaul, 20669, 20673; Talwandi, 16215a.

6. SERICOSTOMA Stocks

S. pauciflorum Stocks in Wight, Ic. t. 1377, 1848; FBI 4: 175; Parker 359; Puri 91.

Small under-shrubs. Flowers white in bracteate racemes.

In sandy places.

Flowers: August-March.

Dhauj, *T. A. Rao* 11080; Hissar, *Silva G.* (DD); Jhabua (Rewari), *N. C. Nair* 20728; Rohtak, *V. J. Nair* 23175; Toru (Rewari), *T. A. Rao* 11098.

7. TRICHODESMA R. Br.

T. amplexicaule Roth, Nov. Pl. Sp. 104, 1821; FBI 4: 154 (pro parte); Maheshw. 226; Puri 90. *T. indicum* var. *amplexicaule* Cooke Fl. Pres. Bomb. 2: 215, 1904. *T. indicum* auct. Pl. (non R. Br.); Duthie 538.

A small annual with rough hairs on tubercles. Flowers blue turning pink.

A weed of cultivated places during the rainy season; also in waste places.

Local name: Nila Krai.

Flowers: July-April.

Bakra Nangal, *T. A. Rao* 10811; Mahendragarh, 20610; Sangrur, 36705; Talwandi, 16215.

8. ARNEBIA Forsk.

A. hispidissima (Sieb. ex Lehm.) DC. Prodr. 10: 94, 1846; FBI 4: 176; Bamber 306; Sabnis 539; Maheshw. 227; Puri 91; Duthie 541.

Lithospermum hispidissimum Sieb. ex Lehm. Icon. Nov. St. t. 39, 1821.

Very hispid herbs. Hairs white from prominent bases. Flowers yellow, fading to white, almost sessile on one-sided racemes.

Common herb in sandy areas. One of the pioneers on dunes.

Local name : Rathanjoth. The real Rathanjoth is a different plant.

Flowers and fruits : Most part of the year.

Badopal, 16234; Beas, *J. N. Vohra* 11319; Bhiwani, 20057; Hissar, *M. A. Rau* 3519, 18807; *Harsukh* 20686 (DD).

76. EHRETIACEAE

- | | |
|--|-------------------|
| 1. Calyx persistent enlarged in fruit; ovary 4-celled; style twice divided | 1. <i>Cordia</i> |
| 1. Calyx not enlarged in fruit; ovary 2-celled; style once divided | 2. <i>Ehretia</i> |

1. CORDIA Linn.

- | | |
|---|------------------------|
| 1. Leaves orbicular ovate or ovate elliptic, more than 4 cm broad, 3-5-nerved | 1. <i>C. dichotoma</i> |
| 1. Leaves oblanceolate-oblong less than 2 cm broad, 1-nerved | 2. <i>C. rothii</i> |

1. *C. dichotoma* Forst. f. Prodr. 18, 1786. *C. obliqua* Willd. Phytogr. 4, t. 4, 1794; FBI 4: 137 (excl. var.); Bamber 34; Sabnis 538; Parker 355; Maheshw. 227; Puri 88. *C. myxa* sensu Clarke in FBI 4: 136 (non Linn.); Bamber 34; Duthie 528.

Medium sized deciduous trees. Leaves orbicular ovate elliptic, ovate or obovate, obtuse or slightly acuminate. Flowers white. Fruits edible. Often planted along road sides.

Local name : Lasura.

Flowers : April. *Fruits* : May-June.

Bhatinda, 27794; Hissar, *V. J. Nair* 19964, 21504; Yamunanagar, 26404, 27522.

2. *C. rothii* Roem. & Schult. Syst. Veg. 4: 798, 1819; Berhaut in Mem. Soc. Bot. Fr. 1953/1954: 4, 1954; Heine in Hutchins. & Dalz. Fl. West Tr. Afr. (ed. 2) 2: 319, 1963; Duthie 530; Maheshw. 228; Puri 88. *Cornus gharaf* Forsk. Fl. Aeg.-Arab. 94, 1775 (nomen). *Cordia gharaf* (Forsk.) Ehrenb. & Asch. in Sitz. Ges. Naturf. Fr. Berlin 1879; Johnston in Jour. Arn. Arb. 37: 252, 1956.

A small tree. Flowers white in lax axillary cymes. Drupes 1-seeded, mucilaginous, edible.

Local name : Gunthia, Gondi.

Flowers : April. *Fruits* : Dec.

Firozpur Jhirka, *T. A. Rao* 11155; Hissar, *V. J. Nair* 19954.

2. EHRETIA Linn.

- | | |
|--|------------------------|
| 1. Leaves serrate, hairy in the axils of nerves beneath | 1. <i>E. acuminata</i> |
| 1. Leaves entire: | |
| 2. Shrubs; leaves hairy beneath at maturity, less than 8 cm long | 2. <i>E. aspera</i> |
| 2. Trees; leaves glabrous beneath at maturity, more than 8 cm long | 3. <i>E. laevis</i> |

1. ***E. acuminata*** R. Br. Prodr. 497, 1810; FBI 4: 141; Bamber 34; Parker 358; Maheshw. 228; Duthie 531.

Deciduous trees. Flowers white, fragrant, in terminal panicles. Drupes black when ripe.

Local name : Puna.

Flowers : March-April.

Hoshiarpur, *Aitchison* 598 (DD).

2. ***E. aspera*** Roxb. Pl. Cor. 1: 41, t. 55, 1795; FBI 4: 141; Parker 358; Puri 88; Duthie 532.

Deciduous shrubs. Flowers bluish white.

Planted.

Flowers : April-May.

Malerkotla, 36710.

3. ***E. laevis*** Roxb. Pl. Cor. 1: 41, t. 56, 1795; FBI 4: 141; Bamber 34; Sabnis 537; Parker 360; Maheshw. 229; Duthie 531.

Small trees with leaves leathery. Flowers white in cymes. Often planted along road sides.

Local name : Charmror, Sakar.

Flowers : March-April.

Hissar, *V. J. Nair* 19912; Hoshiarpur, *Aitchison* 172 (DD), 468 (DD); Jhabua, *T. A. Rao* 11125; Ludhiana, 35996; Rewari, *T. A. Rao* 11112; Sohna, *T. A. Rao* 11049.

77. CONVULVACEAE

- | | |
|---|-----------------------|
| 1. Leafless parasitic herbs | 3. <i>Cuscuta</i> |
| 1. Non parasitic plants: | |
| 2. Pollen grains spinulose: | |
| 3. Corolla salver-shaped; stigmas linear oblong; fruits not dehiscent | 8. <i>Rivea</i> |
| 3. Corolla campanulate, stigmas globose, fruits capsule | 5. <i>Ipomoea</i> |
| 2. Pollen grains not spinulose: | |
| 4. Styles 2, free: | |
| 5. Corolla lobes imbricate; flowers solitary, stamens exerted | 2. <i>Cressa</i> |
| 5. Corolla lobes induplicate-contorted; flowers cymose, stamens not exerted | 4. <i>Evolvulus</i> |
| 4. Style 1, with two minute branches or entire: | |
| 6. Sepals remaining attached after dehiscence of the fruit: | |
| 7. Stigmas linear or filiform | 1. <i>Convolvulus</i> |
| 7. Stigmas globular | 6. <i>Merremia</i> |
| 6. Sepals falling off with the fruit | 7. <i>Porana</i> |

1. CONVULVULUS Linn.

- | | |
|---|---------------------------|
| 1. Leaves hastate, not villous; flowers pedicellate, solitary; corolla with midpetaline bands | 1. <i>C. arvensis</i> |
| 1. Leaves not hastate, villous; flowers subsessile, 2-4 together or in heads; corolla without midpetaline band: | |
| 2. Flowers 2-4 together | 3. <i>C. microphyllus</i> |
| 2. Flowers in heads | 2. <i>C. glomeratus</i> |

1. *C. arvensis* Linn. Sp. Pl. 153, 1753; FBI 4: 219; Bamber 611; Sabnis 541; Maheshw. 239; Puri 94; Duthie 548.

Twining or trailing herbs. Corolla infundibuliform, pink or purplish white.

Common in waste places and cultivated fields.

Flowers and fruits: Dec.-April.

Asandh, 18686; Badopal, *V. J. Nair* 19843; Barwala, *V. J. Nair* 19269; Bhatinda, 26283; Bherian, *V. J. Nair* 19255; Jhabua, 20738; Karnal, *J. N. Vohra* 9931, 9933; Kera (Sirsa), *V. J. Nair* 21570; Ludhiana, 35989; Mahendragarh, 20644; Narnaul, 20668; Rewari, 20738; Rohtak, 26347; Sonpet, *V. J. Nair* 23279.

2. *C. glomeratus* Choisy in DC. Prodr. 9: 401, 1845; FBI 4: 219; Bamber 307; Puri 94.

Perennial diffuse herbs. Head peduncled. Bracts leaf-like.

Flowers: August.

Mahendragarh, 16294, 16297.

3. *C. microphyllus* Sieb. ex Spreng. Syst. 1: 611, 1825; FBI 4: 218; Bamber 307; Sabnis 541; Bole & Shah JBNHS. 58: 838, 1961; Puri 93. *C. pluricaulis* Choisy in Mem. Soc. Phys. Hist. Nat. Geneve 6: 95, 1833; FBI 4: 218; Bamber 307; Sabnis 541; Maheshw. 239; Duthie 547.

Procumbent herbs with silky villous branches. Corolla purplish white.

Common in all places.

Local name: Dodak.

Flowers and fruits: Nov.-April.

Bahuna, 25982; Beas, *J. N. Vohra* 11328; Bhatinda, 26288; Dadri 20519; Fatehbad, 18859; Hissar, *Raizada* 21018 (DD); Jind 26522; Lambi 26199; Mahendragarh 20597; Muktesar, 26534; Rohtak, 26346; Sirsa, 18918.

2. CRESSA Linn.

C. cretica Linn. Sp. Pl. 223, 1753; FBI 4: 225; Bamber 121; Parker 360; Maheshw. 230; Puri 92; Duthie 546.

Herbs. Leaves numerous subsessile, densely hairy. Flowers very small, white or pink. Capsule usually 1-seeded.

E. Panjab, *Parker* s.n. (DD).

3. CUSCUTA Linn.

- | | |
|---|-----------------------|
| 1. Styles minute or absent; corolla lobes reflexed; scales prominent | 3. <i>C. reflexa</i> |
| 1. Styles present, corolla lobes not reflexed; scales very small or absent: | |
| 2. Stigmas capitate, scales absent | 2. <i>C. hyalina</i> |
| 2. Stigmas and styles equally long, scales small | 1. <i>C. capitata</i> |

1. *C. capitata* Roxb. Fl. Ind. 1: 448, 1932; FBI 4: 227; Nair & Nair in Bull. Bot. Surv. India 8: 351, 1966.

Stems slender, light pink. Flowers white in globose heads.

Parasitic on *Trifolium* sp.

Flowers: May.

Ottobridge (Sirsa), 27711.

2. *C. hyalina* Roth, Nov. Pl. Sp. 100, 1821; FBI 4: 226; Nair & Nair in Bull. bot. Surv. India 6: 299, 1964; Maheshw. 240; Puri 92.

Stems filiform, closely twining and forming tangled mass. Flowers yellow on shortly peduncled cymes.

Flowers: Feb.-March.

Parasitic on *Tribulus terrestris* and *Trianthema triquetra*.

Hissar, 24875.

3. *C. reflexa* Roxb. Pl. Cor. 2: 3, t. 104, 1798; FBI 4: 225; Bamber 646; Sabnis 541; Parkar 362; Maheshw. 240; Puri 92; Duthie 543.

Stems flat yellow. Calyx yellow, purple-dotted. Corolla white.

Parasitic on a variety of plants such as species of *Zizyphus*, *Acacia*, *Grewia*, *Adhatoda*, *Ficus*, etc.

Bitmada, 25018; Damla (Ambala Dist.), 26420; Kalka, T. A. Rao 10886; Narnaul, 20647; Rohtak, 24732; Sirsa, 26120; Sohna, T. A. Rao 11069.

4. EVOLVULUS Linn.

E. alsinoides (Linn.) Linn. Sp. Pl. (ed. 2) 392, 1762; FBI 4: 220; Bamber 308, 568; Sabnis 541; Maheshw. 230; Puri 92; Duthie 546. *Convolvulus alsinoides* Linn. Sp. Pl. 157, 1753.

Slender prostrate herbs clothed with spreading hairs. Flowers solitary axillary (rarely in pairs), light blue on filiform pedicels.

Common herb in waste places. Rare in damp areas.

Bakra Nangal, T. A. Rao 10819; Bhundsi, T. A. Rao 11032; Dadri 16260; Kanana (Dadri), 20550; Karnal, 24616; Kurukshetra, J. N. Vohra 9880; Mahendragarh, 20614; Nabha, 36732; Sarsoudh, V. J. Nair 19889; Yamunanagar, 27588.

5. IPOMOEA Linn.

- 1. Sepals distinctly awned at or below the apex; awns straight or curved; corolla salver-shaped with a long narrow tube; stamens and style mostly exserted; leaves pinnately parted into numerous linear or filiform segments, rarely less deeply pinnately cut 12. *I. quamoclit*
- 1. Sepals obtuse or acute (rarely acuminate), whether mucronate or not but not distinctly awned at or below the apex; corolla mostly infundibuliform and campanulate or very rarely salver-shaped; stamens and style almost included:
- 2. Flowers in involucrate heads; leaves digitately 5-9-lobed, pilose beneath, lobes acuminate; calyx pubescent; corolla 3 cm long 11. *I. pestigridis*
- 2. Flowers not in involucrate heads:
- 3. Leaves bilobed at the apex; suborbicular with numerous nerves radiating from near the base; flowers few, in cymes; corolla 5-6 cm long 10. *I. pescaprae*
- 3. Leaves not bilobed at the apex:
- 4. Flowers in long pedunculate clusters:
- 5. Flowers red, purple, pink or lilac: 8. *I. maxima*
- 6. Corolla salver-shaped 7. *I. fistulosa*
- 6. Corolla infundibuliform or campanulate:
- 7. An erect or climbing shrub 3. *I. batatas*
- 7. Weak herbs, climbing, trailing or aquatic: 7a. *I. leavis*
- 8. Leaves cordate or orbicular, trilobed:
- 9. Leaves cordate, subacute to obtusely acuminate with a little mucro, 4-11 cm long; ovary densely to sparsely hairy; a trailing herb 3. *I. batatas*
- 9. Leaves orbicular trilobed; ovary glabrous 7a. *I. leavis*
- 8. Leaves not cordate:
- 10. Leaves broadly triangular to lanceolate, more or less hastate at the base, up to 14 cm long with many lateral nerves; semiaquatic or aquatic herbs; ovary glabrous 2a. *I. aquatica*
- 10. Leaves palmately divided:
- 11. Climbing herbs; sepals rounded at the tip, glabrous 5. *I. digitata*
- 11. Trailing herbs rooting at nodes; roots tuberous; sepals mucronate 3. *I. batatas*
- 5. Flowers yellowish white or white; leaves cordate to cordate-oblong, margins ciliate 13. *I. sinensis*
- 4. Flowers in subsessile clusters or solitary and subsessile or not:
- 12. Pedicels much thickened in fruit 2. *I. alba*
- 12. Pedicels not thickened in fruit:
- 13. Leaves ovate triangular to narrowly lanceolate cordate at base, mucronate, pubescent on the nerves beneath; flowers clustered; fruits pilose 6. *I. eriocarpa*
- 13. Leaves linear or lanceolate not cordate at base or more or less deeply lobed:
- 14. Calyx glabrous outside:
- 15. Lobes of leaves entire or nearly so:
- 16. Sepals apiculate; corolla pale violet 3. *I. batatas*
- 16. Sepals not apiculate; corolla reddish purple 4. *I. cairica*
- 15. Lobes of leaves deeply divided into segments 4a. *I. coptica*
- 14. Calyx pilose or pubescent outside:
- 17. Leaves thinly pilose beneath, cordate, trilobed, lobes acuminate; calyx segments densely pilose; corolla up to 7 cm long 9. *I. nil*
- 17. Leaves white woolly tomentose beneath, trilobed to the middle, cordate; calyx pilose but shorter (than *I. nil*); corolla 2 cm long 1. *I. dichroa*

1. *I. dichroa* (Roem. & Sch.) Choisy in DC. Prodr. 9: 264, 1845.
Convolvulus dichrous Roem. & Sch. Syst. 4: 263, 1819. *I. aitonii* Lindl.

Bot. Reg. 21: t. 1794, 1836; F. W. Andr. Fl. Pl. Sudan 3: 114, 1956; Heins in Hutchins. & Dalz. Fl. W. Tr. Afr. (ed. 2) 352, 1963. *I. pilosa* (Roxb.) Sweet Hort. Brit. (ed. 1) 289, 1827; FBI 4: 213; Bamber 611; Duthie 555 (non Houttouyn 1777). *Convolvulus pilosus* Roxb. Fl. Ind. 1: 473, 1820.

Twining annuals with ovate acute leaves and long hairs arising from glandular bases. Flowers pink in bracteate cymes. Seeds with cottony hairs.

Rare.

Flowers: Sept.-Nov.

Hissar, 24899, Raizada s. n. (DD).

2. *I. alba* Linn. Sp. Pl. 161, 1753. *I. bona-nox* Linn. Sp. Pl. (ed. 2) 288, 1762; FBI 4: 197; Bamber 609; Duthie 559.

Glabrous or rarely pubescent annuals. Flowers white, solitary. The swollen pedicel of the fruit can be cooked and eaten as vegetable.

Flowers: Sept.-Oct.

2a. *I. aquatica* Forsk. Fl. Aeg.-Arab. 44, 1775; FBI 4: 210; Bamber 636; Puri 95. *I. reptans* Poir. in Lamk. Enc. Supp. 3: 460, 1814 (non *Convolvulus reptans* Linn. 1753); Maheshw. 234; Duthie 555.

Stems long, prostrate, trailing in mud or floating, hollow, thick. Peduncles axillary, 1-5-flowered. Flowers pale purple or pale pink.

Common in ponds and jheels.

Local name: Ganthian, Nali.

Flowers: Sept.-Nov.; April-June.

Fatehbad, 18834; Gohana. V. J. Nair 23155; Jind to Hansi 24802; Najafgarh, T. A. Rao 11161; Ottobridge, V. J. Nair 21619; Tohana, 24981.

3. *I. batatas* (Linn.) Lamk. Tabb. Enc. 1: 465, 1791; FBI 4: 202; Bamber 610; Maheshw. 235; Duthie 557. *Convolvulus batatas* Linn. Sp. Pl. 154, 1753.

Cultivated for its underground fusiform tubers which are available in the market from October to January.

Local name: Chakkar kanti.

Flowers: Sept.-Oct.

Panipat, 18629.

4. *I. cairica* (Linn.) Sweet, Hort. Brit. 287, 1827; Maheshw. 238; Puri 95. *Convolvulus cairicus* Linn. Syst. (ed. 10) 922, 1759. *Ipomoea palmata* Forsk. Fl. Aeg.-Arab. 43, 1775; FBI 4: 214; Parker 362.

Perennial. Peduncles 1-3-flowered. Flowers pale violet with a purplish tube.

Grown in gardens.

Local name: Railway creeper.

Flowers: Throughout the year except the cold months.
Hissar, *V. J. Nair* 19974.

4a. *I. coptica* (Linn.) Roth ex R. & S. Syst. 4: 208, 1819; Maheshw. 237. *Convolvulus copticus* Linn. Mant. 2, App. 559, 1771. *I. dissecta* Willd. Phytogr. 5, t. 2, 1794; FBI 4: 200; Duthie 556.

A twining herb. Flowers white. A garden plant.

Flowers: May-June.

Bhatinda, 27786.

5. *I. digitata* Linn. Syst. (ed. 10), 924, 1759; Ooststr. in Blumea 3: 558, 1940; FBI 4: 202.

Perennial twiners. Flowers pale reddish purple. Ovary glabrous.

Grown as ornamental in the moist part of the area, often runs wild.

Flowers: Sept.-Nov.

Panipat, 18624.

6. *I. eriocarpa* R. Br. Prodr. 484, 1810; FBI 4: 204; Bamber 610; Sabnis 540; Maheshw. 235. *I. hispida* R. & S. Syst. 4: 238, 1819; Duthie 554.

Twining herbs with ovate-oblong leaves hairy on both surfaces and margin. Flowers pinkish white in axillary clusters. Ovary densely hairy.

Common among bushes.

Flowers and fruits: Aug.-Nov.

Between Jind and Hansi, 24808; Fatehabad, 24922; Khanak, 25105.

7. *I. fistulosa* Mart. ex Choisy in DC. Prodr. 9: 349, 1845. *I. carnea* sensu Sabnis 240; Parker 343 (non Jacq.).

A shrub 1-3 m high when erect or up to 6 m long when diffuse. Branches fistulose with milky latex. Corolla pink to light purple.

An introduced S. American shrub cultivated in many parts as hedge. Often runs wild. Cultivated easily by cuttings.

Flowers: Throughout the year except the cold months.

Bahmanwas (Rohtak), *V. J. Nair* 23115; Bhatinda, 27793; Gurgaon, 10951; Hissar, *V. J. Nair* 19931; Rewari, 20767; Sonapat, *V. J. Nair* 23358; Subhanpur, *J. N. Vohra* 11331; Yamunanagar, 27529.

7a. *I. learii* Paxt. Bot. Mag. 6, 1939; Sabnis 540; Parker 365; Duthie 558.

Climbing herb with cordate leaves. Flowers deep purplish blue with light mid-petaline bands.

Grown as an ornamental.

E. Panjab, *Parker* s.n. (DD).

8. *I. maxima* (Linn. f.) Don ex Sweet, Hort. Brit. ed. 2, 372, 1830; Ooststr. in Blumea 3: 525, 1940. *Convolvulus maximus* Linn. f. Suppl.

137, 1781. *I. sepiaria* Koen. ex Roxb. Fl. Ind. 2: 90, 1824; FBI 4: 209; Bamber 610; Duthie 555.

Herbaceous perennials. Corolla pale lilac or pinkish white with a purple centre.

Rare.

Flowers: Throughout the year except the cold months.

Karnal, 24641.

9. *I. nil* (Linn.) Roth, Cat. Bot. 1: 36, 1797; Maheshw. 238. *Convolvulus nil* Linn. Sp. Pl. (ed. 2) 219, 1762. *Ipomoea hederacea* sensu Clarke FBI 4: 199; Bamber 621; Sabnis 540; Duthie 556 (non Jacq.).

Twining herbs. Inflorescence an umbellate cyme. Corolla of different shades of blue afterwards becoming reddish purple.

In thickets and jungles.

Flowers: Throughout the year except the cold season.

Between Jind and Hansi, 24804; Daryapur, *M. A. Rao* 3559; Hissar 24969, *Raizada* 20959 (DD); Jind, 24744; Panipat, 18634.

10. *I. pescaprae* (Linn.) Sweet, Hort. Suburb. Londin. 35, 1818; Ooststr. in Blumea 3: 532, 1940. *Convolvulus pescaprae* Linn. Sp. Pl. 159, 1753. *Ipomoea biloba* Forsk. Fl. Aeg.-Arab. 44, 1775; FBI 4: 212.

I have seen this plant grown as an ornamental in gardens.

11. *I. pestigridis* Linn. Sp. Pl. 162, 1753; FBI 4: 204; Bamber 621; Maheshw. 237; Puri 95; Duthie 557.

Herbaceous annual climbers with rigid hairs on all parts. Peduncles involucrate. Flowers white, in heads. Ovary glabrous.

In jungles and on way-side bushes.

Flowers: Aug.-Nov.

Gurgaon, 25256; Hoshiarpur, *T. A. Rao* 10835; Rupar, *T. A. Rao* 10838.

12. *I. quamoclit* Linn. Sp. Pl. 159, 1753; FBI 4: 199; Bamber 621; Sabnis 540; Ooststr. in Blumea 3: 555, 1940; Maheshw. 237.

Annual glabrous twiners. Corolla red. Grown as an ornamental, often running wild.

Flowers: Sept.-Nov.

Bankhandi, *T. A. Rao* 10783; Hoshiarpur, *Aitchison* 635 (DD); Panipat, 24658.

13. *I. sinensis* (Desv.) Choisy in Mem. Soc. Phys. Geneve 6: 459, 1833; Verdcourt in Kew Bull. 204, 1958; Maheshw. 235. *Convolvulus sinensis* Desv. in Lamk. Encycl. 3: 557, 1792. *Ipomoea calycina* Clarke in FBI 4: 201; Duthie 553 (non Meis.).

Twining herbs. Leaves ovate, sparingly hairy. Sepals ciliate. Corolla white.

Rare.

Flowers: Oct.

Hissar, 24859, 24896.

6. *MERREMIA* Dennst.

- 1. Leaves entire or 3-lobed:
 - 2. Peduncles very short or nearly absent; flowers in axillary clusters or solitary in the leaf axils; sepals hairy on the back and fimbriate along the margin; corolla glabrous outside; leaves kidney-shaped; prostrate herbs 4. *M. gangetica*
 - 2. Peduncles long; flowers in axillary clusters or solitary, larger; calyx glabrous; corolla glabrous outside; leaves ovate, cordate at the base; climbing herbs 3. *M. hederacea*
- 1. Leaves palmately 5-7-lobed or compound:
 - 3. Leaves palmately compound with 5 entire leaflets; sepals hirsute 1. *M. aegyptia*
 - 3. Leaves palmately 5-7-lobed, lobes coarsely dentate or lobed; sepals glabrous 2. *M. dissecta*

1. *M. aegyptia* (Linn.) Urban Symb. Antill. 4: 505, 1910; Ooststr. Blumea 3: 327, 1939; Puri 94. *Ipomoea aegyptia* Linn. Sp. Pl. 162, 1753. *I. pentaphylla* Jacq. Collect. 2: 297, 1888; FBI 4: 202.

Twining annual; young parts covered with yellowish brown hairs. Flowers white. Fruits and seeds glabrous.

Common among bushes in the drier parts of the area.

Flowers: Aug.-Nov.

Hissar, 18783, 24861, 24903.

2. *M. dissecta* (Jacq.) Hall. f. in Bot. Jahrb. 16: 552, 1893; Duthie 551. *Convolvulus dissectus* Jacq. Obs. 2: 4, 1767. *Ipomoea sinuata* Ortega, Hort. Matr. Dec. 7: 84, 1798; FBI 4: 214, Parker 362.

Corolla white, throat often rose coloured, limb with purplish bands.

A tropical American element naturalised in several parts.

Flowers: Aug.-Nov.

Hissar. V. J. Nair 21516.

3. *M. hederacea* (Burm. f.) Hall. f. in Bot. Jahrb. 18: 118, 1894. *Evolvulus hederaceus* Burm. f. Fl. Ind. 77, t. 30, f. 2, 1768. *Ipomoea chryseides* Ker-Gawl. in Bot. Reg. t. 270, 1819; FBI 4: 206; Bamber 610.

Corolla yellow, glabrous outside, hairy inside.

Frequent among bushes in the drier parts of the area.

Flowers: Sept.-Nov.

Hissar, 24866, 24972; Raizada 20959 (DD), 201016 (DD); Jind, 24775.

4. *M. gangetica* (Linn.) Cufodont. in Bull. Jard. Bot. Et. Brux. Suppl. 31, 743, 1961. *Convolvulus gangeticus* Linn. Cent. Pl. 2: 9, 1755. *M.*

emarginata (Brum. f.) Hall. f. in Bot. Jahrb. 16: 552, 1893; Duthie 551. *Ipomoea reniformis* Choisy. in Mem. Soc. Phys. Genev. 6: 446, 1833; FBI 4: 206.

Creeping annuals with reniform leaves. Flowers small yellow.

Flowers: Sept.-March.

Mahendragarh, 20578.

7. PORANA Burm. f.

P. paniculata Roxb. Pl. Cor. 3: 31, 1819; Ooststr. in Blumea 3: 93, 1938; FBI 4: 222; Bamber 611; Parker 360; Maheshw. 230; Duthie 544.

Woody climber. Leaves cordate, palmately nerved. Flowers very small, white, in panicles.

Not common.

Flowers: Sept.-Dec.

Bhakra-Nangal, T. A. Rao 10830; Hoshiarpur, Aitchison 515 (DD); Pathankot, Ellis s. n. (DD).

8. RIVEA Choisy.

R. hypocrateriformis (Desr.) Choisy. in Mem. Soc. Phys. Geneve 6: 408, 1834; FBI 4: 184; Sabnis 540; Parker 361; Maheshw. 231; Puri 95; Duthie 560. *Convolvulus hypocrateriformis* Desr. in Lam. Encycl. 3: 561, 1792.

Large twining shrubs with white latex. Leaves orbicular, with a pair of small glands on the midrib towards the base of the blade on the lower surface. Flowers white or yellowish white.

Common.

Flowers: July-Dec.

Bhiwani, 16338; Gohana, V. J. Nair 29729; Hissar, 16194; Duthie 4232 (DD); Raizada 20962 (DD); Panipat, 24722.

78. SOLANACEAE

- | | |
|--|------------------------|
| 1. Anthers connivent to form a tube: | |
| 2. Anthers opening by apical pores | 8. <i>Solanum</i> |
| 2. Anthers opening by longitudinal slits | 5. <i>Lycopersicon</i> |
| 1. Anthers not connivent to form a tube: | |
| 3. Calyx enclosing the fruit: | |
| 4. Flowers solitary | 7. <i>Physalis</i> |
| 4. Flowers clustered | 9. <i>Withania</i> |
| 3. Calyx not enclosing the fruit: | |
| 5. Thorny shrubs; thorns often bear leaves | 4. <i>Lycium</i> |
| 5. Unarmed plants: | |
| 6. Flowers in axillary clusters; corolla tubular, not plicate | 2. <i>Cestrum</i> |
| 6. Flowers not in axillary clusters: | |
| 7. Fruits capsular: | |
| 8. Weak herbs; flowers variously coloured | 10. <i>Petunia</i> |
| 8. Shrubs: | |
| 9. Flowers solitary axillary; corolla plicate | 3. <i>Datura</i> |
| 9. Flowers in terminal panicles; corolla induplicate and valvate | 6. <i>Nicotiana</i> |
| 7. Fruits berry | 1. <i>Capsicum</i> |

1. CAPSICUM Linn.

C. annum Linn. Sp. Pl. 188, 1753; Duthie et Fuller, Field Gard. Crop. 3: 36, 1893; Parker 371; Maheshw. 248; Duthie 2: 11.

Erect shrubs. Flowers white. Fruits red when ripe.

Cultivated for the fruits, which are sold in markets under the name Harimitch.

2. CESTRUM Linn.

1. Leaves foetid when bruised; filaments without appendage at the base of the free portion

2. *C. parqui*

1. Leaves not foetid; flowers very fragrant at night; filaments with an appendage at the base of the free portion

1. *C. nocturnum*

1. *C. nocturnum* Linn. Sp. Pl. 191, 1753; Sabnis 543; Parker 369; Maheshw. 247.

Small shrubs grown in gardens for their fragrant flowers. Flowers pale yellow.

Local name: Rat ki Rani.

Flowers: Aug.-Oct., March-April. I have not seen the plant fruiting anywhere.

Badopal, 24930; Hissar, *V. J. Nair* 1990.

2. *C. parqui* L' Herit. Stipr. Nov. 73, 1785; Parker 369; Maheshw. 247.

Shrubs. Flowers greenish yellow, not fragrant.

I found a few plants in an orchard at Badopal.

Flowers: Throughout the year.

Badopal, 34549.

3. DATURA Linn.

D. innoxia Mill. Gard. Dict. (ed. 8) 5, 1768; Santapau in JBNHS 47: 659, 1948; Maheshw. 243. *D. metel* Sims in Curtis, Bot. Mag. t. 1440, 1812 (non Linn.); FBI 4: 243; Sabnis 543; Parker 370; Puri 98; Duthie 2: 9.

Shrubs clothed with foetid glandular pubescence. Corolla single, white, fragrant, 10-toothed. Fruit armed with long green spines.

Common in waste places and road sides.

Local name: Dhatura.

Flowers: Throughout the year.

Between Jind and Hansi, 24813; Fatehbad, 18905; Fazilka, 36502; Hansi, 16150; Hissar, 18822, *V. J. Nair* 14769, 19913; Kanana (Dadri), 20524; Mahendragarh, 16279; Rohtak, *V. J. Nair* 23212.

4. LYCIUM Linn.

L. europaeum Linn. Sp. Pl. 192, 1753; FBI 4: 240; Bamber 122; Sabnis 543; Parker 368; Maheshw. 248; Puri 97; Duthie 2: 7. *L. barbatum* Clarke in FBI 4: 241 (non Linn.); Puri 97.

Shrubs up to 3 m high. Leaves oblanceolate, oblong-spathulate or linear. Flowers white. Berry yellowish red.

Common in arid areas.

Local name : Jangu.

Flowers : July-March.

Barwala, *V. J. Nair* 19278; Bhiwani, 19006; Gurgaon, *T. A. Rao* 11018; Hansi, 18726; Hissar, 18797, *Harsukh* 20681 (DD); *M. A. Rau* 3503, *V. J. Nair* 14779; Kurukshetra, *J. N. Vohra* 9873; Mahendragarh, 16285; Panipat, 18657; Rewari, *T. A. Rao* 11091.

5. LYCOPERSICON Mill.

L. lycopersicum (Linn.) Karten, Deutsch. Fl. 966, 1882 (sphalm *Lycopersicum lycopersicum*). *Solanum lycopersicum* Linn. Sp. Pl. 225, 1753. *Lycopersicum esculentum* Mill. Gard. Diet. (ed. 8) 2, 1768; FBI 4: 237; Bamber 403; Sabnis 542; Maheshw. 247; Duthie 2: 10. *Lycopersicon lycopersicum* (Linn.) Santapau in Suppl. I Bull. bot. Surv. India 35, 1966.

Annual herbs clothed with spreading hairs. Leaves pinnate. Flowers yellow. Fruits yellow or red.

Cultivated throughout the region for the fruits. Sometimes found as escapes.

Local name : Tomatter.

Flowers and fruits : Sept.-May.

Bhatinda, 27761; Hissar, *V. J. Nair* 19938; Rohtak, 26374.

6. NICOTIANA Linn.

- | | |
|---|------------------------------|
| 1. Flowers light yellow; corolla campanulate; calyx lobes triangular, subobtusate | 2. <i>N. rustica</i> |
| 1. Flowers pinkish white; corolla tubular; calyx lobes lanceolate, acuminate | 1. <i>N. plumbaginifolia</i> |

1. **N. plumbaginifolia** Viv. Elench. Pl. Hort. Dinagro. 26, t. 5, 1802; FBI 4: 246; Maheshw. 242.

Erect viscidly glandular herbs. Leaves elliptic-lanceolate. Flowers in lax corymbs.

An introduced weed native of Mexico and naturalized all over the area. Found on canal banks and other moist places.

Local name : Jangli Tambaku.

Flowers and fruits : April-June.

Amritsar, *J. N. Vohra* 11308; Ferozpur, 36375; Hissar, *V. J. Nair*

21517; Jind, 26528; Kurukshetra. *J. N. Vohra* 8899; Rathal, 16128; Sonapat, *V. J. Nair* 23342.

2. *N. rustica* Linn. Sp. Pl. 180, 1753; FBI 4: 245; Bamber 311; Maheshw. 242; Duthie 2: 12.

Annual velvety herbs. Flowers in closely flowered racemes.

This is a native of Mexico and is found only in cultivation.

Local name : Tambaku.

Flowers : Dec.-March.

Hissar, *V. J. Nair* 19997; Rohtak, 26361.

7. *PHYSALIS* Linn.

- | | |
|--|-------------------------|
| 1. Corolla 1 cm or more across; fruiting calyx more than 2.5 cm across; leaves ovate sinuate | 3. <i>P. peruviana</i> |
| 1. Corolla less than 1 cm across; fruiting calyx less than 2.5 cm across: | |
| 2. Perennial herbs, stems hollow with purplish streaks; almost entire leaves; corolla with purple spots inside towards the base; anthers bluish grey | 1. <i>P. longifolia</i> |
| 2. Annual herbs; leaves sinuate; corolla greenish yellow without purple spots inside; anthers yellow | 2. <i>P. minima</i> |

1. *P. longifolia* Nutt. in Trans. Amer. Phil. Soc. 5: 93, 1837; Dunal in DC. Prodr. 13: 447, 1852; Santapau, Shah et Kapadia in JBNHS 58: 550, 1961; Nair & Nair in Bull. bot. Surv. India 6: 70, 1964.

An American weed naturalized in several parts of India.

Flowers : Sept.-Feb.

Panipat, 24685.

2. *P. minima* Linn. Sp. Pl. 183, 1753; FBI 4: 238; Bamber 308; Duthie 2: 6; Maheshw. 241; Puri 97.

Erect, decumbent, or diffuse herbs of cultivated fields.

Local name : Kaknaji.

Flowers : July-Dec.

Between Jind and Hansi, 24811; Hissar, 18822; Jind, 16112, 24749; Kanana (Dadri), 25153; Panipat 18638.

The specimens cited here show a lot of variation. Some of them may be *P. micrantha* but this could not be determined with certainty.

3. *P. peruviana* Linn. Sp. Pl. 1670, 1753; FBI 4: 238; Bamber 309; Puri 97; Duthie 2: 6.

Shrubs. Cultivated for their edible fruits.

Local name : Tipari.

Flowers : Sept.-Dec. *Fruits* : Feb.-March.

Amritsar, *J. N. Vohra* 11309.

8. SOLANUM Linn.

- | | |
|--|-------------------------|
| 1. Unarmed shrubs or herbs: | |
| 2. Shrubs woolly tomentose | 7. <i>S. erianthum</i> |
| 2. Herbs not woolly tomentose: | |
| 3. Stem tubers present | 6. <i>S. tuberosum</i> |
| 3. Stem tubers absent | 4. <i>S. nigrum</i> |
| 1. Prickly shrubs (Prickles sometimes absent or weakly developed in <i>S. melongena</i>): | |
| 1. Calyx not prickly | 3. <i>S. melongena</i> |
| 4. Calyx prickly: | |
| 5. Diffuse undershrubs; flowers purple | 5. <i>S. surattense</i> |
| 5. Erect shrubs or undershrubs; flowers blue: | |
| 6. Flowers in extra axillary cymes, bisexual | 2. <i>S. violaceum</i> |
| 6. Peduncles lateral, paired, one being a solitary fertile flower and the other raceme of male | 1. <i>S. incanum</i> |

1. *S. incanum* Linn. Sp. Pl. 188, 1753; Parker 365; Duthie 2: 4; Puri 96. *S. melongena* sensu Clarke FBI 4: 235 (pro parte).

Shrubs. Corolla tomentose outside. Berries globose, yellow.

Flowers and fruits: Throughout the year.

Bankhandi, *T. A. Rao* 10755; Jind, 16107; Toru, *T. A. Rao* 11101.

2. *S. violaceum* Ortega. Hort. Matr. Dec. 56, 1798. *S. indicum* auct. Pl. non Linn. Sp. Pl. 187, 1753, FBI 4: 234; Bamber 129; Parker 365; Maheshw. 245; Puri 96; Duthie 2: 3.

Woody shrubs. Corolla stellately hairy outside. Ovary hairy at the top. Fruits globose, yellow, smaller than those of *S. incanum*.

Flowers: Throughout the year.

E. Punjab, *Sharma* s. n. (DD).

3. *S. melongena* Linn. Sp. Pl. 186, 1753; FBI 4: 235; Bamber 129; Duthie 2: 4; Maheshw. 246; Puri 97.

Leaves ovate, lobed, clothed with hairs. Flowers blue.

Common brinjal.

Local name: Baingan.

Flowers: Almost round the year.

Hissar, *Raizada* 21020 (DD); *V. J. Nair* 19961.

4. *S. nigrum* Linn. Sp. Pl. 186, 1753; FBI 4: 229; Bamber 382; Sabnis 541; Maheshw. 245; Puri 96; Duthie 2: 2.

Weak annual, almost glabrous. Inflorescence extra-axillary. Flowers white. Berry black or reddish yellow.

A common weed of cultivated places.

Flowers: Nov.-April.

Local name: Makoi, Kashmach.

Bahumanwas, *V. J. Nair* 23125; Daryapur, *M. A. Rau* 3543; Gurgaon, 25266, *T. A. Rao* 11009; Hissar, *V. J. Nair* 14778, 19973; Jind, 16121, 24764; Panipat, 24678; Sampla, 20005.

5. *S. surattense* Burm f. Fl. Ind. 57, 1768 (excl. syn. Pluk. et Raj.); Santapau in RBSI 16: 154, 1958; Maheshw. 245; Puri 96. *S. xanthocarpum* Schrad et Wendl. Sert. 1: 8, t. 2. 1795; FBI 4: 236; Bamber 382; Sabnis 542; Duthie 2: 3.

Very prickly, young branches stellately tomentose and covered with yellow shining prickles. Leaves subpinnatifid, midrib and lateral nerves with yellow spines. Berries white, streaked with green when young, yellow when ripe.

Common in waste places.

Local name : Kanteli.

Flowers : Most part of the year.

Agrua, 18828; Bhatinda, 27821; Bhiwani, 16334; Hansi, 16157; Hissar, V. J. Nair 19327; Jind, 16109; Lambi, 26188; Mahendragarh, 20591; Narnaul, 20653; Taran Taran, 36359; Yamunanagar, 27567.

6. *S. tuberosum* Linn. Sp. Pl. 185, 1753; FBI 4: 229; Maheshw. 244; Puri 97; Duthie 5.

Cultivated for its tubers during the cold season.

The common potato.

Local name : Alu.

I have not seen them in flower.

7. *S. erianthum* D. Don. Prodr. Fl. Nep. 96, 1825; Roe in Taxon 17: 177, 1968. *S. verbascifolium* FBI 4: 230; Bamber 121; Sabnis 542; Parker 365; Duthie 2: 2 (non Linn. 1753).

Leaves elliptic, entire. Flowers white in terminal corymbs. Berries globose, yellow.

Flowers : Almost round the year.

Local name : Tiari, Kalameva.

Hoshiarpur, Aitchison 508 (DD); Yamunanagar, 27528.

9. WITHANIA Jacq.

W. somnifera (Linn.) Dunal in DC. Prodr. 13: 453, 1852; FBI 4: 239; Bamber 309; Sabnis 543; Parker 367; Duthie 2: 6; Maheshw. 241; Puri 97. *Physalis somnifera* Linn. Sp. Pl. 182, 1753.

Shrubs up to 2 m high. All parts clothed with stellate tomentum. Flowers greenish yellow. Berry enclosed in calyx, red when ripe.

Common in dry situations and along road sides.

Local name : Asandh, Aswagandh.

Flowers and fruits : Most part of the year.

Badopal, V. J. Nair 19832; Bhatinda, 26296; Dabwali, 26131; Daryapur, M. A. Rau 3556; Ferozpur, 36370; Gurgaon, 25265, Giddarbha, 26245; Hansi, 16148; Hissar, V. J. Nair 14757; Jind, 15879; Mahendragarh, 20641; Panipat, 18644; Rewari, 20755; Rohtak, 16369.

10. PETUNIA Juss.

A species of *Petunia*, probably *P. nyctaginiiflora* Juss. in Ann. Mus. Par. 2: 216, t. 47, f. 2, 1803, is grown in gardens during the cold months and spring for flowers.

79. SCROPHULARIACEAE

- | | |
|---|------------------------|
| 1. Leaves, at least the lower if not all, opposite; corolla usually elongate: | |
| 2. Corolla spurred or saccate in front; capsules open by pores: | |
| 3. Corolla spurred in front at base; capsules opening by one pore only | 6. <i>Kickxia</i> |
| 3. Corolla saccate in front; capsules opening by 2 pores | 2. <i>Antirrhinum</i> |
| 2. Corolla not spurred; capsules opening by valves: | |
| 4. Corolla bilabiate: | |
| 5. Stamens 4 with perfect anthers: | |
| 6. Throat of corolla 2-lobed, anthers divaricate | 10. <i>Mazus</i> |
| 6. Throat of corolla not 2-lobed; anthers not divaricate: | |
| 7. Corolla palate with two folds | 8. <i>Lindenbergia</i> |
| 7. Corolla palate without folds: | |
| 8. Anthers stipitate; seeds angular | 7. <i>Limnophila</i> |
| 8. Anthers not stipitate | 3. <i>Bacopa</i> |
| 5. Stamens 2 perfect and 2 staminodes | 9. <i>Lindernia</i> |
| 4. Corolla not bilabiate: | |
| 9. Corolla tube very short: | |
| 10. Corolla lobes 4, subequal; stamens 4; capsule septicidal | 11. <i>Scoparia</i> |
| 10. Corolla lobes 4 or 5, unequal; stamens 2; capsule loculicidal | 14. <i>Veronica</i> |
| 9. Corolla tube elongate: | |
| 11. Calyx spathaceous split in front; anthers with one perfect and one sterile lobe | 5. <i>Centranthera</i> |
| 11. Calyx not spathaceous, tubular: | |
| 12. Corolla tubes straight; lobes subequal | 4. <i>Buchnera</i> |
| 12. Corolla tube abruptly incurved; the two posterior lobes smaller | 12. <i>Striga</i> |
| 1. Leaves all alternate; corolla tube elongate or short: | |
| 13. Stamens 2; corolla tube elongate | 1. <i>Anticharis</i> |
| 13. Stamens 4 or 5; corolla subrotate, tube short | 13. <i>Verbascum</i> |

1. ANTICHARIS Endl.

1. *A. senegalensis* (Walp.) Bhandari in Bull. bot. Surv. India 6: 327, 1963. *Dorotanchera senegalensis* Walp. Repert. 3: 305, 1844-1845. *D. linearis* Benth. in DC. Prodr. 10: 305, 1846. *Anticharis linearis* (Benth.) Hochst. ex Asch. in Mont. Akad. Wiss. Ber. 882, 1866; FBI 4: 250; Bamber 312; Puri 99.

Slender glandular pubescent, sticky annuals. Flowers purplish on filiform stalks. Seeds many, streaked.

In sandy places of the arid tract.

Flowers: Aug.-Nov.

Hissar, Harsuk 20697 (DD); Duthie 4239 (DD); Raizada 21037 (DD), 20971 (DD).

2. ANTIRRHINUM Linn.

A. orontium Linn. Sp. Pl. 617, 1753; FBI 4: 253; Bamber 171; Sabnis 544; Maheshw. 250; Duthie 2: 16.

An erect hairy herb. Flowers solitary in axils, pale pink or streaked with purple. Sepals longer than the corolla.

Common weed of cultivated places.

Flowers : Feb.-April.

Amritsar, *J. N. Vohra* 11294; Badopal, 25923, *V. J. Nair* 19837; Bhatinda, 26273, 36579; Kapurthala, 36307; Lambi, 26220; Yamunanagar, 27582.

3. BACOPA Aubl.

B. monnieri (Linn.) Wettst. in Engl. Pr. Pflanzenfam. 4 (3b): 77, 1891 (*monniera*); Pennell in Proc. Acad. Nat. Sci. Philad. 98: 94, 1946; Maheshw. 253. *Lysimachia monnieri* Linn. Cent. Pl. 2: 9, 1756. *Herpestis monniera* (Linn.) Benth. Scroph. Ind. 30, 1835; FBI 4: 276; Bamber 535; Sabnis 545; Duthie 2: 17.

A glabrous succulent herb, creeping and rooting at nodes. Flowers axillary, solitary, pale blue.

Common near water.

Flowers : Almost round the year.

Badopal, 24952; Hoshiarpur, *Aitchison* 395 (DD); Karnal, *J. N. Vohra* 8877; Pinjaur, *T. A. Rao* 10856; Rohtak, 26368.

4. BUCHNERA Linn.

B. hispida Buch.-Ham. ex D. Don, Prodr. 91, 1825; FBI 4: 298; Bamber 190; Duthie 2: 29.

Small herbs drying black. Flowers mauve or rarely white.

In sandy places. Parasitic on the roots of wheat, bajra and maize.

Flowers : Cold months.

E. Punjab, *anonymous* (DD).

5. CENTRANTHERA R. Br.

C. indica (Linn.) Gamble, Fl. Madr. 971, 1924. *Rhinanthus indica* Linn. Sp. Pl. 603, 1753. *Centranthera hispida* R. Br. Prodr. 438, 1810; FBI 4: 301; Bamber 345; Duthie 2: 32. *C. nepalensis* Don, Prodr. 88, 1825.

Small hispid herbs. Flowers purplish red, purplish white or pinkish white.

Rare.

Flowers : October.

On Cho Bed, *T. A. Rao* 10799.

6. KICKXIA Dum.

K. ramosissima (Wall.) Jauchen in Osterr. Bot. Zeitchr. 82: 152,

1933; Maheshw. 250. *Linaria ramosissima* Wall. Pl. As. Rar. 2: 43, t. 153, 1831; FBI 4: 251; Sabnis 554; Duthie 2: 15.

Small herbs with filiform branches. Flowers yellow.

On rocks and stony places.

Flowers : April-Nov.

Firozpur Jhirka, T. A. Rao 11147.

7. LIMNOPHILA R. Br.

- | | |
|---|---------------------------|
| 1. Flowers with slender pedicels, axillary or subterminal; leaves deeply divided, the lower in whorls, upper whorled or opposite | 2. <i>L. indica</i> |
| 1. Flowers sessile or subsessile: | |
| 2. Leaves pinnately nerved, not ribbed, pinnatifid or multifid, lower leaves absent; calyx striate | 3. <i>L. rugosa</i> |
| 2. Leaves 3-5-ribbed from the base, lower leaves usually pinnatifid; calyx not striate: | |
| 3. Hirsute above, generally all leaves pinnatifid and dissected; calyx ovate, long acuminate | 4. <i>L. sessiliflora</i> |
| 3. Glabrous above, upper leaves opposite; middle ones whorled, pinnatifid, lowest capillate-multifid; calyx lobes ovate shortly acuminate | 1. <i>L. heterophylla</i> |

1. **L. heterophylla** (Roxb.) Benth. Scroph. Ind. 25, 1835; FBI 4: 270; Bamber 627. *Columnnea heterophylla* Roxb. Fl. Ind. 3: 97, 1832.

Aquatic herbs.

E. Punjab, *Anonymous* (DD).

2. **L. indica** (Linn.) Druce in Rep. Bot. Exch. Cl. Br. Isles 3: 420, 1914. *Hottonia indica* Linn. Sp. Pl. 208, 1753. *Limnophila gratioloides* R. Br. Prodr. 442, 1810; FBI 4: 271; Bamber 627; Duthie 2: 21.

There are a few sheets in DD marked Punjab.

3. **L. rugosa** (Roth) Merrill, Interpr. 466, 1917. *Herpestis rugosa* Roth, Nov. Pl. Sp. 290, 1821. *Limnophila roxburghii* G. Don, Gen. Syst. 4: 543, 1838 (non Benth.); FBI 4: 265; Bamber 622.

Annuals. Leaves aromatic and dotted with translucent glands. Flowers blue. Seeds angular.

Flowers : Aug.-Oct.

E. Punjab, *Sharma* s. n. (DD).

4. **L. sessiliflora** (Vahl) Bl. Bijdr. Fl. Ned. Ind. 749, 1825; FBI 4: 270; Bamber 627. *Hottonia sessiliflora* Vahl, Symb. 2: 36, 1791; Duthie 2: 20.

Rare.

Patiala State, *Singh* s. n. (DD).

8. LINDENBERGIA Lehm.

L. indica (Linn.) Vatke in Oster. Bot. Zeitschr. 25: 10, 1875;

Maheshw. 252; Puri 100. *Dodartia indica* Linn. Sp. Pl. 883, 1753. *Lindenbergia urticaefolia* Lehm. in Link et Otto, Icon. Pl. 95, t. 48, 1828; FBI 4: 262; Bamber 198; Duthie 2: 33. *L. polyantha* Royle ex Benth. Scroph. Ind 22, 1835; FBI 4: 262; Bamber 198.

Weak hairy herbs. Flowers yellow.

On walls of buildings and rocks.

Flowers: Aug.-Nov.

Bhundsī, T. A. Rao 11037; Kanana (Dadri), 20522; Khanak, 34574; Mahendragarh, 16292.

9. LINDERNIA All.

1. Capsule twice as long as calyx

1. *L. ciliata*

1. Capsule not twice as long as calyx

2. *L. parviflora*

1. *L. ciliata* (Colsm.) Pennell in Brittonia 2: 182, 1936; Maheshw. 253. *Gratiola ciliata* Colsm. Prodr. Descr. Grat. 14, 1793. *Bonnaya brachiata* Link et Otto, Icon. Pl. Set. 25, t. 11, 1820; FBI 4: 418; Bamber 194; Duthie 2: 26.

Small herbs with 4-angled branches. Leaves sessile. Flowers pinkish white.

Flowers: Aug.-Dec.

Ottobridge (Sirsa), 17186.

2. *L. parviflora* (Roxb.) Haines, Bot. Bih. & Or. 635, 1922; Maheshw. 253. *Gratiola parviflora* Roxb. Pl. Cor. 3: 3, 203, 1819. *Hysanthes parviflora* (Roxb.) Benth. in DC. Prodr. 10: 419, 1846; FBI 4: 283; Bamber 172.

Small herbs, flowers bluish white.

Common in moist places.

Flowers: Cold season.

Jind, 25865.

10. MAZUS Lour.

M. pumilus (Burm. f.) Steenis in Nova Guinea N. S. 31, 1958; Backer. Fl. Java 2: 505, 1965. *Lobelia pumila* Burm. f. Fl. Ind. 186, t. 60, f. 3, 1784. *Lindernia japonica* Thunb. Fl. Jap. 253, 1784. *Mazus japonicus* (Thunb.) O. Ktze. Rev. Gen. Pl. 462, 1891; Maheshw. 252. *Mazus rugosus* Lour. Fl. Coch. 385, 1790; FBI 4: 259; Bamber 422; Duthie 2: 19.

Small herbs with obovate spatulate leaves. Flowers purplish white.

Flowers: Feb.-April.

Binjhol, 25814; Hoshiarpur, Aitchison 51 (DD); Ludwa, 26438.

11. SCOPARIA Linn.

S. dulcis Linn. Sp. Pl. 116, 1753; FBI 4: 289; Duthie 2: 27.

Annual erect herbs. Flowers white; petals bearded. Capsules globose. An American weed which has spread all over India.

Flowers : Feb.-Sept.

Jind, 24779, 25859.

12. STRIGA Lour.

1. Flowers more than 1.3 cm long; calyx 15-nerved
1. Flowers less than 1.3 cm long; calyx 10-ribbed

2. *S. angustifolia*
1. *S. asiatica*

1. ***S. asiatica*** (Linn.) Kuntze, Rev. Gen. Pl. 466, 1891; Merrill in Trans. Amer. Phil. Soc. N. S. 24 (2): 353, 1935. *Buchnera asiatica* Linn. Sp. Pl. 630, 1753. *Striga lutea* Lour. Fl. Coch. 22, 1790; FBI 4: 299; Bamber 173; Duthie 2: 30.

Very small herbs. Corolla yellow or white.

Flowers : After the rainy season.

On Cho Bed, T. A. Rao 10807.

2. ***S. angustifolia*** (Don) Sald. in Bull. bot. Surv. India 5: 70, 1963. *Buchnera angustifolia* Don, Prodr. 91, 1825. *B. euphrasioides* Benth. Scroph. Ind. 41, 1835 (non Vahl). *Striga euphrasioides* (Benth.) Benth. in Hook. Comp. Bot. Mag. 1: 364, 1836; FBI 4: 299; Bamber 173; Maheshw. 251; Duthie 2: 31.

Small herbs. Flowers white.

Flowers : After the rainy season.

On Cho Bed, T. A. Rao 10798.

13. VERBASCUM Linn.

1. Grey pubescent herbs; flowers in branching racemes; stamens 4
1. Stellately woolly tomentose herbs; flowers in dense woolly spikes

1. *V. chinense*
2. *V. thapsus*

1. ***V. chinense*** (Linn.) Santapau, Fl. Pur. 90, 1958; Maheshw. 249; Puri 99. *Scrophularia chinensis* Linn. Mant. 2: 250, 1771. *Celsia coromandeliana* Vahl, Symb. 3: 79, 1794; FBI 4: 251; Bamber 384; Sabnis 544; Duthie 2: 15.

An erect, moisture loving herb, up to 1.5 m high. Leaves petiolate and pinnatifid in the basal region becoming gradually sessile and pass on as bracts in the racemes. Corolla yellow. Filaments hairy.

Flowers : Mostly during the cold season or rarely in the rains.

Amritsar, J. N. Vohra 11271; Dabwali, 26169; Fatehbad, 18890; Feroz-pore, 36371; Hansi, 16153; Hoshiarpur, Aitchison 50 (DD); Jhabua, 20736; Panipat, J. N. Vohra 9905.

2. ***V. thapsus*** Linn. Sp. Pl. 177, 1753; FBI 4: 250; Bamber 485; Sabnis 544; Maheshw. 249; Duthie 2: 14.

Succulent herbs, densely clothed with grey stellate tomentum. Leaves ovate lanceolate, gradually becoming smaller and pass upwards as bracts. Flowers yellow, crowded in spikes which may reach a metre or more in length. Longer stamens glabrous, others hairy on filaments.

Flowers : April-Sept.

Bhatinda, 27804; Fatehbad, 24919; Hansi, 25874; Hissar, 16186; Jind, 26516; Sonpet, *V. J. Nair* 23299.

14. VERONICA Linn.

1. Flowers solitary axillary
1. Flowers in racemes

1. *V. agrestis*
2. *V. anagallis-aquatica*

1. *V. agrestis* Linn. Sp. Pl. 13, 1753; FBI 4: 294; Bamber 537; Maheshw. 254; Duthie 2: 28.

Prostrate herbs. Leaves ovate cordate or orbicular, crenate. Pedicels recurved in fruit. Flowers pale purple.

Flowers : Cold season.

Badopal, 25927; Bhatinda, 36578; Hissar, 25909, *V. J. Nair* 14768; Khanna, 35979; Lambi, 26228.

2. *V. anagallis-aquatica* Linn. Sp. Pl. 12, 1753; FBI 4: 293; Maheshw. 255.

Erect, glabrous, succulent herbs with stoloniferous hollow stems. Leaves oblong lanceolate or linear oblong. Corolla pale purple or white.

Common in marshy places and wet grounds.

Flowers and fruits : Oct.-April.

Hissar, 25905; Jind, 25867; Kapurthala, 36315; Karnal, 25297; Pinjaur, *T. A. Rao* 10859; Rewari, 20801; Rohtak, 26373; Yamunanagar, 27583.

80. OROBANCHACEAE

1. Flowers yellow in dense cylindrical fleshy spikes; corolla campanulate; seeds pitted
1. Flowers bluish in lax or dense spikes; corolla 2-lipped; seeds reticulate

1. *Cistanche*
2. *Orobanche*

1. CISTANCHE Hoffm.

C. tubulosa Wight, Ic. t. 1420, 1849; FBI 4: 324; Bamber 647; Sabnis 545; Puri 101; Duthie 2: 36.

A scapigerous succulent herb up to 1 m high, purplish yellow, covered with dense triangular scales.

Flowers : Nov.-April.

A root parasite on *Salvadora oleoides*, *Calotropis procera*, *Calligonum polygonoides*, *Aerva pseudotomentosa* and *Argemone mexicana*. It is also said to be parasitic on *Acacia* sp. but I have not seen this.

Abohar, 36509; between Bhiwani and Loharu, 20006; Dabwali, 16129; Fatehbad, 16243, 25942; Hissar, *M. A. Rau* 3496; Loharu, 20087.

2. OROBANCHE Linn.

1. Bracteoles 2; flowers in lax spikes
1. Bracteoles absent; flowers in dense spikes

1. *O. aegyptiaca*
2. *O. cernua*

1. ***O. aegyptiaca*** Pers. Syn. 2: 181, 1807; Beck in Bibl. Bot. 19: 100, fig. 14(1), 1890; Maheshw. 255; Duthie 2: 37. *O. indica* Buch.-Ham. in Roxb. Fl. Ind. 3: 27, 1832; FBI 4: 326; Bamber 649.

A much branched root parasite on species of *Brassica*. Flowers blue. Cows feeding on this is said to give more milk.

Local name: Sarsumbandha.

Flowers and fruits: Feb.-May.

Badopal, *V. J. Nair* 19842; Barwala, 26339; Fatehbad, 25935; Mahendragarh, 20560, 20613; Rewari, 20754.

2. ***O. cernua*** Loefl. It. Hisp. 152, 1758; FBI 4: 325; Bamber 648; Duthie 2: 36.

Scape brownish. Flowers blue.

Flowers: Cold season.

I have seen only one plant from the area. The host could not be determined.

Mojukheda, 26056.

81. LENTIBULARIACEAE

UTRICULARIA Linn.

1. Inflorescence with a whorl of 4-8 spongy floats at the base; flowers held much above the level of water
1. Inflorescence without floats;
2. Seeds winged
2. Seeds without wings

1. *U. inflexa* var. *stellaris*
2. *U. exoleta*
3. *U. aurea*

1. ***U. inflexa*** Forsk. var. ***stellaris*** (Linn. f.) P. Tayl. in Mitte. Bot. Staatss. Munchen 4: 96, 1961; Maheshw. 256; Puri 101. *U. stellaris* Linn. f. Suppl. 86, 1781; FBI 4: 328; Bamber 627; Duthie 2: 38.

Floating herbs. Leaves in whorls of 4, pinnately divided into capillary segments; each pinna with a bladder having truncate mouth. Racemes few-flowered. Flowers yellow.

Flowers: Rainy season and after.

Chakka jheel (Sirsa), 18975, 18995; Ottobridge (Sirsa), 18973; Panipat, 24725.

U. exoleta and *U. aurea* (*U. flexuosa*) are reported from the area by Bamber but I have not seen any specimen.

82. BIGNONIACEAE

- 1. Flowers purplish, large, in long pendulous peduncles; fruit long-stalked, gourd-like; seeds not winged 3. *Kigelia*
- 1. Flowers not in pendulous racemes; fruits not gourd-like; seeds winged:
 - 2. Perfect stamens 5; leaves 2-3-pinnate; capsule large, flat 5. *Oroxylum*
 - 2. Perfect stamens 4:
 - 3. Leaves simple; flowers showy, deep orange, or orange yellow 7. *Tecomella*
 - 3. Leaves not simple; flowers not orange:
 - 4. Leaves unipinnate:
 - 5. Trees; leaflets entire; capsules cylindric, curved; flowers yellowish brown, rusty woolly tomentose 1. *Haplophragma*
 - 5. Shrubs; leaflets serrate; capsule linear; flowers golden yellow, not woolly tomentose 6. *Tecoma*
 - 4. Leaves 2-3-pinnate:
 - 6. Flowers white; corolla tube long; staminodes absent 4. *Millingtonia*
 - 6. Flowers mauve; staminodes long 2. *Jacaranda*

1. HAPLOPHRAGMA P. Dop

H. adenophyllum (Wall. ex G. Don) P. Dop in Bull. Soc. Bot. France 72: 890, 1925; Maheshw. 259. *Bignonia adenophylla* Wall. ex G. Don, Gen. Syst. 4: 22, 1837. *Heterophragma adenophyllum* Seem. ex Benth. & Hook. f. Gen. Pl. 2: 1047, 1876; FBI 4: 381; Parker 377; Duthie 2: 46.

A medium sized tree. Leaves large.

Planted as avenue trees.

Rohtak, V. J. Nair 23217.

2. JACARANDA Juss.

J. mimosifolia D. Don in Bot. Reg. t. 63, 1822; Sandwith in Kew Bull. 1953: 456, 1953; Maheshw. 259. *J. ovalifolia* R. Br. in Bot. Mag. t. 2327, 1822; Sabnis 546.

A small ornamental tree. Cultivated in gardens and parks.

Flowers: Hot months.

Precise locality not given. Parker s. n. (DD).

3. KIGELIA DC.

K. pinnata DC. Prodr. 9: 247, 1845; Parker 377; Maheshw. 258; Duthie 2: 46.

Medium-sized spreading trees. Grown in gardens and parks for shade. Native of tropical Africa. Thrives well as avenue tree and provides good shade.

4. MILLINGTONIA Linn. f.

M. hortensis Linn. f. Suppl. 291, 1781; Bamber 7; Parker 376; Maheshw. 259; Duthie 2: 46.

A large tree. Flowers fragrant. It does not bear fruit in the area.

Local name : Safed Chameli.

Flowers : Jan.-March.

E. Punjab, *Parker* s. n. (DD); Hoshiarpur, *Aitchison* s. n. (DD).

5. OROXYLUM Vent.

O. indicum (Linn.) Vent. Dec. Gen. Nov. 9, 1808; FBI 4: 378; Bamber 7; *Parker* 374; Duthie 2: 42.

Deciduous trees. Flowers fleshy, lurid purple.

Only in hilly areas of the sub-Himalayan region.

Local name : Tat Palangi.

Flowers : Rainy season.

Hoshiarpur Siwaliks, *Parker* s. n. (DD).

6. TECOMA Juss.

T. stans (Linn.) H. B. K. Nov. Gen. & Sp. (ed. 4) 3: 144, 1818; Sabnis 546; *Parker* 373; Maheshw. 258; Puri 101. *Bignonia stans* Linn. Sp. Pl. (ed. 2) 871, 1763.

Branches quadrangular. Flowers in terminal panicles.

Cultivated in gardens as hedge. This plant is naturalized in some parts of India but not in the area.

Flowers : July-Jan.

Hissar, *V. J. Nair* 21633; Jullunder, *Parker* 8957 (DD); Sirsa, 18984.

7. TECOMELLA Seem.

T. undulata (Sm.) Seem. in Ann. & Mag. Nat. Hist. (Ser. 3) 10: 30, 1862; Maheshw. 257; Puri 101; Duthie 2: 43. *Bignonia undulata* Sm. Exot. Bot. 1: 35, t. 19, 1805. *Tecoma undulata* Sm. in G. Don, Gen. Syst. 4: 223, 1837; FBI 4: 378; Bamber 4; Sabnis 545; *Parker* 372.

Small trees with drooping branches. Stamens exserted, anthers divaricate. A beautiful tree when in bloom.

Common in sandy areas.

Local name : Lohra.

Flowers : Feb.-April.

Abohar, 36518; Bhatinda, 27807; Bhiwani, 20059, 20060; Hoshiarpur, *Aitchison* 260 (DD); Lambi, 26236; Nizampur, 20692; Rewari, 20773, 20790.

83. PEDALIACEAE

- 1 Diffuse herbs or undershrubs; roots turmeric-coloured; flowers yellow; drupe with 4 sharp horizontal spines
 1. Tall herbs or shrubs; flowers pink or rosy; fruit elongate, capsular

1. *Pedaliium*
 2. *Sesamum*

1. PEDALIUM Linn.

P. murex Linn. Syst. 1123, 1759; FBI 4: 386; Maheshw. 262; Puri 101.

Base of petiole with dark violet glands.

An indicator of salinity in soil.

Local name : Vilayathi Gokhru.

Flowers : Sept.-Nov.

Gurgaon, *Ram Balab* 3017 (DD).

2. SESAMUM Linn.

1. Seeds bordered and reticulate rugose

1. Seeds not bordered, smooth

2. *S. malayanum*

1. *S. indicum*

1. **S. indicum** Linn. Sp. Pl. 634, 1753; FBI 4: 387; Bamber 197; Duthie 2: 47; Maheshw. 262; Puri 102. *S. orientale* Linn. Sp. Pl. 634, 1753.

Erect herbs up to 1.5 m. Seeds black or white.

Cultivated during the rainy season. Often found as escape.

Local name : Till.

Flowers : Aug.-Nov.

Bahmanwas (Rohtak), *V. J. Nair* 23118; Bhiwani, 16357; between Jind and Hansi, 24835; Panipat, 24708; Tohana, 25010.

2. **S. malayanum** N. C. Nair in Bull. bot. Surv. India 5: 251, 1963.

Stout herbs up to 3 m high. Easily distinguished from the above by the seeds.

Common in waste places.

Local name : Jungli Till.

Flowers and fruits : Sept.-Nov.

Gurgaon, 25261; Kanana (Dadri), 25127 (Type), 25132, 25137, 25146; Mahendragarh, 25156, 25157, 25165.

84. MARTYNIACEAE

MARTYNIA Linn.

M. annua Linn. Sp. Pl. 618, 1753; Maheshw. 263. *M. diandra* Glox. Obs. Bot. 14, t. 1, 1785; FBI 4: 386; Bamber 222; Duthie 2: 48.

A tall rough undershrub. Leaves large, ovate, glandular sticky. Flowers rosy, possess semilunar extra floral nectary on pedicel. Fruits large, hard, black, with prominent hooks.

Native of Mexico, naturalized in many parts of India.

Flowers : After the rains.

Hoshiarpur, *T. A. Rao*, 19716.

85. THUNBERGIACEAE

THUNBERGIA Retz.

T. laevis Nees in Wall. Pl. As. Rar. 3: 77, 1832; Bremek. in Verh. K. Neder. Akad. Wet. II, 50: 51, 1955; Maheshw. 265. *T. fragrans* Roxb. var. *laevis*. Clarke in FBI 4: 391. *T. fragrans* auct. (non Roxb.); Duthie 2: 50.

A glabrous climber with triangular ovate leaves. Flowers white, solitary. Calyx many-toothed.

Flowers: Nov.-March.

Hoshiarpur, Aitchison 489 (DD).

86. ACANTHACEAE

- | | |
|---|--------------------------|
| 1. Lobes of corolla twisted in bud: | |
| 2. Fertile stamens 4: | |
| 3. Corolla bilipped: | |
| 4. Inflorescence verticillate, spinous | 12. <i>Hygrophylla</i> |
| 4. Inflorescence spikate, non spinous | 10. <i>Hemidelphis</i> |
| 3. Corolla not bilipped: | |
| 5. Leaves entire: | |
| 6. Roots tuberous; flowers in lax axillary cymes; bracteoles narrow; capsules linear, seed-bearing throughout | 17. <i>Ruellia</i> |
| 6. Roots not tuberous; flowers solitary or in clusters of 3 in the axils; capsules clavate, base solid | 7. <i>Dipteracanthus</i> |
| 5. Leaves crenate; connective excurrent | 2. <i>Aechmanthera</i> |
| 2. Fertile stamens 2: | |
| 7. Capsules 6 or more seeded | 11. <i>Hemigraphis</i> |
| 7. Capsules 4 or less seeded | 9. <i>Eranthemum</i> |
| 1. Lobes of corolla imbricate in bud: | |
| 8. Stamens 4: | |
| 9. Corolla 1-lipped, anthers monothealous | 5. <i>Blepharis</i> |
| 9. Corolla 2-lipped, anthers dithealous | 14. <i>Lepidagathis</i> |
| 8. Stamens 2: | |
| 10. Leaves all radical | 8. <i>Elytraria</i> |
| 10. Leaves cauline: | |
| 11. Calyx segments 4, small: | |
| 12. Corolla not 2-lipped | 4. <i>Barleria</i> |
| 12. Corolla 2-lipped | 16. <i>Justicia</i> |
| 11. Calyx segments 5: | |
| 13. One of the calyx segments small | 16. <i>Justicia</i> |
| 13. All segments equal: | |
| 14. Anther cells tailed at the base | 18. <i>Rungia</i> |
| 14. Anther cells not tailed at the base: | |
| 15. Flowers in axillary and terminal thyrses or cymes: | |
| 16. Corolla deeply 2-fid, upper lobe entire or emarginate | 6. <i>Dicliptera</i> |
| 16. Corolla not deeply 2-fid, upper 2-lobed; ornamental shrubs | 13. <i>Jacobinia</i> |
| 15. Flowers in panicles or spikes: | |
| 17. Fruits 1 or 2 seeded; anthers apiculate | 1. <i>Adhatoda</i> |
| 17. Fruits more than 3-seeded; anthers not apiculate: | |
| 18. Fruits 3-4-seeded | 15. <i>Peristrophe</i> |
| 18. Fruits 6 or more seeded | 3. <i>Andrographis</i> |

1. ADHATODA Adans.

A. zeylanica Medic., Hist. et Comm. Acad. Elect. Sci. Theod. Pl. 6: 393, 1790. *A. vasica* (Linn.) Nees in Wall. Pl. As. Rar. 3: 103, 1832; FBI 4: 540;

Bamber 66; Sabnis 548; Parker 388; Maheshw. 271; Puri 106. *Justicia adhatoda* Linn. Sp. Pl. 155, 1753; Duthie 2: 76.

Gregarious shrubs. Flowers in axillary spikes; corolla white with few purple streaks in the throat.

Common in waste places. Not found in purely sandy localities.

Between Jind and Hansi, 24810; Kalka, *M. A. Rau* 14559; Kanana, (Dadri), 20551; Karnal, 24639; Sampla, 20013; Yamunanagar, 27600.

2. AECHMANTHERA Nees

A. gossypina (Nees) Nees in Wall. Pl. As. Rar. 3: 87, 1832; Saxena in Indian For. 92: 529, 1966. *Ruellia gossypina* Nees in Wall. Pl. As. Rar. 1: 38, t. 42, 1830. *Aechmanthera tomentosa* Nees in Wall. Pl. As. Rar. 3: 87, 1832; FBI 4: 428; Bamber 62; Sabnis 547; Parker 388; Duthie 2: 59.

Undershrubs. Leaves tomentose. Flowers purple. Ovary hairy at the apex. Retinacula hooked.

Found only on Siwalik ranges.

Hoshiarpur, *Aitchison* 549 (DD).

3. ANDROGRAPHIS Wall.

A. echioides Nees in Wall. Pl. As. Rar. 3: 117, 1832; FBI 4: 505; Bamber 168; Maheshw. 268; Puri 104; Duthie 2: 66.

Medium sized annuals. Flowers pink or white with purple, in racemes. Capsules 2-3 times as long as broad. Seeds 6-12, wrinkled.

On Siwalik ranges.

Flowers: After the rains.

Bankhandi, *T. A. Rao* 10770.

4. BARLERIA Linn.

1. Prickly shrubs or undershrubs:

2. Capsules 2-seeded; outer calyx segments ending in a sharp spine

2. Capsules 4-seeded; outer calyx segments only mucronate

1. Unarmed shrubs or undershrubs; outer calyx segments subsparingly toothed on the margins; capsules 4-seeded

3. *B. prionitis*

1. *B. acanthoides*

2. *B. cristata*

1. **B. acanthoides** Vahl. Symb. 1: 47, 1790; FBI 4: 484; Bamber 167; Parker 380; Puri 105; Duthie 2: 69.

Spiny undershrubs. Flowers white on condensed racemes or solitary axillary. Bracts spiny. Outer calyx conspicuously purplish-veined.

On hills in southern parts of the area.

Flowers: Oct.

Kanana (Dadri), 20533, 25135.

2. **B. cristata** Linn. Sp. Pl. 636, 1753; FBI 4: 438; Bamber 168; Sabnis 547; Parker 380; Maheshw. 274; Puri 105; Duthie 2: 70.

Erect undershrubs up to 1 m high. Flowers pale purple, pinkish or white. Calyx prominently veined.

Local name : Bansa.

Flowers : July-Oct.

Hoshiarpur, *Aitchison* 270 (DD), *T. A. Rao* 10729.

The white flowered plants are sometimes considered as a separate species, *B. dichotoma* Roxb., or as a variety of *B. cristata*.

3. ***B. prionitis*** Linn. Sp. Pl. 636, 1753; FBI 4: 482; Parker 379; Maheshw. 274; Puri 105; Duthie 2: 69.

Undershrubs up to 2 m high. Flowers orange-yellow. Bracts spiny.

On dry hill slopes.

Flowers : Oct.-March.

Khanak, 25094; Mahendragarh, 16300; Sohna, *T. A. Rao* 11056.

5. BLEPHARIS JUSS.

1. Tips of bracts spiny; margins not ciliate

1. *B. linariaefolia*

1. Tips of bracts not spiny; margins ciliate

2. *B. maderaspatensis*

1. ***B. linariaefolia*** Pers. Syn. 2: 180, 1807; Duthie 2: 55. *B. scindica* Stocks ex Anders. in Jour. Linn. Soc. 7: 36, 1864; FBI 4: 479; Bamber 193; Sabnis 547; Parker 381; Puri 103.

Undershrubs up to 15 cm high. Leaves linear. Spikes compact; bracts divaricate, 4-ranked. Fruits 2-seeded.

In sandy places of the dry south.

Flowers : Aug.; *Fruits* : Dec.

Abohar (Ferozpur Dist.), 36516; Hissar, *Duthie* 4138 (DD), *Harsukh* 20689 (DD), *M. A. Rau* 3534.

2. ***B. maderaspatensis*** (Linn.) Heyne ex Roth, Nov. Pl. Sp. 320, 1821; Maheshw. 266; Puri 103. *Acanthus maderaspatensis* Linn. Sp. Pl. 639, 1753. *Blepharis boerhaviaefolia* Pers. Syn. 2: 180, 1807; FBI 4: 478; Duthie 2: 53.

Weak herbs. Flowers white with deep brown stripes.

Not very common.

Flowers : Sept.-Dec.

Between Jind and Hansi, 24786; Gohana, *V. J. Nair* 29741; Khanak, 25099; Panipat, 24666; Sohna, *T. A. Rao* 11071.

6. DICLIPTERA JUSS.

D. roxburghiana Nees var. ***bupleuroides*** Nees in Wall. Pl. As. Rar. 3: 111, 1832; FBI 4: 554; Bamber 170; Sabnis 548; Duthie 2: 81.

Spreading herbs with grooved stem. Flowers pink or purplish blue. Capsules 4-seeded.

Used in indigenous medicine.

Local name : Laksmanna, Somni.

Flowers : Sept.-Dec.

Bhakra-Nangal, *T. A. Rao* 10822; Hoshiarpur, *Aitchison* 247 (DD); Rupar, *T. A. Rao* 10846; Yamunanagar, 27598.

7. DEPTERACANTHUS Nees

- | | |
|---|-------------------------|
| 1. Erect herbs or undershrubs; leaves obtuse, densely hairy on both surfaces; capsules glabrous | 1. <i>D. patulus</i> |
| 1. Prostrate herbs or undershrubs, sometimes climbing; leaves acute, glabrous or slightly hairy; capsules pubescent | 2. <i>D. prostratus</i> |

1. *D. patulus* (Jacq.) Nees in Wall. Pl. As. Rar. 3: 82, 1832; Maheshw. 273. *Ruellia patula* Jacq. Misc. Bot. 2: 358, 1781; FBI 4: 412; Sabnis 547; Duthie 2: 58.

Flowers solitary axillary or 2-4-flowered inflorescences, subsessile, purplish blue. Styles pubescent.

Common as undergrowth among bushes.

Flowers : Aug.-Dec., March-May.

Bhundsia, *T. A. Rao* 11068; Daber, 15861; Daryapur, *M. A. Rau* 3557; Hissar, 16201, 24860, 24966, *Duthie* 4285 (DD); Khanak, 25088; Jind, 24780; Mahendragarh, 16304; Sohna, *T. A. Rao* 11068; Yamunanagar, 27598a.

2. *D. prostratus* (Poir.) Nees in Wall. Pl. As. Rar. 3: 81, 1832; Bremek. in Verh. Nederl. Ak. Wet. (II) 45(1): 16, 1948; Maheshw. 273; Puri 103. *Ruellia prostrata* Poir. in Lamk. Encycl. 6: 349, 1804; FBI 4: 411. *Ruellia prostrata* Poir. var. *dejecta* Clarke in FBI 4: 412; Duthie 2: 57.

Very like the last species. Found as undergrowth among bushes.

Flowers : July-Jan.

Jind, 16111; Karnal, 24618; Senipura forest, *V. J. Nair* 23136.

8. ELYTRARIA Michaux

E. acaulis (Linn. f.) Lindau in Engler & Prantl. Pflanzenfam. 1: 304, 1897; Maheshw. 265. *Justicia acaulis* Linn. f. Suppl. 84, 1781. *Elytraria crenata* Vahl, Enum. 1: 106, 1804; FBI 4: 394. *Tubiflora acaulis* Kuntze, Rev. Gen. 500, 1891; Duthie 2: 51.

Common shade loving scapigerous herbs. Flowers white.

Flowers : July-Sept., Feb.-March.

Daber, 15866; Dadri, 20512; Karnal, 24609; Murthal forest (Sonpet), *V. J. Nair* 23331; Rohtak, 16382; Sohna, 11067.

9. ERANTHEMUM Linn.

E. nervosum R. Br. Prodr. 477, 1810; Maheshw. 275. *Daedalacanthus nervosus* (R. Br.) T. Anders. in Jour. Linn. Soc. 9: 487, 1867; FBI 4: 419; Bamber 62; Sabnis 547; Parker 382; Duthie 2: 63.

Erect undershrubs. Flowers blue. Bracts white with green veins. Capsules clavate, 4-seeded.

On Siwalik ranges. Sometimes grown in gardens for the handsome flowers.

Flowers : March-April.

Hoshiarpur, *Aitchison* s. n. (DD).

10. HEMIADELPHIS Nees

H. polyspermus Nees in Wall. Pl. As. Rar. 3: 80, 1832; Bremek. in Dansk Bot. Arkiv, 20: 66, 1961. *Hygrophila polysperma* (Nees) T. Anders. in Jour. Linn. Soc. 9: 456, 1867; FBI 4: 496; Bamber 537; Sabnis 547; Duthie 2: 56.

Procumbent annuals. Flowers bluish white in spikes. Common in moist places.

Flowers : Nov.-May.

Beas, *J. N. Vohra* 11315; E. Punjab, *O. P. Sharma* s. n. (DD); Gurgaon, 25272; Hoshiarpur, *Aitchison* 610 (DD); Jind, 25856; Patiala, *T. A. Rao* 10947; Sirsa, 18936; Yamunanagar, 26395.

11. HEMIGRAPHIS Nees

1. Corolla tubular, ventricose; longer filaments glabrous in the upper part

1. *H. hirta*

1. Corolla narrowly tubular, funnel-shaped; longer filaments densely bearded in the upper part by white hairs

2. *H. latebrosa* var. *rupestris*

1. **H. hirta** (Vahl) T. Anders. in Jour. Linn. Soc. 9: 462, 1867; FBI 4: 422; Maheshw. 272; Duthie 2: 60.

Prostrate hairy herbs. Flowers pale blue or light violet.

Common as undergrowth among bushes.

Flowers : April-May.

Ludwa, 26462; Yamunanagar, 27524.

2. **H. latebrosa** Nees var. **rupestris** Clarke in FBI 4: 424; Bamber 190; Duthie 2: 61.

Erect velvety herbs. Flowers in sessile dense heads. Corolla tube white or yellowish white, limb blue. Seeds hairy when wet.

Only on Siwaliks.

Kalka, *T. A. Rao* 10877.

12. HYGROPHILA R. Br.

H. auriculata (Schumach.) Heine in Kew Bull. 16: 172, 1962. *Barleria auriculata* Schumach. in Schumach. & Tonn. Beskr. Guin. Pl. 285, 1827. *Hygrophila spinosa* T. Anders. in Thw. Enum. 225, 1860; FBI 4: 408; Bamber 174. *Asteracantha longifolia* Nees in Wall. Pl. As. Rar. 3: 90, 1832; Duthie 2: 55.

Stout herbs. Leaves in whorls of 6 with a stout spine in each axil. Flowers whorled in each node, bluish purple or purplish white.

Common in ditches in stagnant water.

Flowers and fruits : Sept.-Feb.

Bhiwani, 19010; Chandigarh, T. A. Rao 10855; Hansi, 16162; Kurukshetra, J. N. Vohra 9875.

13. JACOBINIA Moric.

J. tinctoria Hemsl. Biol. Centr. Am. Bot. 2: 522, 1882; Sabnis 548; Parker 391; Maheshw. 268.

Erect or diffuse shrubs with swollen nodes. Flowers vermilion or orange in terminal and axillary thyrses.

Ornamental.

Flowers : Rainy season.

Ferozpur. Peck 3393 (DD), 3585 (DD).

14. LEPIDAGATHIS Willd.

- | | |
|---|----------------------------|
| 1. Flowers in globose cluster near the base of the stem; capsules 2-seeded | 2. <i>L. hamiltoniana</i> |
| 1. Flowers in not globose cluster near the base; capsules 4-seeded: | |
| 2. Erect undershrubs; bracts and calyx lobes glandular hairy; bracts spine-tipped | 1. <i>L. cuspidata</i> |
| 2. Diffuse or prostrate herbs; bracts not spine-tipped: | |
| 3. Bracts striate; one of the calyx segments larger than the rest | 4. <i>L. purpuricantis</i> |
| 3. Bracts not striate; all calyx segments equal | 3. <i>L. hyalina</i> |

1. **L. cuspidata** Nees in Wall. Pl. As. Rar. 3: 97, 1832; FBI 4: 519; Parker 389; Duthie 2: 73.

Undershrubs. Flowers white with purple spots, in dense spikes. Seeds hairy when wetted.

In sub-Himalayan areas.

Pathankot, *Anonymous* (DD).

2. **L. hamiltoniana** Wall. ex Nees in Wall. Pl. As. Rar. 3: 96, 1832; FBI 4: 516; Duthie 2: 72.

Erect, 16-45 cm high. Leaves linear. Bracts with long white hairs, spinescent. Calyx lobes spinescent. Flowers white, spotted purple inside.

Not common.

Flowers : Nov.-Feb.

Sohna, *T. A. Rao* 11065.

3. *L. hyalina* Nees in Wall. Pl. As. Rar. 3: 111, 1832; FBI 4: 521; Bamber 174; Sabnis 548; Duthie 2: 74.

Herbs. Leaves pendent, undulate. Flowers in dense spikes, white with brown spots on the palate.

Hoshiarpur, *Aitchison* 591 (DD).

4. *L. purpuricaulis* Nees in Wall. Pl. As. Rar. 3: 96, 1832; FBI 4: 519; Bamber 174; Sabnis 547; Duthie 2: 73.

Diffuse perennials. Flowers in dense axillary spikes, white with brownish spots on the palate.

Hoshiarpur, *Aitchison* 590 (DD).

15. PERISTROPHE Nees

P. bicalyculata (Retz.) Nees in Wall. Pl. As. Rar. 3: 113, 1832; FBI 4: 554; Bamber 170; Sabnis 549; Maheshw. 269; Puri 106; Duthie 2: 79. *Dianthera bicalyculata* Retz. in Act. Holm. 297, t. 9, 1775.

Erect herbs. Stems 6-angled, rough. Flowers bright rose in trichotomous panicles. Capsules 4-seeded. Seeds rugose.

Common undergrowth in jungles.

Local name : Atrilal.

Flowers and fruits : Nov.-March.

Dabwali, 26172; Daryapur, *M. A. Rau* 3545; Gidderbha, 26253; Gurgaon, *T. A. Rao* 11010; Hissar, 18785, 24879; Jind, 24768; Kanana (Dadri), 20534, 25148; Panipat, 18610, 24684; Rewari, 20775.

16. JUSTICIA Linn.

- | | |
|---|-------------------------------|
| 1. Bracts, bracteoles and calyx lobes obtuse; plants glabrous or nearly so: | |
| 2. Erect or ascending herbs; leaves linear lanceolate, obtuse | 3. <i>J. quinqueangularis</i> |
| 2. Diffuse herbs; leaves broadly elliptic, tip rounded | 2. <i>J. peploides</i> |
| 1. Bracts bracteoles and calyx lobes very acute; plants more or less hairy: | |
| 3. Capsules of two kinds in most of the axils, normal capsules 4-seeded, oblong with rounded ends; abnormal capsules 1-seeded, winged | 1. <i>J. heterocarpa</i> |
| 3. Capsules not heterocarpous | 4. <i>J. vahlii</i> |

1. *J. heterocarpa* T. Anders. in Jour. Linn. Soc. 7: 41, 1864; FBI 4: 531; Bamber 169.

A grey pubescent herb, erect or diffuse. Flowers axillary. Calyx 5-parted. Seeds of normal capsules rough, almost hairy, those of abnormal capsules smooth.

Ferozapore.

This is mentioned on the authority of C. B. Clarke and Bamber. I have not seen any specimen from the area.

2. *J. peploides* (Nees) T. Anders. in Jour. Linn. Soc. 9: 511, 1867. *Rostellularia peploides* Nees in Wall. Pl. As. Rar. 3: 101, 1832. *Justicia quinqueangularis* Koen. var. *peploides* (Nees) Clarke in FBI 4: 536; Duthie 2: 77.

Common weed in fields. Petals pinkish.

Flowers and fruits : Oct.-Dec.

Badopal, 24941; Bahuna, 18898; between Jind and Hansi, 24823; Bhundsi, T. A. Rao 11035a; Bitmada, 25032; Gurgaon, 25252; Hissar, 18800; Panipat, 18669, 18670; Pinjaur, T. A. Rao 10861; Rohtak, V. J. Nair 23164.

3. *J. quinqueangularis* Koen. ex Roxb. Fl. Ind. 1: 134, 1820; FBI 4: 536; Sabnis 548; Maheshw. 271; Duthie 2: 77. *Rostellularia quinqueangularis* (Koen. ex Roxb.) Nees in Wall. Pl. As. Rar. 3: 101, 1832.

Slender herbs. Flowers in terminal spikes, pink. Common in fields and moist places.

Flowers and fruits : Sept.-Feb.

E. Punjab, O. P. Sharma, s. n. (DD); Fatehbad, 24925, M. A. Rau 3577; Hoshiarpur, Aitchison s. n. (DD).

4. *J. vahlii* Roth, Nov. Pl. Sp. 14, 1821. *J. diffusa* Willd. var. *vahlii* Clarke in FBI 4: 538.

Narrow leaved plant. Flowers reddish white. On canal banks and moist places.

Flowers and fruits : Sept.-March.

Bhundsi, T. A. Rao 11035 B; Fatehbad, 24925 A; Firozapore Jhirka, T. A. Rao 11153; Jhabua, 20710; Kanana (Dadri), 20552, 25142; Mahendragarh, 20604; Sohna, T. A. Rao 11070; Taoru, T. A. Rao 11090.

17. RUELLIA Linn.

R. tuberosa Linn. Sp. Pl. 635, 1753; Nair & Nair in Bull. Bot. Surv. India 5: 222, 1963; Maheshw. 272; Duthie 2: 59.

Annual herbs. Inflorescence a dichasial cyme. Flowers blue or bluish white, showy.

This species is rapidly spreading in the south-eastern part of the Punjab.

Flowers and fruits : Aug.-Feb.

Bhiwani, 16332; Hissar, V. J. Nair 21544; Rohtak, V. J. Nair 23168; Sirsa, 18987.

18. RUNGIA Nees

R. pectinata (Linn.) Nees in DC. Prodr. 11: 470, 1841; Maheshw. 269;

Puri 105. *Justicia pectinata* Linn. Amoen. Acad. 4: 299, 1759. *Rungia parviflora* (Linn.) Nees var. *parviflora* Clarke in. FBI 4: 550; Sabnis 548.

Prostrate herbs in moist places. Flowers blue.

Flowers and fruits : Nov.-May.

Binghol, 25820; Hansi, 25884; Hoshiarpur, Aitchison 479 (DD); Ludwa, 26429; Sirsa, Anonymous 1886 (DD).

87. VERBENACEAE

- | | |
|---|------------------------|
| 1. Inflorescence cymose panicle: | |
| 2. Ovary 4-celled or less: | |
| 3. Leaves digitate; pyrene 1 | 13. <i>Vitex</i> |
| 3. Leaves simple: | |
| 4. Fruits indehiscent: | |
| 5. Corolla bilipped or 4-5-lobed; stamens 4, didynamous: | |
| 6. Flowers small sweet scented in drooping racemes | 3. <i>Citharexylum</i> |
| 6. Flowers not in drooping racemes: | |
| 7. Drupes with one 4-celled pyrene: | |
| 8. Flowers up to 2.5 cm long | 6. <i>Gmelina</i> |
| 8. Flowers less than 1 cm long | 10. <i>Premna</i> |
| 7. Drupes with four 1-celled pyrene: | |
| 9. Calyx in flower rotate | 7. <i>Holmskioldia</i> |
| 9. Calyx in flower campanulate | 4. <i>Clerodendrum</i> |
| 5. Corolla not bilipped; stamens equal: | |
| 10. Calyx enlarged in fruit; corolla white; drupes with one 4-celled pyrene | 11. <i>Tectona</i> |
| 10. Calyx not enlarging in fruit; corolla red or purple; drupes with four 1-celled pyrenes | |
| 4. Fruits breaking up into 4 valves | 1. <i>Callicarpa</i> |
| 2. Ovary 8-celled | 2. <i>Caryopteris</i> |
| | 5. <i>Duranta</i> |
| 1. Inflorescence capitate or spikate: | |
| 11. Creeping herbs; calyx 2-4-lobed; fruits dry, hard | 9. <i>Phyla</i> |
| 11. Erect plants: | |
| 12. Spikes capitate; calyx small; fruits drupaceous, succulent | 8. <i>Lantana</i> |
| 12. Spikes elongate; calyx tubular, half the length of the corolla tube; fruits separating into four 1-seeded pyrenes | 12. <i>Verbena</i> |

1. CALLICARPA Linn.

C. macrophylla Vahl, Symb. 3: 13, t. 53, 1794; FBI 4: 568; Sabnis 550; Bamber 63; Parker 394; Maheshw. 281; Duthie 2: 86.

Medium-sized shrubs. Leaves woolly tomentose beneath. Flowers pink. Fruits white succulent.

Flowers : Rainy season.

Local name : Sumali, Denthar, Bauna.

Found only in sub-Himalayan tracts.

Kalesar, Gupta s. n. (DD).

2. CARYOPTERIS Bunge

C. walllichiana Schauer in DC. Prodr. 11: 625, 1847; FBI 4: 597; Bamber 64; Sabnis 552; Parker 401; Maheshw. 280; Duthie 2: 95.

Large shrubs. Leaves crenate, canescent. Flowers blue or purple or rarely purplish-white, sweet scented.

On Siwalik hills; rarely cultivated in gardens.

Local name : Karni.

Flowers : Feb.-April.

Hoshiarpur, *Aitchison* 568 (DD); Nabha, 36746.

3. CITHAREXYLUM Mill.

C. quadrangulare Jacq. Enum. Pl. Carib. 26, 1760; Sabnis 550.

Large shrubs or small trees. Flowers white, sweet scented.

Grown in gardens.

Ferozapore, *Barvain* 5608 (DD).

4. CLERODENDRUM Linn.

1. Leaves opposite:

2. Corolla double

2. Corolla single:

3. Panicles axillary and only very rarely terminal:

4. Calyx minutely toothed

4. Calyx lobed about half way down

3. Panicles terminal

1. Leaves whorled; stem hollow

1. *C. philippinum*

3. *C. inerme*

4. *C. phlomidis*

5. *C. viscosum*

2. *C. indicum*

1. **C. philippinum** Schauer in DC. Prodr. 11: 667, 1847; Howard et Powell in *Taxon* 17: 54, 1968. *C. fragrans* auct. Pl.

Shrubs up to 2.5 m high. Panicles dense, corymbose. Calyx with subulate lobes; corolla irregularly salver-shaped, white to purple.

Grown in gardens. Often runs wild.

Flowers : Sept.-April.

Hissar, *V. J. Nair* 21626; Hoshiarpur, *Aitchison* 558 (DD).

2. **C. indicum** (Linn.) Kuntze, Rev. Gen. Pl. 586, 1891; Maheshw. 284. *Siphonanthus indica* Linn. Sp. Pl. 109, 1753. *Clerodendrum siphonanthus* R. Br. in Ait. Hort. Kew (ed. 2) 4: 65, 1812; FBI 4: 595; Sabnis 551; Parker 399; Duthie 2: 93.

Tall shrubs. Leaves narrowly lanceolate. Panicles lax, terminal, much elongate. Calyx lobes lanceolate, acute. Corolla narrowly funnel-shaped, white. Fruits bluish-green when ripe, emerging out of the enlarged red calyx.

In sub-Himalayan tracts. Sometimes grown as ornamental.

Local name : Barangi.

Flowers : July-Aug.

Hoshiarpur, *Aitchison* 528 (DD).

3. **C. inerme** Gaertn. Fruct. 1: 271, t. 57, f. 1, 1788; FBI 4: 589; Sabnis 551; Parker 398; Maheshw. 283.

Rambling evergreen shrubs. Leaves obovate, elliptic or orbicular.

obtuse or emarginate. Calyx subtruncate at the base of the spongy drupe. Flowers white. Stamens and style much exerted, crimson.

Grown in gardens as hedge.

Hissar, *Raizada* s. n. (DD).

4. *C. phlomidis* Linn. f. Suppl. 292, 1781; Parker 396; Duthie 2: 92; Maheshw. 283; Puri 108. *C. phlomooides* Willd. Sp. Pl. 3: 386, 1800; FBI 4: 590; Bamber 63; Sabnis 551. Sometimes this is referred to as *C. multiflorum* (Burm.) O. Ktze.

Large shrubs with quadrangular stems. Leaves ovate deltoid, sinuate or serrate. Flowers white or pinkish white, fragrant, on axillary dichotomous cymes.

Common in dry southern part of the area.

Local name : Arni.

Flowers : Aug.-Feb.

Bawal, *T. A. Rao* 11129; Hansi, 25039; Hissar, 16189, 18753; *Harsukh*, s. n. (DD), *Raizada* 21021 (DD); Jind, 24756; Kurukshetra, *J. N. Vohra* 9895; Patiala, *Ganga Singh*, s. n. (DD); Rohtak, 16374.

5. *C. viscosum* Vent. Jard. Malm. t. 25, 1803. *C. infortunatum* auct (non Linn.).

Shrubs. Flowers white tinged with red. Corolla densely pubescent outside. Calyx in fruit enlarged, red and coriaceous.

Kalesar. *Parker* s. n. (DD).

5. DURANTA Linn.

D. repens Linn. Sp. Pl. 637, 1753; Maheshw. 279; Puri 108. *D. plumeri* Jacq. Select. Ann. 186, t. 176, 1763; FBI 4: 560; Parker 401; Duthie 2: 95.

Thorny shrubs often grown as fence. Flowers bright blue. Fruit yellow.

Flowers : Profusely March-May, otherwise all round the year.

Panipat, 24667.

6. GMELINA Linn.

G. arborea Roxb. Hort. Beng. 46, 1814; FBI 4: 581; Bamber 5; Parker 393; Maheshw. 282; Duthie 2: 88.

Medium sized trees. Leaves ovate acuminate. Flowers reddish brown or yellow. Calyx densely hairy. Corolla tubular below, throat obliquely funnel-shaped. Fruits succulent, yellow.

I have seen only a few trees planted along the Nizampur-Khetri Road.

Local name : Kumhar.

Flowers : March-April.

Nizampur, 20680, 20681.

7. HOLMSKIOLDIA Retz.

H. sanguinea Retz. Obs. 6: 31, 1791; FBI 4: 596; Bamber 64; Sabnis 552; Parker 399; Maheshw. 285; Duthie 2: 94.

Straggling shrubs. Leaves ovate acuminate, base truncate. Flowers bright red in short axillary cymes. Fruits deeply 4-lobed at the apex.

Hoshiarpur Siwaliks.

Flowers: Oct.-Dec.

Hoshiarpur, Aitchison 559 (DD).

8. LANTANA Linn.

- | | |
|--|--|
| 1. Stems not prickly; flowers always purplish white or white in ovoid-oblong condensed spike | 1. <i>L. indica</i> |
| 1. Stems prickly; flowers red, orange or yellow not white in permanently capitate spikes | 2. <i>L. camara</i> var. <i>aculeata</i> |

1. **L. indica** Linn. Sp. Pl. 627, 1753. *L. indica* Roxb. Hort. Beng. 46, 1814; FBI 4: 562; Bamber 63; Sabnis 549; Parker 392; Maheshw. 277; Puri 107; Duthie 2: 83.

A few sheets are marked Punjab in DD.
Sometimes this is called *L. salvifolia* Jacq.

2. **L. camara** Linn. var. *aculeata* (Linn.) Moldenke in Torreyia 34: 9, 1934; Santapau in Bull. bot. Surv. India 3: 19, 1961; Puri 107; Maheshw. 277. *L. camara* auct.; FBI 4: 562 (non Linn.); Bamber 63; Sabnis 549; Parker 392; Duthie 2: 84.

Straggling shrubs with characteristic odour. Drupes black. Grown in gardens and often runs wild.

Local name: Panch Phuli.

Flowers: Throughout the year.

Hansi, 25879; Hissar, V. J. Nair 19982; Hoshiarpur, T. A. Rao 10733.

9. PHYLA Lour.

P. nodiflora (Linn.) Greene in Pittonia 4: 46, 1899; Maheshw. 276; Puri 107. *Verbena nodiflora* Linn. Sp. Pl. 20, 1753. *Lippia nodiflora* (Linn.) A. Rich. in Michx. Fl. Bor. Amer. 2: 15, 1803; FBI 4: 563; Bamber 538; Sabnis 549; Duthie 2: 84.

Creeping herbs in moist situations. Leaves spatulate, serrate. Flowers sessile, white or pink on densely packed spikes.

Local name: Bukan, Mokna, Bhuiokra.

Flowers and fruits: April-Dec.

Ferozapore, 36372; Gohana, V. J. Nair 23141; Jind, 15882; Karnal, V. J. Nair 21550; Rathal, 16127; Rohtak, 16361, 16364; Sampla, 20009; Tikri (Rohtak Dist.), V. J. Nair 21641.

10. PREMNA Linn.

P. mucronata Roxb. Fl. Ind. 80, 1832; Parker 395; Maheshw. 282; Duthie 2: 89. *P. latifolia* Roxb. var. *mucronata* (Roxb.) Clarke in FBI 4: 578; Sabnis 551.

Small trees. Leaves petiolate, base cuneate, drying black. Flowers greenish yellow in trichotomous panicles. Fruits globose, black.

Local name : Bhankar, Geen.

Flowers : April-June.

Hoshiarpur, *R. N. Parker* 15045 (DD); Yamunanagar 27556.

11. TECTONA Linn. f.

T. grandis Linn. f. Suppl. 151, 1781; FBI 4: 570; Bamber 5; Sabnis 550; Parker 401; Maheshw. 280; Duthie 2: 87.

The teak. Only known in plantation.

Flowers : May-Oct. *Fruits* : Sept.-Nov.

Hoshiarpur, *Aitchison* 490 (DD).

12. VERBENA Linn.

- | | |
|---|--------------------------|
| 1. Leaves pinnately lobed; flowers in spikes | 1. <i>V. officinalis</i> |
| 1. Leaves dissected to linear segments; flowers in heads, elongating only in fruits | 2. <i>V. pinnatifida</i> |

1. **V. officinalis** Linn. Sp. Pl. 20, 1753; FBI 4: 565; Bamber 22; Sabnis 549; Maheshw. 278; Duthie 2: 85.

Erect pubescent herbs with quadrangular stems. Leaves variously lobed. Flowers small, blue, in dense bracteate terminal spikes.

Flowers : Aug.-Nov.

Hissar, *V. J. Nair* 19923; Karnal, *J. N. Vohra* 9923; Khansala, *V. J. Nair* 23262; Sonpet, *V. J. Nair* 23341.

2. **V. bipinnatifida** Schau. in DC. Prodr. 11: 553, 1847; Maheshw. 278.

The common garden *Verbena* with purplish red flowers.

Flowers : March-April.

Faridkot, 36554.

13. VITEX Linn.

V. negundo Linn. Sp. Pl. 638, 1753; FBI 4: 583; Bamber 72; Sabnis 551; Parker 391; Maheshw. 281; Puri 107; Duthie 2: 90.

Small slender trees. Branches quadrangular with whitish creamy tomentum. Leaves 3-5-foliolate, glabrous above, white tomentose beneath.

Flowers bluish purple.

Grown in gardens as hedge.

Local name : Nirgundi, Marvan.

Hissar, V. J. Nair 21502; Hoshiarpur, Aitchison 380 (DD); Yamunaganar, 27549.

88. LABIATAE

- 1. Stamens 4, all perfect, declinate; anther cells confluent; attachment of nuts basilar:
 - 2. Lower lip of corolla much longer than the upper lip, deflexed, concave, boat-shaped or saccate:
 - 3. Upper lip of corolla very short, obtusely 3-4-toothed, lower elongated and boat-shaped; calyx slightly 2-lipped, upper 3 and lower 2 toothed or the upper lip rounded and reflexed:
 - 4. Filaments free 12. *Plectranthus*
 - 4. Filaments connate in a sheath at their bases round the style 3. *Coleus*
 - 3. Upper lip of corolla very short, 2-lobed, lobes flat, lower lip deflexed, saccate; calyx teeth sub-equal 5. *Hypsis*
 - 2. Lower lip of corolla much declinate flat or slightly concave, generally narrower but hardly longer than the upper lip:
 - 5. Racemes paniculate; calyx suberect or declinate in fruit; upper lobe widest, margins not decurrent on the tube 9. *Basilicum*
 - 5. Flowers in thyrsus; calyx deflexed in fruit, upper lobe widest, large, ovate recurved, the margins decurrent on the tube 11. *Ocimum*
- 1. Stamens erect or spreading or ascending:
 - 6. Stamens 4, perfect:
 - 7. Corolla lobes 4; stamens equal or subequal:
 - 8. Calyx 5-toothed; stamens exserted:
 - 9. Corolla lobes unequal; whorls in glomerate or paniculate or solitary interrupted spikes; filaments bearded or naked 13. *Pogostemon*
 - 9. Corolla lobes equal; whorls in slender continuous spikes; filaments bearded 4. *Dysophylla*
 - 8. Calyx 5-partite, the lobes plumose; filaments naked, included 2. *Colebrookea*
 - 7. Corolla lobes 5, 2-lipped; stamens didynamous:
 - 10. Anterior pair of stamens longer:
 - 11. Calyx 13-nerved; anthers 2-celled, cells short; calyx equally 5-toothed 8. *Micromeria*
 - 11. Calyx 5-10-nerved; anthers 2-celled, cells linear:
 - 12. Upper lip of corolla short and flat; stamens exserted; the cells of the upper pair dimidiate, of the lower transverse 1. *Anisomeles*
 - 12. Upper lip of corolla hooded; often woolly:
 - 13. Calyx 5-toothed; anthers divergent 6. *Lamium*
 - 13. Calyx 6-10-toothed; anthers divergent 7. *Leucas*
 - 10. Posterior pair of stamens longer; calyx 15-nerved 10. *Nepeta*
 - 6. Stamens 2, anterior pair only perfect; anthers linear, separated by an elongated connective or one cell abortive; calyx 2-lipped 14. *Salvia*

1. ANISOMELES R. Br.

A. *indica* (Linn.) Ktze. Rev. Gen. Pl. 512, 1891; Mukerjee in RBSI 14: 152, 1940; Maheshw. 289; Puri 109. *Nepeta indica* Linn. Sp. Pl. 571, 1753. *Anisomeles ovata* R. Br. in Ait. Hort. Kew. 3: 364. 1881; FBI 4: 672; Bamber 211; Sabnis 554; Duthie 2: 109.

Erect undershrubs; branches hairy 4-winged. Flowers red.

Frequent on canal banks.

Flowers : Sept.-Nov.

Badopal, 24950; Bankhandi, *T. A. Rao* 10757; Bhakra-Nangal, *T. A. Rao* 10817; Jind, 16116, 18694, 24737; Mahendragarh, 16290; Panipat, 24680.

2. COLEBROOKEA Sm.

C. oppositifolia Sm. *Exot. Bot.* 2: 111, t. 115, 1805; *FBI* 4: 642; *Parker* 403; *Duthie* 2: 107.

Woolly shrubs. Leaves velvety, wrinkled above, grey woolly beneath. Flowers functionally dioecious, white. Calyx lobes plumose. Corolla slightly shorter than calyx. Stamens exerted in female flowers.

Found only on Siwalik hills.

Local name : Pansra, Shukardana.

Flowers : Jan.-April.

Bankhandi, *T. A. Rao* 10756.

3. COLEUS Lour.

1. Leaves not succulent, not aromatic, mottled with purple or sanguineous stains

1. Leaves succulent, highly aromatic, green

2. *C. blumei*
1. *C. amboinicus*

1. **C. amboinicus** Lour. *Fl. Coch.* 372, 1790; *Duthie* 2: 121. *C. aromaticus* Benth. in *Wall. Pl. As. Rar.* 2: 15, 1830; *FBI* 4: 625; *Bamber* 202.

Small herbs. Leaves broadly ovate, crenate. Flowers light purple. Stamens exerted.

Grown in gardens. Its leaves are reputed carminative and useful in the treatment of the urinary system.

Local name : Pathor Chur.

Flowers : March-June.

Bhatinda, 36563.

2. **C. blumei** Benth. *Lab.* 56, 1832.

Garden ornamentals. The leaves are exceedingly beautiful.

Flowers : March-May.

Nabha, 36751.

4. DYSOPHYLLA Bl.

D. crassicaulis Benth. in *Wall. Pl. As. Rar.* 2: 30, 1830; *FBI* 4: 640; *Bamber* 191; *Duthie* 2: 106.

Strongly aromatic annuals with lanceolate toothed leaves. Flowers small, blue or bluish white, crowded on cylindrical terminal spikes.

In marshy places.

Flowers: Sept. onwards.

Gurgaon, 25271; Soan River bed, *T. A. Rao* 10800.

5. HYPTIS Jacq.

H. suaveolens (Linn.) Poit. in Ann. Mus. Par. 7: 472, t. 29, f. 2, 1806; FBI 4: 630. *Ballota suaveolens* Linn. Syst. (ed. 10) 1100, 1759.

Rigid hairy annuals with ovate sinuate leaves. Flowers in heads.

I have seen only one specimen from the area.

Pinjaur, *T. A. Rao* 10862.

6. LAMIUM Linn.

L. amplexicaule Linn. Sp. Pl. 579, 1753; FBI 4: 679; Bamber 540.

Glabrescent annuals; lower leaves petiolate and lobulate, upper sessile.

Flowers in axillary heads.

Hoshiarpur, *Aitchison* s. n. (DD); Laroha (Jullunder), *T. S. Bakshi* 16 (DD).

7. LEUCAS R. Br.

- | | |
|---|---------------------------|
| 1. Longer side of calyx mouth anterior | 3. <i>L. usticaefolia</i> |
| 1. Longer side of calyx mouth posterior: | |
| 2. Calyx tube bent, abruptly deflexed; head narrow; petiole short | 2. <i>L. nutans</i> |
| 2. Calyx tube erect; heads narrow; petiole about 13 mm | 1. <i>L. cephalotes</i> |

1. **L. cephalotes** (Roth) Spreng. Syst. 2: 743, 1825; FBI 4: 689; Bamber 215; Mukerjee in RBSI 14(1): 168, 1940; Duthie 2: 114; Maheshw. 289; Puri 110. *Phlomis cephalotes* Roth, Nov. Sp. 262, 1821.

Erect aromatic annuals. Hairs spreading. Flowers white in globose whorls. Bracts ciliate.

Frequent near cultivated places.

Local name: Guldoda, Dhurpi Sag, Phuman.

Flowers and fruits: Sept.-April.

Barwala, *V. J. Nair* 19286; Bitmada, 25028; Kanana (Dadri), 20527; Karnal, *J. N. Vohra* 8876; Mahra (Rohtak), *V. J. Nair* 21700; Mahendragarh, 2620; Panipat, 24709.

2. **L. nutans** (Roth) Spreng. Syst. 2: 743, 1825; FBI 4: 688; Bamber 214; Duthie 2: 114.

Small diffuse, pubescent herbs. Hairs on veins of leaves long. Flowers white in terminal or subterminal whorls. Bracts ciliate.

In sandy places.

Flowers and fruits: Oct.-March.

Bhiwani, 19005; Dadri, 16262; Dhauj, *T. A. Rao* 11084; Hoshiarpur,

T. A. Rao 10744; Loharu, 20501; Mahendragarh, 20584, 20642; Narnaul, 20648.

3. *L. urticaefolia* R. Br. Prodr. 504, 1810; FBI 4: 680; Bamber 214; Sabnis 555; Maheshw. 290; Puri 110; Duthie 2: 112.

Erect hairy herbs. Flowers in round axillary clusters.

Not very common. In sandy places of drier districts.

Flowers and fruits: Oct.-March.

Hissar, 24855, *Harsukh* 20696 (DD), *Raizada* 20980 (DD), *M. A. Rau*, 3484.

8. MICROMERIA Benth.

M. biflora Benth. Lab. 378, 1832; FBI 4: 650; Bamber 68; Sabnis 553.

Prostrate or erect hairy herbs like *Thymus*. Leaves sessile. Flowers pink, 1-4 in the axils.

Only on Hoshiarpur Siwaliks.

Flowers: Sept.-May.

Hoshiarpur, *Anonymous* (DD).

9. BASILICUM Moench.

B. polystachyum (Linn.) Moench. Meth. Suppl. 143, 1802; Bennett in Indian Forest. 95: 9, 1969. *Ocimum polystachyon* Linn. Mant. 567, 1767. *Moschosma polystachyum* (Linn.) Wall. Pl. As. Rar. 2: 13, 1830; FBI 4: 612; Nair & Nair in Bull. bot. Surv. India 8: 351, 1966; Puri 109.

Slender annuals. Stems angled, scabrid. Flowers purplish white. Peduncles filiform.

Flowers: Oct.

Between Jind and Hansi, 24788; Hissar, 24898.

10. NEPETA Linn.

- | | |
|---|--------------------------|
| 1. Whorls dense flowered, subglobose, in interrupted spikes; flowers shortly pedicelled; 3 upper calyx teeth triangular, aristate | 2. <i>N. hindostana</i> |
| 1. Whorls few flowered, not in interrupted spikes; flowers long-pedicelled; 3 upper calyx teeth broadly triangular, acute | 1. <i>N. bombaiensis</i> |

1. *N. bombaiensis* Dalz. in Dalz. et Gibs. Bomb. Fl. 209, 1861; FBI 4: 661.

Laxly villous herbs on old walls and rocks. Flowers purplish white.

Laroha (Jullunder), *T. S. Bakshi* 14 (DD); Hoshiarpur, *Aitchison* s. n. (DD).

2. *N. hindostana* (Roth) Haines, Bot. Bih. & Or. 744, 1922; Maheshw. 290. *Glechoma hindostana* Roth, Nov. Pl. Sp. 258, 1821. *Nepeta ruderalis*

Hamilt. ex Benth. Lab. 475, 1832; FBI 4: 661; Bamber 206; Duthie 2: 117.

Velvety annuals. Stems 4-angled. Flowers blue or purple.

Local name : Billy Lotan, Boya.

Flowers and fruits : Oct.-March.

E. Punjab, *Singh* s. n. (DD); Hoshiarpur, *Parker* s. n. (DD).

11. OCIMUM Linn.

- | | |
|---|------------------------|
| 1. Seeds not mucilagenous when wetted; calyx glabrous inside | 3. <i>O. sanctum</i> |
| 1. Seeds mucilagenous when wetted; calyx hairy inside: | |
| 2. Plants up to 50 cm tall, very hairy on the calyx, inflorescence and stem; fruiting calyx 3 mm long | 2. <i>O. canum</i> |
| 2. Plants more than 60 cm tall; not very hairy; fruiting calyx 6 mm long | 1. <i>O. basilicum</i> |

1. ***O. basilicum*** Linn. Sp. Pl. 597, 1753; FBI 4: 608; Bamber 175; Sabnis 552; Morton in Jour. Linn. Soc. 58: 234, 1962; Duthie 2: 99; Maheshw. 286. *O. americanum* Linn. Sp. Pl. (ed. 2) 833, 1763.

Strongly aromatic glabrous herbs. Corolla white. Nutlets pitted. Grown in gardens.

Local name : Tulsi, Baburi.

Flowers : Dec.-March.

Bankhandi, *T. A. Rao* 10772; Barnala, 36588; Bhundsi, *T. A. Rao* 10772; Hissar, 34533, *M. A. Rau* 3488; Kurukshetra, *J. N. Vohra* 9888; Patiala, *T. A. Rao* 10939.

2. ***O. canum*** Sims in Bot. Mag. t. 2452, 1824; FBI 4: 607; Duthie 2: 99; Morton in Jour. Linn. Soc. 58: 234, 1962. *O. americanum* auct. non Linn.; Maheshw. 286; Puri 108.

Aromatic herbs with pubescent, striate and quadrangular stems. Flowers subsessile in closely arranged whorls.

In waste places.

Flowers : Aug.-March.

Dadri, 20517; Khanak, 16258; Narnaul, 20649; Rohtak, 16373.

3. ***O. sanctum*** Linn. Mant. 1: 85, 1767; FBI 4: 609; Bamber 175; Maheshw. 287; Puri 108; Duthie 2: 98.

Aromatic undershrubs. Thyrsus green or purple.

The sacred Tulsi. Grown in houses and near temples.

Flowers : Aug.-Dec.

12. PLECTRANTHUS L'Herit.

P. japonicus (Burm. f.) Koidz. in Bot. Mag. Tokyo 43: 386, 1929. *Scutellaria japonica* Burm. f. Fl. Ind. 130, 1768. *Plectranthus coetsa*

Buch.-Ham. ex Don, Prodr. 117, 1825; FBI 4 : 619; Bamber 202; Duthie 2 : 103.

Perennial aromatic herbs. Flowers white with purplish dots.

Found on Siwalik hills.

Flowers : Oct.-March.

Kasauli, T. A. Rao 1092, Gupta s. n. (DD).

13. POGOSTEMON Desf.

P. benghalense (Burm. f.) O. Kuntze, Rev. Gen. Pl. 529, 1891; Merr. in Philip. Jour. Sci. 19 : 379, 1921. *Origanum benghalense* Burm. f. Fl. Ind. 128, t. 38, f. 3, 1768. *Pogostemon plectranthoides* Desf. in Ann. Mus. Paris 2 : 155, 1803; FBI 4 : 632; Bamber 191; Sabnis 553; Parker 404; Duthie 2 : 105.

Large perennials. Leaves aromatic velvety. Flowers pinkish white in cylindric spikes; stamens lilac, protruding far out, bearded.

Common on Siwalik hills.

Hoshiarpur, Aitchison 472 (DD).

14. SALVIA Linn.

1. Leaves more than 3 cm long

1. Leaves less than 3 cm long

1. *S. plebeia*

2. *S. santolinaefolia*

1. **S. plebeia** R. Br. Prodr. 501, 1810; FBI 4 : 655; Bamber 197; Sabnis 553; Maheshw. 288; Duthie 2 : 118.

Erect annual herbs. Stems 4-angled, grooved. Leaves ovate to oblong-lanceolate, crenate. Flowers purplish white in spicate inflorescence.

Common in moist places.

Local name : Sathi, Sok.

Flowers and fruits : Feb.-May.

Badopal, 34545; Gidarbha (Ferozpur Dist.), 27836; Hansi, 26540; Hissar, V. J. Nair 19965; Hoshiarpur, Aitchison 574 (DD); Kera, V. J. Nair 21566; Yamunanagar, 26386.

2. **S. santolinaefolia** Boiss. Diagn. Pl. Orient. Ser. 1 : 13, 1859; Puri 110; Maheshw. 288. *S. aegyptiaca* Linn. var. *pumila* Hook. f. in FBI 4 : 656; Duthie 2 : 119. *S. aegyptiaca* auct. non Linn.; Bamber 197; Sabnis 554.

A scabrous shrub in crevices of rocks of dry hills.

Punjab, Harsukh s. n. (DD), Anonymous (DD).

89. PLANTAGINACEAE

PLANTAGO Linn.

1. Corolla lobes ovate acute:
 2. Scapes shorter than leaves or rarely equalling it; prostrate herbs; leaves less than 7 cm long 2. *P. baphula*
 2. Scapes mostly longer than leaves; erect; leaves 7-15 cm long 1. *P. amplexicaulis*
 1. Corolla lobes rounded, concave, obtuse 3. *P. ovata*

1. *P. amplexicaulis* Cav. Ic. 2: 22, t. 125, 1793; FBI 4: 706 (excl. syn. *P. baphula*); Pilger in Pflanzenr. 102: 310, 1937; Bamber 426; Sabnis 555; Duthie 2: 123 (pro parte).

Leaves serrulate, hairy. Peduncles very variable; flowers white. Capsules 1-2-seeded.

Flowers and fruits: April-May.

Barwala, *V. J. Nair* 19868; Choudhriwas, *V. J. Nair* 19381; Fatehbad, 25955; Hissar, *V. J. Nair* 19359, 19361; Lambi, 26182; Rewari, 20756; Sarsoudh, *V. J. Nair* 19888; Tatwandi, *V. J. Nair* 19847.

2. *P. baphula* Edgew. in Hook. Jour. Bot. 2: 285, 1840. *P. amplexicaulis* sensu Hook. f. in FBI 4: 706 (pro parte); Duthie 2: 123 (pro parte). *P. amplexicaulis* Cav. var. *baphula* (Edgew.) Pilger in Notizblat. Bot. Gart. Mus. Berlin Dahlem 9: 90, 1102, 1927. *P. salina* Decne. in DC. Prodr. 13: 720, 1852.

Much smaller than the above species. Plants almost glabrous. Flowers white.

Rare. Found only in hard ground.

Flowers: March-May.

Dadri, 20504, 20507; Sirsa, *W. Koelz* 1591 (DD).

3. *P. ovata* Forsk. Fl. Aeg.-Arab. 31, 1775; FBI 4: 707; Bamber 426; Sabnis 555; Maheshw. 291; Duthie 2: 124.

Villous acaulescent herbs. Flowers white.

Seeds used in dysentery.

Local name: Isphagul.

Flowers: Nov.-April.

Lalpur, *Inayat's brother* s. n. (DD).

90. NYCTAGINACEAE

1. Thorny shrubs; bracts coloured 2. *Bougainvillea*
 1. Unarmed plants; bracts not coloured:
 2. Erect herbs; flowers showy with a calyx-like campanulate involucre 3. *Mirabilis*
 2. Climbing or diffuse herbs; flowers not showy without an involucre 1. *Boerhavia*

1. BOERHAVIA Linn.

1. Flowers sessile; leaves in unequal pairs:
 2. Leaves usually ovate, obtuse, 2.5 cm long and a little less in breadth, usually pubescent or puberulous 1. *B. diffusa*
 2. Leaves usually lanceolate acute, much smaller in size, usually glabrous 3. *B. repens*
1. Flowers on capillary pedicels; leaves in equal pairs arrow-shaped:
 3. Fruits glandular on the ribs 2. *B. chinensis*
 3. Fruits not glandular on the ribs; but with a crown of stalked globose glands 4. *B. verticillata*

1. *B. diffusa* Linn. Sp. Pl. 3, 1753; Maheshw. 292; Puri 111; Duthie 2 : 127. *B. repens* sensu Bamber 555; Sabnis 555. *B. repens* var. *diffusa* et var. *procumbens* Hook. f. in FBI 4 : 709.

Diffuse perennial herbs. Roots fusiform. Leaves opposite, orbicular or broadly ovate, rounded at the apex or slightly acuminate, reddish pubescent. Flowers pink, in umbels of 8-10. Fruits ribbed, ribs glandular.

Common everywhere.

Flowers : Aug.-Nov.

Agrua, 18830; Barwala, *V. J. Nair* 19266; Bhatinda, 26309, 27740; Bhiwani, 16333; Hansi, 16188; Hissar, *Duthie* 4327 (DD); Hoshiarpur, *T. A. Rao* 10713; Rathal, 16132; Yamunanagar, 27554.

2. *B. chinensis* (Burm. f.) Druce in Rep. Bot. Exch. Club Brit. Isles 1913 (3) : 415, 1914. *Valeriana chinensis* Burm. f. Fl. Ind. 15, t. 6, f. 3, 1768. *Boerhavia repanda* Willd. Sp. Pl. 1 : 22, 1797; FBI 4 : 709; Bamber 586; Maheshw. 293; Puri 111; Duthie 2 : 128.

A pubescent herb with long internodes. Leaves deltoid ovate, acuminate, margins repand-sinuate, glabrous above, pubescent beneath. Flowers 3-8 together on umbels. Perianth pink. Stamens 4 or 5, exerted.

Fruits ribbed glandular.

Common in jungles and among bushes.

Flowers and fruits : Sept.-Dec.

Bahmanwas (Rohtak Dist.), *V. J. Nair* 23122; Bitmada, 25020; Daber, 15862; Jind, 24772; between Jind and Hansi, 18717; Karnal, 24601; Panipat, 18616; Yamunanagar, 26413.

3. *B. repens* Linn. Sp. Pl. 3 : 1753; FBI 4 : 709.

A more delicate plant than *B. diffusa*. Inflorescence and flowers are like those of *B. diffusa* except for the smaller size. Fruits a little longer and more glandular.

Not common. Found only in hard soil.

Flowers and fruits : Sept.-Feb.

Bhiwani, 16333; Hissar, 24892; Fatehbad, 25965; Mojukheda, 16049.

4. *B. verticillata* Poir. Encyc. Method. 5 : 56, 1804; FBI 4 : 710; Bamber 586; Puri 111; Duthie 2 : 128.

A perennial climber among bushes; branches glabrous; leaves somewhat succulent, ovate or sub-orbicular. Flowers white or red. Stamens not so much exerted as in *B. chinensis*. Fruits with a crown of globose glands.

Flowers: Aug.-Nov.

Hansi, 18735, 18737; Hissar, 24867; Rohtak, 16377.

2. BOUGAINVILLEA Juss.

B. spectabilis Willd. Sp. Pl. 2 : 348, 1799; Parker 410; Maheshw. 292; Puri 111; Duthie 2 : 129.

Large shrubs, suberect with scrambling branches or climbing. Leaves broadly ovate. Bracts purple. Cultivated in gardens.

Flowers: Almost round the year except colder months.

Hissar, *V. J. Nair* 19963.

3. MIRABILIS Linn.

M. jalapa Linn. Sp. Pl. 177, 1753; Maheshw. 292; Puri 111; Duthie 2 : 129.

Herbs with tuberous tap root. Stems somewhat fleshy, glabrous. Leaves deltoid ovate. Flowers dark crimson, white or yellow. Grown in gardens.

Hissar, *V. J. Nair* 19984.

91. ILLECEBRACEAE

HERNIARIA Linn.

H. hirsuta Linn. Sp. Pl. 218, 1753; FBI 4 : 712; Sabnis 555.

Prostrate hirsute herbs. Leaves very small. Flowers very minute, green in axillary clusters.

Flowers: Feb.-April.

Fatehbad, 26009.

92. AMARANTHACEAE

1. Leaves alternate:

2. Fruits usually many seeded; stamens united at the base:

3. Fruits circumsciss

3. Fruits indehiscent

2. Fruits 1-seeded:

4. Stamens connate at the base; pseudostaminodes present

4. Stamens free; pseudostaminodes absent:

5. Flowers bisexual; styles 2-3 mm long

5. Flowers unisexual; styles nearly absent

5. *Celosia*

7. *Deeringia*

2. *Aerva*

8. *Digera*

4. *Amaranthus*

1. Leaves opposite:

6. Perfect flowers 1-3, along with stellate hooked spines which are modified sterile flowers;

- | | |
|---|-------------------------|
| 7. Pseudostaminodes absent | 11. <i>Paspalia</i> |
| 7. Pseudostaminodes present | 6. <i>Cyathula</i> |
| 6. Flowers not with stellate spines: | |
| 8. Anthers dithecal: | |
| 9. Pseudostaminodes absent; stamens 1-2 | 10. <i>Nothosaerva</i> |
| 9. Pseudostaminodes present: | |
| 10. Sepals spinescent; flowers deflexed | 1. <i>Achyranthes</i> |
| 10. Sepals not spinescent; flowers not deflexed | 2. <i>Aerva</i> |
| 8. Anthers monotheical: | |
| 11. Flowers in ovoid terminal heads; stigmas bifid | 9. <i>Gomphrena</i> |
| 11. Flowers in axillary clustered heads; stigmas capitate | 3. <i>Alternanthera</i> |

1. ACHYRANTHES Linn.

- | | |
|---|------------------------|
| 1. Back of pseudostaminode with a fimbriate scale just below the apex; wings of bracteole adnate to spine | 1. <i>A. aspera</i> |
| 1. Back of the pseudostaminodes without scale; wings of bracteole adnate only at the base of the spine | 2. <i>A. bidentata</i> |

1. *A. aspera* Linn. Sp. Pl. 204, 1753; FBI 4: 730; Bamber 181; Sabnis 557; Puri 114; Duthie 2: 140.

Erect herbs with striate subcylindric branches. Leaves obovate. Flowers greenish white on elongated spikes, deflexed.

The spiny bracteoles help in the dispersal of the fruit by animals. Common in waste places and along road sides. Typical ruderal.

Local name: Latjira, Chichira.

Flowers and fruits: Aug.-Nov.

Amritsar, *J. N. Vohra* 11345; Bhatinda, 26302; Dabwali, 26163; Gurgaon, *T. A. Rao* 11008, 25255; Hansi, 16149; Hissar, 18801, *Duthie* 4331 (DD); Karnal, 14642.

2. *A. bidentata* Bl. Bijdr. 545, 1825; FBI 4: 730; Bamber 181.

Erect flaccid herbs with purplish tinge.

Only in sub-Himalayan tracts.

Flowers: Aug.-Nov.

Bankhandi, *T. A. Rao* 10760.

2. AERVA Forsk.

- | | |
|---|------------------------------|
| 1. Climbing herbs; flowers bisexual | 4. <i>A. sanguinolenta</i> |
| 1. Erect herbs flowers bisexual and unisexual or unisexual: | |
| 2. Inflorescence panicle of spikes: | |
| 3. Panicle naked | 2. <i>A. persica</i> |
| 3. Panicle not naked, leafy | 3. <i>A. pseudotomentosa</i> |
| 2. Inflorescence axillary spikes | 1. <i>A. lanata</i> |

1. *A. lanata* (Linn.) Juss. in Ann. Mus. Paris 11: 131, 1808; FBI 4: 728; Bamber 315; Maheshw. 294; Puri 113; Duthie 2: 139. *Achyranthes lanata* Linn. Sp. Pl. 204, 1753.

Erect woolly herbs, rarely prostrate. Leaves ovate orbicular.

I have included this species on the authority of Bamber. The plant

is common in adjoining places and could therefore be found in the area also.

2. *A. persica* (Burm. f.) Merr. in Phil. Jour. Sc. 10: 348, 1921. *Iresine persica* Burm. f. Fl. Ind. 222, 1768. *I. javanica* Burm. f. Fl. Ind. 212, t. 65, 1768. *Aerva javanica* (Burm. f.) Juss. in Ann. Mus. 2: 131, 1808; FBI 4: 727; Bamber 123; Sabnis 557; Puri 113. *A. tomentosa* Forsk. Fl. Aeg.-Arab. 170, 1775; Parker 412; Maheshw. 294; Duthie 2: 138.

A tomentose shrub up to 1.5 m high. Flowers unisexual dioecious, dull white, sessile on naked panicles of long spikes which sometimes reach a length of 20 cm. Perianth greenish white inside.

Common in open sandy areas. One of the early pioneers on sand dunes.

Local name : Boikalan.

Flowers and fruits : Feb.-Nov.

Bhatinda, 26301; Giddarbha (Ferozpur Dist.), 26252; Hissar, *Duthie* 4328 (DD); *Harsukh*, 20691 (DD); Narnaul, 20656; Sirsa, 18918; Talwandi, *V. J. Nair* 19349.

3. *A. pseudotomentosa* Blatt. et Hallb. in JBNHS 26: 817, 1919; *Nair & Nair* in Bull. bot. Surv. India 5: 219, 1964; Puri 113.

A white tomentose shrub like the last species but distinguished by the following characters; narrower leaves; panicles not naked; spikes very short, stout and often compound; perianth red inside.

Very common in dry loose sandy soil. An early pioneer on sand dunes.

Local name : Boikalan.

Flowers and fruits : Feb.-Nov.

Barwala, *V. J. Nair* 19298; Fatehbad, 19009; Hissar, 18757, 18805, *M. A. Rau* 3491; Lambi, 26333; Rohtak, *V. J. Nair* 29725; Tosham, 25044.

4. *A. sanguinolenta* (Linn.) Bl. Bijdr. 547, 1825; Merr. Interp. Herb. Amb. 214, 1917. *Achyranthes sanguinolenta* Linn. Sp. Pl. (ed. 2) 294, 1762. *A. scandens* Roxb. Fl. Ind. 2: 509, 1824. *Aerva scandens* (Roxb.) Moq. in DC. Prodr. 13 (2): 300, 1849; FBI 4: 727; Bamber 586; Sabnis 557; Duthie 2: 138.

Adpressedly hairy perennial herbs. Flowers bisexual or rarely female. Stigmas 2.

Flowers : April-Oct.

Bhakra-Nangal, *T. A. Rao* 10824; Damla (Ambala Dist.), 26419.

3. ALTERNANTHERA Forsk.

1. Tepals spine-tipped

1. Tepal segments not spine-tipped:

2. *A. pungens*

- | | |
|---|-----------------------------|
| 2. Tepals 1-nerved; pseudostaminodes dentate | 1. <i>A. paronychioides</i> |
| 2. Tepals at least obscurely 3-nerved: | |
| 3. Pseudostaminodes entire; leaves green; hairs smooth | 3. <i>A. sessilis</i> |
| 3. Pseudostaminodes dentate; leaves coloured brown, purplish or variegated; hairs dentate | 4. <i>A. ficoidea</i> |

1. *A. paronychioides* St. Hil. Voy. Bres. 2: 439, 1833; Santapau in JBNHS 54: 476, 1956; Nair & Nair in Bull. bot. Surv. India 5: 219, 1964.

Prostrate herbs rooting at nodes; young parts villous. Leaves spatulate with distinct petioles. Flowers in dense glomerate white heads.

This is a tropical American weed spreading rapidly in the area.

Flowers and fruits: Aug.-March.

Gohana, *V. J. Nair* 29726; Hissar, *V. J. Nair* 19904, 19971; Sonpet, *V. J. Nair* 23286, 23346.

2. *A. pungens* H. B. K. Nov. Gen. Sp. 2: 206, 1819; Melville in Kew Bull. 13: 174, 1958; Nair & Nair Bull. bot. Surv. India 5: 219, 1964; Maheshw. 298. *Illecebrum pungens* (H.B.K.) Spr. Syst. Veget. 1: 820, 1825. *A. repens* Link, Enum. Pl. Hort. Berol. 1: 54, 1821.

Creeping herbs often rooting at nodes and adpressed to the ground beneath. Spikes 1-5 in axils, globose or oblong, shining white.

Native of tropical America now spreading rapidly in the area.

Flowers and fruits: Oct.-April.

Gurgaon, 20817, *T. A. Rao* 11015; Hissar, 17191, 18786, 24850, *V. J. Nair* 19975; Jind, 26512; Rai (Sonpet), *V. J. Nair* 23301.

3. *A. sessilis* (Linn.) DC. Cat. Hort. Monsp. 27, 1813; FBI 4: 731; Bamber 543; Sabnis 557; Maheshw. 299; Puri 114; Duthie 2: 142. *Gomphrena sessilis* Linn. Sp. Pl. 225, 1753. *Alternanthera triandra* Lamk. Encycl. 1: 95, 1783.

Prostrate herbs adpressed to the ground. Leaves shortly stalked, linear-lanceolate. Spikes sessile, axillary, white.

Common in all wet places and as weed of cultivation.

Flowers: April-Oct.

Daber, 15868; Daryapur, *M. A. Rau* 3548; Fatehbad, 18835; Gurgaon, 11017; Hissar, *Duthie* 4333 (DD), *Raizada* 21040 (DD); Karnal, *J. N. Vohra* 8884; Mahendragarh, 20556.

4. *A. ficoidea* (Linn.) R. Br. ex Griseb. Fl. Br. West. Ind. 67, 1864. *Gomphrena ficoidea* Linn. Sp. Pl. 225, 1753. *Alternanthera ficoidea* R. Br. ex Roem. & Sch. Syst. 5: 555, 1819 (non Beauv. 1807).

Perennial herbs. Flowers white or yellowish, shining.

Native of Brazil, cultivated as an ornamental.

Flowers: Feb.-April.

Khanna, 35977.

4. AMARANTHUS Linn.

- | | |
|---|----------------------------|
| 1. Leaf axils with spines; tepals 5; stamens 5 | 2. <i>A. spinosus</i> |
| 1. Leaf axils without spines; tepals 3; stamens 3: | |
| 2. Flowers both in the axils and on terminal spikes | 3. <i>A. viridis</i> |
| 2. Flowers only in the axils | 1. <i>A. roxburghianus</i> |

1. *A. roxburghianus* Nevski in Acta Inst. Bot. Acad. Sc. URSS Ser. 1, Fasc. 4: 311, 1937; Nair in JBNHS. *A. polygonoides* auct. non Linn.; Roxb. Fl. Ind. 3: 602, 1832; Nair in Bull. bot. Surv. India 8: 89, 1966. *A. polygamus* auct. non Linn.; Hook. f. FBI 4: 721; Bamber 314; Sabnis 556; Duthie 2: 137.

A much branched prostrate or decumbent herb. Leaves obovate somewhat 2-lobed at the apex, usually with a bristle between the lobes. Flowers few in axillary clusters. Bracts shorter than tepals.

A weed of cultivation. At times used as a pot herb.

Local name: Choli.

Flowers: April-Sept.

Bahuna, 18893; Fatehbad, 18837, 18857; Hissar, Duthie 4329 (DD), M. A. Rau 3478; Lambi, 26203; Mojukheda, 26070.

2. *A. spinosus* Linn. Sp. Pl. 991, 1753; FBI 4: 718; Bamber 313; Puri 112; Maheshw. 296; Duthie 2: 133.

Erect spiny herbs. Branches streaked or tinged red. Leaves ovate, glabrous. Flowers unisexual, in dense axillary clusters or in terminal interrupted spikes. Bracts longer than tepals.

Common in waste places; typical ruderal.

Local name: Kantiari Cholai.

Flowers: July-March.

Jind, 15876; Mahendragarh, 20606; Rewari, 20758.

3. *A. viridis* Linn. Sp. Pl. (ed. 2) 1405, 1763 (ex parte); FBI 4: 720; Bamber 314; Sabnis 556; van Steenis in Fl. Males. Ser. 1, 4: 594, 1954; Duthie 2: 136. *A. gracilis* Desf. Tabl. Bot. 43, 1804: Thellung in Asch. & Gr. Syn. 5: 335, 1914; Maheshw. 297.

Annual ascending or prostrate herbs. Leaves long-petioled, ovate rhomboid, cuneate. Flowers greenish, lower clusters axillary, upper in interrupted spikes or panicles. Utricles corrugated, included in the perianth.

Local name: Cholai, Safed Sag.

Flowers and fruits: Feb.-Oct.

Badopal, 34538; Bhiwani, 16334; Hissar, V. J. Nair 19808; Lambi, 26240; Mahendragarh, 20628; Rewari, 20748; Sirsa, 26583; Yamunanagar, 27573.

5. CELOSIA Linn.

C. argentea Linn. Sp. Pl. 205, 1753; FBI 4: 714; Bamber 313; Sabnis 556; Maheshw. 295; Puri 112; Duthie 2: 131. *C. cristata* Linn. *ibid.* 205, 1753.

Erect annual herbs. Leaves oblong lanceolate. Spikes solitary, paired or very rarely 3 together; cylindrical, conic, dense flowered.

Common weed in fields.

Flowers and fruits: Oct.-Dec.

Bahmanwas, *V. J. Nair* 23127; Bitmada, 25030; Chandigarh, *T. A. Rao* 10850; Hissar, *Raizada* 20995 (DD); Kanana (Dadri), 25147; Mahendragarh, 20565; Panipat, 18674.

6. CYATHULA LOUR.

C. tomentosa (Roth) Moq. in DC. Prodr. 13 (2): 327, 1849; FBI 4: 722; Bamber 180. *Achyranthes tomentosa* Roth, Nov. Sp. 167, 1821.

Tomentose or woolly undershrubs. Heads globose, spicate. Staminodes fimbriate.

Found only on Siwalik hills.

Flowers: Sept.-Feb.

Kasauli, *T. A. Rao* 10911.

7. DEERINGIA R. Br.

D. amaranthoides (Lamk.) Merr. Int. Herb. Amb. 211, 1917. *Achyranthes amaranthoides* Lamk. Encycl. 1: 548, 1785. *Deeringia celosioides* R. Br. Prodr. 413, 1810 (non Hassk.); FBI 4: 714; Sabnis 556; Parker 409; Duthie 2: 130.

Scandent shrubs. Leaves ovate lanceolate. Flowers in racemes. Tepals and stamens reflexed, yellowish.

Found only in Siwalik Hills.

Flowers: July-Nov.

Hoshiarpur, *Aitchison* 510 (DD); Pathankot, *P. N. Mehra* s. n. (DD).

8. DIGERA Forsk.

D. muricata (Linn.) Mart. Beitr. Amar. 77, 1825; Puri 112. *Achyranthes muricata* Linn. Sp. Pl. (ed. 2) 295, 1762. *A. alternifolia* Linn. Mant. 50, 1767. *Digera arvensis* Forsk. Fl. Aeg.-Arab. 65, 1775; FBI 4: 717; Bamber 572; Sabnis 556; Duthie 132. *D. alternifolia* (Linn.) Asch. in Schweinf. Beitr. Fl. Aeth. 180, 1867.

Glabrous or slightly pubescent annuals. Leaves petioled, ovate oblong. Bracts ovate lanceolate with a strong mid-rib and scarious margin.

Flowers red or pink. Lower flowers with a pair of palmatifid scales. Fruits globose with persistent styler bases.

Common in moist soil as a weed in gardens. Found also in sandy places. The adaptability of the plant to survive in various habitats seems remarkable.

Flowers and fruits: During and after the rains.

Agrua, 18831; Bahuna, 18902; Barwala, *V. J. Nair* 19284; Hissar, *Harsukh* s. n. (DD), *Raizada* 21039 (DD), 20997 (DD); Narnaul, 25216; Panipat, 18625.

9. GOMPHRENA Linn.

G. celosioides Mart. Beitr. Amar. 93, 1825; *Raizada* in JBNHS 48 : 675, 1949; *Nair & Nair* in Bull bot. Surv. India 5: 220, 1964; Maheshw. 298.

Annual ascending erect herbs. Leaves subsessile, spatulate, or oblong-lanceolate. Heads sessile, at first globose gradually elongating into a spike, white. Receptacles woolly.

This is a Brazilian herb established in several parts of India. Adapted to dry habitats.

Flowers: July-Dec.

Badopal, 10230; Bahadurgarh, *V. J. Nair* 21671; Gurgaon, 25270, *T. A. Rab* 11014; Hissar, 24862; Karnal, *J. N. Vohra* 8889; Nilokheri, 15838.

10. NOTHOSAERVA Wight

N. brachiata (Linn.) Wight, Icon. 6: 1, 1853; FBI 4: 726; Bamber 181; Duthie 2: 139; Puri 114; Maheshw. 299. *Achyranthes brachiata* Linn. Mant. 1: 50, 1767.

Erect annual herbs. Leaves opposite, elliptic or ovate elliptic, green turning red before drying. Flowers in dense spikes often clustered in axils, white, 3-5-merous.

Common in moist shady situations.

Flowers and fruits: May-Nov.

Daryapur, *M. A. Rau* 3547, 3549; Hansi, 18719; Hissar, 24880; Jind, 24739; Karnal, 24631.

11. PUPALIA Juss.

P. lappacea (Linn.) Juss. in Ann. Mus. 2: 132, 1803; FBI 4: 724; Bamber 557; Sabnis 557; Maheshw. 300; Puri 114; Duthie 2: 141. *Achyranthes lappacea* Linn. Sp. Pl. 204, 1753.

A straggling herb, commonly found in jungles and dry situations. Leaves ovate or elliptic, acute or acuminate; tomentose on both sides.

Spikes terminal and in highest leaf axils. Flowers clustered, sessile. Seeds shining, dark brown.

Flowers: Rainy season.

Bhatinda, 27803; Hissar, 16196, *Raizada* 20968 (DD); Hoshiarpur, *T. A. Rao* 10720; Karnal, 24610, *J. N. Vohra* 3894; Loharu, 20091; Yamunanagar, 26403.

93. CHENOPODIACEAE

- | | |
|---|-----------------------|
| 1. Climbing plants | 2. <i>Basella</i> |
| 1. Erect plants: | |
| 2. Female flowers without tepals | 1. <i>Atriplex</i> |
| 2. Female flowers with tepals: | |
| 3. Leaves flat: | |
| 4. Leaves not scale-like; stem not jointed: | |
| 5. Tepals in fruits with transverse wings | 6. <i>Kochia</i> |
| 5. Tepals in fruits without wings: | |
| 6. Flowers unisexual | 8. <i>Spinacia</i> |
| 6. Flowers bisexual: | |
| 7. Flowers with bracts and bracteoles; tepals in fruits become thickened and hard at the base | 3. <i>Beta</i> |
| 7. Flowers without bracts and bracteoles; tepals do not become hard at base | 4. <i>Chenopodium</i> |
| 4. Leaves scale-like; stem jointed | 5. <i>Haloxylon</i> |
| 3. Leaves fleshy, semiterete: | |
| 8. Tepals with transverse wings in fruit | 7. <i>Salsola</i> |
| 8. Tepals not winged in fruit | 9. <i>Sueda</i> |

1. ATRIPLEX Linn.

A. crassifolia C. A. Mey in Ledeb. Fl. Alt. 4: 309, 1833; FBI 5: 6; Bamber 315; Sabnis 558; Puri 115.

Annual herbs. Stems whitish. Flowers unisexual; males without bracts; females with two bracts; males alone possess tepals.

Rare.

Flowers: July-Aug.

Hissar, *Raizada* s. n. (DD); near Rathal, 16119.

2. BASELLA Linn.

B. alba Linn. Sp. Pl. 272, 1753; van Steenis Fl. Males. Ser. 1, 5: 300, 1958. *B. rubra* Linn. Sp. Pl. 272, 1753; FBI 5: 20; Bamber 612; Duthie 2: 147.

A glabrous, perennial, climbing herb tinged with red. Leaves ovate, fleshy. Flowers pink on axillary spikes.

Leaves cooked as vegetables.

Local name: Poi.

Flowers: Feb.-May.

Hissar, *V. J. Nair* 14758, 21518; Yamunanagar, 26415.

3. BETA Linn.

B. vulgaris Linn. forma **cicla** (Linn. Sp. Pl. 222, 1753 pro sp.) Backer in Fl. Mal. Ser. 1, 4 : 100, 1949. *B. vulgaris* Linn. in FBI 5 : 5; Bamber 497. *B. benghalensis* Roxb. Fl. Ind. 2 : 59, 1824; Duthie 2 : 147.

Succulent glabrous herbs. Flowers in slender panicles. Tepals with membranous margins.

Cultivated for the leaves which are eaten as spinach.

Local name : Palak.

Flowers : Feb.-April.

Badopal, 34542; Hissar, *V. J. Nair* 19919; Rohtak, 26372.

B. vulgaris Linn. forma **rapa** (Dum. Fl. Belg. 21, 1827 pro sp.) Backer in Fl. Mal. Ser. 1, 4 : 100, 1949.

Roots fleshy, red, edible. Cultivated during the cold months.

Local name : Chukundari.

I have seen the roots being sold in markets.

4. CHENOPODIUM Linn.

- | | |
|---|---------------------------|
| 1. Aromatic plants; young parts powdery; ovary with yellow glands; stigmas 3-5 | 2. <i>C. ambrosioides</i> |
| 1. Non-aromatic; young parts covered with powdery vesicles; ovary without yellow glands; stigmas 2: | |
| 2. Leaves toothed; seeds smooth | 1. <i>C. album</i> |
| 2. Leaves entire or lobed; seeds minutely papillate | 3. <i>C. murale</i> |

1. **C. album** Linn. Sp. Pl. 219, 1753; FBI 5 : 3; Bamber 346; Sabnis 557; Maheshw. 302; Puri 115; Duthie 2 : 143.

Common in moist places and in gardens as a weed during the cold season.

Local name : Bhatua.

Flowers : Feb.-May.

Bhatinda, 25804; Dabwali, 26163; Fatehbad, 25981; Jind, 24741; Lambi, 26218; Panipat, 24672; Rohtak, 20040.

2. **C. ambrosioides** Linn. Sp. Pl. 219, 1753; FBI 5 : 4; Sabnis 558; Nair & Nair in Bull. bot. Surv. India 5 : 220, 1964; Maheshw. 301.

Large erect herbs. Leaves oblong-lanceolate, shallowly serrate or entire. Flowers in clusters of 10-25 in the axils of narrow bract-like leaves and forming a leafy panicle.

Native in tropical America, naturalized throughout the humid parts of Northern India. In Punjab it is common on canal banks and road sides.

Flowers : Sept.-Nov.

Dabwali, 26171; Fatehbad, 24918; Hansi, 16160; Hissar, *V. J. Nair* 21514; Karnal, *J. N. Vohra* 9924; Lambi, 26332; Nilokheri, 15855; Rohtak, 16367; Yamunanagar, 27564.

3. **C. murale** Linn. Sp. Pl. 219, 1753; FBI 5 : 4; Bamber 387; Sabnis 558; Maheshw. 302; Duthie 2 : 144.

Much branched annuals. Leaves and stems shining. Flowers greenish. Common in moist places. Used as vegetable.

Local name : Bathua.

Flowers : Feb.-April.

Badopal, *V. J. Nair* 19834; Fatehbad, 26016; Hissar, *V. J. Nair* 19816; Lambi, 26219; Patiala. *T. A. Rao* 10949.

5. HALOXYLON Bunge

H. recurvum Bunge ex Boiss. Fl. Or. 4 : 449, 1879; FBI 5 : 15; Bamber 70; Sabnis 559; Parker 415; Puri 116.

A straggling gregarious shrub. Leaves ellipsoid. Flowers axillary in interrupted spikes. Tepals and bracts fleshy.

Indicator of saline soils.

Flowers : Nov.-Dec.

Sirsa, *Anonymous* 10055 (DD)-10060 (DD), 10063 (DD)-10068 (DD), 10073 (DD), 10096 (DD).

6. KOCHIA Roth

1. Leaves succulent
1. Leaves not succulent

1. *K. indica*
2. *K. trichophylla*

1. **K. indica** Wt. Ic. t. 1791, 1852; FBI 5 : 11; Bamber 316; Sabnis 558; Maheshw. 301; Duthie 2 : 144.

Pubescent erect herbs forming clumps. Flowers pink, usually paired. Tepals woolly.

Common in dry saline areas when freshly irrigated. Eaten by cattle and camels.

Flowers and fruits : March-Nov.

Gohana, *V. J. Nair* 23153; Hissar, *M. B. Raizada* 21047 (DD), *V. J. Nair* 21545; Nilokheri, 15852; Rajpura, *T. A. Rao* 10921; Tohana, 24979.

2. **K. trichophylla** Hort. ex in Tribune Hort. 11 : 445, 1907; Bailey, *Encycl. Hort.* 1753, 1958.

Common *Summer Cypress* of gardens. Ovoid conical or globose plants. Leaves alternate, linear, sharply pointed, bright green, with long white hairs on the margin. Flowers polygamous.

7. SALSOLA Linn.

S. baryosma (Roem. & Schult.) Dandy in F. W. Adr. Fl. Pl. Anglo-Egypt Sud. 1 : 111, 1950; Maheshw. 302. *Chenopodium baryosmum*

Roem. & Schult. Syst. 6 : 269, 1820. *Salsola foetida* Del. ex Boiss. Fl. Or. 4 : 961, 1879; FBI 5 : 18; Bamber 124; Sabnis 559; Parker 414; Puri 116; Duthie 2 : 146.

A perennial undershrub or shrub up to 1 m high. Leaves fleshy, subglobose, densely crowded. Flowers axillary green. Tepals in fruit white, membranous.

Common in saline areas. The ash of the plant is used for washing clothes.

Local name : Lana, Lani, Nonunja.

Flowers and fruits : Dec.-March.

Bhiwani, 19004; Fatchbad, 18906; Hissar, *Duthie* 4335 (DD), *Raizada* 20960 (DD), *V. J. Nair* 14783, 19909.

8. SPINACIA Linn.

S. oleracea Linn. Sp. Pl. 1027, 1753; FBI 5 : 6; Bamber 388; Sabnis 558; Maheshw. 304; Puri 116; Duthie 2 : 147.

Erect annuals. Radical leaves large, cauline lanceolate and narrow. Staminate flowers in spikes, female in clusters.

Cultivated during the cold months for its leaves which are used as vegetable.

Local name : Palak.

Flowers and fruits : Feb.-June.

Badopal, 25924.

9. SUEDA Forsk.

S. fruticosa (Linn.) Forsk. Fl. Aeg.-Arab. 70, 1775; FBI 5 : 13; Bamber 123; Sabnis 559; Parker 413; Maheshw. 303; Puri 115; Duthie 2 : 145. *Salsola fruticosa* Linn. Sp. Pl. (ed. 2) 324, 1762.

Succulent shrubs. Leaf scars prominently raised. Leaves linear oblong, fleshy. Flowers minute, foetid, in interrupted spikes.

Common in moist swampy and saline soils. Often gregarious. Ash of the plant is sometimes used for washing clothes.

Local name : Lana, Lani.

Flowers and fruits : Aug.-Dec.

Balabgarh, *T. A. Rao* 8280; Bhiwani, 16358; Hansi, 18740; Hissar, *V. J. Nair* 14782; Panipat 18662; Rathal, 16126; Sirsa, *Drummond* 36956 (DD), 36957 (DD).

94. POLYGONACEAE

1. Woody plants; leaves minute
1. Herbaceous plants; leaves conspicuous;
 2. Tepals 4-5-merous
 2. Tepals 3-merous

1. *Calligonum*
2. *Polygonum*
3. *Rumex*

1. CALLIGONUM Linn.

C. ploygonoides Linn. Sp. Pl. 530, 1753; FBI 5: 22; Bamber 84; Sabnis 560; Parker 418; Puri 116; Duthie 2: 159.

A large shrub. Branches somewhat zig-zag, slender, twigs green, fascicled, leafless looking. Leaves very minute. Flowers in fascicles. Tepals white. Stamens pink or red. Fruits clothed with branched bristles.

A common psalmophyte in the arid regions of the area. In places bordering Rajasthan near Rajgarh this is the dominant plant covering large tracts. One of the pioneers on dunes on which it sometimes grows at the very top. A very useful plant for reclamation of sandy areas. Camels are fond of the tender shoots of the plant.

Local name: Phog.

Flowers: March-April. *Fruits*: May.

Bhiwani, 20062; Jhumpa, 34516; Loharu, 20076; Mahendragarh, 20580.

2. POLYGONUM Linn.

- | | |
|--|--|
| 1. Prostrate plants; flowers in axillary clusters | 5. <i>P. plebeium</i> |
| 1. Erect or decumbent plants; flowers in terminal racemes or spikes: | |
| 2. Plants white tomentose, bracts woolly | 4. <i>P. lanigerum</i> |
| 2. Plants not white tomentose: | |
| 3. Ochrea and leaf margins not ciliate | 2. <i>P. glabrum</i> |
| 3. Ochrea and leaf margins ciliate: | |
| 4. Flowers white; tepals not glandular | 1. <i>P. barbatum</i> subsp. <i>gracile</i> |
| 4. Flowers pink; tepals glandular | 3. <i>P. hydrophibet</i> subsp. <i>microcarpum</i> var. <i>lenticulare</i> |

1. ***P. barbatum*** Linn. subsp. ***gracile*** Danser in Bull. Jard. Bot. Buitenz. (Ser. 3) 8: 146, 1927; Maheshw. 306. *P. barbatum* in FBI 5: 37; Bamber 228; Sabnis 560; Duthie 2: 154. *P. serrulatum* in FBI 5: 38 (excl. var. *donii*; non Lagasca, nec Meissn. nec Miq.).

An erect glabrous annual. Leaves up to 18 cm long, lanceolate or linear lanceolate. Stipules strigose with ciliate mouth; length of cilia exceeds that of tube. Flowers in stout short racemes, white.

Common in wet places and canal banks.

Flowers: July-Nov.

Hansi, 16136; Hissar, 24931; Jind, 15886; Karnal, J. N. Vohra 9920; Panipat, 18666.

2. ***P. glabrum*** Willd. Sp. Pl. 2: 447, 1799; FBI 5: 34 (pro parte); Bamber 227; Maheshw. 306; Puri 117; Duthie 2: 153.

Erect glabrous herbs; leaves lanceolate, acuminate, gland-dotted. Flowers pink in terminal panicles.

Common on canal banks.

Flowers and fruits: Oct.-March.

E. Punjab, Gupta s. n. (DD).

3. *P. hydropiper* Linn. subsp. *microcarpum* Danser var. *lenticulare* Danser in *Jar. Bot. Buitenz.* (ser. 3) 8 : 189, 1927; Maheshw. 306; Duthie 2 : 155. *P. hydropiper* Meissn. in DC. *Prodr.* 14 : 109, 1856 (pro parte); FBI 5 : 39; Bamber 229; Sabnis 561.

A glabrous annual. Nodes swollen, rooting when prostrate. Stipules very shortly ciliate. Raceme filiform, flexuous, glandular. Tepals pink, very glandular.

In wet places.

Flowers and fruits : Oct.-March.

Bitmada, 25024; Hoshiarpur, *Aitchison* 47 (DD).

4. *P. lanigerum* R. Br. *Prodr.* 419, 1810; FBI 5 : 35; Bamber 548; Maheshw. 305; Duthie 2 : 152.

Branches zig-zag clothed with snow-white tomentum. Stipules membranous, mouth unequal, sparsely ciliate. Inflorescence terminal, spikeate. Tepals reddish.

Flowers : December.

Hissar, *M. A. Rau* 3537; Karnal, *J. N. Vohra* 9921.

5. *P. plebeium* R. Br. *Prodr.* 420, 1810; FBI 5 : 27; Bamber 547; Sabnis 560; Maheshw. 305; Puri 117; Duthie 2 : 149.

A prostrate variable herb. Flowers axillary 1-3 together, subsessile. Tepals pink.

Common in dried up temporary ponds and canal beds.

Flowers : Dec.-May.

Bahuna, 25983; Bhatinda, 36577; Fatehbad, 18839; Ludwa, 26463; Panipat, 18653; Rohtak, 22045; Yamunanagar, 26382.

3. RUMEX Linn.

R. dentatus Linn. *Mant.* 2 : 226, 1777; FBI 5 : 59; Sabnis 561; Maheshw. 307; Duthie 2 : 158.

Erect glabrous herbs with reddish tint. Stems ribbed. Radical leaves longer than cauline ones. Flowers bisexual, clustered. Teeth turning red in fruit.

Common on canal banks and other moist situations.

Flowers and fruits : Feb.-May.

Attari, 36327; Bhatinda, 26278; Gola, 25846; Hoshiarpur, *Aitchison* 607 (DD); Jind, 25620; Ludwa, 26439; Rohtak, 26362.

95. PIPERACEAE

P. longum Linn. *Sp. Pl.* 29, 1753; FBI 5 : 83; Sabnis 561.

Creeping plants. Lower leaves long petioled, upper amplexicaul.

Only known in cultivation.

Hoshiarpur, *Aitchison* 493 (DD); Pinjaur Gardens, *Sunder Lal* s. n. (DD).

96. LORANTHACEAE

DENDROPHTHOE Mart.

D. falcata (Linn. f.) Etting. in *Denskchr. Akad. Wissen. Math. Naturw. Cl.* 32: 52, 53, 58, t. 13, f. 14, 1872; *Danser* in *Bull. Jard. Bot. Buitenz.* Ser. 3, 11: 403, 1931; *Maheshw.* 309. *Loranthus falcata* Linn. f. *Suppl.* 211, 1781. *L. longiflorus* *Descr. in Lamk. Encycl.* 3: 598, 1789; *FBI* 5: 214; *Bamber* 65; *Sabnis* 562; *Duthie* 2: 175.

Parasitic shrubs found on a variety of plants. Flowers red below, yellow green above. Berry sticky.

Local name: Amut, Panda.

Flowers: Feb.-March.

Hoshiarpur, *Aitchison* 502 (DD), *T. A. Rao* 10735.

97. ARISTOLOCHIACEAE

ARISTOLOCHIA Linn.

1. Flowers small, less than 5 cm long
1. Flowers large, more than 10 cm long

1. *A. bracteolata*
2. *A. elegans*

1. **A. bracteolata** Lamk. *Encycl.* 1: 258, 1783; *Andrews, Fl. Pl. Anglo-Egypt. Sudan* 1: 21, f. 17, 1950. *A. bracteata* *Retz. Obs. Bot. Fasc.* 5: 29, 1789; *FBI* 5: 29; *Maheshw.* 308; *Puri* 117; *Duthie* 2: 160.

A decumbent or trailing perennial herb, climbing when among bushes. Flowers solitary with a large sessile orbicular bract on the pedicel. Tepals globose with cylindrical tube and trumpet-shaped mouth, reflexed and clothed with purplish hairs inside. Capsules 12-ribbed.

Local name: Kiromer.

Flowers: Rainy season.

Hansi, 25041; Talwandi, 16206, 18772.

2. **A. elegans** Mast. in *Gard. Chron.* 2: 301, 1885; *Maheshw.* 308. Large climbers. Grown as ornamentals in gardens.

Flowers: Sept.-Nov.

Nabha, 36743.

98. EUPHORBIACEAE

1. Flowers in cyathia
1. Flowers not in cyathia:

5. *Euphorbia*

- 2. Flowers apetalous:
 - 3. Leaves peltate and palmatilobed 10. *Ricinus*
 - 3. Leaves not peltate:
 - 4. Carpellodes absent in male flowers:
 - 5. Herbs (trees in *Sapium*); fruits capsular or ultimately dehiscent:
 - 6. Flowers in conspicuously bracteate spikes 1. *Acalypha*
 - 6. Flowers not in conspicuously bracteate spikes:
 - 7. Flowers axillary or on old nodes 8. *Phyllanthus*
 - 7. Flowers not axillary:
 - 8. Flowers on wiry inflorescence 7. *Micrococca*
 - 8. Flowers in spikes 12. *Sapium*
 - 5. Shrubs or trees; fruits berry or drupe:
 - 9. Fruits berry:
 - 10. Shrubs; fruits small with 6-12 crustaceous seeds 6. *Kirganelia*
 - 10. Trees; fruits large with 3-6 hard cocci in a fleshy epicarp 4. *Emblica*
 - 9. Fruits drupe; trees 9. *Putranjiva*
 - 4. Carpellodes present in male flowers 11. *Securinega*
- 2. Flowers with petals or petals reduced to glands in female flowers:
 - 11. Filaments free, inflexed in bud 3. *Croton*
 - 11. Filaments connate at the base, erect 2. *Chrozophora*

1. ACALYPHA Linn.

- 1. Bracts distant, shortly dentate; capsules hispid 2. *A. indica*
- 1. Bracts crowded, fimbriate; capsules glabrous 1. *A. ciliata*

1. *A. ciliata* Forsk. Fl. Aegypt-Arab. 162, 1775; FBI 5 : 417; Bamber 348; Puri 123; Duthie 2 : 209.

Stout herbs. Flowers in androgynous spikes. Bracts strongly nerved. Very rare.

Local name : Kuppi, Kokali.

Flowers : Sept.-Oct.

Karnal, 24606.

2. *A. indica* Linn. Sp. Pl. 1003, 1753; FBI 5 : 416; Nair & Nair in Bull. bot. Surv. India 6 : 69, 1964; Maheshw. 316; Duthie 2 : 209.

Annual herbs. Flowers in androgynous axillary spikes. Capsules 1-seeded.

Rohtak, V. J. Nair 23167.

2. CHROZOPHORA Neck

- 1. Shrubs; capsules with stellate hairs as well as silvery scales; stamens less than 10 1. *C. oblongifolia*
- 1. Herbs:
 - 2. Capsules with stellate hairs alone; stamens 10 or more:
 - 3. Leaves eglandular at the base 2. *C. prostrata*
 - 3. Leaves with 2 glands at the base 3. *C. parviflora*
 - 2. Capsules with stellate hairs and silvery scales 4. *C. verbascifolia*

1. *C. oblongifolia* (Del.) A. Juss. Tent. Euphorb. 28, 1824; Pax in Pflanzenr. 57: 25, 1912. *Croton oblongifolius* Del. Fl. Aeg. 139, 1813.

Chrozophora obliqua Juss. loc. cit. 28, 1824; FBI 5: 409; Bamber 572; Duthie 2: 206.

A thickly stellately tomentose shrub. Leaves ovate, sinuate, toothed, clothed with stellate tomentum on both sides. Perianth yellow.

Common on road sides and sandy places.

Flowers and fruits: Feb.-Aug.

Bhatinda, 27788; Bhiwani, 34579; Fatehbad, 26569; Hansi, 16171; Lambi, 27844; Loharu, 16326.

2. *C. prostrata* Dalz. in Dalz. et Gibs. Bomb. Fl. 233, 1861; Puri 122; Maheshw. 315. *C. plicata* forma 3 FBI 5: 410.

A prostrate or suberect herb. All parts covered with stellate hairs. Flowers in axillary racemes.

Common in dried up ponds.

Flowers: Feb.-Aug.

Bahuna, 25984; Rohtak, 20042.

3. *C. parviflora* Klotz. ex Schwienf. Pl. Nilot. 11, 1862; Prain in Kew Bull. 91, 1918; Maheshw. 315. *C. prostrata* var. *parvifolia* Duthie 2: 207.

Prostrate or suberect woolly herbs. Branches often tinted pink.

In dried up ponds and canals.

Flowers: Dec.-July.

Fatehbad, 18891; Ottobridge (Sirsa), 27707.

4. *C. verbascifolia* A. Juss. Tent. Euph. 28, 1824; Pax in Pflanzenr. 57: 26, 1912; Maheshw. 315.

Erect herbs. Flowers in short terminal racemes; male pale green, above, female below.

Flowers and fruits: May-Oct.

Hoshiarpur, *Bisram* 342 (DD); Mahendragarh, 20623; Rewari, 20795.

3. CROTON Linn.

C. bonplandianum Baill. in Adans. 4: 339, 1863; Maheshw. 315. *C. sparsiflorus* Morung in Ann. N. Y. Acad. Sc. 7: 221, 1893; Parker 459.

A shrub up to 1 m high; branches ribbed with stellate hairs. Leaves ovate lanceolate, toothed, sparsely stellately hairy beneath. Racemes terminal, filiform. Male flowers yellowish white, several in the axils of bracts. Female flowers solitary; ovary stellately hairy becoming glabrescent in fruit.

This American weed introduced in India towards the close of the last century has now spread all over the country. It is mainly seen along railway lines, roadsides and in waste places.

Flowers and fruits: Sept.-April.

2: 188. *E. thymifolia* var. *microphylla* Thallung in Asch. et Graebn Syn. 7: 475, 1916.

Glabrous annuales, pale green or tinted red. Leaves obliquely oblong, entire. Stipules minute, bifid, often laciniate. Cyathia minute, axillary, often solitary. Limb of involucre bracts sub-equal. Capsules glabrous throughout. Common in shady places.

Flowers: Cold season.

Badopal, 24932; Bahuna, 18894; Hissar, 18760; Ratia, 25988; Sirsa, 18916.

2. *E. clarkeana* Hook. f. FBI 5: 253; Bamber 523; Maheshw. 313; Puri 120; Duthie 2: 189.

A glabrous prostrate herb. Leaves oblong, base slightly oblique, tip rounded. Capsules glabrous, keeled.

Rare in sandy moist places.

Badopal, 24907; Lambi; Mojukheda, 26050; Narnaul, 25200; Tosham, 25050, 25083.

3. *E. dracunculoides* Lamk. Encycl. 2: 428, 1786; FBI 5: 262; Bamber 318; Sabnis 563; Maheshw. 312; Puri 119; Duthie 2: 185.

A glabrous dichotomously branched annual herb. Leaves sessile, linear or lanceolate. Cyathia in the forks of branches, solitary, subsessile. Involucres campanulate, glabrous outside, hairy inside, glands semilunar and yellow. Capsules smooth. Seeds with a leprous tuberculate testa.

Common weed in cultivated places.

Flowers: Dec.-March.

Agrua, 18832; Bhatinda, 26294; Bhiwani, 20053; Fazilka, 36400; Hissar, V. J. Nair 19330; Mahendragarh, 20558.

4. *E. geniculata* Ort. Nov. Pl. Rar. Pl. Hor. Matr. Decad. 18, 1797; Santapau in Bull. bot. Soc. Bengal 8: 10, 1954; Nair & Nair in Bull. bot. Surv. India 6: 69, 1964; Maheshw. 312; Duthie 2: 190. *E. heterophylla* var. *elliptica* O. Ktze. Rev. Gen. Pl. 506, 1891.

Annual herbs. Leaves oblanceolate, alternate at lower nodes and opposite above. Cyathia in terminal cymose clusters. Involucre campanulate, glands without any appendage. Seeds angular on the outer face.

Not common.

Hissar, V. J. Nair 21541; Kalka, T. A. Rao 10879.

5. *E. granulata* Forsk. Fl. Aeg.-Arab. 94, 1775; FBI 5: 252; Bamber 523; Sabnis 563; Maheshw. 313; Puri 120; Duthie 2: 188.

A small hispidly hairy prostrate herb. Leaves opposite, coriaceous, villous on both sides. Inflorescence axillary on short leafy branches, subsessile. Seeds 4-angled, faintly pitted.

Flowers: Feb.-July.

Hissar, *M. A. Rau* 3498; Fatehbad, 26576; Patiala, *Duthie* 5231 (DD).

6. ***E. helioscopia*** Linn. Sp. Pl. 459, 1753; FBI 5 : 262; Bamber 347; Sabnis 563.

Stout herbs umbellately branched above. Floral leaves large, orbicular. Seeds deeply reticulately pitted.

Weed of cultivation.

Flowers: Feb.-April.

Ferozapore, 26374; Jind, 25863; Khanna, 35973.

7. ***E. hirta*** Linn. Sp. Pl. 454, 1753; Pax et Hoffm. in Engler & Prantl Pflanzfam. (ed. 2) 19 (C) : 210, 1931; Sabnis 562; *Duthie* 2 : 187; Maheshw. 312; Puri 120. *E. pilulifera* auct. non Linn.; FBI 5 : 250; Bamber 137.

Annual erect or decumbent herbs. Leaves obliquely lanceolate, serrulate. Cyathia in pedunculate globose or subglobose cymose heads, staminate and hermaphrodite. Capsules globose, trigonous. Seeds tetragonal, transversely rugose.

Common in cultivated and in waste places.

Flowers: March-Nov.

Bhatinda, 26276; Hansi, 18729; Hissar, *V. J. Nair* 14771; Jhabua, 20729; Narnaul, 20652; Panipat, 18618.

8. ***E. milli*** Ch.-des Moulins in Bull. Hist. nat. Soc. Linn. Bord 1 : 27, t. 1, 1826; Croizat in Jour. Arn. Arb. 21 : 506, 1940; Maheshw. 311. *E. splendens* Boj. ex Hook. in Bot. Mag. t. 2902, 1829.

A spiny shrub with red flowers on dichotomous clusters of cyathia.

Ornamental. Grown in gardens.

Flowers: Throughout the year.

9. ***E. nerijfolia*** Linn. Sp. Pl. 451, 1753; FBI 5 : 255; Parker 442; Maheshw. 311; *Duthie* 2 : 184.

Succulent shrubs with 5 spirally twisted ribs. Cyathia and glands yellow.

Flowers: Hot season.

Grown as ornamental as well as hedge.

Nabha, 36742; Rewari, 20791; Sirsa, 34578; Yamunanagar, 25289.

10. ***E. nivalis*** Buch.-Ham. in Trans. Linn. Soc. 15 : 286, 1825; FBI 5 : 255; Bamber 85; Puri 119.

Succulent shrubs with clumped branches Flowers reddish yellow.

Common on dry hills.

Local name: Thura.

Flowers : March-April.
Nizampur-Khetri, 20690.

11. *E. parviflora* Linn. Syst. 2 : 1047, 1759; Puri 120. *E. hypericifolia* Linn. Sp. Pl. 454, 1753 (pro parte); FBI 5 : 249 (non 250); Bamber 137; Sabnis 562; Duthie 2 : 187. *E. hypericifolia* var. *parviflora* Prain, Beng. Pl. 2 : 924, 1903.

Annual erect herbs. Leaves reddish, opposite, unequal-sided, serrulate. Cyathia in axillary and terminal peduncles. Capsules hairy.

Common in moist places and as weed in gardens and fields.

Flowers and fruits : March-Oct.

Badopal, 34538; Hissar, 18803, *Duthie* 4275 (DD); Jind, 15898; Kanana (Dadri), 25140; Karnal, *J. N. Vohra* 8886; Panipat, 24726; Rohtak 26359.

12. *E. chamaesyce* Linn. Sp. Pl. 455, 1753; Willd. Weeds Aleins in Africa 17, 1968. *E. prostrata* Ait. Host. Kew 2 : 139, 1789; FBI 5 : 266; Santapau in Bull. bot. Soc. Bengal 8; 1954; Nair & Nair Bull. bot. Surv. India 5 : 220, 1964; Maheshw. 313.

Prostrate herbs. Capsules pubescent on the angles, glabrous elsewhere.

Common along road sides and dry open areas and gardens.

Flowers and fruits : Throughout the year.

Barwala, 26335; Bhatinda, 27741; Hissar, *V. J. Nair* 21527; Jind, 16115, 24746; Mahendragarh, 20590; Rewari, 20792; Sonpet, *V. J. Nair* 23287.

13. *E. pulcherrima* Willd. ex Klotz in Otto. Dietr. Allgem. Gartenz. 2 : 27, 1834; Sabnis 563; Maheshw. 311; Duthie 2 : 189. *Poinsettia pulcherrima* R. Grah, in Edinb. N. Phil. Jour. 20 : 412, 1836.

Garden shrubs. Bracts petaloid, rayed, crimson or scarlet. Cyathia with a large gland on one side.

Flowers : Dec.-Jan.

Hoshiarpur, *Aitchison* 481 (DD); Khanna, 35981.

14. *E. thymifolia* Linn. Sp. Pl. 454, 1753; FBI 5 : 252; Bamber 523; Sabnis 562; Maheshw. 313; Puri 120; Duthie 2 : 188.

Small prostrate herbs. Leaves oblong; stipules fimbriate. Capsules keeled, hairy. Seeds transversely furrowed.

Common in waste places.

Flowers and fruits : Aug.-Dec.

Chakka Jheel (Sirsa), 26021; Hissar, *Duthie* 437a (DD), *Harsukh* 20688 (DD); Mahendragarh, 20594; Talwandi, 16211.

15. *E. thircalli* Linn. Sp. Pl. 452, 1753; FBI 5 : 254; Bamber 71; Parker 444; Duthie 2 : 189.

Large shrubs. Grown as hedge plants.

Local name : Sehud, Sehmar.

Chandigarh, V. N. Puri s. n. (DD).

6. KIRGANELIA Bail.

K. reticulata (Poir.) Bail. Etud. Gen. Euph. 613, 1858; Maheshw. 320. *Phyllanthus reticulatus* Poir. in Lamk. Encycl. 5 : 298, 1804; FBI 288; Parker 451; Duthie 2 : 199.

A scandent shrub with drooping branches. Leaves variable. Stipules sometimes bristle pointed. Flowers axillary, female solitary, male in fascicles. Fruits purple when ripe. Seeds trigonous.

In moist places. Common.

Bitmada, 25019; Hansi, 18738; Hissar, V. J. Nair 19972; Panipat, 24682.

7. MICROCOCCA Benth.

M. mercurialis (Linn.) Benth. in Hook. Niger. Fl. 503, 1849; Nair & Nair in Bull. bot. Surv. India 6 : 70, 1964. *Tragia mercurialis* Linn. Sp. Pl. 980, 1753. *Claoxylon mercurialis* (Linn.) Thw. Enum. 271, 1861; FBI 5 : 413.

Sparsely hispid herbs with glands in the leaf axils. Stamens 3-10. Seeds non strophiolate.

Collected only from Mahendragarh district.

Kanana (Dadri), 25138, 25150, 25155.

8. PHYLLANTHUS Linn.

- | | |
|---|------------------------------|
| 1. Branches resembling pinnate leaf: | |
| 2. Filaments united | 1. <i>P. fraternus</i> |
| 2. Filaments free | 3. <i>P. virgatus</i> |
| 1. Branches not resembling a compound leaf: | |
| 3. Filaments united: | 2. <i>P. maderaspatensis</i> |
| 4. Capsules smooth | 4. <i>P. urinaria</i> |
| 4. Capsules echinate | 3. <i>P. simplex</i> |
| 3. Filaments free | |

1. **P. fraternus** Webst. Gray Herb. 176 : 53, 1955; Jour. Arn. Arb. 38 : 309, 1957; Maheshw. 320. *P. niruri* auct. non Linn.; Hook. f. FBI 5 : 298; Bamber 233; Sabnis 564; Puri 121; Duthie 2 : 201.

Glabrous annuals; main stems not leafy. Leaves many, distichous. Flowers axillary, yellowish-white.

A common weed of cultivation.

Flowers and fruits : Aug.-Dec.

Between Jind and Hansi, 24807; Gurgaon, 25260; Jind, 15892; Narnaul, 20664; Panipat, 18650; Sonpet, V. J. Nair 23332.

2. **P. maderaspatensis** Linn. Sp. Pl. 982, 1753; FBI 5 : 292; Nair & Nair in Bull. bot. Surv. India 5 : 220, 1964; Maheshw. 319; Puri 121; Duthie 2 : 200.

Annual herbs. Leaves scattered, variable.

Flowers and fruits : Rainy season.

Dadri, 16266; Fazilka, 36399; Mahendragarh, 20567; Talwandi, 16207.

3. **P. virgatus** forst. f. Fl. Ins. Austr. Prodr. 65, 1786; Backer et Bakh. f., Fl. Java 1 : 469, 1963. *P. simplex* Retz. Obs. 5 : 29, 1788; FBI 5 : 295; Bamber 86; Maheshw. 319; Duthie 2 : 200.

Perennial herbs; branches spreading. Leaves distichous.

Rare.

Flowers : Aug.-Nov.

Karnal, 24633.

4. **P. urinarja** Linn. Sp. Pl. 982, 1753 (ex parte); FBI 5 : 293; Bamber 232; Puri 121; Duthie 2 : 200.

Annual herbs with reddish tinge. Branches slightly winged, hispid at the angles. Leaves sessile, distichous, oblong or linear-oblong. Flowers minute, solitary, subsessile. Capsules globose. Seeds trigonous, transversely furrowed.

Rare; in moist places.

Flowers : Aug.

Hansi, 16155; Karnal, 24635.

9. PUTRANJIVA Wall.

This genus is sometimes referred to as *Drypetes*.

P. roxburghii Wall. Tent. Fl. Nepal. 61, 1826; FBI 5 : 336; Maheshw. 317; Duthie 2 : 202.

Large evergreen trees with drooping branches. Leaves coriaceous, elliptic-oblong. Flowers unisexual, yellow; male in dense axillary clusters, female 1-3, stigmas large. Drupes ellipsoid.

Known only in cultivation.

Local name : Jaiputra. Pitrungia.

Flowers and fruits : April-Aug.

Khanna, 35976.

10. RICINUS Linn.

R. communis Linn. Sp. Pl. 1007, 1753; FBI 5 : 457; Bamber 130; Parker 458; Maheshw. 316; Puri 123; Duthie 2 : 212.

A glaucous shrub. Leaves alternate, palmately lobed, lobes serrate. Flowers in large terminal, subpanicked racemes, monoecious.

The castor oil plant; cultivated and running wild. Two varieties : one

with red stem, petioles and fruits, and the other with green stems, petioles and fruits.

Flowers: Sept. onwards.

Hissar, 25014, *V. J. Nair* 14765; Jind, 26515; Mahendragarh, 20645; Malerkotla, 36713.

11. SECURINEGA Juss.

1. Unarmed plants: leaves 2.5-7 cm long
1. Spiny shrubs; leaves up to 2.5 cm long

2. *S. virosa*
1. *S. leucopyrus*

1. *S. leucopyrus* (Willd.) Muell.-Arg. in DC. Prodr. 15: 451, 1866; Pax et Hoffm. in Eng. & Prantl Pflanzenfam. (ed 2) 19c: 60, 1931; Maheshw. 318; Puri 121. *Flueggea leucopyrus* Willd. Sp. Pl. 4: 757, 1805; FBI 5: 328; Bamber 126; Parker 452; Duthie 2: 197.

A large glabrous dioecious shrub. Branches straggling and ending in spines. Leaves obovate or obcordate. Flowers in axillary clusters. Fruits white.

Common in dry places and jungles.

Flowers and fruits: July-Nov.

Bhiwani, 16342; Hissar, 24897; Mahendragarh, 16287.

2. *S. virosa* (Roxb. ex Willd.) Pax et Hoffm. in Engl. & Prantl Pflanzenfam. (ed. 2) 19c: 60, 1931; Maheshw. 318; Puri 121. *Phyllanthus virosa* Roxb. ex Willd. Sp. Pl. 4: 578, 1805. *Flueggea microcarpa* Bl. Bijdr. 580, 1826; FBI 5: 328; Bamber 126; Parker 452; Duthie 2: 196.

Dioecious shrubs; like the last species but larger. Fruits white, edible.

Flowers: Hot months. *Fruits*: July-Oct.

Hissar, *Raizala* 20989; Jind, 16104, 24767.

12. SAPIUM P. Br.

S. sebiferum (Michx.) Roxb. Fl. Ind. 3: 693, 1832; FBI 5: 470; Sabnis 565; Parker 455; Maheshw. 317; Duthie 2: 215. *Stillingia sebifera* Michx. Fl. Bor. Amer. 2: 213, 1803.

Small deciduous trees with greyish bark. Leaves rhomboid acuminate. Flowers yellow in spikes.

Planted along road sides and canal banks. Almost naturalized.

Flowers: June-Aug.

Yamunanagar, 26379.

99. URTICACEAE

1. Herbs or undershrubs: stigmas jointed to the apex of the ovary,
deciduous

1. Shrubs; stigmas persistent

2. *Pouzolzia*
1. *Boehmeria*

1. BOEHMERIA Jacq.

B. platyphylla Don, Prodr. 60, 1825; FBI 5 : 578; Sabnis 567; Parker 466; Duthie 2 : 225.

Shrubs about 1½ m high. Leaves opposite. Flowers white in clusters.
Flowers : Sept.

Hoshiarpur, *Aitchison* 534 (DD).

2. POUZOLZIA Gaud.

P. pentandra (Roxb.) Benn. Pl. Jav. Rar. 67, 1838; FBI 5 : 583; Bamber 524; Sabnis 567; Duthie 2 : 227. *Urtica pentandra* Roxb. Fl. Ind. 583, 1832.

Perennial herbs up to 1 m or more high. Stems angular. Leaves sessile or subsessile, lower opposite, oblong lanceolate, acuminate, strongly 3-nerved. Flowers axillary, clustered in nodding terminal racemes.

Common along canal banks.

Local name : Pipira.

Flowers : Rainy season.

Badopal, 24949; Bhatinda, 27825; Hansi, 16144, 16154; Jind, 26335; Karnal, *J. N. Vohra* 9927.

100. MORACEAE

- | | |
|--|----------------------|
| 1. Flowers in globose or oblong heads | 1. <i>Artocarpus</i> |
| 1. Flowers not as above: | |
| 2. Flowers in spikes or catkins: | |
| 3. Flowers in catkins; perianth fleshy in fruit | 3. <i>Morus</i> |
| 3. Male flowers in spikes, female solitary; perianth not fleshy in fruit | 4. <i>Streblus</i> |
| 2. Flowers in hypanthodium | 2. <i>Ficus</i> |

1. ARTOCARPUS Forst.

A. heterophyllus Lamk. Encycl. 3 : 210, 1789; Maheshw. 322. *A. integrifolius* auct. (non Linn. f.); Duthie 2 : 235.

The Jack tree; known only in cultivation.

Hoshiarpur, *Aitchison* 476 (DD); Punjab, *Parker* 10237 (DD).

2. FICUS Linn.

- | | |
|--|---------------------------|
| 1. Hypanthodia sessile: | |
| 2. Leaves ovate elliptic; apex obtuse, tomentose | 1. <i>F. benghalensis</i> |
| 2. Leaves cordate; apex long acuminate, glabrous | 7. <i>F. religiosa</i> |
| 1. Hypanthodia stalked: | |
| 3. Hypanthodia axillary, solitary or in pairs: | |
| 4. Leaves crenate dentate: | |
| 5. Leaves ovate; branches tomentose | 6. <i>F. palmata</i> |
| 5. Leaves lobed; branches pubescent or glabrous | 2. <i>F. carica</i> |

4. Leaves entire
 3. Hypanthodia on leafless parts of the plant, clustered:
 6. Leaves symmetrical
 6. Leaves unequal sided at the base
5. *F. nemoralis*
 4. *F. racemosa*
 3. *F. cunia*

1. ***F. benghalensis*** Linn. Sp. Pl. 1059, 1753; FBI 5: 499; Bamber 16; Sabnis 566; Parker 476; Maheshw. 324; Puri 124; Duthie 2: 238. *F. indica* Linn. Amoen. Acad. (ed. 3): 27, 1787 (excl. syn. *katavalou* Rheede).

A large tree whose aerial roots when they reach the ground, thicken and form supports. Hypanthodium with 3 roundish bracts. Ripe figs red. Cultivated near villages.

Local name : Bar, Bud, Wad.

Flowers : June-Sept.

Bitmada, 25016; Mahendragarh, 20622.

2. ***F. carica*** Linn. Sp. Pl. 1059, 1753; Maheshw. 327; Puri 125; Duthie 2: 250.

Cultivated for the edible figs.

Local name : Angir, Anjir.

Flowers : Oct.

Parker 479 (DD).

3. ***F. cunia*** Buch.-Ham. ex Roxb. Fl. Ind. 3: 561, 1832; FBI 5: 523; Bamber 17; Parker 476; Duthie 2: 246.

Small trees. Leaves both sides pubescent. Stamens in male flowers one. Figs reddish brown when ripe.

Hoshiarpur, *Aitchison* s. n. (DD).

4. ***F. racemosa*** Linn. Sp. Pl. 1060, 1753; Corner in Dansk. Bot. Arkiv. 23: 28, 1963. *F. glomerata* Roxb. Pl. Cor. 2: 13, t. 123, 1798; FBI 5: 535; Bamber 17; Sabnis 567; Parker 480; Maheshw. 326; Puri 125; Duthie 2: 248.

Large trees. Leaves elliptic lanceolate. Inflorescence cauliflorous, clustered. Fruits red, edible but often full of insects.

Local name : Gular.

Flowers : June-Nov.

Hansi, 25880; Jind, 24759; Nizampur, 20685; Sonpet, 23374.

5. ***F. nemoralis*** Wall. Ex Miq. in Lond. Jour. Bot. 7: 453, 1848; FBI 5: 534; Bamber 17; Parker 479.

Small trees. Figs red when ripe.

Flowers and fruits : April-Oct.

Kasauli (Ambala Dist.), *B. L. Gupta* s. n. (DD).

6. **F. palmata** Forsk. Fl. Aegypt.-Arab. 179, 1775; FBI 5: 530; Bamber 71; Sabnis 567; Parker 479; Maheshw. 327.

Erect shrubs or small trees, deciduous. Young parts tomentose. Leaves orbicular or ovate. Hypanthodia single in axils.

Very rare.

Flowers: February.

Bhatinda, 36574; Hansi, 25888; Mojukheda, 26073.

7. **F. religiosa** Linn. Sp. Pl. 1059, 1753; FBI 5: 513; Bamber 16; Sabnis 566; Parker 476; Maheshw. 325; Puri 125; Duthie 2: 241.

Large trees often planted near villages and temples. Hypanthodia sessile.

Local name: Peepal.

Flowers: March-April.

Hoshiarpur, Aitchison 126 (DD); Mahendragarh, 20621; Yamunanagar, 26406.

3. MORUS Linn.

M. alba Linn. Sp. Pl. 986, 1753; FBI 5: 492; Bamber 15; Sabnis 566; Parker 472; Maheshw. 328; Puri 124; Duthie 2: 231.

A medium-sized deciduous tree. Leaves ovate, obtuse, acute or acuminate, shortly serrate or crenate serrate. Flowers monoecious. Fruit purple.

Cultivated for the sake of its fruits.

Local name: Sethud.

Flowers: Feb.-April.

Hissar, V. J. Nair 19906; Lambi, 26225; Nizampur, 20679; Panipat, 26498.

4. STREBLUS Lour.

S. asper Lour. Fl. Coch. 2: 615, 1790; FBI 5: 489; Parker 481; Maheshw. 329; Duthie 2: 232.

Trees looking like *Ficus*. Wood white. Flowers dioecious axillary. Fruits 1-seeded berry, loosely enclosed by the enlarged sepals.

Local name: Choria.

Flowers: March-April.

Yamunanagar, 27548.

101. ULMACEAE

1. Leaves and young branches smooth or softly hairy; sepals imbricate
1. Leaves and shoots very rough; sepals induplicate valvate

1. *Celtis*
2. *Trema*

1. *CELTIS* Linn.

C. australis Linn. Sp. Pl. 1043, 1753; FBI 5: 482; Bamber 15; Parker, 464; Maheshw. 321; Duthie 2: 218.

Deciduous trees. Leaves obliquely ovate; coriaceous. Flowers yellow. Drupes ellipsoid, rugose.

Known only from cultivation.

Local name : Kharak.

Flowers : March-May. *Fruits* : June-Sept.

Hoshiarpur, *Aitchison* s. n. (DD); Rohtak, *V. J. Nair* 23215.

2. *TREMA* Lour.

T. politoria Planch. in Ann. Sc. Nat. Ser. 3: 10: 326, 1848; FBI 5: 484; Bamber 15; Sabnis 565; Parker 465; Duthie 2: 220.

Small trees. Leaves obliquely and narrowly ovate lanceolate, very hard and scabrid on both sides. Flowers minute.

Known only as planted on Hoshiarpur Siwaliks.

Local name : Khagshi.

Flowers : April-June.

Hoshiarpur, *Aitchison* 506 (DD).

102. CANNABACEAE

CANNABIS Tourn.

C. sativa Linn. Sp. Pl. 1027, 1753; FBI 5: 487; Bamber 248; Sabnis 565; Parker 483; Maheshw. 329; Puri 125; Duthie 2: 220.

Erect annuals. Leaves slightly aromatic, palmately partite, serrate. Flowers deciduous, pale green. Fruits enclosed in the persistent tepals.

Common along road sides and canal banks.

Local name : Bhang.

Flowers : Aug.-Nov.

Hissar, *V. J. Nair* 19905, 21538; Jind, 15887.

103. CERATOPHYLLACEAE

CERATOPHYLLUM Linn.

C. demersum Linn. Sp. Pl. 992, 1753; FBI 5: 639; Bamber 628; Duthie 2: 255; Maheshw. 331; Puri 125. *C. verticillatum* Roxb. Fl. Ind. 3: 624, 1832.

Much branched aquatic herbs. Leaves in whorls of 6-10, twice forked, segments 4, rarely 2, 3 or 5. Fruits with 1 apical spine.

In pools, lakes and canals.

Fatehbad, 18840, 24914.

104. HYDROCHARITACEAE

- | | |
|--|-----------------------|
| 1. Leaves all radical, in rosettes, linear, flat | 2. <i>Vallisneria</i> |
| 1. Leaves on distinct branches, whorled, linear lanceolate | 1. <i>Hydrilla</i> |

1. HYDRILLA Rich.

H. verticillata (Linn. f.) Royle, Ill. t. 376, 1839; FBI 5: 659; Bamber 624; Sabnis 570; Maheshw. 331; Puri 125; Duthie 2: 262. *Serpicula verticillata* Linn. f. Suppl. 416, 1781.

A much branched glabrous aquatic herb, Leaves in whorls of 3-8, sessile, linear to lanceolate or rarely elliptic, with red brown dots.

Flowers: March-Nov.

Gurgaon, 20808; Hansi, 19001; Phagwara, T. A. Rao 10704; Tohana, 24983; Yamunanagar, 27541.

2. VALLISNERIA Linn.

V. spiralis Linn. Sp. Pl. 1015, 1753; FBI 5: 660; Bamber 625; Maheshw. 331; Puri 126; Duthie 2: 263.

Submerged aquatic herbs. Leaves ribbon-like, radical. Flowers dioecious. Peduncles of female flowers elongated carrying the flower above the water by uncoiling and after fertilization coils again closely bringing the ovary down to mature under water. Female spathe covers half the ovary. Male flowers shortly stalked. Fruits linear.

Flowers: Sept.-June.

Chakka Jheel (Sirsa), 18976, V. J. Nair 21580; Gurgaon, 20808.

105. ORCHIDACEAE

- | | |
|----------------------|--------------------|
| 1. Pollinia waxy | 1. <i>Eulophia</i> |
| 1. Pollinia not waxy | 2. <i>Zeuxine</i> |

1. EULOPHIA R. Br.

E. campestris Wall. ex Lindl. Gen. Sp. Orch. 185, 1830; FBI 6: 4; Bamber 427; Sabnis 570; Duthie 2: 281.

Tuberous herbs. Leaves 2. Flowers drooping, yellowish or green with pink or purple markings on the sides of lip, centre with 3 yellow ridges, fimbriate on the terminal lobe.

In damp places.

Local name: Salab Misri.

Near Hoshiarpur, Parker 3389 (DD).

2. ZEUXINE Lindl.

Z. strateumatica (Linn.) Schltr. in Fedde. Repert. Beih. 1: 77, 1911; Maheshw. 332. *Orchis strateumatica* Linn. Sp. Pl. 943, 1753. *Adenostylis sulcata* Bl. Bijdr. 414, 1825. *Zeuxine sulcata* (Bl.) Lindl. Gen. et Sp. Orch. 485, 1840; FBI 6: 106; Bamber 488. Sabnis 570; Duthie 2: 298.

A small terrestrial herb up to 10 cm tall. Leaves linear acuminate. Flowers pink in compact racemes. Capsules ellipsoid.

On canal banks and near marshy places.

Flowers and fruits: Feb.-May.

Badopal, 25979.

106. LILIACEAE

- | | |
|--|----------------------|
| 1. Spiny climbing shrubs | 2. <i>Asparagus</i> |
| 1. Bulbous or rhizomatous herbs: | |
| 2. Rhizomatous herbs; inflorescence raceme | 3. <i>Asphodelus</i> |
| 2. Bulbous herbs; inflorescence umbel or subumbellate cyme: | |
| 3. Scapigerous herbs; leaves cylindrical or flat never filiform; flowers less than 1 cm across | 1. <i>Allium</i> |
| 3. Bulbs densely fibrillose; leaves filiform; flowers more than 1 cm across | 4. <i>Gagea</i> |

1. ALLIUM Linn.

- | | |
|--|----------------------|
| 1. Leaves cylindrical; bulbs pinkish white | 1. <i>A. cepa</i> |
| 1. Leaves flat; bulbs white | 2. <i>A. sativum</i> |

1. *A. cepa* Linn. Sp. Pl. 300, 1753; FBI 6: 337, 1892; Bamber 438; Maheshw. 336; Duthie 2: 334.

Leaves fistular, subdistichous. Heads white, dense with flowers and bulbils.

Cultivated as a cold season crop.

Local name: Piaj.

Ludwa, 26475; Malerkotla, 36722; Talwandi, 34527.

2. ASPARAGUS Linn.

- | | |
|--|-------------------------|
| 1. Flowers solitary or in small clusters; cladodes needle-like in tufts of 2-8, straight | 2. <i>A. gracilis</i> |
| 1. Flowers in racemes; cladodes flat, recurved: | |
| 2. Cladodes in tufts of 2-6; spines recurved | 3. <i>A. racemosus</i> |
| 2. Cladodes in tufts of 6-20; spines straight | 1. <i>A. adscendens</i> |

1. *A. adscendens* Roxb. Fl. Ind. 2: 153, 1832; FBI 6: 317; Bamber 652; Sabnis 571; Parker 519; Duthie 2: 238.

Straggler. Flowers yellowish white.

Local name: Safed Musli.

Hoshiarpur, Aitchison 629 (DD).

2. *A. gracilis* Royle, Ill. 393, 1839; FBI 6: 315; Bamber 651; Parker 519.

A slender suberect undershrub. Cultivated.

Local name : Safed Musli.

Flowers : March-June.

Amritsar, *R. S. Chopra* s. n. (DD).

3. *A. racemosus* Willd. Sp. Pl. 2: 152, 1799; FBI 6: 316; Bamber 651; Sabnis 571; Parker 519; Maheshw. 336; Duthie 2: 327.

A scandent spinous undershrub. Flowers white.

Common in dry places.

Local name : Shatawar.

Flowers : Oct.-Dec.

Between Jind and Hansi, 18718, 18721; Hissar, 18793, *Duthie* 4450 (DD); Kanana (Dadri), 20546.

3. ASPHODELUS Linn.

A. tenuifolius Cav. in Ann. Sci. Nat. 3: 46, t. 27, f. 2, 1801; FBI 6: 332; Bamber 437; Sabnis 471; Maheshw. 337; Puri 127; Duthie 2: 333.

Rhizomatous annuals. Leaves terete, fistulous. Inflorescence raceme. Flowers white. Capsules globose.

A common weed of cultivation.

Barwala, *V. J. Nair* 19276; Hissar, *V. J. Nair* 19365; Jhabua, 20713; Rohtak, 20037.

4. GAGEA Salisb.

G. reticulata Schult. f. Syst. 542, 1820; FBI 6: 356; Bamber 499.

Small herbs; flowers many, green with white border.

Flowers : Sept.-Nov.

Hoshiarpur, *Aitchison* s. n. (DD).

107. SMILACACEAE

SMILAX Linn.

S. zeylanica Linn. Sp. Pl. 1029, 1753; FBI 6: 309. *S. macrophylla* Roxb. Fl. Ind. 3: 373, 1832 (non Willd.); FBI 6: 310; Duthie 2: 329.

Stout climbers. Petioles with narrow sheath.

Flowers : Nov.-Dec.

Kalesar (Ambala Siwaliks), *Parker* s. n. (DD).

108. DIOSCOREACEAE

DIOSCOREA Linn.

D. belophylla Voigt. Hort. Sub. Calc. 653, 1845 : Sabnis 570; Parker 524; Duthie 2: 325. *D. glabra* Hook. f. FBI 6: 294 (pro parte).

Twining rhizomatous herbs. Bulbils rarely present. Leaves opposite or alternate, ovate, acuminate.

Flowers : Sept.-Oct.

Hoshiarpur, *Aitchison* 586 (DD).

109. MUSACEAE

MUSA Linn.

M. paradisiaca Linn. Sp. Pl. 1043, 1753; Maheshw. 332; Puri 126; Duthie 2: 312. *M. sapientum* Linn. Syst. 1303, 1759; FBI 6: 262; Bamber 432; Puri 126.

Several varieties of bananas are cultivated in orchards.

Local name : Kela.

110. CANNACEAE

CANNA Linn.

C. orientalis Rosc. Monandr. Pl. t. 12, 1828; FBI 6: 260.

Grown in gardens as an ornamental.

Local name : Kakik, Hakik, Keli.

111. AMARYLLIDACEAE

CRINUM Linn.

C. deflexum Ker-Gawl. in Quart. Jour. Sci. 3: 105, 1817; FBI 6: 281; Puri 126; Maheshw. 333. *C. asiaticum* sensu Roxb. Fl. Ind. 2: 127, 1832 (non Linn.); Duthie 2: 320.

Commonly grown in gardens.

Local name : Sukhadarshini.

Flowers : Oct.-Dec.

112. AGAVACEAE

AGAVE Linn.

A. mexicana Lamk. Encyc. 1: 52, 1791; Drum. & Prain in Agric. Ledger 13 (7); 88, 1906; Duthie 2: 315.

Planted as hedge.

E. Punjab, *Jiwan Singh* s. n. (DD).

113. PONTEDERIACEAE

- | | |
|--|----------------------|
| 1. Filaments of large anthers with an acute horn on one side; perianth free; petiole without floats | 2. <i>Monochoria</i> |
| 1. Filaments without horn; perianth united and tubular at the base; petiole with a swollen bulbous float at the base | 1. <i>Eichhornia</i> |

1. EICHHORNIA Kunth

E. crassipes (Mart.) Solms. in DC. Mon. Phan. 4: 527, 1882; Maheshw. 338.

Floating herbs. Leaves in rosettes, spatulate. Flowers violet or blue in dense showy spikes.

Common water-hyacinth, Bengal terror.

Flowers and fruits: Sept.-Nov.

Phagwa, *T. A. Rao* 10707; Taran Taran, 36357.

2. MONOCHORIA Presl

M. vaginalis Presl, Reliq. Haenk. 2: 128, 1825; FBI 6: 363; Bamber 636; Duthie 2: 336.

Amphibious herbs. Leaves lanceolate or ovate-lanceolate. Flowers blue. Weed in rice fields; found also in marshy places and muddy soil.

Local name: Piazl.

Flowers: Sept.-Nov.

Karnal, 24628; Kurukshetra, *J. N. Vohra* 9869.

114. COMMELINACEAE

COMMELINA Linn.

- | | |
|--|---------------------------|
| 1. All cells of the ovary 1-ovuled; seeds smooth | 2. <i>C. kurzii</i> |
| 1. Two cells 2-ovuled and one 1-ovuled; seeds rugose | 1. <i>C. benghalensis</i> |

1. *C. benghalensis* Linn. Sp. Pl. 41. 1753; FBI 6: 370; Bamber 564; Sabnis 572; Maheshw. 340; Puri 127; Duthie 2: 339.

Diffuse herbs with dimorphic flowers; aerial flowers blue, underground flowers solitary yellow.

In moist localities.

Local name: Kanna, Kanshura, Kankawwa.

Flowers: Aug.

Karnal, *J. N. Vohra* 8891.

2. *C. kurzii* Cl. in Jour. Linn. Soc. 11: 444, 1871; Barnes in JBNHS 46: 87, 1946; Maheshw. 339.

Straggling or erect herbs. Leaves lanceolate, villous or scabrous. Flowers purplish-blue.

Flowers and fruits: Aug.-Oct.

Bankhandi, *T. A. Rao* 10825.

115. JUNCACEAE

JUNCUS Linn.

- 1. Leaves not septate
- 1. Leaves septate

- 1. *J. bufonius*
- 2. *J. lampocarpus*

1. *J. bufonius* Linn. Sp. Pl. 328, 1753; FBI 6: 392; Bamber 282; Maheshw. 341; Duthie 2: 346.

Small tufted annuals. Branches dichotomous. Flowers pale green in few-flowered cymes. Seeds numerous.

Common in muddy places.

Local name: Bhola.

Flowers and fruits: Feb.-March.

Beas, *J. N. Vohra* 11312; Laroha (Jullunder Dist.), *T. S. Bakshi* 27 (DD); Rewari 20782, 20797.

2. *J. lampocarpus* Ehr. ex Davies in Trans. Linn. Soc. 10: 13, 1810; FBI 6: 395.

Punjab, *Anonymous* (DD).

116. PALMAE

- 1. Leaves bipinnate or decomposed; stem smooth
- 1. Leaves pinnate, lower leaflets spinous; stem rough with bases of petioles

- 1. *Caryota*
- 2. *Phoenix*

1. CARYOTA Linn.

C. (urens Linn. ?)

A tall feather-leaved palm. Grown in gardens.

2. PHOENIX Linn.

- 1. Male spadix less than 35 cm long
- 1. Male spadix more than 35 cm long up to 1 m

- 1. *P. humilis*
- 2. *P. sylvestris*

1. *P. humilis* Royle. Ill. Bot. Himal. 394, 1839; Parker 523; Duthie 2: 355.

A small palm often with a number of root suckers. Flowers yellow. Fruit edible.

Balabgarh, *T. A. Rao* 8281.

2. *P. sylvestris* (Linn.) Roxb. Fl. Ind. 3: 787, 1832; FBI 6: 425; Bamber 45; Parker 522; Maheshw. 343; Puri 128; Duthie 2: 354. *Elate sylvestris* Linn. Sp. Pl. 1189, 1753 (pro parte).

Tall palms up to 16 m high. Flowers yellow.

Common along railway tracks, marshy places etc.

Local name: Kajur.

Flowers: Hot season.

Yamunanagar, 26412.

117. TYPHACEAE

TYPHA Linn.

1. Leaves 3-gonous above the sheath; pollen 4-globate
1. Leaves semicylindric above sheath; pollen simple

2. *T. elephantina*
1. *T. angustata*

1. *T. angustata* Bory & Chaub. Exp. Sc. Mor. 3 (2): 33, 1832; FBI 6: 489; Bamber 636; Sabnis 572; Maheshw. 344; Puri 128; Duthie 2: 359.

Marshy herbs.

Rare.

Local name: Patira.

Najafgarh. *T. A. Rao* 11158.

2. *T. elephantina* Roxb. Fl. Ind. 3: 566, 1832; FBI 6: 489; Sabnis 572; Duthie 2: 359.

Marshy herbs up to 4 m high. Spikes brown, cylindrical.

Local name: Patira.

Flowers: Oct.-May.

Hansi, 27850.

118. ARACEAE

1. Climbing perennials; leaves often blotched yellow
1. Cormaceous erect herbs; leaves not blotched yellow

2. *Scindapsus*
1. *Colocasia*

I. COLOCASIA Schott

C. esculenta (Linn.) Schott, Melet. 1: 18, 1832. *Arum esculentum* Linn. Sp. Pl. 965, 1753; Maheshw. 345. *Colocasia antiquorum* Schott, Melet. 1: 18, 1832; FBI 6: 523; Duthie 2: 365.

Cultivated for the edible tubers. The leaves are also cooked as vegetables.

Local name : Arbi.

2. SCINDAPSUS Schott

S. aureus (Lindl.) Engl. is often grown in gardens and homes under the name *Money Plant*. When grown in shade the blotches of white may disappear. The stem can grow in water for a long time. I have not seen the plant in flower. It is also called *Pothos aureus* Lindl.

119. LEMNACEAE

- 1. Plants with roots;
- 2. Roots several
- 2. Roots only one
- 1. Plants without roots

- 2. *Spirodela*
- 1. *Lemna*
- 3. *Wolffia*

1. LEMNA Linn.

- 1. Fronds entire; branches soon detached
- 1. Fronds serrulate; branches persistent

- 1. *L. paucicostata*
- 2. *L. trisulca*

1. *L. paucicostata* Hegelm. Lemn. 138, t. 8, 1868; FBI 6: 556; Sabnis 573; Maheshw. 347; Duthie 2: 369.

Floating herbs. Fronds thin flat on both surfaces. Root sheath appendaged.

Common in canals, ponds etc.

Flowers : Oct.

Hissar, 24848.

2. *L. trisulca* Linn. Sp. Pl. 970, 1753; FBI 6: 557; Bamber 642; Duthie 2: 368.

Common in ponds.

Yamunanagar, 27544.

2. SPIRODELA Schleid.

S. polyrrhiza (Linn.) Schleid. in Linnaea 13: 392, 1839; Wilson in Jour. Arn. Arb. 41: 66, 1960; Maheshw. 346; Puri 129; Duthie 2: 368. *Lemna polyrrhiza* Linn. Sp. Pl. 970, 1753.

A highly reduced floating herb; often found in groups. Fronds round or ovate. Roots 10-12 for each frond. Common in still waters.

Bhiwani, 16360; Gurgaon, 25269; Sangrur, 36707; Sonpet, V. J. Nair 23339; Panipat, 18655; Yamunanagar, 27542.

3. WOLFFIA Schleid.

W. microscopica Kurz in Jour. Linn. Soc. 9: 265, 1867; FBI 6: 558; Sabnis 573; Duthie 2: 369.

Fronds flat above, conical beneath. Associated with *Lemma paucicostata* in ponds, puddles, etc. The smallest flowering plant known.

Hissar, 24849.

120. SPARGANIACEAE

SPARGANIUM Linn.

S. ramosum Huds. Fl. Angl. 401, 1778; FBI 6: 490; Bamber 637; Duthie 2: 359.

Perennial herbs in marshy places. Flowers in round heads.

Rare.

Subhanpur, J. N. Vohra 11329.

121. ALISMATACEAE

- | | |
|--|-------------------------|
| 1. Leaves 1 m or more long, linear, triquetrous | 2. <i>Butomus</i> |
| 1. Leaves up to 20 cm long, cordate or elliptic lanceolate: | |
| 2. Flowers bisexual; stamens 9 or less | 1. <i>Alisma</i> |
| 2. Flowers unisexual; stamens many: | |
| 3. Leaves sagitate; stamens about 24 in male flowers, reduced to staminodes in females | 4. <i>Sagittaria</i> |
| 3. Leaves cordate; stamens 6-10 in male flowers and 9-12 in bisexual flowers | 3. <i>Lophotocarpus</i> |

1. ALISMA Linn.

A. plantago Linn. Sp. Pl. 342, 1753; FBI 6: 559; Bamber 639; Duthie 2: 370.

Erect herbs. Leaves ovate-lanceolate. Flowers in panicles. Common in Sub-Himalayan tracts, rarely found elsewhere.

Flowers: May-June.

Hissar, 19015; Hoshiarpur, Bisram 339 (DD), Aitchison 332 (DD).

2. BUTOMUS Linn.

B. umbellatus Linn. Sp. Pl. 372, 1753; FBI 6: 562; Bamber 640.

Large herbs with creeping root stocks. Leaves erect, 3-angled, linear, sheathing. Flowers pinkish in simple bracteate umbels.

Near water.

Chakka Jheel (Sirsa), 18989, V. J. Nair 21587.

3. LOPHOTOCARPUS Durand

L. guyanensis (Kunth) Morong et J. C. Smith in Mem. Torrey Bot. Cl. 5: 25, 1894; Bullock in Kew Bull. 14: 226, 1960. *Sagittaria guyanensis* sensu FBI (pro parte, non HBK); Bamber 640; Maheshw. 347; Duthie 2: 372.

A scapigerous stemless herb. Leaves broadly ovate, deeply notched at the base, blunt pointed. Flowers white. Achenes flat, surrounded by a broad toothed wing.

Common marshy herbs.

Chakka Jheel (Sirsa), 18977, 18988; Kapurthala, *J. N. Vohra* 9870; Patiala, *T. A. Rao* 10950.

4. SAGITTARIA Linn.

S. sagittifolia Linn. Sp. Pl. 993, 1753; FBI 6: 561; Bamber 640; Duthie 2: 371.

Stoloniferous herbs. Petioles long, sometimes reaching 50 cm. Flowers white. Achenes winged.

Subhanpur, *J. N. Vohra* 11330.

122. NAJADACEAE

NAJAS Linn.

N. graminea Del. Fl. Aeg. 282, t. 50, f. 3, 1812; FBI 6: 569; Bamber 628; Puri 130; Duthie 2: 377.

A delicate submerged herb with creeping root-stock and branched thread-like stems. Leaves linear, sharply toothed. Flowers minute in axillary clusters, monoecious.

Common in still waters.

Flowers: Sept.-Dec.

Chakka Jheel (Sirsa), 18993; Panipat, 24727.

123. APONOGETONACEAE

APONOGETON Linn. f.

- | | |
|---|----------------------|
| 1. Leaves floating; spikes dense; fruits 4-8-seeded | 2. <i>A. natans</i> |
| 1. Leaves mostly submerged, spikes at first dense then lax; fruits usually single seeded, sometimes 2 | 1. <i>A. crispus</i> |

1. **A. crispus** Thunb. Nov. Gen. 4: 78, 1781; FBI 6: 564; Bamber 641; Duthie 2: 374.

Aquatic herbs. Leaves linear lanceolate. Petioles shorter than the blade.

Pipli-Shahabad, *M. A. Rau* 12626.

According to van Bruggen (*Blumea* 16: 265, 1968) this species occurs only in Ceylon. Hence, the N. Indian material needs further study.

2. *A. natans* (Linn.) Engl. & Krause in *Pfleich.* 24: 11, 1906; Maheshw. 348. *Saururus natans* Linn. *Mant.* 227, 1771. *Aponogeton monostachyus* Linn. f. *Suppl.* 214, 1781; FBI 6: 564; Bamber 641; Duthie 2: 373.

Floating aquatic herbs. Leaves linear oblong, petioles much longer than blade. Flowers pink or bluish. Seeds ribbed.

In stagnant water.

Amritsar, *R. S. Chopra* O.A. 1 (DD); Kurukshetra, *J. N. Vohra* 9877; Rohtak, *V. J. Nair* 23274.

124. POTAMOGETONACEAE

POTAMOGETON Linn.

- | | |
|--|-------------------------|
| 1. Leaves floating, broad and petioled; flowers in compact spikes | 2. <i>P. nodosus</i> |
| 1. Leaves submerged, filiform or linear-oblong and without petiole; flowers in distant whorls: | |
| 2. Leaves filiform | 3. <i>P. pectinatus</i> |
| 2. Leaves linear-oblong, translucent, crisp | 1. <i>P. crispus</i> |

1. *P. crispus* Linn. *Sp. Pl.* 126, 1753; FBI 6: 566; Bamber 632; Sabnis 574; Maheshw. 349; Puri 130; Duthie 2: 375.

Floating herbs. Flowers pinkish white.

Ottobridge (Sirsa). 34563.

2. *P. nodosus* Poir. in *Encycl. Meth. Bot. Suppl.* 4: 535, 1816; Dandy in *Jour. Linn. Soc.* 50: 531, 1937. *P. indicus* Roxb. *Fl. Ind.* 1: 471, 1820 (non Roth ex Roem. et Schult.); FBI 6: 565; Bamber 631; Maheshw. 348; Puri 130; Duthie 2: 374.

Rooted herbs. Leaves elliptic lanceolate. Peduncles axillary or leaf-opposed. Nutlets oblique, shortly beaked.

Common in canals and ponds.

Flowers: Sept.-April.

Chakka Jheel (Sirsa). 34559; Gurgaon, 20813; Sangrur, 36708; Taran Taran, 36360.

3. *P. pectinatus* Linn. *Sp. Pl.* 127, 1753; FBI 6: 567; Bamber 632; Sabnis 574; Maheshw. 349; Puri 130; Duthie 2: 375.

Floating herbs. Leaves filiform. Flowers whorled.

Common in running and still water.

Flowers: Hot season.

Badopal, 24948; Gola, 25843; Gurgaon, 20812; Hansi, 25902; Rania, 34566.

125. ZANNICHELLIACEAE

ZANNICHELLIA Linn.

Z. palustris Linn. subsp. *pedicellata* Wahlenb. et Rosen in Nov. Act. Upsal. 8 : 227, 254, 1821; FBI 6 : 563; Bamber 633; Duthie 2 : 376.

Slender submerged herbs with delicate branches. Leaves linear in threes or opposite; stipules minute, sheathing. Flowers monoecious. Tepals absent. Achenes curved and crowned with persistent style.

Flowers : March-April.

Sampla, 20803; Sidravli, 20804.

126. CYPERACEAE

- | | |
|--|------------------------|
| 1. Nuts not enclosed in utricles; nut-bearing glumes contain stamens: | |
| 2. Glumes distichous throughout; hypogynous bristles absent | 3. <i>Cyperus</i> |
| 2. Glumes spirally arranged throughout or only the basal ones sometimes distichous; hypogynous bristles or scales present or absent: | |
| 3. Stylar bases dilated and constricted or articulated above the nut: | |
| 4. Hypogynous bristles present | 4. <i>Eleocharis</i> |
| 4. Hypogynous bristles absent; leaves usually developed: | |
| 5. Stylar bases usually persistent; if deciduous not bearing a tumour on the nut | 6. <i>Fimbristylis</i> |
| 5. Style deciduous, bearing a tumour on the nut | 1. <i>Bulbostylis</i> |
| 3. Stylar bases not dilated, continuous with the nut: | |
| 6. Bristles linear, filiform or 0 | 7. <i>Scirpus</i> |
| 6. Bristles 6, cut into narrow segments | 5. <i>Eriophorum</i> |
| 1. Nuts enclosed in a utricle | 2. <i>Carex</i> |

1. BULBOSTYLIS Kunth

B. barbata (Rottb.) Clarke in FBI 6 : 651; Kern in Reinwardtia 6 : 51, 1961; Maheshw. 361; Duthie 2 : 408. *Scirpus barbatus* Rottb. Descr. et Icon. 52, t. 17, f. 4, 1773.

Tufted herbs with fibrous roots and filiform leaves. Spikelets in small dense, brown, terminal heads. Nuts dull white.

Bankhandi, T. A. Rao 10781.

2. CAREX Linn.

C. fedia Nees in Wight, Contrib. 129, 1834; Maheshw. 350. *C. wallichiana* auct. (non Spreng.); FBI 6 : 747; Sabnis 576; Duthie 2 : 418.

Glabrous herbs with stout rhizome. Leaves longer than the panicle. Nuts brown.

Local name : Motha.

Flowers and fruits : Feb.-April.

E. Punjab, anonymous (DD).

3. CYPERUS Linn.

1. Nuts lenticular, compressed or flattened; stigmas 2:
 2. Nuts dorsally compressed; spikelets in large terminal compound umbels 1. *C. alopecuroides*
 2. Nuts laterally compressed; rachilla of spikelets deciduous:
 3. Spikelets aggregated into white heads; glumes 4-5 only:
 4. Heads solitary:
 5. Nut-bearing glumes keeled with a crest on it 13. *C. kyllinga*
 5. Nut-bearing glumes not crested 5. *C. brevifolium*
 4. Heads grouped in threes 18. *C. triceps*
 3. Spikelets grouped in umbellate inflorescences 11. *C. globosus*
1. Nuts trigonous; stigmas 3:
 6. Spikelets in elongated rachis, spikately disposed:
 7. Rachilla winged; styles long:
 8. Rhizome horizontal, prostrate, producing long stolons; glumes densely imbricate:
 9. Culms stout, without leaves; bracts short; spicules linear; glumes narrowly elliptic, concave, carinate, many-nerved; margins rolled:
 10. Rhizome short; glumes few, remote, oblong elliptic, red 16. *C. pungovic*
 10. Rhizome long, stoloniferous; glumes many, densely imbricate and obscurely coloured 7. *C. corymbosus*
 9. Culms slender, with leaves; bracts long; spicules linear-lanceolate; glumes ovate to ovate elliptic, margins not rolled:
 11. Stolons woody; glumes carinate, obsolete or faintly nerved 17. *C. rotundus*
 11. Stolons slender; glumes concave, hardly carinate, evidently multinerved 6. *C. bulbosus*
 8. Rhizome short with short erect suckers; glumes remotely elliptic obtuse:
 12. Rays divaricate; glumes obtuse, shortly mucronate 15. *C. distans* var. *pseudonutans*
 12. Rays sub-erect; glumes ovate elliptic and conspicuously mucronate 10. *C. eleusinoides*
 7. Rachilla not or hardly winged; styles short 12. *C. iria*
 6. Spicules in short rachis, digitately fascicled:
 13. Inflorescence spreadout in compound umbels:
 14. Perennials; rhizome short, woody; culm rigid; leaves many; glumes and nuts somewhat large:
 15. Spicules compressed; glumes dorsally 3-5-nerved 2. *C. alternifolius* subsp. *flabelliformis*
 15. Spicules sub-turgid; glumes multinerved 9. *C. diffusus*
 14. Annuals; culms slender, leaves few 8. *C. difformis*
 13. Inflorescence a head of contracted umbels:
 16. Spicules turgid; glumes hardly carinate at apex:
 17. Rhizome short 4. *C. atkinsonii*
 17. Rhizome long, very much branched 3. *C. arenarius*
 16. Spicules compressed; glumes boat-shaped, carinate 14. *C. niveus*

1. *C. alopecuroides* Rottb. Descr. et Icon. 38, t. 8, fig. 2, 1773; Kükenth. in Pflanzenr. 101: 71, 1956; Maheshw. 352. *Juncellus alopecuroides* (Rottb.) Clarke in FBI 6: 595; Duthie 2: 394.

Marshy sedge up to 2 m high. Inflorescence pale brown. Nuts broadly ovate, dull white.

Flowers and fruits: Aug.-Nov.

Punjab, Anonymous (DD).

2. *C. alternifolius* Linn. subsp. *flabelliformis* (Rottb.) Kukenth Pflanzenr. 101: 193, 1956. *C. flabelliformis* Rottb. Descr. et Icon. 42, t. 12, f. 2, 1773; Maheshw. 354.

Erect stout herbs, native to Africa. Grown as ornamental in gardens.

3. *C. arenarius* Retz. Obs. 4: 9, 1786; FBI 6: 602; Sabnis 574.

In sandy soil.

Charki Dadri, Duthie 4491 (DD).

4. *C. atkinsonii* Clarke in Jour. Linn. Soc. 21: 109, 1884; FBI 6: 603; Sabnis 574; Maheshw. 355.

Erect herbs with woody rhizome. Umbels simple, contracted, pale brown.

Charki Dadri, Duthie 4491a (DD).

5. *C. brevifolius* (Rottb.) Hassk. Cat. Hort. Bogor. 24, 1844; Kukenth. in Pflanzenr. 101: 600, 1956; Maheshw. 354. *Kyllinga brevifolia* Rottb. Descr. et Icon. 13, t. 4, f. 3, 1773; FBI 6: 588; Sabnis 575; Duthie 2: 396.

Spikelets single-flowered. Nuts laterally compressed, obovate-ellipsoid. In moist soil.

Flowers and fruits: June-Oct.

E. Punjab, O. P. Sharma s. n. (DD), Hansi, 16137; Soan River Bed, T. A. Rao 10802.

6. *C. bulbosus* Vahl, Enum. 2: 342, 1806; FBI 6: 611; Maheshw. 356; Puri 132; Duthie 2: 391.

Stolons thread-like. Bulbils white, striated black. Umbels contracted.

Flowers: Sept.

Nilokheri, 15846.

7. *C. corymbosus* Rottb. Descr. et Icon. 42, t. 7, f. 4, 1773; FBI 6: 612; Maheshw. 355; Duthie 2: 391.

Tall sedge. Rhizome woody. Umbels compound. Glumes pale reddish brown.

Common in marshy places.

Flowers and fruits: July-Dec.

Karnal Dist., J. N. Vohra 8880; Phugwara, T. A. Rao 10702.

8. *C. difformis* Linn. Cent. Pl. 2: 6, 1756; FBI 6: 599; Maheshw. 355; Puri 132; Duthie 2: 382.

Annual herbs with many fibrous roots. Inflorescence compact, nearly globose, some rayed, others sessile.

In damp places.

Flowers and fruits: Aug.-March.

Jind, 24785; Panipat, 18660; Patiala, T. A. Rao 10945; Rajpura, T. A. Rao 10928.

9. *C. diffusus* Vahl, Enum. 2: 321, 1806; FBI 6: 603; Duthie 2: 384.

Rhizomes short, roots wiry. Umbels decompound.

Common.

Flowers: Sept.-March.

Rajpura, *T. A. Rao* 10928; Patiala, *T. A. Rao* 10938.

10. *C. distans* Linn. f. var. *pseudonutans* Pflanzenr. 101: 140, 1935. *C. nutans* FBI 6: 607 p.p. (non Vahl. 1806); Maheshw. 357.

Stout sedges with brown decompound umbels and spiral spikes on the ultimate branches. Glumes linear, apiculate, margined.

Near water.

Flowers: Sept.-Nov.

On Cho Bed, *T. A. Rao* 10786.

11. *C. cleusinoides* Kunth, Enum. 2: 39, 1837; FBI 6: 608; Sabnis 574; Maheshw. 357; Duthie 2: 386.

Erect perennials with triangular stems. Umbels compound, rays unequal.

Flowers: Aug.-Oct.

E. Punjab, *O. P. Sharma* s. n. (DD).

12. *C. globosus* All. Auct. Fl. Pedem. 49, 1789; Kükenth. in Pflanzenr. 101: 353, 1956. *Pycnus globosus* Reich. Fl. Germ. 740, 1830. *P. capillaris* Nees in Linnaea 7: 73, 1834; FBI 6: 591; Duthie 2: 392.

Tufted herbs; umbels simple.

Flowers: Aug.-May.

Bhatinda, 27832; E. Punjab, *O. P. Sharma* s. n. (DD).

13. *C. iria* Linn. Sp. Pl. 45, 1753; FBI 6: 606; Sabnis 574; Maheshw. 357; Puri 132; Duthie 2: 385.

Erect annuals with striate stems. Umbels decompound.

In marshy localities.

Flowers: Aug.-March.

Hissar, *Raizada* 21006 (DD); Patiala, *T. A. Rao* 10946; Sirsa, *M. A. Rau* 3595.

14. *C. kyllinga* Endl. Cat. Hort. Vindob. 1: 94, 1842; Kükenth. in Pflanzenr. 101: 606, 1956; Maheshw. 353. *Kyllinga monocephala* Rottb. Descr. et Icon. 13, t. 4, f. 4, 1773 (excl. syn. *nonnullis*); FBI 6: 587; Duthie 2: 397.

Tufted herbs. Inflorescence of 3 cylindrical, ovoid, white heads. Third glume acuminate, 3-nerved on each side of the serrulate and winged keel.

In moist places.

Flowers: July-Sept.

Rohtak, *V. J. Nair* 23170.

15. *C. niveus* Retz. Obs. 5: 12, 1788; FBI 6: 601; Sabnis 574; Maheshw. 354; Puri 132; Duthie 2: 383.

Tufted herbs with woody rhizomes. Inflorescence a solitary head. Glumes close-nerved.

Only known from the hilly tracts.

Flowers: July-Nov.

Hoshiarpur, *Aitchison* 134 (DD).

16. *C. pangorie* Rottb. Descr. et Icon. 31, t. 7, f. 3, 1773; Kukenth. in *Pflanzenr.* 101: 76, 1956. *C. tegetum* Roxb. Fl. Ind. 208, 1832; FBI 6: 613; Sabnis 574; Duthie 2: 389.

Robust herbs with large decompound umbels. Glumes spreading in fruit.

Rare.

Flowers: Aug.

Hissar, *Duthie* 4483 (DD).

17. *C. rotundus* Linn. Sp. Pl. 45, 1753; FBI 6: 614; Sabnis 574; Maheshw. 356; Puri 132; Duthie 2: 388.

Erect herbs. Inflorescence condensed, yellow or brown; often with reddish tinge. Glumes decurrent as hyaline wings beneath.

Common during the rainy season.

Hissar, *Raizada* 21035 (DD); Jind, 16101; Karnal, *J. N. Vohra* 8880; Laroha (Jullunder), *T. S. Bakshi* 18 (DD); Nilokheri, 15851; Panipat, 18658.

18. *C. triceps* (Rottb.) Endl. Cat. Hort. Vindob. 1: 94, 1842; Kukenth. in *Pflanzenr.* 101: 578, 1956; Puri 131; Maheshw. 353. *Kyllinga triceps* Rottb. Descr. et Icon. 14, t. 4, f. 6, 1773 (excl. cit. Reed); Duthie 2: 396.

Small tufted herbs. Inflorescence in 3 cylindric, ovoid, white heads. Third glume with a green keel.

Flowers: Aug.-Nov.

Karnal Dist., *J. N. Vohra* 9872.

4. ELEOCHARIS R. Br.

- | | |
|--|---------------------------|
| 1. Keels of glumes prominent, spikelets wider than the stems; | |
| 2. Stylar bases persistent and almost half as long as the nut; | |
| margins of glumes hyaline or brown | 2. <i>E. palustris</i> |
| 2. Stylar bases very minutely persisting; margins of glumes broad, | |
| membranous, dark coloured | 1. <i>E. atropurpurea</i> |
| 1. Keels of glumes not prominent; nuts tipped by conical stylar bases; | |
| spikes less scarcely wider than stem; margins of glumes scarious | 3. <i>E. dulcis</i> |

1. *E. atropurpurea* (Retz.) Kunth, Enum. 2: 151, 1837; FBI 6: 627; Maheshw. 358; Puri 133; Duthie 2: 400.

This plant is found in the adjoining regions and may be found in the area also.

2. *E. palustris* R. Br. Prodr. 224, 1810; FBI 6: 628; Sabnis 575; Maheshw. 358; Duthie 2: 400.

Common marshy herbs with creeping rhizomes. Stems longitudinally striate. Leaves wanting. Spikes ellipsoid or cylindrical.

Flowers: Dec.-April.

Gurgaon, 20814; Yamunanagar, 25280, 27540.

3. *E. dulcis* (Burm.) Henschel, Vit. Rumph. 186, 1833; Kern in Back. et Bakh. f. Fl. Java 3: 460, 1968. *Andropogon dulcis* Burm. Fl. Ind. 219, 1768. *E. plantaginea* R. Br. Prodr. 324, 1810; FBI 6: 625; Duthie 2: 401.

Densely tufted herbs. Stems longitudinally striate and distantly transverse septate.

Flowers: Sept.-April.

E. Punjab, O. P. Sharma s. n. (DD); Jagadri, Parker 3263 (DD).

5. ERIOPHORUM Linn.

E. comosum Wall. ex Nees in Wt. Contrib. 110, 1834; FBI 6: 664; Maheshw. 363; Duthie 2: 414.

Tufted sedge often hanging from rocks. Leaves narrowly linear. Spikelets reddish brown in umbels. Nuts subtended by a ring of cottony hairs.

Flowers and fruits: Oct.-Nov.

Hoshiarpur Siwaliks, Aitchison s. n. (DD), T. A. Rao 10749.

6. FIMBRISTYLIS Vahl

1. Spikelets numerous:

2. Stigmas 3; nuts trigonous

2. Stigmas 2:

3. Glumes less than 1.5 mm long, boat-shaped

3. Glumes more than 2 mm long; concave

1. Spikelets few (1-3):

4. Spikelets solitary; nuts trigonous

4. Spikelets 2-3; glumes hoary hairy

1. *F. complanata*

2. *F. dichotoma*

3. *F. diphylla*

5. *F. ovata*

4. *F. ferruginea*

1. *F. complanata* Link. Hort. Berol. 1: 292, 1827; FBI 6: 646; Duthie 2: 407.

Tufted herbs with creeping rhizomes. Spikelets in decompound rayed umbels.

Rare.

E. Punjab, O. P. Sharma s. n. (DD).

2. **F. dichotoma** (Linn.) Vahl, Enum. 2: 287, 1806; FBI 6: 635; Sabnis 575; Maheshw. 359; Puri 133; Duthie 2: 403. *Scirpus dichotomus* Linn. Sp. Pl. 50, 1753.

A common sedge of sandy and silty soil. Spikelets sessile and pedicelled. Nuts 5-9-ribbed, transversely rugose.

Flowers: Feb.-June.

Rewari, 20783, 20787; Rohtak, 26376.

3. **F. diphylla** (Retz.) Vahl, Enum. 2: 289, 1806; FBI 6: 636; Duthie 2: 402. *Scirpus diphyllus* Retz. Obs. 5: 15, 1789.

Tufted herbs. Stems striate. Leaves scabrid on the margin towards the apex. Nuts 5-6-ribbed with cross lines between the ribs.

Flowers: Sept.-June.

East Punjab, O. P. Sharma s. n. (DD); Hissar, M. A. Rau 3575; Karnal, J. N. Vohra 8879.

4. **F. ferruginea** (Linn.) Vahl, Enum. 2: 291, 1806; FBI 6: 638; Sabnis 575; Maheshw. 350; Puri 133; Duthie 2: 405. *Scirpus ferrugineus* Linn. Sp. Pl. 50, 1753.

I have seen only one specimen in DD marked Punjab without Collector's name.

5. **F. ovata** (Burm.) Kern in Blumea 15: 126, 1967. *Carex ovata* N. Burm. Fl. Ind. 194, 1768. *F. monostachyos* (Linn.) Hassk. Pl. Jav. Rar. 61: 1848; FBI 6: 649; Duthie 2: 405; Maheshw. 359. *Cyperus monostachyos* Linn. Mant. 180, 1768.

Tufted slender herbs. Spikelets pale green. Nuts minutely tubercled and apiculate.

Flowers: Sept.-Nov.

Rajpura, T. A. Rao 10922.

7. SCIRPUS Linn.

1. Spikelets in umbels, bracts leafy:

2. Bristles 6 unequal

2. Bristles 4 as long as the nut

4. *S. maritimus*

1. *S. affinis*

1. Spikelets in simple clusters or heads, lateral on the stem:

3. Bristles present:

4. Styles 2-fid; stems terete

4. Styles 3-fid; stems trigonous

3. *S. erectus*

5. *S. mucronatus*

3. Bristles absent:

5. Glumes mucronate, keeled:

6. Glumes smooth

6. Glumes multiseriate

7. *S. supinus*

6. *S. roylei*

5. Glumes acute, not or scarcely keeled

2. *S. articulatus*

1. **S. affinis** Roth in Roem. & Schult. Syst. 2: 140, 1817 & Nov. Pl. Sp. 30, 1821; Maheshw. 362. *S. maritimus* var. *affinis* (Roth) Cl. in FBI 6: 659; Duthie 2: 412.

Spongy rooted sedges. Stems trigonous, leafy. Spikelets few, pale.

Flowers: Feb.-June.

Attari, 36328; Gurgaon, 20811, 20816; Ludhiana, 35990.

2. *S. articulatus* Linn. Sp. Pl. 47, 1753; FBI 6: 656; Maheshw. 361; Duthie 2: 410.

Stems terete septate. Spikelets brown in dense single lateral heads. Faces of nuts transversely rugose.

Flowers: Sept.-Dec.

E. Punjab, *Anonymous* (DD).

3. *S. erectus* Poir. Encycl. 6: 761, 1804; FBI 6: 656; Duthie 2: 409. Stems terete tufted. Spikelets in a single lateral head near the apex of the stem.

Flowers: Nov.-June.

Rajpura, *T. A. Rao* 10926.

4. *S. maritimus* Linn. Sp. Pl. 51, 1753; FBI 6: 658; Puri 134; Duthie 2: 412.

Rhizome nodes dialating into woody tubers. Stems trigonous.

Flowers: Nov.-June.

E. Punjab, *O. P. Sharma* s. n. (DD); Gola, 25842; Hissar, *M. A. Rau* 3590; Rajpura, *T. A. Rao* 10924.

5. *S. mucronatus* Linn. Sp. Pl. 50, 1753; FBI 5: 657; Duthie 2: 409. Perennial tufted sedges. Stems triquetrous. Spikelets in simple lateral clusters.

Flowers: Sept.-June.

Kapurthala, *J. N. Vohra* 11339; Phagwara, *T. A. Rao* 10701.

6. *S. roylei* (Nees) Duthie in Fl. Upp. Gang. Pl. 3: 361, 1929; Duthie 2: 410; Maheshw. 362. *Isolepis roylei* Nees in Wt. Contrib. 107, 1834.

Erect tufted sedges. Stems terete, transversely septate. Glumes keeled. Nuts triquetrous.

Flowers: Sept.-Nov.

Hissar, *Raizada* 21007 (DD); Patiala, *T. A. Rao* 10936; Panipat, 18659.

7. *S. supinus* Linn. Sp. Pl. 49, 1753; FBI 6: 655; Puri 134; Duthie 2: 410.

Stems terete. Spikelets in single lateral clusters. Nuts black, faces transversely undulate, rugose.

Flowers: Sept.-June.

Gola, 25851.

127. GRAMINEAE

All keys adapted from Bor

1. 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 entirely absent, all alike or more often differing in size shape and structure, frequently dorsally compressed:
 2. Male and female spikelets in separate inflorescences or in different parts of the same inflorescence and of different appearance; lemmas hyaline or membranous 54. *Zea*
 2. Spikelets all hermaphrodite or with male or barren and 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:
 3. Spikelets in pairs, one sessile and the other pedicelled; rarely solitary when 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 lemma usually awned:
 4. Spikelets of each pair similar, the sessile and the pedicelled hermaphrodite; joints of the panicle thin, linear or somewhat expanded at the top:
 5. Spikelets in panicles or compound racemes; upper glumes not awned:
 6. Rachis of racemes tough or tardily breaking up; spikelets deciduous from their pedicels; lemmas awned; callus hairs twice as long as the glumes or more .. 26. *Imperata*
 6. Rachis of racemes breaking up:
 7. Spikelets unawned; culms solid; spikelets similar 45. *Saccharum*
 7. Spikelets awned 21. *Erianthus*
 5. Spikelets in solitary racemes; upper glumes awned 44. *Pogonatherum*
 4. Spikelets of each pair dissimilar, the sessile hermaphrodite, the pedicelled male or sessile or completely absent or if more or less similar then the joints of the racemes and the pedicels thick and swollen:
 8. Joints of the rachis and the pedicels of the pedicelled spikelets swollen, 3-angled, rounded or flattened:
 9. Sessile spikelets with a male and a hermaphrodite floret; upper lemma awned; racemes 1-noded, reduced to 3 heteromorphous spikelets enclosed in a boat-shaped spathe 9. *Apluda*
 9. Sessile spikelets with a hermaphrodite floret only sunk in a depression formed by the joint and pedicel, or in a cavity in the joint:
 10. Racemes covered with shaggy hairs 29. *Lasiurus*
 10. Racemes not conspicuously hairy 23. *Hemarthria*
 8. Joints of the rachis and pedicels narrow, seldom thickened upwards, occasionally with a translucent longitudinal groove; sessile spikelets usually awned:
 11. Spikelets in racemes not interrupted by spathes; joints and pedicels not furrowed:
 12. Spikelets dorsally compressed in panicles of many pairs; rachis nodes and pedicels ciliate; lodicules hairy 47. *Sorghum*
 12. Spikelets compressed from the sides:
 13. Spikelets in groups each consisting of a sessile and two more or less reduced pedicelled

- spikelets; lower glumes smooth not tuberculate 9. *Chrysopogon*
13. Spikelets with many pairs of spikelets arranged in whorled racemes; lower glumes tuberculate 53. *Pectiveria*
11. Spikelets in panicles interrupted by spathes:
14. Margins of lower glume of the sessile spikelets sharply infolded, 2-keeled; awns glabrous:
15. Upper lemma of sessile spikelets not cleft, often stipitate and pass into the awn:
16. Racemes solitary at the ends of branches supported by spathes, but sessile spikelets not overlapping 20. *Eremopogon*
16. Racemes several to many, if solitary then the sessile spikelets imbricate:
17. Joints of pedicels with a translucent longitudinal furrow 6. *Bothriochloa*
17. Joints of pedicels without a translucent furrow 14. *Dichanthium*
15. Upper lemma of the sessile spikelets 2-lobed or 2-cleft, awned in the sinus:
18. Aromatic grasses; racemes in pairs supported by spathes often collected into huge panicles; one pair of spikelets in each raceme homogamous, male or neuter, all other pairs heterogamous 10. *Cymbopogon*
18. Grasses not aromatic; racemes in pairs or digitate or solitary 55. *Andropogon*
14. Margins of the lower glumes inturred and rounded at the sides, at the most keeled upwards; callus mostly sharp and long; awn usually hairy:
19. Racemes solitary at the ends of branches surrounded at the base by an involucre of homogamous spikelets 28. *Iseilema*
19. Racemes without an involucre 24. *Heteropogon*
3. Spikelets solitary or paired, almost similar; glumes often membranous, lower smaller or sometimes suppressed; lower lemma mostly resembling the upper glume in texture; upper lemma papery to very tough and rigid, usually awnless:
20. Spikelets falling singly, not subtended by bristles or if so, then the bristles persisting after the spikelets have fallen (*Setaria*):
21. Spikelets arranged in more or less open panicles or with the panicles contracted and spike-like:
22. Spikelets not subtended by bristle-like branches; upper glumes as long as spikelets 37. *Panicum*
22. Spikelets subtended by bristle-like branches which remain after the spikelets have fallen; upper lemma often transversely rugose 46. *Setaria*
21. Spikelets arranged in 1-sided spikes or spike-like racemes; spikes or racemes digitate or scattered, rarely solitary:
23. Lemma of upper florets more or less crustaceous or coriaceous usually with narrow inrolled margins exposing much of the palea:
24. Lower glume and the lowest internode of the rachilla not forming a swollen callus at the base of the spikelet:
25. 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 abaxial:
26. Lower glumes usually absent; spikelets planoconvex 38. *Paspalum*
26. Lower glumes developed:

- 27. Glumes acuminate or awned, rarely only acute; upper lemma not mucronate:
 - 28. Leaf blades linear; racemes dense; culms erect or suberect
 - 28. Leaf blades lanceolate-to ovate; racemes loose to moderately dense; culms creeping and ascending
 - 27. Glumes awnless, if acuminate then with the upper lemma mucronate:
 - 29. Upper lemma acute not mucronate
 - 29. Upper lemma obtuse mucronate or very shortly awned
 - 25. Lower glume turned towards the rachis, the back of the upper lemma turned away from it, i.e. spikelets adaxial
 - 24. Lower glume and lowest internode of rachilla forming a swollen callus at the base of the spikelets; upper lemma mucronate or short-awned
 - 23. Lemma of the upper floret thinly cartilagenous, usually with flat hyaline margins
 - 20. Spikelets with an involucre of bristles or subtended by a solitary bristle and falling without the bristles at maturity, solitary or in clusters:
 - 30. Upper lemma smooth; bristles caducous;
 - 31. Involucre of free naked or plumose bristles
 - 31. Involucre of spines of rigid bristles united at the base into a cup
 - 30. Upper lemma transversely rugose, bristles persistent
 - 1. 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 or if 2-flowered and falling entire, the glumes and lemmas all membranous and with a globose wrinkled seed which splits the palea when mature:
 - 32. Spikelets borne on open or contracted spike-like panicles, less often in racemes or spikes:
 - 33. Spikelets usually with two or more fertile florets or if with one fertile floret then with sterile reduced florets above it:
 - 34. Lemma and rachilla glabrous or hairy, but with the hairs not enveloping the lemma or if so, then the lemma with a geniculate awn; low or moderately tall grass:
 - 35. Glumes shorter than the lowest floret and with the upper floret distinctly exerted, rarely longer and then with firm dull margins like the lemmas or if with hyaline margins then the lemma firmly keeled; lemmas awnless or with a straight or curved awn from the entire or the bifid apex or several awned or lobed:
 - 36. Lemmas usually 5-many-nerved, awnless or awned; awn usually simple, not kneeed or twisted below the knee:
 - 37. Lemmas usually 9-awned and the uppermost lemma reduced to a bundle of awns; awns scabrid or ciliate
 - 37. Lemmas usually 1-awned
 - 36. Lemmas 1-3-nerved; inflorescence of panicle of racemes, spikes or spikes:
 - 38. Inflorescence panicle, if racemes or spikes the spikelets not secund:
 - 39. Lemmas usually entire at the apex, obtuse, acute or acuminate; cleistogamous spikelets not
- 16. *Echinochloa*
 - 34. *Oplismenus*
 - 39. *Paspalidium*
 - 52. *Urochloa*
 - 7. *Brachiaria*
 - 22. *Eriochloa*
 - 15. *Digitaria*
 - 40. *Pennisetum*
 - 7a. *Cenchrus*
 - 46. *Setaria*
 - 18. *Enneapogon*
 - 31. *Lolium*

- developed in the axils of the leaf sheaths;
40. Spikelets in open contracted or spike-like panicles 19. *Eragrostis*
40. Spikelets sessile or very short-pedicelled, loosely to densely imbricate in digitate or racemously arranged spikes or spike-like racemes:
41. Axis of spike ending in a sharp point; upper glumes mucronate or awned; spikes digitate, rarely racemose 12. *Dactyloctenium*
41. Axis and branches of the inflorescence ending in a spikelet:
42. Spikelets falling entire at maturity from the axis of straight spikes, the latter numerous and crowded into a long narrow dense panicle; glume 1-nerved 13. *Desmostachya*
42. Spikelets breaking up at maturity:
43. Spikelets digitate or subdigitate; spikelets 3-6-flowered; glumes 1-5-nerved; grains oblong to globose, grooved with a loose conspicuous pericarp 17. *Eleusine*
43. Spikelets usually in pseudowhorls or scattered; spikelets 8-20-flowered; grains coarsely rugose; grooved or hollowed on one face with an early deciduous pericarp 1. *Acrachne*
39. Lemmas usually emarginate or 2-4-lobed or toothed at the apex; cleistogamous spikelets sometimes developed in the sheaths; lemmas keeled; spikelets laterally compressed 30. *Leptochloa*
38. Inflorescence of racemes or panicles of racemes; spikelets secund:
44. Inflorescence terminal, spicate, not of digitate or racemose spikes; lemmas not obovate:
45. Inflorescence of spaced clusters of awned spikelets on a simple rachis 33. *Melanocenchris*
45. Inflorescence of simple spikes, spikelets more or less sunk in the thick rough rachis 35. *Oropetium*
44. Inflorescence of digitate spikes or spikes racemose very rarely solitary, but if so, lemmas obovate:
46. Spikelets with one or more fertile florets and one or more imperfect florets above them; lemmas usually widened upwards:
47. Spikelets 1-3; fertile florets 2 or more 50. *Tetrapogon*
47. Spikelets 4 or more; fertile florets one only 8. *Chloris*
46. Spikelets with one fertile floret and no imperfect florets, awnless 11. *Cynodon*
35. Glumes usually as long as or longer than the lowest floret, often as long as the spikelets and enclosing the florets, if shorter, shorter than the lowest floret:
48. Lemmas awnless or awned from the back, rarely from the tip; awn usually kneed; ligules membranous:
49. Ovary hairy; awns mostly twisted at the base; spikelets more than 8 mm long; glumes 7-11-nerved 5. *Avena*
49. Ovary glabrous; awns not twisted at base 32. *Lophochloa*
48. Lemmas awned from the sinus between the two terminal lobes or no trace of an awn, often only a mucro; ligule a hairy rim 45a. *Schismus*
34. Lemmas or rachilla joints bearing long silky hairs which envelope the lemma; lemmas awnless or with a straight awn from the tip, often thin; tall grasses with large plume-like panicles 43. *Phragmites*
33. Spikes with one fertile floret, with or without one or two male or barren florets below it, the latter often much-reduced:
50. Glumes minute or suppressed; fertile lemma and palea very similar in shape and texture; spikelets firmly compressed;

- stamens usually six; florets hermaphrodite or unisexual
50. Glumes well developed; fertile lemmas and palea not similar: 36. *Oryza*
51. Spikelets with 3 florets, the lower two represented by empty lemmas which are often minute and occasionally one of them absent 42. *Phalaris*
51. Spikelets with 1 or 2 florets only:
52. Spikelets with 2 florets; the lower male or barren, the upper hermaphrodite 27. *Isachne*
52. Spikelets with 1 fertile floret only:
53. Spikelets very rarely falling entire and then with firmly membranous to coriaceous awned or 5-nerved lemmas:
54. Lemmas hyaline or membranous at maturity, rarely indurated and then laterally compressed, awnless or awned from low down on the back or from the middle or from the entire bifid tip:
55. Lemmas usually 3-5-nerved, frequently awned; glumes longer and firmer than the hyaline lemma or when the lemma is longer than the latter indurated; grains usually with adhering pericarp:
56. Panicle cylindric ovoid or spiciform, very dense; lemma awned 2. *Alopecurus*
56. Panicle spreading, if dense, then not cylindric and spiciform; glumes long awned 44a. *Polygona*
55. Lemmas 1-3-nerved, awnless; glumes and lemmas very similar in texture, hyaline or thinly membranous shining; grains usually with a free pericarp:
57. Inflorescence spicate, very dense, subtended by an inflated sheath bearing rudimentary blade 9a. *Cryptis*
57. Inflorescence a spreading panicle; no inflated sheath; fruit without beak 48. *Sporobolus*
54. Lemmas indurated or rigid at maturity, terete or dorsally compressed 4. *Aristida*
53. Spikelets falling entire at maturity either singly or in clusters from the axis of slender spike-like panicles or racemes; lemma delicate, 1-3-nerved:
58. Spikelets fascicled or solitary; glumes not awned 49. *Tragus*
58. Spikelets solitary, glumes awned 41. *Perotis*
52. Spikelets sessile or shortly pedicelled along one side of the rachis of solitary, digitate or scattered spikes, spike-like racemes or on opposite sides of the rachis of solitary, spikes or racemes; ovary hairy, lemmas 3-5 or more nerved; lodicules hairy:
59. Spikelets normally solitary at each node of the spike axis; spikelets more than 2-flowered; glumes more than 1-nerved; glumes and lemmas keeled on the back 51. *Triticum*
59. Spikelets more than one (usually three) at each node of the spike axis; spikelets 1-flowered; glumes standing in front of the spikelets 25. *Hordeum*

I. ACRACHNE Wt. et Arn.

A. racemosa (Heyne ex Roem. et Schult.) Ohwi in Bull. Tokyo Sci. Mus. n. 18 : 1, 1947; Bor 487. *Eleusine racemosa* Heyne ex Roem. et Schult. Syst. Veg. 2: 583, 1817. *E. verticillata* Roxb. Fl. Ind. 1: 346, 1820.

Chandigarh, P. N. Mehra 55 (DD); Hissar, Harsukh 70703 (DD), Duthie 5098 (DD).

2. ALOPECURUS Linn.

A. nepalensis Trin. ex Steud. Syn. Pl. Glum. 1 : 148, 1854; Bor 393; Maheshw. 386.

Awn very short or absent, much shorter than the lemma; spikelets 3 mm long, lemma projecting beyond the glumes; glumes glabrous inside.

Bhatinda, 36575; Panipat, 25833; Laroha (Jullunder Dist.), *T. S. Bakshi* 29 (DD).

3. APLUDA Linn.

A. nutica Linn. Sp. Pl. 82, 1753; Bor 93; Puri 139. *A. varia* auct.; FBI 150. *A. varia* var. *aristata* sensu Sabnis 581.

Perennials. Spikelets 3 with a two-flowered hermaphrodite one having a terminal neuter or male and a basal imperfect one.

Karnal, *Drummond* s. n. (DD); Hissar, *Duthie* s. n. (DD).

4. ARISTIDA Linn.

1. Articulations not present between lemma and awns; panicles contracted, glumes not long-awned:
 2. Panicles contracted:
 3. Lemmas shorter or not much longer than the upper glumes; erect plants; lower glumes 5-8 mm long, upper glumes 6-9 mm long; lemmas 10 mm long
 1. *A. adscensionis* var. *adscensionis*
 3. Lemmas much longer than the upper glumes, up to 12 mm long; dwarf plants
 2. *A. adscensionis* var. *pumila*
 5. *A. hystrix*
 2. Panicles not contracted, effuse, often as broad as long
 1. Articulations present between the lemma and the awns:
 4. Articulations between the lemma and the awns situated at the top of the column, just below the spreading awns
 6. *A. mutabilis*
 4. Articulations between the tip of the lemma and the base of the column:
 5. Lower glumes always longer than the upper; column of awns longer than 2 cm long, white sparse hairs present in the axils and on pedicels and leaves at the base
 3. *A. funiculata*
 5. Lower glumes shorter than the upper; callus forked at the base; dwarf plants
 4. *A. histricula*

1. *A. adscensionis* Linn. Sp. Pl. 82, 1753 var. *adscensionis*; Sabnis 581; Bor 407; Maheshw. 398.

Annuals or perennials. Glumes not awned; upper glumes emarginate with a short mucro between the lobes.

Hissar, *Duthie* 5078 (DD), *Harsukh* 20701 (DD); Karnal; *Drummond* s. n. (DD).

2. *A. adscensionis* Linn. var. *pumila* (Decne.) Coss et Dur. Fl. Alger. Glum. 84, 1855; Bor 409. *A. pumila* Decne. in Ann. Sci. Nat. Ser. 2, 4: 85, 1835.

Like last species, but dwarf, and lemmas 5-6 mm longer than the upper glumes.

Hissar, *Drummond* 15243 (DD).

3. *A. funiculata* Trin. et Rupr. Sp. Gram. Stirp. 159, 1842; FBI 226; Sabnis 581; Bor 410; Puri 145.

Very slender annuals. Panicles capillary.

Chopalia Bir (Hissar Dist.), *Raizada* 20982; Hissar, *Duthie* 5079 (DD).

4. *A. histricula* Edgew. in Jour. Linn. Soc. 6: 208, 1862; FBI 7: 227; Sabnis 581; Bor 410; Puri 145.

Hissar, *Harsukh* 20712 (DD).

5. *A. hystrix* Linn. f. Suppl. 113, 1781; Bor 410

Hissar, *Duthie* 5079 (DD).

6. *A. mutabilis* Trin. et Rupr. in Mem. Acad. Petersb. Ser. 6: 150, 1849; Puri 145.

There is a sheet in DD marked Punjab without collector's name.

5. AVENA Linn.

1. All lemmas with a thickened callus at the base; spikelets up to 29 mm long; lemmas up to 20 mm long; rachilla articulating between the florets

1. *A. fatua*

1. Lowest lemmas only with a thickened callus; rachilla continuous and tough between florets; spikelets 19-30 mm long; lowest florets 16-25 mm long; lemmas glabrous except a few hairs at the base

2. *A. sativa* × *sterilis*

1. *A. fatua* Linn. Sp. Pl. 80, 1753; Bor 434.

Laroha (Jullunder Dist.), *T. S. Bakshi* 30 (DD).

2. *A. sativa* × *sterilis*

Ludhiana, 35993.

6. BOTHRIOCHLOA O. Kuntze

1. Lower glumes of sessile spikelets with one, rarely two pits; racemes few (2-8), up to 5 cm long

2. *B. pertusa*

1. Lower glumes of sessile spikelets without pits; racemes up to 5 cm long, 2-7 in number; lower glumes with short woolly hairs in the lower three quarters, 5-7-nerved

1. *B. ischaemum*

1. *B. ischaemum* (Linn.) Keng in Contr. Biol. Lab. Sci. Soc. China Bot. Ser. 10, 201, 1936; Bor 108. *Andropogon ischaemum* Linn. Sp. Pl. 1047, 1753.

Leaf sheath prominently keeled. Leaves mainly collected at the base of the stem.

Hissar, *Duthie* 5060 (DD); Yamunanagar, 27560.

2. **B. pertusa** (Linn.) A. Camus in Ann. Soc. Linn. Lyon 1930, n. s. 76: 164, 1931; Bor 109; Maheshw. 394; Puri 140. *Holcus pertusus* Linn. Mant. 2: 301, 1771. *Andropogon pertusus* (Linn.) Willd. Sp. Pl. 4: 922, 1806; FBI 7: 173.

Nodes somewhat bearded. Racemes purple.

Kanana (Dadri), 25141.

7. BRACHIARIA Griseb.

- | | |
|--|----------------------|
| 1. Spikelets less than 2.6 mm long, paired, pedicels with white bristles; lower glumes truncate | 2. <i>B. reptans</i> |
| 1. Spikelets more than 2.6 mm long, hairy or glabrous; lower glumes usually 5-7-nerved, upper 7-nerved | 1. <i>B. ramosa</i> |

1. **B. ramosa** (Linn.) Stapf in Prain, Fl. Trop. Afr. 9: 542, 1919; Bor 284; Maheshw. 397; Puri 142. *Panicum ramosum* Linn. Mant. Pl. 1: 29, 1767; Sabnis 576.

Leafy annual grasses, up to 1.5 m tall. Spikelets pedicellate, in pairs.

Hissar, *Duthie* 5019 (DD); Karnal, *Drummond* s. n. (DD); Murthal forest, *V. J. Nair* 23312.

2. **B. reptans** (Linn.) Gard. et C. E. Hubbard in Hook. Ic. Pl. 3363, 1938; Bor 285; Maheshw. 397. *Panicum reptans* Linn. Syst. Nat. end. 10, 870, 1759. *P. prostratum* Lamk. Ill. 1: 171, 1791; Sabnis 576. *Urochloa reptans* (Linn.) Stapf in Prain, Fl. Trop. Afr. 9: 601, 1920.

Glabrous or slightly hairy plants. Rachis triquetrous. Lower glumes not more than half the length of the spikelets.

Flowers: Sept.-Oct.

Bhatinda, 2772; Hissar, *Raizada* 20999 (DD).

7a. CENCHRUS Linn.

- | | |
|---|------------------------|
| 1. Bristles or spines of the involucre antrorsely scabrid: | |
| 2. Bristles connate at the base only: | |
| 3. Annuals; involucre with a wide naked connate base; inner bristles stouter at the base, ciliate on both the margins; outer long, flexuous, scabrid, up to 2 cm long | 3. <i>C. pricurii</i> |
| 3. Perennials; bases of the involucre small, elliptic, naked; inner bristles not very stout at the base, ciliate on the margins, not more than 1.5 cm long | 2. <i>C. ciliaris</i> |
| 2. Bristles connate to form a cup; inner bristles rigid, acute at the tip, not drawn out | 4. <i>C. setigerus</i> |
| 1. Bristles or spines of the involucre retrorsely scabrid; bristles numerous, connate at the base only, hook-like | 1. <i>C. biflorus</i> |

1. **C. biflorus** Roxb. Fl. Ind. 1: 238, 1820; Sabnis 578; Bor 237; Maheshw. 377. *C. catharticus* Del. Cat. Hort. Monsp. 1838: 4, 1839.

Hissar, *Harsukh* 20702 (DD), *M. A. Rau* 3580; Panipat, *Drummond* s. n. (DD).

2. *C. ciliaris* Linn. Mant. 2 : 302, 1771; Bor 287; Maheshw. 377; Puri 144. *Pennisetum cenchroides* Rich. in Pers. Syn. 1 : 72, 1805; Sabnis 577.

Local name : Anjan.

Considered a good fodder.

Flowers : After the rains.

Bhatinda, 27779, 36569; Faridkot, 36542; Hissar, Raizada 20984 (DD), M. A. Rau 3566; Lambi, 26196; Laroha (Jullunder Dist.), T. S. Bakshi 19 (DD).

3. *C. prieurii* (Kunth) Maire in Bull. Mus. Hist. Nat. Paris, Ser. 2, 3 : 523, 1931; Bor 290. *Pennisetum prieurii* Kunth, Revis. Gram. 2 : 411, 1831; Sabnis 577.

Hissar, Drummond 21191 (DD).

4. *C. setigerus* Vahl, Enum. Pl. 2 : 395, 1806; Bor 290; Maheshw. 377; Puri 144. *C. biflorus* sensu FBI 7 : 89 (non Roxb. 1820); Sabnis 578.

Amritsar, 36322; Faridkot, 36542; Hissar, Harsukh 20708 (DD), Duthie 5034 (DD); Laroha (Jullunder Dist.), T. S. Bakshi s. n. (DD).

8. CHLORIS SW.

1. Empty lemmas above the fertile florets solitary;

2. Spikes up to 25 cm long, spreading; upper glumes 5-7.5 mm long; empty lemmas reduced to awns up to 1.25 cm long 1. *C. dolichostachya*

2. Spikes not more than 6.5 cm long, closely crowded, ascending; upper glumes 3-3.5 mm; empty lemma oblanceolate, truncate with an arista 4 mm or more long; stems prostrate, rooting at nodes

3. *C. virgata*

1. Empty lemmas above the lowest ones, 2-4; culm glabrous below the inflorescence; awns 4 or 5; creeping and rooting perennials

2. *C. montana*

1. *C. dolichostachya* Lagasca, Gen. et Sp. Pl. 5, 1816; Bor 466; Maheshw. 387. *Melica digitata* Roxb. Fl. Ind. 1 : 328, 1820. *Chloris incompleta* Roth, Nov. Pl. Sp. 60, 1821; FBI 7 : 290.

Perennial erect. Rachilla produced to half the length of the glume.

Gurgaon Dist., T. A. Rao 11054.

2. *C. montana* Roxb. Fl. Ind. 1 : 331, 1820; FBI 7 : 292; Bor 466. Ligules very short; mouth of the sheath ciliate.

Near Panipat, N. P. Mohan s. n. (DD).

3. *C. virgata* Sw. Fl. Ind. Occ. 1 : 203, 1797; FBI 291; Bor 468; Maheshw. 388.

Karnal Dist., J. N. Vohra 8898.

9. CHRYSOPOGON Trin.

C. fulvus (Spreng.) Chiov. Fl. Somal. 1 : 327, 1929; Bor 116; Maheshw. 401. *Pollinia fulva* Spreng. Pugill. 2 : 10, 1815. *Andropogon monticola* Roem. et Schult. Syst. Veget. 2, Mant. 665, 1827.

Leaves glabrous or with few tubercled hairs; not distichous. Sessile spikelets 4-6 mm long. Pedicelled spikelets 4 mm long. Lower glume of pedicelled spikelets awned.

Gurgaon Dist., *T. A. Rao* 11058.

9a. CRYPISIS Ait.

C. schoenoides (Linn.) Lamk. Tab. Encycl. 1 : 166, t. 42, 1791; Bor 622; Puri 146. *Heleochoa schoenoides* (Linn.) Host. Icon. Gram. Austr. 1 : 23, t. 30, 1801; FBI 7 : 235.

Leaves often reduced. All glumes 1-nerved, keel ciliate.

Ferozpor, *Griffith* s. n. (DD).

10. CYMBOPOGON Spreng.

1. Panicles narrow of short dense fascicles of raceme pairs; joints and pedicels villous all over; hairs long, more or less concealing the sessile spikelets:
 2. Lower glumes of sessile spikelets pubescent in the groove; pedicels of the lowest pedicelled spikelets in the subsessile raceme swollen, hard, shining or hairy; basal sheaths woolly; pedicelled spikelets hairy on the nerves 3. *C. parkeri*
 2. Lower glumes of the sessile spikelets smooth and glabrous; pedicel of the lowest pedicelled spikelet not enlarged; basal sheaths not woolly; pedicelled spikelets glabrous:
 3. Leaf blades more or less biliform and flexuous; sheaths widened and thickened below; the old ones never curled in a spiral 4. *C. schoenanthus*
 3. Leaf blades flat; basal sheaths when old slipping from the culm and becoming curled in a spiral 1. *C. jwaranchusa*
1. Panicles very large, decomposed or compound; pedicelled spikelets glabrous 2. *C. martinii*

1. **C. jwaranchusa** (Jones) Schult. Syst. Veg. 2, Mant. 458, 1824; Bor 128; Puri 141. *Andropogon jwaranchusa* Jones in Asiat. Res. 4 : 109, 1795; FBI 7 : 203 (excl. *A. laniger*); Sabnis 580.

Tufted annuals, easily identified by the characteristic twisting of the old leaves.

Faridkot, 36559; Ferozpor, *Griffith* 6770 (DD).

2. **C. martinii** (Roxb.) Watts in Atkins, Gaz. N. W. Prov. Ind. 392, 1882; Bor 129; Puri 141. *Andropogon martinii* Roxb. Fl. Ind. 1 : 280, 1820. *A. schoenanthus* var. *martinii* Hook. f. FBI 7 : 204.

Pedicels of the lowest pedicelled spikelets swollen. Lower glumes of the sessile spikelets with a narrow slit-like groove in the lower half which appears as a rib on the inner surface.

Local name : Motia, Sofia.

Flowers : After the rainy season.

Hissar, *Harsukh* 20709 (DD).

3. *C. parkeri* Stapf in Kew Bull. 1929; 10, 1929; Bor 129. *Andropogon laniger* Duthie, Ill. Fodd. Gr. N. W. Ind. 1, 23, 1886 (non Desf.).

Stems short. Lower sheaths hardened. Panicles narrow.

Flowers : Sept.-Nov.

Hissar, *Duthie* 5062 (DD), *Harsukh* 20705 (DD), *Raizadu* 20958 (DD).

4. *C. schoenanthus* (Linn.) Spreng. Pugil. 2: 15, 1815; Bor 131. *Andropogon schoenanthus* Linn. Sp. Pl. 1046, 1753. *A. jwaranchusa* subsp. *laniger* (Desf.) Hook. f. FBI 7: 203.

Flowers : Sept.

Hissar, *Coldstream* s.n. (DD), *Harsukh* 20709 (DD); Patiala, *anonymous* 35 (DD).

11. CYNODON Rich.

C. dactylon (Linn.) Pers. Syn. Pl. 1: 85, 1805; FBI 7: 288; Bor 469; Maheshw. 390; Puri 149. *Panicum dactylon* Linn. Sp. Pl. 58, 1753.

Culms creeping below. Inflorescence digitate. Lemmas longer than the upper glume; ligule a ring of white hairs.

Flowers : Almost round the year.

Bhatinda, 27810; Gurgaon, *T. A. Rao* 11012, 11021; Yamunanagar, 27515.

12. DACTYLOCTENIUM Willd.

- | | |
|---|------------------------|
| 1. Annual stoloniferous; spikes 2.5 cm long | 1. <i>D. aegyptium</i> |
| 1. Perennial; spikes 0.5-2 cm long; back of rachis with a groove on each side of the keel | 2. <i>D. scindicum</i> |

1. *D. aegyptium* (Linn.) P. Beauv. Ess. Agrost. Expl. Pl. 15, 1812; Bor 489; Maheshw. 392; Puri 151. *Cynosurus aegyptius* Linn. Sp. Pl. 72, 1753. *Eleusine aegyptia* (Linn.) Desf. Fl. Atlant. 1; 85, 1798; FBI 7: 295 (as *aegyptiaca*).

Generally prostrate, spreading and rooting. Tip of the rachis produced slightly.

Flowers : Sept.-Nov.

Bhatinda, 27773; Chandigarh, *P. N. Mehra* 35 (DD); Gurgaon Dist. *T. A. Rao* 11022; Hissar, *Duthie* 5101 (DD), *Harsukh* 20713 (DD).

2. *D. scindicum* Boiss. Diagn. Ser. 2, 4: 131, 1859; Maheshw. 392; Puri 151. *Eleusine scindica* (Boiss.) Duthie Fodd. Grass. N. W. Ind. 58, 1888.

Tufted. Shorter than the above species.

Flowers : After the rains.

Hissar, *Duthie* 5100 (DD), *Harsukh* 20713 (DD), *Raizada* 20983 (DD).

13. DESMOSTACHYA Stapf

D. bipinnata (Linn.) Stapf in Dyer, Fl. Cap. 7 : 632, 1900; Bor 491; Maheshw. 395; Puri 149. *Briza bipinnata* Linn. Syst. Nat. ed. 10, 2 : 875, 1759. *Eragrostis cynosuroides* (Retz.) P. Beauv. Ess. Agrost. 162, 1812; FBI 7 : 324.

Tufted grass in arid areas; rootstock stout.

Local name : Darbha.

Flowers : Nov.-March.

Chandigarh, *P. N. Mehra* 34 (DD); Faridkot, 36560; Fazilka, 36501; Hissar, *Duthie* 5108 (DD); Larooha, *T. S. Bakshi* 26 (DD); Ludwa, 26459; Panipat, 25835.

14. DICHANTHIUM Willemet

D. annulatum (Forsk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178, 1917; Bor 133; Maheshw. 395; Puri 140. *Andropogon annulatus* Forsk. Fl. Aegypt.-Arab. 173, 1775; FBI 7 : 196. *A. ischaemum* sensu FBI 7 : 171; Sabnis 580.

Densely tufted. Sheaths terete, ligules long. Peduncles glabrous. Common on canal banks.

Attari Road (Amritsar), 36321; Bhatinda 26311; Hissar, *Duthie* 5063 (DD); Yamunanagar, 27560, 27561.

15. DIGITARIA Heist ex Fabr.

Hairs on the spikelet clavate; upper glumes distinct

3. *D. stricta*

Hairs on the spikelet not clavate:

Culms bulbously thickened at base which is covered with densely silky villous cataphylls; upper glumes almost as long as the spikelet; plants rhizomatous

2. *D. nodosa*

Culms not thickened at the base and without villous cataphylls; racemes nodding usually more than 3; lower lemmas of sessile spikelet with prominent nerves

1. *D. biformis*

1. **D. biformis** Willd. Enum. Pl. Hort. Berol. 92, 1809; Bor 299. *Panicum biforme* (Willd.) Kunth Rev. Gram. 1 : 33, 1829.

Spikelets of each pair heteromorphous; sessile spikelets almost glabrous; pedicelled spikelets with long hairs.

Flowers : Sept.

Chopalia Bir (Hissar), *Raizada* 20979 (DD).

2. **D. nodosa** Parl. Plant. Nov. 39, 1842: Bor 303. *Paspalum sanguinale* (Linn.) Lamk. var. *palulare* (Aitch.) Hook. f. FBI 7: 15.

Perennial.

Punjab, *Drummond* 14444 (DD).

3. **D. stricta** Roth ex Roem. et Schult. Syst. Veg. 2, 474, 1817: Bor 305. *Paspalum royleanum* Nees ex Thw. et Hook. f. FBI 7: 18.

Erect. Leaves long.

Flowers: Sept.

Karnal. *Duthie* s.n. (DD).

16. ECHINOCHLOA P. Beauv.

1. Lower lemmas and upper glumes equally acute or cuspidate, not awned; spikes rather distant, 1-2 cm long, spikelets 2.5-3 mm long 1. *E. colonum*

1. Lower lemmas and upper glumes acuminate, cuspidate, the former often produced into an awn:

2. Lower lemmas cuspidate or shortly awned 3. *E. crusgalli* var. *breviseta*

2. Lower lemmas long to moderately long awned 2. *E. crusgalli* var. *crusgalli*

1. **E. colonum** (Linn.) Link. Hort. Berol. 2: 209, 1833; Bor 308; Maheshw. 393; Puri 142. *Panicum colonum* Linn. Syst. Nat. ed. 10. 2: 870, 1759; Sabnis 576.

Weed in rice fields and irrigated soil.

Hissar, *Duthie* 5026 (DD); Karnal 24627; Nilokheri, 15849.

2. **E. crusgalli** (Linn.) P. Beauv. Ess. Agrost. 53, 161, 1812 var. **crusgalli**; Bor 310; Maheshw. 393; Puri 142. *Panicum crusgalli* Linn. Sp. Pl. 56, 1753; Sabnis 576.

Flowers: Aug.

E. Punjab, *O. P. Sharma* 138565 (D); Karnal, *Drummond* s.n. (DD).

3. **E. crusgalli** (Linn.) P. Beauv. var. **breviseta** (Doell) Neill. Fl. Nied. Ost. 31, 1859; Bor 310.

Flowers and fruits: Sept.-Nov.

Panipat, 18665.

17. ELEUSINE Gaertn.

E. compressa (Forsk.) Aschers. et Schweinf. ex C. Christens. in Dansk. Bot. Arch. 4: 12, 1922; Bor 492; Maheshw. 390. *Panicum compressum* Forsk. Fl. Aegypt.-Arab 18, 1775. *Eleusine flagellifera* Nees in Linnea 16: 220, 1842; Sabnis 583.

Perennial; stem creeping and rooting at the nodes, glaucous; basal sheaths woolly at the base.

Flowers: April-Dec.

Chakka Jheel (Sirsa), 34557; Faridkot, 36543; Hissar, *Harsukh* 20710 (DD); *Duthie* 5099 (DD).

18. ENNEAPOGON Desv. ex P. Beauv.

- 1. Awns 9, 4 much shorter than the others; palea about twice as long as the or as long as the lemma; lemmas hairy inside at the base of the awns or awns ciliate:
 - 2. Awns ciliate; palea about as long as the lemma 3. *E. persicus*
 - 2. Awns hairy at the base; palea twice as long as lemma 2. *E. cenchroides*
- 1. Awns mostly of the same length; panicle steel grey, awns shortly ciliate, not bristly; palea longer than broad, shortly ciliate on the keels 1. *E. brachystachyus*

1. ***E. brachystachyus*** (Jaub. et Spach) Stapf in Dyer, Fl. Cap. 7: 654, 1900; Bor 608. *Pappophorum brachystachyum* Jaub. et Spach in Ann. Sci. Nat. Bot. Ser. 3, 14: 365, 1850.

This plant occurs in the adjoining areas of Rajasthan and is very likely that it occurs in the area.

2. ***E. cenchroides*** (Licht. ex Roem. et Schult.) C. E. Hubbard in Kew Bull. 1934: 119, 1934; Puri 152. *Pappophorum cenchroides* Licht. ex Roem. et Schult. Syst. Veg. 2: 616, 1817.

Tosham, *Drummond* 3007 (DD).

3. ***E. persicus*** Boiss. Diag. (ser. 1) 5: 71, 1844; Bor 610; Nair & Nair in Bull. bot. Surv. Ind. 6: 299, 1964; Puri 152. *Pappophorum aucheri* Jaub. et Spach, Ill. Pl. Or. 4: 32, t. 323, 1851; FBI 7: 301.

Perennial tufted grass. Lemmas 9-nerved. Palea ciliate on the keel. Mahendragarh 16303; Khanak 16253.

19. ERAGROSTIS P. Beauv.

- 1. Spikelets breaking up from the above downwards; rachis fragile:
 - 2. Keels of the palea more or less ciliate:
 - 3. Panicles effuse, lemmas not ciliate on the keels; leaves not viscous 9. *E. tenella*
 - 3. Panicle spiciform or compact and dense:
 - 4. Panicles spiciform; annuals; lemmas ciliate on the keels; cilia on keels of palea soft, longer than the width of the palea 2. *C. ciliaris*
 - 4. Panicle dense, margins of lemma with a few cilia; perennials; lemmas not ciliate on the keels, acute at the apex in profile 3. *E. coarctata*
 - 2. Keels of the palea scabrid or smooth, not ciliate; panicles linear:
 - 5. Branches of panicle more or less whorled; spikelets loose scattered, few flowered, lemma less than 1 mm long 5a. *E. japonica*
 - 5. Branches of panicle mostly solitary; spikelets densely clustered; lemma 1 mm long 4. *E. diarrhena*
- 1. Spikelets breaking up from below upwards, rachis tough; lemmas falling away with or without the paleas; lemmas, paleas and glumes falling very tardily:
 - 6. Annuals:
 - 7. Lemmas up to 1.5 mm long:
 - 8. Plants glandular; raised glands on the margins of the leaf or band-like on the pedicel or pitted glands just above and below the lowest node of the panicle:
 - 9. Lowest branches of panicle whorled or sub-whorled with pitted glands just below and above the lowest node; glandular band present below culm nodes 7. *E. pilosa*

9. Lowest branches not whorled; leaf margins with raised glands on the margins; leaf sheath bearded in the throat 8. *E. poaeoides*
 8. Plants without glands; lemmas not closely imbricate; spikelets slate grey; paleas deciduous 5. *E. gangetica*
 7. Lemmas over 1.5 mm long;
 10. Pedicels with crateriform gland; grain oblong; lemmas 1.5-2 mm long 8. *E. poaeoides*
 10. Pedicels without glands:
 11. Spikelets 2 mm or more wide; paleas persistent; keels of lemma and leaf margins glandular; grains sub-globose 1. *E. cilianensis*
 11. Spikelets 0.75-2 mm wide; spikelets many flowered, seated on pedicels over 5 mm long, lemmas ovate acute 10. *E. tremula*
 6. Perennials spikelets 1-1.25 mm wide; paleas persistent; panicles contracted; tips of lemmas overlapping base of lemmas next above 6. *E. nutans*

1. ***E. cilianensis*** (All.) Vignolo-Lutati in Malpighia 18: 386, 1904; Bor 503; Maheshw. 384. *Poa cilianensis* All. Fl. Pedem. 2: 246, t. 91, f. 2, 1785. *Eragrostis major* Linn. Host Gram. Austr. 4: 14, t. 24, 1809; FBI 7: 320.

Lemmas 2-2.8 mm long; grains subglobose and reddish brown.
 Hissar, Harsukh 20704 (DD); Karnal, Drummond 21347 (DD).

2. ***E. ciliaris*** (Linn.) R. Br. in Tuckey, Narr. Exp. Congo App. 478, 1818; Bor 506; Maheshw. 385; Puri 147. *Poa ciliaris* Linn. Syst. Nat. ed. 10, 2: 875, 1759. *E. ciliaris* var. *ciliaris* (Linn.) Stapf in Hook. f. FBI 7: 314.

Procumbent. Spikelets 6-12 flowered, pale.
 Gurgaon, 25250; Narnaul 25197, 25191.

3. ***E. coarctata*** Stapf ex Hook. f. FBI 7: 313; Bor 507.
 Tufted grass. Panicles narrowly pyramidal, white.
Flowers: Aug.-Nov.
 Gurgaon Dist., T. A. Rao 11103.

4. ***E. diarrhena*** (Schult.) Steud. Svn. Pl. Glum. 1: 266, 1854; Bor 507; Maheshw. 386. *Poa diarrhena* Schult. Syst. Veg. 2, Mant. 616, 1827. *Eragrostis interrupta* var. *koenigii* Stapf ex Hook. f. FBI 7: 316 & *E. interrupta* var. *diarrhena* Stapf ex Hook. f. FBI 7: 316.

Flowers: Sept.-Oct.
 Hissar, Harsukh 20714 (DD), Duthie s.n. (DD).

5. ***E. gangetica*** (Roxb.) Steud. Svn. Pl. Glum. 1: 266, 1874; Bor 508. *Poa gangetica* Roxb. Fl. Ind. 1: 341, 1820. *E. stenophylla* Hochst. ex Miq. in Verh. Konink-Nedel Inst. 3: 39, 1851 (pro parte); FBI 7: 318 (pro parte).

Annual tufted grass. Spikelets crowded, blue grey.
Flowers: Sept.-Oct.
 Punjab, Drummond 21295 (DD).

5a. *E. japonica* (Thunb.) Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 1 : 405, 1831; Bor 509; Puri 148. *Poa japonica* Thunb. Fl. Jap. 51, 1784.

E. interrupta var. *tenuissima* Stapf ex Hook. f. FBI 7 : 316.

Panicle long loose; branchlets and pedicels divaricate, filiform.

Flowers : Sept.-Oct.

Panipat, 18672.

6. *E. nutans* (Retz.) Nees ex Steud. Nom. Bot. 563, 1840; Bor 511. *Poa nutans* Retz. Obs. Bot. 4: 19, 1796. *E. stenophylla* sensu FBI 7: 318 (pro parte, non Hochst.).

Rachilla zig-zag.

Flowers : Sept.-Oct.

Hissar Dist., Duthie s. n. (DD), M. A. Rau 3588.

7. *E. pilosa* (Linn.) P. Beauv. Ess. Agrost. 71, 1761; Bor 512; Maheshw. 385; Puri 148. *Poa pilosa* Linn. Sp. Pl. 68, 1753.

Spikelets usually grey tipped with purple. Grain ellipsoid.

Flowers : July-Oct.

Hissar, Harsukh 20716 (DD), Duthie 5109 (DD).

8. *E. poaeoides* P. Beauv. Ess. Agrost. 162, 1812; Bor 512; Maheshw. 384; Puri 148. *Poa eragrostis* Linn. Sp. Pl. 68, 1753. *Eragrostis minor* Host, Gram. Austr. 4: 15, 1809.

Rachilla zig-zag.

Flowers : Sept.-Oct.

Bhatinda, 27748, 27753; Hissar, Duthie 5110 (DD), Raizada 21033 (DD); Yamunanagar 2759.

9. *E. tenella* (Linn.) P. Beauv. ex Roem. et Schult. Syst. Veg. 2: 576, 1817; Bor 513; Maheshw. 386; Puri 147. *Poa tenella* Linn. Sp. Pl. 69, 1753. *Poa tenella* var. *plumosa* (Retz.) Stapf ex Hook. f. FBI 7: 315.

Nodes of flexuous panicle often bearded. Grains ovoid.

Flowers : Aug.-Nov.

Bhatinda, 27815; Karnal Dist., J. N. Vohra 8870; Narnaul, 25198; Yamunanagar 26402.

10. *E. tremula* (Lamk.) Hochst. ex Steud. Syn. Pl. Glum. 1: 269, 1854; Sabnis 585; Bor 514; Maheshw. 384; Puri 148. *Poa tremula* Lamk. Tab. Encyc. 1: 185, 1791.

Panicles nodding, large. Spikelets versatile. Grains globose.

Flowers : September onwards.

Hissar, Duthie 5510 (DD); Narnaul, 25192, 25194.

20. EREMOPOGON Stapf

E. foveolatus (Del.) Stapf in Prain, Fl. Trop. Afr 9: 183, 1917; Bor 148. *Andropogon foveolatus* Del. Fl. Eg. 16, t. f. 2, 1812; Sabnis 579. *A. strictus* Roxb. Fl. Ind. 1: 260, 1832. *Eremopogon strictus* (Roxb) A. Camus in Ann. Soc. Linn. Lyon n. s. 68, 208, 1822; Puri 141.

Pits present in the lower glumes of pedicelled and sessile spikelets. Hissar, *Duthie* 5064 (DD).

21. ERIANTHUS Michx.

E. ravennae (Linn.) P. Beauv. Ess. Agrost. 14, 1812; Bor 151; Maheshw. 371. *Andropogon ravennae* Linn. Sp. Pl. 1481, 1763. *Erianthus elephantinus* Hook. f. FBI 7: 122.

Very tall grass. Leaves broad, flat. Panicle large, purplish. Spikelets 3-4 mm long. Awn well exerted. Lower glumes 2-keeled, scabrid on the keels.

Common along road sides and canal banks.

Flowers: Oct.

Hussainiwala, 36391; Karnal, *Jabraya* 3008 (DD); Panipat, 24718.

22. ERIOCHLOA Kunth

E. procera (Retz.) C. E. Hubbard in Kew Bull. 1930: 256, 1930; Bor 312; Maheshw. 403. *Agrostis procera* Retz. Obs. Bot. 4: 19, 1786. *Eriochloa polystachya* Hook. f. FBI 7: 20 (non H.B.K.).

Stems up to 2 m high. Panicle compound. Spikelets 2.5-3.5 mm long, elliptic acute or ovate acute, not awned.

Flowers: Hot months.

Karnal, *Drummond* 21136 (DD), *Duthie* s. n. (DD).

23. HEMARTHRIA R. Br.

H. compressa (Linn. f.) R. Br. Prodr. 207, 1810; Bor 161; Maheshw. 381. *Rottboellia compressa* Linn. f. Suppl. 114, 1781. *R. glabra* Roxb. Fl. Ind. 1: 353, 1820.

Grass of damp places. Lower glumes of sessile spikelets constricted suddenly at the apex into a 'point'. Upper glumes acute.

Chandigarh, *P. N. Mehra* 43 (DD).

24. HETEROPOGON Pers.

H. contortus (Linn.) P. Beauv. ex Roem. et Schult. Syst. Veg. 2: 836, 1817; Bor 163; Maheshw. 374; Puri 141. *Andropogon contortus* Linn. Sp. Pl. 1045, 1753.

Perennial. Racemes short, bristly hairy.

Flowers: Sept. onwards.

Hissar, *Duthie* 5058 (DD).

25. HORDEUM Linn.

H. vulgare Linn. Sp. Pl. 87, 1753; Bor 677; Maheshw. 376.

Cultivated. Spikelets in groups of three on the main axis forming a dense spike.

Flowers: Feb.-March.

Malerkotla, 36720.

26. IMPERATA Cyr.

I. cylindrica (Linn.) P. Beauv. Ess. Agrost. 165, 1812; Bor 169; Maheshw. 381. *Lazurus cylindricus* Linn. Syst. Nat. 878, 1759. *Imperata arundinacea* Cyr. Pl. Rar. Neap. 2: 26, 1792; FBI 7: 107.

Panicles spiciform, silvery with dark anthers. Stamens 2.

Flowers: Sept. onwards.

Bhatinda 27505; Ludhiana 35988.

27. ISACHNE R. Br.

I. albens Trin. Sp. Gram. 1: t. 85, 1826; FBI 7: 22; Bor 579.

Panicle pyramidal. Spikelets 1.5 mm long; white.

Flowers: Dec.

E. Punjab, *O. P. Sharma* 1123308 (DD).

28. ISEILEMA Anders.

I. prostratum (Linn.) Anders. in Nov. Act. Soc. Sci. Upsal. Ser. 3, 2: 251, 1856; Bor 188. *Andropogon prostratus* Linn. Mant. Alt. 304, 1771. *Iseilema wightii* Anders. in Nov. Act. Soc. Sci. Upsal. Ser. 3, 2: 251, 1856.

Chandigarh, *P. N. Mehra* 41 (DD); Hissar, *Harsukh* 20706 (DD), *Duthie* 5076 (DD).

29. LASIURUS Boiss.

L. hirsutus (Forsk.) Boiss. Diagn. Pl. Orient. Ser. 2, 4: 146, 1859; Bor 189; Puri 139. *Saccharum hirsutum* Forsk. Fl. Aeg.-Arab. 16, 1775. *Elyonurus hirsutus* (Vahl) Munro ex Benth. in Jour. Linn. Soc. 19: 68, 1881; Sabnis 579.

Culms glabrous.

Flowers: Sept. onwards.

Hissar, *Duthie* 3053 (DD), 20700 (DD), *M. A. Rau* 3585; Lambi, 27845.

30. LEPTOCHLOA P. Beauv.

L. panicea (Retz.) Ohwi in Bot. Mag. Tokyo 55: 311, 1941; Bor 517; Maheshw. 396. *Poa panicea* Retz. Obs. Bot. 3: 11, 1783. *Leptochloa filiformis* sensu FBI 7: 298 (non P. Beauv.).

Leaves narrowly linear. Spikelets 2-3-flowered.

Flowers : Oct.

Chandigarh, P. N. Mehra 47 (DD).

31. LOLIUM Linn.

- | | |
|---|---|
| 1. Spikelets awned; lemmas 6-8 mm long rounded on the back, awned from near the tip; awns up to 2 cm long | 1. <i>L. temulentum</i>
var. <i>temulentum</i> |
| 1. Spikelets not awned; spikelets very turgid; lemmas 6-8 mm long | 2. <i>L. temulentum</i>
var. <i>arvense</i> |

1. **L. temulentum** Linn. Sp. Pl. 83, 1753 var. **temulentum** ; Bor 546; Maheshw. 374.

Common weed in wheat fields. Annuals. Upper glumes at least more than half the length of the spikelets; lemmas very turgid.

Flowers : Feb.

Chakka Jheel (Sirsa), 34553; Mukerian, P. N. Mehra s. n. (DD); Karnal, Drummond 21384 (DD).

2. **L. temulentum** Linn. var. **arvense** Lilj. Sv. Pl. 80, 1816; Bor 546. Like the above but spikelets without awns.

Flowers : Feb.

Bhiwani, 35585; Ludhiana, 35994.

32. LOPHOCHLOA Reichb.

- | | |
|--|------------------------|
| 1. Glumes unequal, sparsely hairy or not; rachilla glabrous or subglabrous; lemmas with curious papillose appearance | 1. <i>L. phleoides</i> |
| 1. Glumes subequal, densely and shortly hairy; rachilla always produced, clothed with long hairs | 2. <i>L. pumila</i> |

1. **L. phleoides** (Vill.) Reichb. Fl. Ger. Excurs. 42, 1830; Bor 445; Maheshw. 402. *Festuca phleoides* Vill. Fl. Delph. 7, 1785.

Spikelets 3-7-flowered; awns shorter than the lemmas.

Flowers : Feb.-April.

Badopal, 34543, 34544; Muktesar, 36525.

2. **L. pumila** (Desf.) Bor 445. *Avena pumila* Desf. Atlant. 1: 103, 1798.

Flowers : Feb.-March.

Bhatinda, 26279; Kapurthala 36305.

1. Lemmas of the upper floret quite smooth; nerves of upper glumes and lower lemmas definite, conspicuous:
2. Lower glumes cuspidate or cuspidate-acuminate; spikelets gaping widely at anthesis 6. *P. trypheron*
2. Lower glumes not cuspidate-acuminate and spikelets not gaping:
3. Lower glumes one-quarter to half the length of the spikelet:
4. Annuals; culms erect or geniculate; leaf blades linear; lower florets palcate; sheaths sometimes hairy:
5. Spikelets persistent; panicle contracted; 4-15 cm long; lower glumes orbicular apiculate 4. *P. miliare*
5. Spikelets deciduous; panicle effuse, often diseased and the spikelets giant and deformed; lower glumes ovate and apiculate 5. *P. psilopodium*
4. Perennials, spikelets crowded, suffused with purple; seeds hairy stolons in all directions; lower florets neuter 1. *P. antidotale*
3. Lower glumes one-half to three-quarters the length of the spikelet or more:
6. Perennials; upper lemmas white or cream; plants glabrous; spikelets often crowded on the branches; rootstock often creeping; stout with villously sheathed stolons; glumes with broad membranous margins 1. *P. antidotale*
6. Annuals; lower glumes one-half to two-thirds as long as the spikelet; culms and leaves hairy; dwarf grass 2. *P. atrosanguineum*

1. *P. antidotale* Retz. Obs. Bot. 4: 17, 1786; Sabnis 577; Bor 322; Maheshw. 406; Puri 143.

Flowers : Aug.-Sept.

Hissar, Harsukh 20715 (DD), Duthie 5025 (DD); Hoshiarpur, Aitchison 1114 (DD); Karnal, Drummond s. n. (DD).

2. *P. atrosanguineum* Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 375, 1851; Bor 322. *P. hydaspicum* Edgew. in Jour. Linn. Soc. 6: 207, 1862; Sabnis 577.

Fruits brown to purple black.

Flowers : July-Feb.

Karnal, Drummond s. n. (DD).

3. *P. maximum* Jacq. Collect. Bot. 1: 76, 1786; Icon. Pl. Rar. 1: 2, t. 13, 1781-1786; Bor 327; Maheshw. 405; Puri 143.

Flowers : July-Sept.

Karnal, Drummond s. n. (DD).

4. *P. miliare* Lamk. Tab. Encycl. Meth. Bot. 1: 173, 1791; Bor 329; Maheshw. 406.

Sirsa, Economic Botanist A (DD).

5. *P. psilopodium* Trin. Gram. Panic. 217, 1826; Bor 329; Puri 143.

Flowers : Aug.

Karnal, Drummond s. n. (DD).

6. *P. trypheron* Schult. Syst. Veg. 2: Mant. 244, 1824; FBI 7: 47; Bor 331; Maheshw. 406; Puri 143. *P. tenellum* Roxb. Fl. Ind. 1: 309, 1820.

Flowers : Sept. onwards.

Chandigarh, *P. N. Mehra* 50 (DD).

38. PASPALUM Linn.

1. Spikelets arranged in four rows upon a broad rachis up to 4 mm broad 1. *P. longifolium*
1. Spikelets in two rows; spikelets more than 1.5 mm long;
 2. Spikelets broadly elliptic to ovate elliptic, acute, 2.5-4.5 mm long; perennial aquatic grass with rhizomes and long creeping stolons 3. *P. vaginatum*
 2. Spikelets orbicular or ovate-orbicular, 2.5 mm long; lower lemma 7-nerved, membranous; annual 2. *P. scrobiculatum*

1. ***P. longifolium*** Roxb. *Fl. Ind.* 1: 283, 1820; Bor 339. *P. longiflorum* sensu Sabnis 576 (non Trin.).

Flowers : Aug.-Sept.

Karnal, *Drummond* s. n. (DD).

2. ***P. scrobiculatum*** Linn. *Mant. Pl.* 1: 291, 1767; Bor 340.

Flowers : Aug.-Sept.

Chandigarh, *P. N. Mehra* 51 (DD).

3. ***P. vaginatum*** Swartz, *Prodr. Veg. Ind. Occ.* 21, 1788; Bor 341.

Stem prostrate. Racemes short. Spikelets three times as long as broad. Lower glumes absent. Upper glumes glabrous.

Flowers : Aug.-Sept.

Karnal, *J. N. Vohra* 8869.

39. PASPALIDIUM Stapf

P. flavidum (Retz.) A. Camus in Lecomte *Fl. Gen. Indo-Chine* 7: 419, 1922; Bor 333; Maheshw. 392. *Panicum flavidum* Retz. *Obs. Bot.* 4: 15, 1786.

Annual. Spikelets shorter than the internodes. Rachis much produced. Upper glumes not as long as the granular upper lemma.

Flowers : June.

Chandigarh, *P. N. Mehra* 39 (DD); Patiala, *Sunderlal* 36 (DD).

40. PENNISETUM Rich.

1. Anther cells bearded at the apex; annuals; spikelets crowded into a cylindrical inflorescence 2. *P. typhoides*
1. Anther cells not bearded at the apex; rachis flexuous 1. *P. orientale*

1. ***P. orientale*** Rich. in *Pers. Syn. Pl.* 1: 72, 1805; Sabnis 577; Bor 345; Puri 144.

Spikelets 4 mm long, 2 or more in an involucre, rarely solitary.

Hissar, *Duthie* 7606 (DD).

2. *P. typhoides* (Burm.) Stapf et C. E. Hubbard in Kew Bull. 1933: 271, 1933; Sabnis 577; Bor 350; Maheshw. 380; Puri 144. *Alopecurus typhoides* Burm. Fl. Ind. 27, 1768.

Cultivated throughout the area as a rainy season crop.

Local name : Bajra.

41. PEROTIS Ait.

P. indica (Linn.) O. Ktze. Rev. Gen. Pl. 2: 787, 1891; Bor 611; Maheshw. 373; Puri 146. *Anthoxanthum indicum* Linn. Sp. Pl. 28, 1753.

Callus definite. Glumes with scattered hairs on the dorsal side.

Bor (loc. cit.) gives the distribution as S. India.

Flowers : Aug.-Oct.

Chandigarh, *P. N. Mehra* 56 (DD); Gurgaon, 25246; Narnaul, 25193.

42. PIALARIS Linn.

P. minor Retz. Obs. Bot. 3: 8, 1783; Sabnis 581; Bor 616; Maheshw. 382.

Annuals. Sterile lemmas present, dissimilar, the lower very minute, the upper about one-third the length of the spikelet. Wings of glume minutely serrate and undulate.

Flowers : Sept.-March.

Laroha (Jullunder Dist.), *T. S. Bakshi* 20 (DD); Taran Taran, 36333.

43. PHRAGMITES Trin.

P. karka (Retz.) Trin. ex Steud. Nom. Bot. ed. 2, 2: 324, 1841; Sabnis 584; Bor 416. *Arundo karka* Retz. Obs. Bot. 4: 21, 1786. *P. maxima* Blatt. & McC. Bomb. Gr. 202, 1935; Maheshw. 372; Puri 144.

Pedicels of the spikelets glabrous. Joints of rachilla long.

Flowers : Sept.-Oct.

E. Punjab, *O. P. Sharma* s. n. (DD).

44. POGONATHERUM P. Beauv.

P. paniceum (Lamk.) Hack. in Allg. Bot. Zeit. 12: 178, 1906; Bor 202. *Saccharum paniceum* Lamk. Encycl. Meth. Bot. 1: 595, 1785. *Pogonatherum saccharoides* P. Beauv. Ess. Agrost. 176, 177, 1812; Sabnis 579.

Nodes bearded; hairs up to 1.5 mm long. Racemes up to 4 cm long. Spikelets 2.5-3 mm long. Lower floret male; upper floret with 2 stamens.

Flowers : Feb.-March.

Hoshiarpur, *Aitchison* 542 (DD).

44a. POLYPOGON Desf.

P. monspeliensis (Linn.) Desf. Fl. Atlant. 1: 67, 1798; Sabnis 582; Bor 403; Maheshw. 401. *Alopecurus monspeliensis* Linn. Sp. Pl. 61, 1753.

Awns 5-9.75 mm long, 2-3 times the length of the glumes.

Flowers : Jan.-March.

Hoshiarpur, Aitchison 626 (DD); Laroha (Jullunder Dist.), T. S. Bakshi 28 (DD); Taran Taran 36356.

45. SACCHARUM Linn.

- | | |
|---|---------------------------|
| 1. Peduncles hairy below the panicles; rachis very fragile; hairs very white silvery | 4. <i>S. spontaneum</i> |
| 1. Peduncles not hairy; rachis less fragile: | |
| 2. Lower glumes of sessile spikelets glabrous; upper glumes also glabrous | 3. <i>S. officinarum</i> |
| 2. Lower glumes of sessile spikelets with long hairs: | |
| 3. Spikelets 4-6 mm long, longer than the joints of the rachis; leaves glaucous | 2. <i>S. bengalense</i> |
| 3. Spikelets 2.5-4 mm long, shorter than the joints of the rachis; leaves green; leaves villous at the base only; panicle not very loose or silky | 1. <i>S. arundinaceum</i> |

1. **S. arundinaceum** Retz. Obs. Bot. 4: 14, 1786; Sabnis 578; Bor 211; Puri 140.

Culms very strong, straight.

Flowers : Sept.-Oct.

Karnal, Drummond 3006 (DD).

2. **S. bengalense** Retz. Obs. Bot. 5: 16, 1789; Bor 211. *S. munja* Roxb. Fl. Ind. 1: 250, 1820; Puri 140. *S. arundinaceum* Hook. f. FBI 7: 119 (pro parte, non Retz.).

Tufted grass. Very useful for clothing sandy areas.

Used for making baskets, chairs and fibre.

Local name : Munj.

Flowers : Feb.

Sirsa, Drummond 3005 (DD).

3. **S. officinarum** Linn. Sp. Pl. 54, 1753; Bor 212; Maheshw. 371. Cultivated.

Local name : Ganna.

Besides this *S. sinense* Roxb. Pl. Cor. 3: t. 232, 1819 with leaves up to 5 cm broad and greenish brown joints and *S. barberi* Jesw. in Arch. Suik. Ned. 396, 1925 with narrower leaves and joints whitish or ivory coloured are also cultivated.

4. **S. spontaneum** Linn. Mant. Alt. 183, 1771; Sabnis 578; Bor 214; Maheshw. 371; Puri 140.

A very effective sand-binding grass with extensive root system.

Flowers : End of rainy season.

Sutlej River (Ludhiana), *P. N. Mehra* 49 (DD).

45a. SCHISMUS P. Beauv.

S. arabicus Nees, Fl. Afr. Austr. 422, 1841; Bor 481. *S. marginatus* sensu FBI 7: 336 (non Beauv).

Spikelets viewed from the sides show lobes of lemma acuminate, paleas rounded at the tip, shorter than the lemmas.

Flowers : Feb.-March.

Muktesar, 36526.

46. SETARIA P. Beauv.

- 1. Bristles retrorsely barbed
- 1. Bristles antrorsely barbed

- 2. *S. verticillata*
- 1. *S. glauca*

1. *S. glauca* (Linn.) Beauv. Ess. Agrost. 51, 169, 178, 1812; Sabnis 577; Bor 360; Maheshw. 379; Puri 143. *Panicum glaucum* Linn. Sp. Pl. 56, 1753.

Inflorescence a cylindric false spike. Upper glume shorter than the rugose upper lemma.

Jind 15885; Karnal, *Drummond* s. n. (DD); Panipat, 18667.

2. *S. verticillata* (Linn.) P. Beauv. Ess. Agrost. 51, 178, 1812; Bor 365; Maheshw. 378; Puri 143. *Panicum verticillatum* Linn. Sp. Pl. (ed. 2): 82, 1762.

Annual plants, panicle cylindric. Spikelets solitary in the involucre. The fruiting panicle gets attached to the body of the animals by the barbed bristles and thus effect dispersal.

Budha Nala (Ludhiana), *P. N. Mehra* 37 (DD); Hissar, *Raizada* 20981, 20986.

47. SORGHUM Moench.

**

- 1. Perennials with distinct elongate rhizomes; pedicelled spikelets when mature deciduous; glumes coriaceous
- 1. Annuals; racemes tough; mature spikelets not deciduous; lower glumes of sessile spikelets thin papery and transversely wrinkled; upper lemma awned

2. *S. halepense*

1. *S. cernuum*

1. *S. cernuum* Host, Gram. Austr. 4: 2, t. 3, 1809; Bor 228.

Flowers : End of rainy season.

Sangrur, 36600.

2. *S. halepense* (Linn.) Pers. Syn. Pl. 101, 1805; Bor 222; Maheshw. 400; Puri 140. *Holcus halepensis* Linn. Sp. Pl. 1047, 1753.

Flowers : Rainy season.

Hissar, Raizada 2100 (DD).

48. SPOROBOLUS R. Br.

- | | |
|--|--------------------------|
| 1. Lower glumes as long as the spikelet or at least three quarters its length; leaf margins smooth; spikelets and basal leaves glaucous; ligule almost absent | 2. <i>S. helveolus</i> |
| 1. Lower glumes much shorter than the lemma: | |
| 2. Upper glumes as long, nearly as long or longer than the lemmas; lower branches truly whorled; perennials; stolons woody; roots often covered with minute sand particles | 3. <i>S. marginatus</i> |
| 2. Upper glumes distinctly shorter than the lemmas, lower branches not truly whorled; panicle effuse: | |
| 3. Lemmas 1 mm long or less; stamens 3 | 4. <i>S. tenuissimus</i> |
| 3. Lemmas 1.5 mm long or longer; stamens 2 | 1. <i>S. diander</i> |

1. *S. diander* (Retz.) P. Beauv. Ess. Agrost. 26, 147, 178, 1812; Sabnis 582; Bor 629; Maheshw. 403. *Agrostis diander* Retz. Obs. Bot. 5, 19, 1789.

Spikelets rather crowded on panicles up to 20 cm long, slate-grey in colour.

Flowers : Sept.-Nov.

Chandigarh, P. N. Mehra 36 (DD).

2. *S. helveolus* (Trin.) Th. Dur. et Schinz, Consp. Fl. Afr. 5: 820; 1895; Bor 629; Puri 146. *Vilfa helveola* Trin. in Mem. Acad. Sci. Petersb. ser. 6, 5: 52, 1839. *Sporobolus glaucifolius* Hochst. ex Steud. Syn. Pl. Glum. 154, 1854; Sabnis 582.

Flowers : Sept.-Dec.

Hissar, Duthie 5085 (DD).

3. *S. marginatus* Hochst. et A. Rich. Tent. Fl. Abyss. 2: 397, 1851; Bor 632; Maheshw. 404. *S. arabicus* Boiss. Diagn. Ser. 1, 13: 47, 1853.

Flowers : Sept.-Dec.

Hissar; Duthie 5082 (DD), 5084 (DD); Panipat, 15847.

4. *S. tenuissimus* (Schrank) O. Ktze. Rev. Gen. Pl. 3: 369, 1893; Bor 633. *Panicum tenuissimum* Schrank in Denkschr. Bot. Ges. Regensb. 2: 26, 1822. *Sporobolus minutiflorus* (Trin.) Link. Hort. Berol. 1: 88, 1827; Sabnis 582.

Flowers : Aug.-Sept.

Hissar, Duthie 5083 (DD).

49. TRAGUS Hall.

T. roxburghii Panigrahi in Kew Bull. 29: 495, 1974. *T. biflorus* sensu Schult. Syst. Veg. 2. Mant. 205, 1824; Bor 683; Maheshw. 380; Puri 146. *T. racemosus* sensu FBI 7: 97; non (Linn.) All. 1785.

Spikelets in pairs on erect racemes. Lower glumes with recurved spines, upper glumes smooth.

Flowers: May-Aug.

Chandigarh, *P. N. Mehra* 45 (DD); Hissar, *Duthie* 5042 (DD), *Raizada* 21028 (DD).

50. TETRAPOGON Desf.

T. tenellus (Roxb.) Chiov. in Arn. Ist. Bot. Roma 8. 352, 1908; Bor 475; Maheshw. 375. *Chloris tenella* Roxb. Fl. Ind. 1: 330, 1820; Sabnis 583. *Tetrapogon triangularis* (Hochst.) Hochst. Pl. Arab. Schweinf. 967, *vide* FBI 7: 291.

Spikes 1-3; fertile florets 2 or more. Lemmas glabrous.

Flowers: Oct.

Hissar, *Coldstream* s. n. (DD).

51. TRITICUM Linn.

T. aestivum Linn. Sp. Pl. 85, 1753; Bor 679; Maheshw. 376. *T. sativum* Lamk. Fl. Franc. 3: 625, 1778. *T. vulgare* Vill. Hist. Pl. Dauph. 2: 153, 1787; Sabnis 586.

Widely cultivated in the area.

Lambi, 26222; Malerkotla 36719, 36721.

52. UROCHLOA P. Beauv.

U. panicoides P. Beauv. Ess. Agrost. 53, t. 11, f. 1, 1812; Bor 372; Maheshw. 396.

Annual. Spikelets glabrous. Lower glumes less than one half the length of the spikelet. Lower lemma without fringe of bristle.

Flowers: End of rainy season.

Punjab, *Drummond* 21151 (DD).

53. VETIVERIA Lem.-Lisanc.

V. zizanioides (Linn.) Nash in Small Fl. South-east. U. S. 67, 1903; Bor 258; Maheshw. 402; Puri 140. *Phalaris zizanioides* Linn. Mant. Pl. 2. 183, 1771. *Andropogon squarrosus* sensu FBI 7: 186.

Tufted tall grass. Panicle 15-40 cm long, greenish to purple. Joints pedicels and callus of sessile spikelets glabrous. Lower glume muriculate.

Flowers : Aug.-Sept.

Chandigarh, *P. N. Mehra* 44 (DD); Gurgaon Dist., *T. A. Rao* 11157; Hissar, *Duthie* 5061 (DD); Senipura Forest (Gohana), *V. J. Nair* 23159.

54. ZEA Linn.

Z. mays Linn. Sp. Pl. 951, 1753; FBI 7: 102; Bor 270; Maheshw. 369; Puri 139.

Tall annual. Female spikelets in crowded longitudinal rows on a very thick axis; male spikelets in ample terminal panicles.

Cultivated throughout the area.

Flowers : Sept.-Oct.

Sirsa, *Economic plant survey, Kapurthala* 880 (DD).

55. ANDROPOGON Linn.

A. pumilus Roxb. Fl. Ind. 1: 277, 1820; Bor 93.

Tall grass; can be grown as a fodder grass.

Flowers : Sept.

There is one sheet from Punjab without collector's name in DD.

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