FLORA OF TONK DISTRICT

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TONK DISTRICT
INTRODUCTION

Tonk district is one of the 26 districts of Rajasthan state. It has a number of places of interest to attract the tourist. The forest, lakes and the historical buildings can enchant any tourist. A scheme has also been formulated by the Rajasthan State Government to bring Toda Rai Singh, a picturesque place surrounded by hills and historically an important town named after the great grandson of Rana Amar Singh of Marwar, Raja Rai Singh Sisodia, on the tourist map of Rajasthan.

HISTORY

The Malavas were perhaps the earliest people to inhabit the area. The movement of the Malava tribe or a section of it to Rajputana from their homeland north of the confluence of the Ravi and Chenab is believed to have begun perhaps after the Indo-Greek occupation of Punjab. During the time of the powerful Samudra Gupta, Malavas, whose rule probably extended over Mewar, Tonk and the adjoining regions of south-east Rajasthan, submitted to him and entered into friendly relations with him by paying taxes. They appear to have retained their semi-independent status during the reigns of Chandra Gupta II and Kumar Gupta I also. It is believed that they have been engulfed in the Huna avalanche by the middle of the fifth century A.D. Later, Tonk region came under the Guhilot dynasty of Mewar and during the 7th century A.D. a part of the Tonk region apparently come under Chahamanas dynasty. It appears to have come under one or all of the following during the eleventh and twelfth centuries: Chahamanas (Chauhans), Chalukyas (Solanki) and Paramars (Pawars).

It is said that during the reign of Akbar the great, Tordi and Tonkara districts were conquered by Maharaja Man Singh of Jaipur and that in 1643 A.D. twelve deserted villages in tonkara were given as grant to a Brahman named Bhola who named his cluster Tonk. The founder of the princely state of Tonk was Nawab Amir Khan (1768-1834 A.D.), the hero and villain of many battles and intrigues. The era of modernisation dawned on the state with the reign of Nawab Hafiz Mohammad Ibrahim Ali Khan, the great grandson of Amir Khan. During his long reign which lasted from 1867 to 1930, the longest in the history of the
state, it witnessed several changes in the fields of administration, revenue, justice and social reforms. Following India’s independence in 1947, Tonk state was merged with the former Rajasthan on March 25, 1948 (Maya Ram, 1970).

LOCATION

The present district of Tonk has, however, no semblance with the old Tonk state. The tahsils of Tonk and Aligarh of the former state, together with some adjacent territories from the states of Bundi, Jaipur and Ajmer were made into a separate district of Tonk. It is located between longitudes 75°07’ and 76°19’ E and latitudes 25°41’ and 26°34’ N. It is bounded in the north by Jaipur district, in the east by Sawai Madhopur district, in the south by Kota, Bundi and Bhilwara districts and in the west by Ajmer district. Its area is about 7,163 sq km.

PAST AND PRESENT WORK

A review of literature on the floristic studies in Rajasthan (Jain, 1970; Sharma, 1981) has revealed that Tonk district has received very little attention. The two recent floras on Rajasthan viz. by Bhandari (1978) and Sharma and Tiagi (1979) deal with W. Rajasthan (Jaisalmer, Jodhpur and Barmer districts) and N.E. Rajasthan (Jaipur, Sawai Madhopur and Alwar districts) respectively.

A preliminary ecological survey of plant communities in and around Tonk was undertaken by Mulay and Mathur (1961). A short account of the Vegetation of Tonk district is given in the Tonk District Gazetteer (Maya Ram l.c.). Apart from these, there is no other published account on the flora or vegetation of Tonk district. Thus, there is not even a check list of plants found in Tonk district.

The present work which was undertaken to fill up this lacuna and bring out a flora of the district is the result of four botanical explorations conducted during different seasons of the year. Almost the entire district was covered during each trip, taking care to visit the different vegetation zones for the collection of plant specimens. Detailed, on the spot field notes were made on habit, habitat, colour of flower, association, vegetation type, local name, uses etc. Collections were mainly confined to native or naturalised plants of the district. Cultivated plants were not collected, although a brief account of it is given elsewhere. Efforts were made to identify the plants based on fresh or pickled materials. The determinations were
finally checked and confirmed by the study of literature and by comparison with herbarium specimens deposited in the herbaria of Arid Zone Circle, Botanical Survey of India, Jodhpur (BSJO), Central Arid Zone Research Institute, Jodhpur and in some cases the Central National Herbarium, Calcutta (CAL). Specimens collected have been deposited in the BSJO and CAL.

Bentham and Hooker's system of classification has been followed, with present day delimitation of certain families. Keys to families, genera and species are so constructed as to assist in the easy identification of the plants reported in this work. The genera within families and the species within genera are arranged in an alphabetical sequence.

An attempt has been made to give the correct nomenclature of the taxa dealt with, based on the study of recent monographs, floras and other taxonomic literature. For each species the valid name with citation is followed by the basionym, wherever applicable. Reference is also made to the Flora of British India (Hooker, 1872-1897), Flora of the Upper Gangetic Plain (Duthie, 1903-1929), published illustrations, particularly those devoted almost exclusively to Indian plants and recent monographs, wherever available. Local names in Hindi, as far as could be ascertained, are given after the citation of literature.

A brief description of each species and intraspecific category is given, stressing primarily on characters not reflected in the key. This is followed by flowering and fruiting periods, frequency, general habitat and distribution, nomenclatural notes in a few cases and economic importance, wherever known.

PHYSIOGRAPHY

The Aravalli ranges tending in north-easterly direction divide the semi-desert and desert regions of western Rajasthan from the comparatively more damp and fertile region on the east and south-east. The district lies at a not very far off distance, east of the Aravalli range and has the shape of a kite or a rhombus. The general slope is from north-west to the south and east. There are many ridges of rocky hills scattered in the district. One chain of hills starts from Bhilwara district and running along the boundaries of Bhilwara and Bundi districts enters the Tonk district in the south near Rajkot. It runs in a north-easterly direction and extends up to Banetha. It continues in the same direction through Sawai Madhopur district. A second chain extends from Toda Rai Singh to Rajmahal. The other important hill is near Malpura.
The main river in this district is the Banas with its tributaries. It rises from the eastern flank of the Aravalli at Paras Ram Mahadev in Udaipur district and enters Tonk district at Negdia in Deoli Tahsil. Forcing its way through the hill Rajmahal it takes a serpentine course dividing the district roughly into two parts—two thirds to its west and north and one third to its east and south. It leaves the district at Sureli near Barwana. It is more or less perennial and is fordable during winter and summer but in the rains becomes a swift and angry torrent, more than half a kilometre in breadth and sometimes 9 metres deep. Its bed is sandy-alluvial and at certain places it is cultivated. The total length of Banas is about 400 km of which about 135 km is in Tonk district. Mashi and Sohadra, both of which rise from Ajmer district are the principal tributaries of Banas. The other small rivers which join the Banas or its tributaries are Khari, Dai, Badi and Galwa.

There is no natural lake in the district. However, several tanks formed by harnessing the feeders of the Mashi and the Banas are found; the biggest of such tanks is Tordi Sagar which is said to be one of the biggest irrigation tanks in Rajasthan. It is fed by Sohadra. In addition, there are a number of small tanks scattered in different parts of the district, like Malpura, Toda Rai Singh, Deoli, Tonk etc.

GEOLOGY AND SOIL

The two main geological formations in this region are the Aravalli system and the Delhi system. The Aravalli system consists of three parallel belts running from north east to south west. The first is the Baonli-Anwa belt, the second is a short distance to the north-west of Baonli-Anwa belt and is extensively intruded by pegmatites, the third is further north-west and runs through Tonk city. Here it consists of alteration of mica schists and thin rusty quartzites. Other exposures of this belt are at Niwai and Rajmahal, and at the latter place the formations consist of garnetiferous mica schists and pegmatites. Granites are important intrusive rocks of igneous origin in the Aravalli system of this area.

The scattered outliers of the Delhi system found (as detached hills) at places like Niwai consist of Alwar quartzites. At Rajmahal and Chandren also there are exposures of quartzite, resembling the Alwar series. The minerals found in this district are beryl, garnet, mica, soapstone and building stone.

The soil for the greater part is loam. At places like Niwai and Tonk it varies from sandy loam to loam and in most of the remaining area it
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varies from clay loam to loam. In the river beds of Banas, Mashi etc. the soil is alluvial. In some areas it is sandy.

The soils from ponds, puddles and ditches have fairly rich amount of silt and clay and are usually black in colour.

CLIMATE

Except in the short south west monsoon season, which commences from about the third week of June and lasts till the middle of September, the climate is dry. The hot weather (summer) begins in March and extends till June. The winter season is between December and February.

The average annual rainfall in the whole district is 613.6 mm but it generally decreases from the south-east to the north-west. The bulk of the annual rainfall (about 93%) is received during the south-west monsoon viz. June to September and the months in which highest rainfall occurs over the region are July and August.

May is usually the hottest month when the mean daily maximum temperature is about 40°C and the mean daily minimum temperature is about 26°C. On individual days the day temperature may be as high as 46°C. In summer months humidity is relatively very low. After about the middle of November both day and night temperatures begin to drop steadily till January which is generally the coldest part of the year. The mean daily maximum temperature in that month is about 22°C while the mean daily minimum temperature is about 8°C. During cold waves in the wake of cold western disturbances the minimum temperature may sometimes comes down to a degree or two below the freezing point of water, especially in January and February. Occasionally frosts may occur.

Winds are generally light to moderate with a slight strengthening in summer and in early monsoon.

VEGETATION

The vegetation in Tonk district may conveniently be treated under the following heads:

1. Forests on hills and base of hills
2. Vegetation on low sand dunes
3. Plantations
4. Vegetation on plains
5. Aquatic habitat
6. Marshy habitat
7. Weeds of cultivated fields

**Forests on hill and base of hill** : About 14% of the total area of the district is forest mostly located at Toda Rai Singh, Bisalpura, Rajmahal, Tonk, Niwai, Siras, Banetha, Kakor, Nagar and Amli. The forests mainly fall under Northern tropical dry deciduous forest coming under the following types as per Champion and Seth's (1968) classification:

i. *Anogeissus pendula* forest (5/E1)
ii. *Anogeissus pendula* scrub (5/E1/DS1)

*Anogeissus pendula* Forest

The forests on the hills, particularly at Toda Rai Singh, Bisalpura, Rajmahal, Bhotunda, Tordi, Ghati, Niwai, Sohela, Banetha, Kakor and Amli are of the *Anogeissus pendula* type with *Anogeissus pendula* as the dominant tree species. The usual trees and shrubs associated with it are *Acacia senegal*, *Bauhinia racemosa*, *Boswellia serrata*, *Butea monosperma*, *Capparis sepiaria*, *Cassia auriculata*, *C. fistula*, *Crataeva adansonii subsp. odora*, *Dichrostachys cinerea*, *Diospyros melanoxylon*, *Dyserotheum indicum*, *Ehretia aspera*, *Flacourtia indica*, *Grewia flavesens*, *G. tenax*, *Holoptelea integrifolia*, *Lannea coromandelica*, *Moringa concanensis*, *Sterculia urens*, *Wrightia tinctoria*, *W. tomentosa* etc. In rocky areas *Euphorbia caducifolia* is dominant.

At the summit of the hills, however, *Boswellia serrata* becomes dominant. The other tree species commonly found being *Acacia catechu*, *Anogeissus pendula*, *Bauhinia racemosa*, *Dalbergia sissoo*, *Wrightia tinctoria* etc.

In the valleys between the hills the vegetation is comparatively denser with trees and shrubs like *Anogeissus pendula*, *Aegle marmelos*, *Butea monosperma*, *Capparis sepiaria*, *Cassia fistula*, *Cordia gharaf*, *Crataeva adansonii subsp. odora*, *Ehretia aspera*, *Flacourtia indica*, *Grewia subinacqualis*, *Mitragyna parvifolia*, *Syzygium cumini*, *Wrightia tinctoria*, *W. tomentosa* etc. At Toda Rai Singh *Dendrocalamus strictus* is also sometimes encountered.

At the base of the hills the common trees and shrubs found are *Acacia leucophloea*, *A. nilotica* subsp. *indica*, *A. senegal*, *Anogeissus*
pendula, Balanites aegyptiaca, Bauhinia racemosa, Butea monosperma, Capparis decidua, C. sepiaria, Cassia auriculata, Cordia gharaf, Euphorbia caducifolia, Maytenus emarginata, Prosopis cineraria, Salvadoria oleoides, Ziziphus nummularia etc. At the base of the hills at Tordi, Ghati and Pucha Bundha Phoenix sylvestris and Cryptostegia grandiflora with its showy flowers are abundant. Vitex negundo and Opuntia dillenii are common at the base of the hills at Bisalpura. A patch of Pongamia pinnata forest is also found on the banks of the river Banas at Bisalpura.

Of the climbers found particularly on the hills, mention may be made of Abrus precatorius, Atylosia scarabaeoides, Canavalia virosa, Cocculus hirsutus, Maerua arenaria var. scabra, Rhynchosia minima etc.

The ground flora in these forests is represented by herbs and undershrubs like Achyranthes aspera, Anisomeles indica, Barleria prionitis, Bidens biternata, Blepharis maderaspatensis, Boerhavia diffusa, Borreria articularis, Cassia tora, Cleome viscosa, Commelina forskalaei, Desmodium neomexicana, Dipteranthenus patulus var. alba, Elytraria acaulis, Indigofera cordifolia, Ipomoea pes-tigris, Kickxia ramosissima, Lantana indica, Lepidagathis cristata, Lindenbergia indica, Melhania futteryporensis, Ocimum americanum, Peristrophne bicalculata, Pupalia lappacea, Rostellularia vahlii, Sida cordifolia, S. cordata, Tephrosia purpurea, Trichodesma indicum, Tridax procumbens, Triumphetra pentandra, Urginea indica, Vernonia cinerea etc. The common grasses found are Apluda mutica, Chloris dolichostachya, Schoenfeldia gracilis and Sehima nervosum, the last two species being common at the foot of the hills. The parasite Dendrophthoe falcata is common on Boswellia serrata and the fern Adiantum incisum is encountered at Toda Rai Singh growing from rock-crevices.

\textit{Anogeissus pendula scrub}

There are some low rocky hills with very little top soil in places like Anwa, Gar, Indoda, Banetha, Kacha Bundha and Siras which are more or less barren. The vegetation here is very sparse with the trees assuming stunted, bushy habit. The forests on these hills come under \textit{Anogeissus pendula} scrub type. In addition to the dominant species, \textit{Anogeissus pendula} the other species encountered are Acacia leucophloea, Butea monosperma, Capparis decidua, C. sepiaria, Dickrostachys cinerea, Grewia renax and Maytenus emarginata with climbers like Cocculus hirsutus and Maerua arenaria var. scabra and herbs like Apluda mutica, Boerhavia diffusa, Borreria articularis, Glossocardia bosvallea, Indigofera cordifolia, Lepidagathis cristata, Polygala eriopera, Urginea indica etc.
At the base of these hills *Ziziphus nummularia* and *Cassia tora* along with *Acacia leucophloea*, *Capparis decidua*, *Maytenus emarginata*, *Prosopis cineraria*, *Salvadora oleoides* etc. are found.

It is said that there were beautiful dense forests with many species of fauna in these places when it was a princely state. The ruthless destruction of the forests, coupled with excessive grazing has resulted in the continuous retrogradation of the vegetation to its present state.

**Vegetation on low sand dunes**

At certain places like Toda Rai Singh, Tordi, Ghati, Kakor, Banetha, Sohela, Niwai and Siras there are deposition of sand, generally at the base of hills, forming small sand dunes. The vegetation here comes under Northern tropical thorn forest falling broadly under the type Desert thorn forest (6B/C1), as per the classification of Champion and Seth (I. c.). *Maytenus emarginatus* is the dominant species here with *Holoptelea integrifolia* as the co-dominant. The other species of trees and shrubs found are *Acacia leucophloea*, *A. nilotica* subsp. *indica*, *A. senegal*, *Capparis decidua*, *C. sepiaria*, *Flacourtia indica*, *Prosopis cineraria*, *Salvadora oleoides*, *Tecomella undulata* and *Ziziphus nummularia*. Herbs and undershrubs are represented by *Aerva javanica*, *Alhagi pseudalhagi*, *Arnebia hispidissima*, *Boerhavia diffusa*, *Convolvulus prostratus*, *Crotalaria burhia*, *Farsetia hamiltonii*, *Heliotropium strigosum*, *Indigofera linifolia*, *Leptadenia pyrotechnica*, *Sericostoma pauciflorum*, *Tephrosia purpurea*, *Tribulus terrestris* etc. along with grasses like *Eleusine compressa*, *Perotis hordeiformis* etc. Occasionally, *Striga gesnerioides* is met with as a parasite on *Lepidagathis trinervis*.

**Plantations**

In the plantations and closures of forest department found in places like Tordi, Rajmahal, Tonk, Kacha Bundha, Sohela, Amli, etc. the common trees and shrubs found are *Acacia catechu*, *A. leucophloea*, *A. nilotica* subsp- *indica*, *A. senegal*, *Ailanthus excelsa*, *Albizia lebbeck*, *Anogeissus pendula*, *Azadirachta indica*, *Balanites aegyptiaca*, *Bauhinia*, *Racemosia*, *Butea monosperma*, *Capparis decidua*, *C. sepiaria*, *Cordia gularif*, *Dalbergia sissoo*, *Dichrostachys cinerea*, *Euphorbia caducifolia*, *Grewia flaveescens*, *Maytenus emarginata*, *Prosopis cineraria*, *P. juliflora*, *Salvadora oleoides*, *Tecomella undulata*, *Ziziphus nummularia* etc. Climbers like *Abrus precatorius*, *Asparagus racemosus*, *Cardiospermum helicacabum*, *Maerua arenaria* var. *scabra*, *Mukia maderaspata*, *Pergularia daemia*, *Rhynchostachys minima* and *Rivea hypocotylediformis* are also met with. In the ground flora the common plants found are
Achyrnanthes aspera, Boerhavia diffusa, Ipomoea pes-tigridis, Ocimum americanum, Pavonia zeylanica, Rostellularia vahlitii, Tephrosia purpurea, Triumphianta pentandra and Vernonioa cinerea, along with grasses like Cenchrus ciliaris, Tetrapogon tonellus etc. Vetivera zizanoides is grown on a large scale in Sohela R. F.

**Vegetation on plains**

Much of the plains in Tonk district, leaving the areas under reserve forests, are utilised for growing agricultural crops. Hence the vegetation here is scarce, and is generally confined to waste lands and fallow fields. Ziziphus mucmumaria is abundant almost throughout the district on plains, the other notable species being Leptadenia pyrotechnica. Of the trees and other shrubs found, mention may be made of Acacia leucophloea, A. nilotica subsp. indica, Azadirachta indica, Calotropis procera, Capparis decidua, Mimosam hamata, Phoenix sylvestris, Prosopis cineraria and Salvadoria oleoides. The common herbaceous plants are Alhagi pseudalhagi, Argemone mexicana, Boerhavia diffusa, Chrozophora protrata, Convolvulus prostratus, Corchorus depressus, Crotalaria medicaginosa, Datura innoxia, Echinops echinatus, Euphorbia clareana, Evolvulus alsinoides, Fagonia schweinfurthii, Heliotropium stegosum, Hibiscus ovalifolius, Indigofera cordifolia, I. linnaei, Lamnea procumbens, Pavonia zeylanica, Rhynchosia capitata, sida cordifolia, Solanum surattense, Tephrosia purpurea, Tribulus terrestris, Urginea indica, Vernonioa cinerea etc. The common grasses found are Cenchrus ciliaris, C. setigerus, Chloris virgata, Cynodon dactylon, Desmostachya bipinnata, Eragrostis tremula etc.

on the Banas river bed, wherever it is rather dry, plants like Alhagi pseudalhagi, Argemone mexicana, Chrozophora protrata, Echinops echinatus, Vetivera zizanoides etc. are met with.

**Aquatic habitat**

The Banas river is rich in aquatic plants like Hydrilla verticillata, Potamogeton pectinatus, Vallisneria spiralis and Zanichellia palustris subsp. pedicellata. Occasionally, Nymphoides indicum is also met with. In streams, as in Niwai, Azolla pinnata, Lemna perpusilla, Pistia stratioites and Spirodela polyrhiza are common. In ponds, puddles, tanks etc. Ceratophyllum demersum, Hydrilla verticillata, Ipomoea aquatica, Nechamandra alternifolia, Nymphaeas nauchali, N. pubescens, Nelumbo nucifera, Potamogeton nodosus, P. petinatus, Trapa hispinoza, Vallisneria spiralis, Chara sp. etc. are generally met with.

**Marshy habitat**

The common plants found in marshy habitats around tanks, lakes, ponds, water courses, streams, dam sites and the marshy places in the
Banan river bed are Alternanthera sessilis, Ammannia baccifera, A. multiflora, Bacopa monnieri, Bergia ammannioides, Caesalia axillaris, Eclipta alba, Ludwigia perennis, Potentilla supina, Vahlia digyna, Veronica anagallis-aquatica etc. Polygonum glabrum is generally found on Banas river bed in marshy situations. At certain places in the marshy places around tanks as in Rampura near Kakor and Bhotunda near Rajmahal Glossostigma spathulatum is abundant. The species commonly associated with it is Dopatrium junceum. Some of the other plants encountered in marshy areas around tanks and ponds are Dentella repens, Merremia emarginata, Peplidium maritimum, Sagittaria guayanensis and Typha angustiata. It is also of interest to note the occurrence of the orchid Zeuxine strateumatica growing in marshy place at Niwai under the shade of Pandanus sp. Sedges abound in marshy habitats, of which mention may be made of Cyperus alopecuroides, C. dfformis, C. iria, C. leavigatus, C. pangorei, C. pygmaeus, Fimbristylos bisumbellata, F. quinquangularis, Picreus flavidus, P. pumilus, Scirpus affinis, S. littoralis, S. roylei, S. tuberosus etc. Grasses commonly found in such habitats are Echinochloa colonum, E. crus-galli, Eragrostis minor, E. tenella, Dichanthium annulatum, Hemarthria compressa, Imperata cylindrica, Paspalidium geminatum, Phragmites karka and Polyggon monspeliensis. At Tordi Sagar Equisetum ranosissimum is common in swampy areas by the side of irrigation channels.

Slightly away from the margins of tanks lake etc. and in drying up ponds the following plants are encountered: Blumea obliqua, Coldenia procumbens, Glinus lotoides, Gnephaliium polycaulon, G. pulvinatum, Grangea maderaspatara, Heliotropium ovalifolium, H. supinum, Phyla nodiflora, Polygonum plebeium, Portulaca pilosa, Pulicaria crispa, Verhacrum chinense etc.

Phoenix sylvestris is common throughout the district and are generally encountered in marshy places like margins of tanks etc.

Weeds of cultivated fields

The common weeds found in the cultivated fields on the Banas river bed are: Amaranthus spinosus, Asphodelus tenuifolius, Chenopodium album, Melilotus alba, M. indica, Pluchea lanceolata and Polygonum plebeium along with sedges and grasses like Cyperus compressus, C. leavigatus, Fimbristylos bisumbellata, Crypsis schoenoides, Echinochloa colonum, Eragroistis minor, E. pilosa, E. tenella, Polyggon monspeliensis etc.

When the water level is low, the margins of tanks are converted into cultivated fields as in Tordi Sagar and the weeds found here are Eclipta alba, Gnephaliium polycaulon, Polygonum, plebeium, Potentilla supina and the sedge Cyperus pygmaeus.
The common weeds found in and around the other cultivated fields in Tonk district are: *Abutilon indicum*, *Anagallis arvensis*, *Asphodelus tenuifolius*, *Catharanthus pusillus*, *Celosia argentea*, *Chenopodium album*, *C. murale*, *Convolvulus arvensis*, *Euphorbia dracunculoides*, *Gynandropsis gymandra*, *Ipomoea pes-tigrides*, *Malva parvifolia*, *Melilotus indica*, *Solanum nigrum*, *Spergula fallax*, *Striga angustifolia* and grasses like *Cenchrus setigerus*, *Cynodon dactylon* etc.

**Cultivated plants**

Tonk is famous for its water melons, locally known as Turbooz (*Citrullus vulgaris* Schrad. ex Eckl. & Zeyh.) and musk melons, locally known as Kharbuza (*Cucumis melo* L.) which are cultivated extensively on the Banas river beds and sent to different parts of India.

On the Banas river bed and elsewhere the following vegetables are also grown: *Abelmoschus esculentus* (L.) Moench. (Lady’s finger; *Bhendi*), *Allium cepa* L. (Onion; *Pyaaz*, *Kandu*), *A. sativum* L. (Garlic; *Lashan*), *Benincasa hispida* (Thunb.) Cogn. (White gourd; *Petha*), *Brassica oleracea* L. var. *botrytis* L. (Cauliflower; *Phoolgobi*), *B. oleracea* var. *capitata* L. (Cabbage; *Bandgobhi*), *Capsicum annuum* L. (Chilli; *Mirch*), *Citrullus vulgaris* Sard. var. *fistulosus* Duthie & Fuller (Squash melon; *Tinda*), *Coriandrum sativum* L. (Coriander; *Dhana*), *Cucumis melo* L. var. *cula* Royle (Cucumber; *Kachra*, *Kakaria*), *Cucurbita moschata* Duch. ex Poir. (Cushaw and winter crookneck squash; *Sitaphal*, *Mitha kaddu*), *Daucus carota* L. (Carrot; *Gajar*), *Ipomoea batatas* (L.) Lam. (Sweet-potato; *Shakar-Kandi*), *Lagenaria vulgaris* Ser. (Bottle-gourd; *Lauki*, *Ghinya*), *Luffa acutangula* (L.) Roxb. (Dish-cloth gourd; *Rag-gourd; Tori*), *Lycopersicon lycopersicum* (L.) Karst. (Tomato; *Tamatar*), *Momordica charantia* L. (Bitter-gourd; *Karala*), *Pisum sativum* L. (Pea; *Mattar*), *Raphanus sativus* L. (Radish; *Multi*), *Solanum melongena* L. (Bringal; *Baigan*) and *S. tuberosum* L. (Potato; *Alu*).

Cereals, pulses, cash crops and other crop plants grown are: *Arachis hypogaea* L. (Ground nut; *Mungphali*, *Mumphali*), *Brassica campestris* L. var, *sarson* Prain (Mustard; *Sarso*), *B. nigra* Koch (Black mustard; *Birai*), *Cicer arietinum* L. (Chic-pea; *Chana*), *Coriandrum sativum* L. (Coriander; *Dhana*), *Cuminum cyminum* L. (Cumin; *Zera*), *Foeniculum vulgare* Mill. (Fennel; *Sonf*), *Gossypium* spp. (Cotton; *Rul*), *Hordeum vulgare* L. (Barley; *Jow*), *Linum usitatissimum* L. (Linseed; *Alsi*), *Pennisetum typhoïdes* (Burm. f.) Stapf & C. E. Hubb. (Pearl-millet; *Bajra*), *Phaseolus aureus* Roxb. (Green or golden gram; *Moong*), *Saccharum officinarum* L. (Sugar cane; *Ikh*, *Gana*), *Sesamum indicum* L. (Sesame; *Till*), *Sorghum vulgare* Pers.
(Sorghum; Jawar), Trigonella foenum-graecum L. (Fenugreek; Methi), Triticum aestivum L. (Wheat; Kanak, Gehr), Vigna aconitifolius (Jacq.) Marechal (Moth bean; Moth), V. mungo (L.) Hepper (Black gram; Urd) and Zea mays L. (Maize; Makki).

The common fruit trees grown in the Tonk district are: Carica papaya L. (Papaya; Poppita), Citrus aurantium. L. (Orange; Santara, Malta), C. limon (L.) Burm. f. (Lemon; Nimbu), Mangifera indica L. (Mango; Am), Manilkara hexandra (Roxb.) Dub. (Khirni), Psidium guajava L. (Guava; Amrood), Punica granatum L. (Pomegranate; Anar) and Syzygium cumini (L.) Skeels (Black plum; Jammun).

SYNOPSIS OF THE FLORA

The total Angiosperm Flora of Tonk district, including both indigenous and naturalised plants, comprises of about 370 species belonging to 258 genera under 88 families. The following table (Table 1) gives the number of families, genera and species under Dicotyledons and Monocotyledons.

<table>
<thead>
<tr>
<th>Angiosperms</th>
<th>Families</th>
<th>Genera</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Dicotyledons</td>
<td>72</td>
<td>81.8</td>
<td>197</td>
</tr>
<tr>
<td>Monocotyledons</td>
<td>16</td>
<td>18.2</td>
<td>61</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>88</strong></td>
<td><strong>100</strong></td>
<td><strong>258</strong></td>
</tr>
</tbody>
</table>

The families with 10 or more species are as follows:

1. Poaceae 50 spp. (36 genera)
2. Fabaceae 30 spp. (18 genera)
3. Asteraceae 26 spp. (23 genera)
4. Cyperaceae 22 spp. (4 genera)
5. Euphorbiaceae 14 spp. (5 genera)
6. Convolvulaceae 13 spp. (5 genera)
7. Acharitaceae 12 spp. (9 genera)
8. Boraginaceae 12 spp. (7 genera)
9. Mimosaceae 11 spp. (7 genera)
10. Scrophulariaceae 11 spp. (10 genera)
11. Amaranthaceae 10 spp. (8 genera)

The following families have 5 or more genera:

1. Poaceae 36 genera (50 spp.)
2. Asteraceae 23 genera (26 spp.)
3. Fabaceae 18 genera (30 spp.)
4. Scrophulariaceae 10 genera (11 spp.)
5. Acanthaceae 9 genera (12 spp.)
6. Amaranthaceae 8 genera (10 spp.)
7. Boraginaceae 7 genera (12 spp.)
8. Mimosaceae 7 genera (11 spp.)
9. Lamiaceae 6 genera (9 spp.)
10. Euphorbiaceae 5 genera (14 spp.)
11. Convolvulaceae 5 genera (13 spp.)
12. Malvaceae 5 genera (7 spp.)
13. Rubiaceae 5 genera (5 spp.)

If the Fabaceae s. l. are taken as one family they comprise 27 genera and 49 species. Even then poaceae occupy the first place, the second and third position being occupied by Fabaceae s. l. and Asteraceae respectively.

Except for Poaceae (50 spp.) and Cyperaceae (22 spp.), the Monocotyledons are poorly represented. The remaining 24 species belong to 14 different families. The ratio of species belonging to Monocotyledons to Dicotyledons is 1 : 2.9, of genera 1 : 3.2 and of families 1 : 4.5.

The proportion of genera to species is 1 : 1.4 which is rather low in comparison to the corresponding ratio for the whole of India which is estimated to be about 1 : 7, but it is more or less comparable to the ratio for North Gujarat 1 : 1.83 (Saxton, 1922) and Delhi State 1 : 1.63 (Maheshwari, 1963).
REFERENCES


HOOKER, J. D. The flora of British India. 7 vols. London. 1872-1897.


FLORA OF TONK DISTRICT

KEY TO FAMILIES

1 a. Tap root usually present; vascular bundles of the stem usually in a circle; leaves usually with reticulate venation; pollen grains usually not monocolporate; cotyledons 2 :

2 a. Perianth of 2 or more whorls, usually differentiated into an outer calyx and inner corolla :

3 a. At least some of the petals free at the base :

4 a. Ovary inferior or half inferior :

5 a. Stamens numerous, more than 10 :

6 a. Aquatic herbs; leaves cordate; seeds arillate  ... NYMPHAEEACEAE 2

6 b. Terrestrial plants; leaves not cordate, rarely much reduced; seeds not arillate :

7 a. Plants succulent, very spiny; leaves much reduced; petals numerous  ... CACTACEAE 37

7 b. Plants woody, unarmed; leaves well-developed with pellucid glands; petals 4-5  ... MYRTACEAE 33

5b. Stamens definite, not more than 10 :

8 a. Tendrillar vines; flowers unisexual; anther loculi usually flexuous or conduplicate  ... CUCURBITACEAE 36

8 b. Plants not tendrillar; flowers bisexual; anther loculi straight :

9 a. Flowers 4-merous; style 1; ovary 4-locular  ... ONAGRACEAE 35

9 b. Flowers 5-merous; styles 2; ovary 1-locular  ... VAHLIACEAE 31

4 b. Ovary superior :

10 a. Stamens numerous, more than 10 :

11 a. Aquatic herbs; leaves peltate; connective clavate  ... NELUMBONACEAE 3

11 b. Terrestrial plants; leaves not peltate; connective not clavate :

12 a. Gynoecium of many, free carpels ...

12 b. Gynoecium of 1 carpel or syncarpous :
BOTANICAL SURVEY OF INDIA

13a. Plants with yellow sap; leaves lacerate; petals biseriate ... **PAPAVERACEAE 4**

13b. Plants without yellow sap; leaves not lacerate; petals uniseriate :

14a. Petals 4 :

15a. Plants woody; fruit indehiscent ... **CAPARACEAE 7**

15b. Herbs; fruit dehiscent ... **CLEOMACEAE 6**

14b. Petals 5 :

16a. Leaves bipinnate; ovary 1-locular; placentation marginal ... **MIMOSACEAE 29**

16b. Leaves simple, sometimes lobed, never bipinnate; ovary 2-or more locular; placentation axile :

17a. Flowers unisexual ... **EUPHORBIACEAE 69**

17b. Flowers bisexual :

18a. Stamens monadelphous; anthers 1-locular ... **MALVACEAE 12**

18b. Stamens free or very shortly connate at the base; anthers 2-locular ... **TILIACEAE 14**

10b. Stamens definite, not more than 10 :

19a. Sepals 3+3; petals 3+3; carpels free ... **MENISPERMAECEAE 1**

19b. Sepals 4-5; petals 4-5; gynoeicum of 1 carpel or syncarpous :

20 a. Stamens tetradyamous ... **BRASSICACEAE 5**

20 b. Stamens not tetradyamous :

21a. Ovary 1-locular :

22a. Flowers unisexual; ovule 1 ... **ANACARDIACEAE 25**

22b. Flowers bisexual; ovules 2-numerous :

23a. Petals 4 ... **CLEOMACEAE 6**

23b. Petals 5 :
FLORA OF TONK DISTRICT

24a. Branches and inflorescence dichotomously branched with one branch tending to outgrow the other; placentation free-central ...  

24b. Branches in the vegetative region and the inflorescence not dichotomous; placentation parietal or marginal:  

25a. Fruit a capsule:  

26a. Indumentum stellate; flowers actinomorphic; filaments connate below; anthers 2-locular ...  

26b. Indumentum not stellate; flowers zygomorphic; filaments free; anthers 1-locular  

25b. Fruit a legume, sometimes indehiscent or lomentoid:  

27a. Leaves hipinnate; corolla actinomorphic; petals valvate ...  

27b. Leaves simple, unifoliate, trifoliate or simply pinnate; corolla zygomorphic (sometimes weakly so); petals imbricate:  

28a. Adaxial petal interior (ascending imbrication)...  

28b. Adaxial petal exterior (descending imbrication)...  

CARYOPHYLLACEAE 10  
STERCULIACEAE 13  
MORINGACEAE 26  
MIMOSACEAE 29  
CAESALPINIACEAE 28  
FABACEAE 27
21b. Ovary 2 or more locular:

29a. Sepals unequal, the two inner larger; petals 3, the median anterior keel-like and crested  ...  **POLYGALACEAE 9**

29b. Sepals or calyx lobes equal or nearly so; petals 4-5, not keeled or crested:

30a. Inflorescence leaf-opposed  ...  **VITACEAE 23**

30b. Flower or inflorescence axillary:

31a. Petals 4:

32a. Leaves biternate; seeds arillate  ...  **SAPINDACEAE 24**

32b. Leaves simple; seeds not arillate  ...  **LYTHRACEAE 34**

31b. Petals 5:

33a. Leaves simple:

34a. Flowers unisexual  ...  **EUPHORBIACEAE 69**

34b. Flowers bisexual:

35a. Plants stellately hairy  ...  **STERCULIACEAE 13**

35b. Plants not stellately hairy:

36a. Trees or shrubs with stipular spines; style simple or 2-4-fid:

37a. Stamens alternate with petals; fruit a capsule; seeds arillate... **CELASTRACEAE 21**

37b. Stamens antepetalous; fruit a drupe; seed not arillate... **RHAMNACEAE 22**

36b. Unarmed herbs; style 5-fid  ...  **LINACEAE 15**

33b. Leaves pinnate or (1-) 2-3-folate:

38a. Herbs  ...  **ZYGOPHYLLACEAE 16**
38b. Plants woody:

39a. Plants armed with simple or forked spines  \textbf{Balanitaceae 18}

39b. Plants unarmed:

40a. Stamens connate into a tube  \textbf{Meliaceae 20}

40b. Stamens free:

41a. Resinous trees; flowers bisexual; fruit a drupe ...  \textbf{Rutaceae 19}

41b. Trees not resinous; flowers unisexual or polygamous; fruit a samara...  \textbf{Simaroubaceae 17}

3b. Petals all united, at least at the base:

42a. Ovary inferior or half inferior:

43a. Tendril-bearing vines; anther loculi usually flexuous or conduplicate ...  \textbf{Cucurbitaceae 36}

43b. Plants not tendrillar; anther loculi straight:

44a. Stamens antipetalous or more numerous than the petals; ovary half inferior ...  \textbf{Portulacaceae 11}

44b. Stamens alternating with the petals; ovary inferior:

45a. Leaves extipulate; inflorescence an involucrate capitulum; anthers usually syngenious; fruit an achene ...  \textbf{Asteraceae 41}

45b. Leaves with inter- or intrapetiolar stipules; inflorescence not an involucrate capitulum; anthers free; fruit a capsule, berry or drupe ...  \textbf{Rubiaceae 40}

42b. Ovary superior:

46a. Flowers unisexual ...  \textbf{Ebenaceae 45}

46b. Flowers bisexual:

47a. Corolla regular:

48a. Stamens antipetalous:

49a. Plants with milky juice; ovary many-locular ...  \textbf{Sapotaceae 44}
49b. Plants without milky juice; ovary 1-locular:

50a. Styles or style branches 5; placentaation basal; ovule 1 ...  
Plumbaginaceae 42

50b. Style simple; placentaation free-central; ovules numerous ...  
Primulaceae 43

48b. Stamens alternating with or more numerous than the corolla lobes:

51a. Stem parasites without chlorophyll; stem thread-like ...  
Cuscutaceae 54

51b. Free-living plants with chlorophyll; stem not thread-like:

52a. Leaves bipinnate ...  
Mimosaceae 29

52b. Leaves simple:

53a. Placentation parietal:

54a. Aquatic herbs; leaves orbicular, deeply cordate ...  
Menyanthaceae 51

54b. Terrestrial herbs; leaves not orbicular or cordate ...  
Gentianaceae 50

53b. Placentation axile, basal or marginal:

55a. Flowers 4-merous; ovary 1-locular ...  
Salvadoraceae 46

55b. Flowers 5-merous; ovary 2-4-locular or carpels 2 and free or connate at base:

56a. Ovules 1-2 in each loculus:

57a. Plants usually climbing; fruit capsular ...  
Convolvulaceae 53

57b. Plants not climbing; fruit of 4 nutlets or pyrenes or drupaceous ...  
Boraginaceae 52

56b. Ovules 4-many in each loculus:
58a. Plants with milky latex; leaves opposite; seeds usually with silky appendages:

59a. Pollen granular:

60a. Stamens with coronal appendage ... Periplocaeeae 49

60b. Stamens without coronal appendage ... Apocynaceae 47

59b. Pollen in pollinia ... Asclepiadaceae 48

58b. Plants without milky juice; leaves alternate; seeds without silky appendages ... Solanaceae 55

47b. Corolla irregular:

61a. Fruit a long-horned capsule ... Martyniaceae 58

61b. Fruit not long-horned:

62a. Leaves usually prominently marked with cystoliths; capsule dehiscing elastically ... Acanthaceae 59

62b. Leaves without cystoliths; fruit not elastically dehiscent:

63a. Ovules 1-2 in each loculus:

64a. Style gynobasic; fruit of 4 nutlets ... Lamiaeeae 61

64b. Style terminal; fruit a drupe or pyrene ... Verbenaceae 60

63b. Ovules many in each loculus:

65a. Trees; seeds winged ... Bignoniaceae 57

65b. Herbs; seeds not winged ... Scrophulariaceae 56

2b. Perianth of 1 whorl, mostly sepaloid, sometime petaloid or 0:

66a Ovary inferior:

67a. Trees ... Combretaceae 32

67b. Shrubs, sometimes climbing:

68a. Branch-parasitic shrubs; flowers actinomorphic; style simple ... Loranthaceae 68

68b. Non-parasitic climbers; flowers zygomorphic; style divided ... Aristolochiaceae 67

66b. Ovary superior:

69a. Submerged aquatic herbs ... Ceratophyllaceae 72

69b. Terrestrial plants:
70a. Gynoecium of usually 5, distinct or nearly distinct carpels:

71a. Trees, stellately hairy ... Sterculiaceae 13
71b. Herbs, not stellately hairy ... Molluginaceae 39

70b. Gynoecium of 1 carpel or syncarpous:

72a. Ovary 1-locular:

73a. Herbs, undershrubs or shrubs:

74a. Leaves with an ochrea ... Polygonaceae 66
74b. Leaves without an ochrea:

75a. Perianth petaloid:

76a. Twining plants; leaves alternate; fruits not glandular ... Basellaceae 65
76b. Plants not twining; leaves opposite; fruits glandular ... Nyctaginaceae 62

75b. Perianth not petaloid:

77a. Bracts and bracteoles present; perianth scarious ... Amaranthaceae 63
77b. Bracts and bracteoles absent; perianth green ... Chenopodiaceae 64

73b. Trees:

78a. Plants with milky sap; fruit multiple, composed of a number of drupes or achenes inside a common, fleshy, flask-shaped receptacle ... Moraceae 71
78b. Plants without milky sap; fruit a samara ... Ulmaceae 70

72b. Ovary 2-or more locular:

79a. Flowers unisexual:

80a. Trees; stamens numerous; fruit a berry ... Flacourtiaceae 8
80b. Herbs, under shrubs or shrubs; stamens up to 8; fruit a capsule. Euphorbiaceae 69

79b. Flowers bisexual:

81a. Stamens 4 ... Lythraceae 34
81b. Stamens 5 or more:
82a. Stamens hypogynous ... **Molluginaceae** 39

82b. Stamens perigynous ... **Aizoaceae** 38

1b. Tap root usually absent; vascular bundles of the stem scattered; leaves usually with parallel venation; pollen grains usually monocolpate; cotyledon 1:

83a. Ovary superior:

84a. Perianth absent (when flowers are unisexual then absent at least in male flowers) or rudimentary, or of scales or bristles or lodicules:

85a. Plants minute, thalloid: ... **Lemnaceae** 82

85b. Plants well-developed, differentiated into stem and leaves:

86a. Flowers in spikelets and in the axils of membranous bract:

87a. Stem usually with solid internodes; leaf sheath usually closed; each flower subtended by a single bract (glume); perianth of bristles, hairs, scales or 0; style 1 **Cyperaceae** 87

87b. Stem usually with hollow internodes; leaf sheath usually with free margins; each flower subtended by a bract (lemma) and a bracteole (palea); perianth reduced to lodicules; styles usually 2 ... **Poaceae** 88

86b. Flowers not in spikelets; bracts when present not membranous:

88a. Aquatic plants, submerged or floating; inflorescence glabrous:

89a. Plants floating, inflorescence subtended by a spathaceous bract; fruits sessile ... **Araceae** 81

89b. Plants submerged; bract absent; fruits stipitate **Zannichelliaceae** 85

88b. Marsh plants; inflorescence densely pappose ... **Typhaceae** 80

84b. Perianth present:

90a. Aquatic plants; carpels free:

91a. Flowers in spikes, ebracteate; perianth 4, in one series; carpels 4 ... **Potamogetonaceae** 84

91b. Flowers in racemes, bracteate; perianth 6, in two series, inner petaloid; carpels many ... **Alismataceae** 83
90b. Terrestrial plants; carpels united:

92a. Trees; leaves plicate, palmately or pinnately divided ... \textit{Areceaeae} 79

92b. Herbs or shrubs; leaves simple or reduced, not plicate:

\begin{itemize}
  \item 93a. Inflorescence an involucrate capitula; flowers unisexual ... \textit{Eriocaulaceae} 86
  \item 93b. Inflorescence not a capitula; flowers bisexual:
    \begin{itemize}
      \item 94a. Outer whorl of perianth herbaceous and different from the petaloid inner whorl ... \textit{Commelinaceae} 77
      \item 94b. Outer and inner whorl or perianth similar:
        \begin{itemize}
          \item 95a. Perianth scarious; pollen in tetrads ... \textit{Juncaceae} 78
          \item 95b. Perianth petaloid; pollen free ... \textit{Liliaceae} 76
        \end{itemize}
    \end{itemize}
\end{itemize}

83b. Ovary inferior:

\begin{itemize}
  \item 96a. Flowers actinomorphic; pollen free:
    \begin{itemize}
      \item 97a. Terrestrial shrubs; ovary 3-locular with axile placentation; style simple ... \textit{Agavaceae} 75
      \item 97b. Aquatic herbs; ovary 1-locular with diffuse parietal placentation; style divided ... \textit{Hydrocharitaceae} 73
    \end{itemize}
  \item 96b. Flowers zygomorphic; pollen in pollinia ... \textit{Orchidaceae} 74
\end{itemize}
DICOTYLEDONS

1. MENISPERMACEAE

Cocculus DC. nom. cons.


Pubescent climbing shrubs. Leaves up to 8.0 x 6.5 cm, ovate or ovate-oblong, subcordate or cuneate, obtuse or mucronate. Staminate flowers in short, many-flowered cymes in clusters of 2-3, greenish-yellow. Pistillate flowers 1-3, axillary. Drupes c. 4.5 mm in diam., red or dark purple; endocarp laterally ribbed and with a prominent dorsal ridge, condylo perforate, pericarp of dried fruit easily rubbed off.

Fl. & Fr.: Almost throughout the year.

Common in forests; Tonk R.F. and Rajmahal R.F.

2. NYMPHIAEACEAE

Nymphaea L. nom. cons.

1a. Leaves entire or wavy, glabrous; connective produced beyond anther tip

1b. Leaves sharply toothed, densely hairy beneath; connective of anthers hardly produced

N. nouchali 1

N. pubescens 2

Perennial aquatic herbs. Leaves up to $20 \times 16$ cm, orbicular, peltate, floating, green above, purple beneath. Flowers c. 9 cm in diam. Petals white, the tip often bluish. Stamens 22–30; anthers yellow with bluish appendages. Stigmas yellow.

*Fl. & Fr.*: August October.

Common; Mor village near Malpura.


Perennial aquatic herbs. Leaves up to $25 \times 20$ cm, orbicular, peltate, floating, green above, brownish beneath. Flowers large, showy, c. 12 cm in diam. Petals white with a tinge of pink. Stamens c. 40, yellow.

*Fl.*: August October.

Rare; found in the tank at Chandalai village near Tonk.

3. NELUMBONACEAE

**Nelumbo** Adans.


Perennial, stoloniferous, aquatic herbs. Leaves c. $25 \times 21$ cm, orbicular, margins upturned, exactly peltate, when mature raised high above the water; petiole with small, distinct prickles. Flowers large, showy, c. 19 cm in diam., pink or rosy; peduncle with black prickles. Stamens c. 230. Carpels several, embedded separately on the top of the turbinate spongy receptacle. Fruit an aggregate of indehiscent, single seeded nutlets.
Fl. & Fr.: March May.

Common; Bomb Talab in Malpura.

This is the sacred lotus of India. The rhizomes, young leaves and peduncles are used as vegetable. The carpels are eaten raw. The plant is also of medicinal value.

4. PAPAVERACEAE

ARGEMONE L.


Glaucous, prickly herbs or undershrubs, 0.5–1.0 m, with yellow sap. Leaves up to 15.0 × 8.5 cm, prickly, sinuate pinnatifid, variegated with white. Flowers 4–5 cm in diam., yellow. Stamens indefinite; anthers yellow or orange. Stigma red. Capsules 2.5–4.0 × 1.0–1.5 cm, prickly, dehiscing by valves. Seeds brownish black.

Fl. & Fr.: October March.

Very common on Banas river bed; Benthali village.

It is a native of tropical America and has run wild in India.

5. BRASSICACEAE

FARSETIA Turra

Erect herbs up to 60 cm densely covered with closely appressed mediixed hairs. Leaves up to $7.5 \times 0.15 (-0.3)$ cm linear. Flowers in lax, ebracteate racemes, white or pinkish. Sepals appressed hairy. Silique 1.0 $4.2 \times 50.25 \ 0.4$ cm, linear-oblong with wavy margins, flattened, beaked with persistent style, appressed hairy with mediixed hairs, brown. Seeds 1 seriate, suborbicular with a broad membranous wing, dark brown.

*Fl. & Fr.*: September March.

Very Common on sandy river bed; Mavasi.

6. CLEOMACEAE

CLEOME L.

1a. Plants usually glandular - hairy; leaves digitately 3-5 (-7) - foliate; seeds with distinct cross - ribs:

2a. Flowers in dense, bracteate racemes, white or purplish; androgynophore conspicuous ... *C. gynandra* 1

2b. Flowers in lax, leafy racemes, yellow; androgynophore absent ... *C. viscosa* 3

1b. Plants spinescent - hairy; leaves simple; seeds without distinct cross - ribs ... *C. simplicifolia* 2


Erect, glandular hairy herbs, 30-100 cm. Leaflets up to $6.5 \times 3.5$ cm, obovate to oblanceolate, denticate to subentire. Stamens 6. Capsules 2.5 - 8.0 x 0.3 - 0.4 cm, glandular pubescent, obliquely striated, many seeded. Seeds c. 1.4 mm in diam., reniform, with superficial concentric ribs and irregular cross ribs, black brown.
Fl. & Fr.: June November.

Common weed in wastelands; Niwai.


Strigose herbs, 10-75 cm. Leaves up to 7.0 × 2.5 cm, obovate to oblong-elliptic. Flowers in elongated leafy racemes, purple; pedicels up to 3.5 cm long, filiform. Stamens 10-12. Capsules 1.5-3.0 cm long, striate; tortuose. Seeds c. 2 mm in diam., reniform, yellowish with brown spots.

Fl. & Fr.: July November.

Rare; Gaunri village near Rajmahal.


Erect, glandular hairy herbs, 15-100 cm. Leaflets up to 5.5 × 3.0 cm, obovate to elliptic oblong. Stamens 10-20. Capsules 2.5-9.0 × 0.25-0.45 cm, glandular hairy, obliquely striated, many seeded. Seeds c. 1.25 mm in diam., reniform, with faint concentric ribs and strong cross ribs, dark brown.

Fl. & Fr.: July November.

Common at the foot of the hills; Kakor R. F.

7. CAPPARACEAE

1a. Sepals free; fruits globose or ovoid:

2a. Leaves simple with 2 stipular spines

... Capparis 1

2b. Leaves trifoliate, without stipular spines

... Crataeva 2

1b. Sepals united at base; fruits moniliform

... Maerua 3
1. Capparis L.

1a. Plants leafless except on young shoots; flowers in corymbose racemes or fascicles, red or orange-red

\[ C. \text{ decidua} \]

1b. Plants leafy; flowers subumbellate, creamish white

\[ C. \text{ sepia} \]


Densely branched shrubs or small trees, 2-6 m, with leafless (except the young shoots), green, spiny branches. Leaves when present small, linear, soon caducous. Stipular spines straight. Flowers 1-2 cm across. Fruits 1.0-1.5 cm across, globose or ovoid, bright red when ripe. Seeds 4-5 mm in diam.

Fl. & Fr.: February November.

Common; Frazer Bridge near Tonk and Aamli R. F.


Much branched, subscandent or scandent, more or less pubescent shrubs. Leaves c. 4×2 cm, elliptic, oblong, elliptic or obovate. Stipular spines recurved. Flowers at the ends of branches, 5-10 mm across, slightly fragrant. Berries c. 1 cm across, globose.

Fl. & Fr.: April - July.

Common at Paccha Bundha (Tonk) and fairly common at Mohamadpura R. F. near Aamli.

2. Crataeva L.


Moderate sized, deciduous trees, 4–10 m; bark dark grey. Petiole up to 10 cm long; leaflets up to 11 x 5 cm, elliptic to elliptic lanceolate, cuneate, acuminate. Flowers greenish yellow. Berries c. 3.5 cm in diam., globose, red. Seeds reniform, brown.

Fl. & Fr.: April–September.

Common on the hills; Tordi R. F. and Toda Rai Singh R. F.

3. MAERUA FORSSK.


Scandent shrubs. Leaves up to 7 x 3 cm, oblong ovate. Flowers usually in dense corymbose racemes, greenish - cream with white filaments. Fruits l 6 cm long, cylindric, somewhat twisted, moniliform, deeply constricted between the seeds.

Fl. & Fr.: October-March.

Found on Aunwa hills and in Tonk R. F.

8. FLACOURTIACEAE

Flacourtia Commers. ex L., Herit.'

Deciduous trees, 5 8 m; younger branches pubescent. Leaves up to 8×5 cm, ovate, elliptic, obovate or suborbicular, crenate - serrate. Flowers unisexual, greenish or yellowish. Male flowers in short, clustered racemes. Calyx pubescent. Stamens numerous. Female flowers solitary or in pairs. Calyx pubescent. Styles, 4 - 5. Berries globose with persistent styles, reddish when ripe.

*Fl. & Fr.*: February May.

Common in forests; Niwai, Aamli R. F. and Sohela R. F. The fruits are edible.

9. POLYGALACEAE

POLYGALA L.


Pubescent herbs, 5.0 6.5 cm. Leaves up to 4.5×1.0 cm, linear, linear oblong or rarely elliptic or obovate lanceolate. Flowers in short, few - flowered, axillary or extra axillary racemes throughout the stem, pink with dark pink crest. Capsules 3 5×2 3mm, elliptic oblong, emarginate, pubescent. Seeds pilose; strophiole 3 lobed.

*Fl. & Fr.*: August November.

Common; Kacha Bundha R. F. near Tonk.

10. CARYOPHYLLACEAE

1a. Leaves ending in a prickly point; flowers in compact, terminal cymes; style 1, with capitate or 3-lobed stigma

... *Polycarpaea* 1
1b. Leaves not ending in a prickly point; flowers in loose, terminal dichasia; styles 3 or 5, free ... *Spergula* 2

1. **Polycarpacea Lam. nom. cons.**


Erect, generally much branched herbs, 10–30 cm. Leaves up to 2.5 × 0.12 cm, spuriously whorled, linear. Stipules scarious. Flowers small, silvery white to reddish. Sepals entirely scarious. Stamens 5. Capsules c. 0.15 mm long, 3-valved, brown.

*Fl. & Fr.*: August November.

Common weed in fallow fields; Rajmahal R. F.

2. **Spergula L.**


Annual herbs, 10–30 cm, often branched from the base. Leaves up to 4.0 × 0.1 cm, spuriously whorled, linear. Flowers white. Sepals white-margined. Stamens 8–10. Styles 3. Capsules 4–5 mm long, ovoid or sub-globose, 3-valved. Seeds black with hyaline wing.

*Fl. & Fr.*: December March.

Common weed found in moist localities; Haji-Ki Kothi (Niwai).
Closely allied to *Spergula arvensis* L. and *S. pentandra* L. which, however, are characterised by 5-valved capsules and 5 styles, while in *S. fallax* the capsules are 3-valved, the styles being 3. *S. pentandra* does not occur in India. In *S. arvensis* which in India is found in southern and eastern parts the leaves are channelled beneath and the seeds are narrowly marginated. In *S. fallax* the leaves are not channelled beneath and the seeds are winged.

11 PORTULACACEAE

**PORTULACA L.**

1a. Leaves spatulate or obovate-oblong; stipular hairs inconspicuous; sepals carinate... *P. oleracea* 1

1b. Leaves linear-lanceolate to elliptic; stipular hairs conspicuous; sepals not carinate... *P. pilosa* 2


Prostrate or ascending, succulent herbs, 4-35 cm, with reddish-pink stem. Leaves up to 2.5×1.0 cm, fleshy, subsessile, rounded or truncate at apex. Flowers in capituli of usually 3-6 flowers, yellow. Capsules ovoid, many seeded. Seeds reniform, tuberculate, black.

*Fl. & Fr.*: Almost throughout the year.

Common on Banas river bed; Tonk.


Prostrate or ascending herbs, up to 20 cm. Leaves up to 1.8×0.2 cm, fleshy. Flowers in terminal capituli of 2-6 flowers surrounded by ring of pale hairs pink. Capsules ovoid, many-seeded. Seeds reniform, tuberculate, shining black.
Fl. & Fr.: May September

Common in wet places; Niwai temple.

Geesink (l. c.) states that "I have come to the conclusion that this is a very complex species in which I have here combined 60 names." He treats P. tuberosa as a synonym of P. pilosa subsp. pilosa. Ghafoor (l. c.) and Rechinger, Fl. Iranica 117: 3-4. 1976, however, treat P. tuberosa and P. pilosa as distinct species.

12. MALVACEAE

1a. Epicalyx present:

2a. Epicalyx segments 5 or more:

3a. Style branches 5, as many as carpels; fruit a Capsule

3b. Style branches 10, twice as many as carpels; fruit a schizocarp, at maturity breaking up into mericarps

2b. Epicalyx segments 3

1b. Epicalyx absent:

4a. Ovules 2 or more per locule; seeds 2 or more per mericarp

4b. Ovule 1 per locule; seed 1 per mericarp

Hibiscus 2

Pavonia 4

Malva 3

Abutilon 1

Sida 5

1. ABUTILON Mill.


Erect, tomentose undershrubs, up to 1.5 m. Leaves up to 7×7 cm, broadly ovate or suborbicular, cordate, acute, dentate. Flowers axillary, solitary, yellow or orange; pedicels jointed near the apex, geniculate. Mericarps 15–20, much longer than the calyx, flattened, reniform, shortly acuminate at apex, dorsally densely hairy. Seeds reniform, punctate by minute warts, hairy at the hilum, brown grey.
Fl. & Fr.: July    March.
Common by the side of the fields; Ghati village near Tordi.

2. Hibiscus L. nom. cons.


Erect, suffruticose, stellately hairy perennials, 0.5 - 2.5 m. Leaves up to 3.5×3.0 cm ovate. Flowers solitary, axillary, white fading to pink. Capsules 7 - 9 mm long, globose. Seeds reniform, cottony.

Fl. & Fr.: May    November.
Common on hills; Tordi R. F., Sohela, Toda Rai Singh and Bantha.

3. Malva L.


Prostrate or ascending herbs. Leaves with long petiole, lamina up to 5.0×7.5 cm, suborbicular or reniform. Epicalyx segments linear. Flowers in axillary clusters, white. Calyx accrescent. Petals notched, hardly exceeding the sepals. Stigma linear. Schizocarp c. 7 mm across, discoid. Mericarps c. 10, prominently veined, 1 seeded. Seeds glabrous, dark brown.

Fl. & Fr.: February    March.
Common on field bunds; Tordi.

4. Pavonia Cav. nom. cons.


Erect, suffruticose, glandular - hairy perennials, 0.5 - 1.5 m. Leaves up to 3×3 cm, undivided or 3 - lobed, dentate. Epicalyx segments setaceous, hairy. Flowers pink or rarely white. Mericarps, slightly winged at edges, pale brown. Seeds minutely longitudinally papillately striate, puberulous, dark brown.
Fl. & Fr. : May - December.
Common ; Rajmahal R. F., Sohela R. F. and Niwai.

5. Sida L.

1a. Style branches and mericarps 5; mericarps smooth, mucilaginous

1b. Style branches and mericarps more than 5; mericarps prominently reticulated, 2-awned:

2a. Awns long, exceeding the calyx, retorse ciliate

2b. Awns short, not exceeding the calyx, stellate hairy

S. cordifolia 2
S. ovata 3


Ascending or erect, slender, hairy, herbs, up to 65 cm. Leaves up to 6 x 5 cm, broadly ovate to suborbicular, cordate, acute to acuminate, crenate to serrate. Flowers on long pedicels, axillary. yellow or orange. Mericarps thin walled. seeds glabrous, brown black.

Fl. & Fr. : Almost throughout the year.
Common ; Mayola forest (Bisalpur) and by the side of Niwai tank.


Erect, much branched, tomentose undershrubs up to 1 m. Leaves up to 5 x 3 cm, broadly ovate or orbicular, shallowly cordate, obtuse or acute, serrate to crenate. Flowers axillary. cream or pale yellow. Mericarps 10, tough walled, stellately hairy. Seeds glabrous except at the hilum, brown black.

Fl. & Fr. : Almost throught the year.

Common in waste lands, cultivated fields and river beds ; Haji- Ki-Kothi (Niwai) ; Ghati village and on dry river bed of Mavasi.

Erect, tomentose undershrubs, up to 1 m. Leaves up to 5×5 cm, ovate elliptic, oblong elliptic, oblong ovate or suborbicular, rounded or shallowly cordate, crenate. Flowers axillary, yellow, orange - yellow or white. Mericarps 7 - 8, tough walled; awns very short, connivent. Seeds glabrous except at the hilum, dark brown.

Fl. & Fr. : Almost throughout the year.

Common at the base of the hills; Ghati village.

13. STERCULIACEAE

1a. Trees; flowers unisexual or polygamous; petals 0 ...

Sterculia 2

1b. Shrubs or herbs; flowers hermaphrodite; petals present:

2a. Flowers in sessile or subsessile dense heads in leaf axils; petals clawed; staminodes 0; style 1, not branched; ovary 1 - celled ...

Waltheria 3

2b. Flowers solitary or on forked peduncles from leaf axils; petals not clawed; staminodes 5; style divided into 5 spreading branches; ovary 5 - celled ... Melhania 1

1. Melhania Forssk.

Hoary tomentose undershrubs, c. 1 m. Leaves up to 9.5 × 5.5 cm, ovate to ovate lanceolate, cordate, crenate serrate. Flowers in 2-4 flowered terminal cymes, pale orange. Bracts 3, ovate, cordate at base, tomentose. Capsules ovoid, 1.0 × 1.5 × 0.8 × 1.0 cm, villous. Seeds angular muricate.

Fl. & Fr.: May September.

Common on hills; Tordi R.F. and Toda Rai Singh R.F.

2. Sterculia L.


Moderate sized trees, 6-10 m; bark red, peeling. Leaves large, up to 18 × 26 cm, crowded at the ends of branches, shallowly palmately 3-5-lobed, cordate. Flowers numerous in terminal, glandular pubescent panicles. Stamens 10, united into a column. Follicles 5, each 2.0 × 5.5 × 1-2 cm, woody, covered with stinging bristles, red. Seeds oblong, dark brown or black.

Fl. & Fr.: November - May.

Common on Hills; Toda Rai Singh R.F. and Ghati R.F.

3. Waltheria L.


Perennial, suffruticose, pubescent herbs or undershrubs, 50-120 cm. Leaves up to 7.0 × 5.5 cm, ovate to ovate - oblong, crenate - serrate. Flowers yellow. Capsules c. 3 mm long, obovoid; villous above, enclosed in the calyx. Seeds solitary, obovoid, black or brown - black.

Fl. & Fr.: September February.

Rare; Bisalpura R.F., Malpura and Sohela R.F.
14. TILIACEAE

1a. Basal serrations of lamina mostly glandular; fruits echinate or bristly

1b. Basal serrations of lamina eglandular; fruits neither echinate nor bristly:

2a. Trees or shrubs; petals clawed, glandular at base; fruits drupaceous, often 2-4 lobed, rarely not lobed

2b. Herbs or undershrubs; petals not clawed, eglandular at base; fruits elongate or subglobose capsules

1. CORCHORUS L.

1a. Plants prostrate; capsules 4-loculed

1b. Plants erect or suberect; capsules 3- or 5-loculed:

2a. Capsules ending in 3 radiating points, winged

2b. Capsules ending in a single beak lobed at the tip, not winged:

3a. Leaf blade usually with filiform appendages at base; capsules more than 2.5 cm long, with a long beak, 5-loculed

3b. Leaf blade without filiform appendages at base; capsules up to 1.5 cm long, shortly beaked, 3-loculed


Ascending, suberect or erect, Much branched, hairy annuals, 6-60 cm. Leaves up to 10x5 cm, ovate to ovate - lanceolate, serrate, basal serratures sometimes produced into filiform appendages. Flowers 1-3 (4) together, yellow. Capsules 1.5 4.0x0.3 0.6 cm, 3-loculed; beaks bifid. Seeds angular, obliquely truncate at both ends, rough, brown.
Fl. & Fr.: August November.

Common; Benthali (Deoli).


Prostrate, much, branched, woody perennials. Leaves up to 25 x 12 mm, elliptic, broadly elliptic, obovate elliptic or roundish, crenate serrate, plicate in bud. Flowers yellow. Capsules 7 to 1.5 - 2.0 mm, oblong cylindrical; beak short, entire, straight or curved. Seeds angular, obliquely truncate, smooth, greyish brown.

Fl. & Fr.: August March.

Common; Sohela R.F.


Woody herbs, c. 0.5 m. Leaves up to 5.0 x 1.5 cm, elliptic oblong or lanceolate, serrate. Flowers in fascicles of usually 2 - 5 flowers, yellow. Capsules 0.8 - 1.5 x 0.2 cm, pubescent. Seeds wedge-shaped, smooth, dark brown.

Fl. & Fr.: September November.

Common; Siras forest.


Erect herbs, 15 - 100 cm, woody at base, glabrous except the petiole. Leaves up to 12.0 x 5.5 cm, lanceolate or ovate - lanceolate, serrate. Flowers 1 - 3 together, yellow. Capsules up to 7 cm, 10 ribbed; locules with distinct partitions between seeds. Seeds trigonous, rough, black.

Fl. & Fr.: July November.

Common by the sides of cultivated fields; Nayagaon (Deoli).
2. Grewia L.

1a. Leaves up to 5 cm long; flowers usually solitary, white or cream-coloured; drupes glabrous, rarely with a few stellate hairs

G. tenax 3

1b. Leaves up to 10 cm long; flowers in axillary cymes, yellow or orange - yellow; drupes hairy or pilose:

2a. Leaves 3 - nerved, rounded or subtruncate at base; drupes stellately hairy

G. flavescens 1

2b. Leaves 5 6 nerved, cordate at base; drupes pilose

G. subinaequalis 2


Straggling shrubs or small trees 3 4 m; bark grey. Leaves up to 11.0 × 4.5 cm, ovate oblong to oblong lanceolate, irregularly serrate, stellately hairy. Flower buds densely bristly tomentose, oblong, dilated at base, constricted in the middle. Flowers yellow. Anthers hairy on the back. Drupes 7 10 × 6 - 15 mm, entire or slightly 2 4 lobed, with a crustaceous rind; mesocarp fibrous. Stone muricate.

Fl. & Fr.: August November.

Common; Kachha Bundha R.F. near Tonk.


Shrubs or trees, up to 10 m; bark grey. Leaves up to 16 × 15 cm, broadly ovate to almost orbicular, obliquely cordate at base, irregularly crenate; petiole clavate. Flowers orange - yellow; pedicels clavate. Drupes 4 - 8 × 4 - 11 mm, entire or slightly lobed; mesocarp fibrous. Stone rugose.

Fl. & Fr.: November May.

Common in the valley of hills; Toda Rai Singh R.F.
There is considerable confusion on the nomenclature of this species and a number of authors assign it to G. asiatica L. Narayanaswami and l. c. 183 185 have dealt with the nomenclature of this plant.


Shrubs, up to 3 m; bark dark grey. Leaves up to 5×4 cm, ovate, ovate - elliptic, obovate or almost orbicular, serrate, 5 nervcd at base. Flowers with mild fragrance. Petals usually notched. Drupes 5 9×5 14 mm, usually 2 4 lobed, orange or orange red. Stone muricate.

Fl. & Fr.: May February.

Common on hills; Ghati, Tordi R.F. and Sohela R.F.

3. TRIUMFETTA L.


Erect, hairy herbs, 25 - 60 cm. Leaves up to 9.0×8.5 cm, rhomboid-orbicular or ovate lanceolate, coarsely serrate, undivided, or 3 lobed. Flowers yellow or orange - yellow. Stamens 5 - 7. Capsules 5.0 - 7.0×4.5 mm including the uncinate spines, densely tomentose; spines ciliate on their upper edges. Seeds somewhat trigonous, brown.

Fl. & Fr.: August - October.

Rare; near the river at Vijaypura (Deoli).

15. LINACEAE

Linum L.

Erect, annual herbs, 10 1100 cm. Leaves sessile, up to 3.5 × 0.5 cm, linear or linear - lanceolate. Flowers in terminal panicles, blue. Capsules 9 11 mm, globose, beaked, 10 valved. Seeds flattened, ellipsoid, smooth, shining, dark brown.

Fl. & Fr.: February March.

The plant is cultivated for its oil and is found as an escape in cultivated fields; Deoli.

16. Zygophyllaceae

1a. Leaves 1 3 - foliate; stipules spiny; fruits not spinous; seeds albuminous

Fagonia 1

1b. Leaves pinnate; stipules not spiny; fruits spinous; seeds exalbuminous

Tribulus 2

1. Fagonia L.


Diffuse, branched, suffrutescent herbs, 15 40 cm with terete, striate branches. Leaves trifoliate, terminal ones unifoliate; leaflets up to 2.8 × 0.3 cm, linear - oblong, mucronate. Spines shorter or longer than leaves. Flowers pink or purple. Petals clawed. Stamens 10. Capsules 4 - 6 × 2.5 5.0 mm including the aristate tip, deeply 5 - angled, pyramidal, pubescent. Seeds c. 3.0 × 2.5 mm, compressed, ovate orbicular, punctate.

Fl. & Fr.: Almost throughout the year.

Common in wastelands; Kotri village (Aligarh).

2. Tribulus L.

Procumbent or ascending, pilose herbs. Leaves paripinnate; leaflets usually 5–6 pairs, up to $1.5 \times 0.7$ cm, ovate to elliptic-oblong. Flowers yellow. Stamens 10. Fruits 0.8–1.5 cm wide; mericarps 3–5, tuberculate on dorsal side, hairy, with two long patent and 2 short downwardly directed spines.

*Fl. & Fr.*: March November.

Common by the side of tanks and rivers; Niwai.

17. SIMAROUBACEAE

**Ailanthus** Desf. *nom. cons.*


Trees, 4–10 m or more tall; bark whitish. Leaves up to 40 cm; leaflets 8–14 pairs, alternate or subopposite, up to $11 \times 5$ cm, obliquely ovate or ovate-lanceolate, very unequal at the base, acuminate or acute, irregularly toothed, densely tomentose particularly beneath. Flowers in large, lax, tomentose panicles, greenish yellow. *Samara* 4 $6 \times 0.8$ 1.3 cm, ob lanceolate, twisted, copper red, many nerved, the nerves reticulate above the seeds, otherwise nearly parallel. Seed solitary in the centre of the samara.

*Fl. & Fr.:* December April.

Common in Tonk R. F.; planted.

18. BALANITACEAE

**Balanites** Delile *nom. cons.*


Small thorny trees, 3 - 5 m; bark whitish. Leaves 2-foliate; leaflets up to 5.0 × 2.5 cm, elliptic to obovate. Flowers in few flowered fascicles, greenish, fragrant; peduncle and pedicel pubescent. Sepals 5, elliptic-ovate densely pubescent outside, with long silky hairs inside. Petals 5, elliptic-oblong, glabrous outside, with long silky hairs inside. Disc prominent. 10-lobed. Drupes 4.4 - 6.5 × 1.4 - 5.0 cm, ellipsoid, ovoid or subspherical, grooved, puberulous, 1 seeded. Seed testa fibrous.

\textit{Fl. & Fr.}: April February.

Common; Tonk R. F.

19. BURSERACEAE

\textbf{Boswellia} Roxb. ex Colebr.


Deciduous trees, c. 6 m; bark peeling off in thin flakes. Leaves up to 30 cm long, pinnate, crowded near the ends of branches; leaflets opposite or subopposite, up to 5 × 2 cm, ovate to oblong ovate, oblique at base, rounded, retuse or acute, crenate serrate. Flowers in axillary, pubescent racemes, shorter than the leaves, white with a tinge of pink, slightly fragrant. Drupes 1.25 - 2.75 × 0.75 - 1.75 cm, trigonous, dehiscent. Seeds heart-shaped, acuminate at apex, pale yellow.

\textit{Fl. & Fr.}: February March.

Common on hills in rocky places; Toda Rai Singh. R. F.

20. MELIACEAE

\textbf{Azadirachta} A. Juss.


Trees, 8 15 m. Leaves up to 25 cm long, pinnate, crowded near the ends of branches; leaflets alternate to opposite, up to $8 \times 2$ cm. ovate-lanceolate, falcate from a very oblique, unilaterally resected, acute base, acuminate, serrate. Flowers in panicles in the topmost leaf axils, white, sweet - scented. Sepals 5. petals 5. Petals 5, puberulus. Anthers 10; staminal tube a little shorter than petals. Stigma 3 - dentate. Drupes 1.4 1.8 x 1.1 1.7 cm, oblong, glabrous, yellow when ripe, 1 - seeded. Seeds c. 1 cm long, oblong - ovoid, brown.

**Fl. & Fr.**: March July.

Commonly planted along road sides and near villages; Uniyara along Tonk Aligarh road.

Seeds yield oil which is used in soap industry.

21. CELASTRACEAE

**Maytenus Molina**


Armed or unarmed shrubs or small trees, 2 6 m. Leaves up to $5.5 \times 1.8$ cm, variable in shape, obovate, ob lanceolate or linear - spathulate, cuneate at base, obtuse, emarginate or acute at apex, entire or crenulate. Cymes dichotomous or fasciculate, axillary or borne on spines. Flowers pentam erous, white. Sepals ovate, ciliate. Petals oblong. Stigmas 2. Disc lobed. Ovary 2 - celled. Capsules 2.5 - 60 mm across, subglobose 2 - 1- celled, purple when ripe. Seeds c. 3.5 mm long, ellipsoid, red or chestnut brown; aril fleshy, attached at the base.

**Fl. & Fr.**: October - May

Common on sandy loam and rocky soil; Raj mahal, Kachha Bundha (near Tonk) and Tonk R. F.
22. RHAMNACEAE

**ZIZIPHUS** Miller

1a. Bushes; leaves up to 2.5 cm long; fruits less than 1 cm long ... *Z. nummularia* 2

1b. Trees; leaves more than 3 cm (up to 8 cm) long; fruits over 1.2 cm long ... *Z. mauritiana* 1


Much branched trees, 3–7 m; prickles solitary or generally paired. Leaves up to 8.0 × 4.5 cm, oblong elliptic, ovate or nearly orbicular, faintly and irregularly dentate, strongly 3-nerved at the base, densely tomentose beneath. Flowers in cymes, greenish pale yellow. Drupes 1.5 × 1.3 × 1.5 cm, globose, ellipsoid or oblong, yellow, orange or red when ripe; stone 1–2 seeded. Seeds plano-convex, orbicular to lanceolate, brown.

*Fl. & Fr.*: August March.

Common; Janakpur Village (Tordi Sagar).

The fruits are edible.


Thorny shrubs or small bushes, 1–3 m; stipular spines in pairs, slender, one of them much shorter and curved. Leaves up to 2.5 × 2.0 cm, broadly ovate to orbicular, entire or crenulate, 3-nerved at the base, densely tomentose beneath. Flowers in axillary cymes greenish pale yellow. Drupes 7–9 mm across, globose, red when ripe; stone 1–2 seeded. Seeds c. 4 mm across, subhemispherical, brown.

*Fl. & Fr.*: July December.

Abundant; Kakor forest.

The fruits are edible.

23. VITACEAE

**CAYRATIA** Juss. *nom. cons.*


Fairly large, herbaceous climbers, woody at base only. Leaves digitately trifoliate, rather fleshy; leaflets 8 × 6 cm, variable, broadly elliptic to ovate or suborbicular, oblique at the base, crenate serrate. Tendrils branched. Flowers in long - peduncled, divaricate cymes, greenish with conspicuous, white, lobed disc. Berries c. 7 × 7 mm, obovoid-globose, shining black or dark purple. 2-4 seeded. Seeds trigonous, the ventral side with two cavities.

Fl. & Fr.: August November.

Occasionally found on gravelly soil; Rajmahal R. F.

24. SAPINDACEAE

CARDIOSPERMUM L.


Slender herbs climbing by means of peduncular, circinate tendrils. Leaves bi-nate; leaflets up to 5. 5 × 2.2 cm, lanceolate, ovate - lanceolate, ovate or elliptic, coarsely toothed. Flowers in axillary cymes, white. Capsules trigonous, inflated, winged at the three angles, veinèd. Seeds 3, globose, smooth, black with a small, white, cordate aril.

Fl. & Fr.: August November.

Common; Sohela R. F.

25. ANACARDIACEAE

LANNEA A. Rich. nom. cons.

Lannea coromandelica (Houtt.) Merrill in Journ. Arnold Arb. 19:

Deciduous trees, 5 - 10 m ; bark whitish - grey; younger leaves and branches stellately pubescent. Leaves oddpinnate; leaflets 5 - 11, 0.2 - 6.5 × 1.75-3.0 cm, ovate, base rounded or truncate, caudate - acuminate, entire. Flowers crowded in fascicled racemes born at the ends of leafless branches, unisexual, tetramerous. Male racemes compound; female simple. Drupes c. 1.25 × 0.75 cm, fleshy, pale pink to red. Seeds c. 1.0 × 0.7 cm, compressed, reniform, grey.

*Fl.* : February - April ; *Fr.* : April June.

Common on rocky hills ; Ghati R. F. and Sohela R. F.

26. MORINGACEAE

**MORINGA** Adans.


Trees, 4 - 8 m, Leaves usually bipinnate; leaflets up to 3.5 × 3.0 cm, broadly elliptic, obovate or suborbicular, obtuse or emarginate. Flowers in lax, thinly pubescent panicles, white with pink streaks, fragrant. Pods 30-45 cm long, linear, acutely 3 - angled, slightly constricted between the seeds. Seeds 3 - angled, with a very thin, hyaline wing at each angle.

*Fl. & Fr.* : December - March.

Common ; Mayola forest (Bisalpura) on rocky/gravelly soil.

27. FABACEAE

1a. Herbs or shrubs, sometimes climbing :

2a. Leaves even pinnate :
3a. Herbs; leaflets in 1 pair; stipules peltate; pods echinate ... \textit{Zornia} 18

3b. Climbers; leaflets in many pairs; stipules basifixed; pods not echinate ... \textit{Abrus} 1

2b. Leaves odd pinnate, digitately 3-foliolate, unifoliolate or simple:

4a. Undershrubs with axillary spines ... \textit{Alhagi} 2

4b. Unarmed:

5a. Hairs centrally attached; anthers apiculate ... \textit{Indigofera} 11

5b. Hairs basifixed or none; anthers muticous:

6a. Leaflets dentate:

7a. Pods spirally twisted, spinous ... \textit{Medicago} 12

7b. Pods globose or ovoid, not spinous ... \textit{Melilotus} 13

6b. Leaves and leaflets not dentate:

8a. Venation striate ... \textit{Tephrosia} 16

8b. Venation reticulate:

9a. Leaves simple, unifoliolate or digitately or subdigitately 3-foliolate:

10a. Seeds strophiolate ... \textit{Atylosia} 4

10b. Seeds estrophiolate:

11a. Stamens diadelphous; anthers uniform; pods jointed ... \textit{Alysicarpus} 3

11b. Stamens diadelphous; anthers dimorphous; pods not jointed:

12a. Prostrate herbs; flowers solitary; pods flat ... \textit{Goniogyna} 10

12b. Erect herbs or under-shrubs; flowers in racemes; pods turgid or inflated ... \textit{Crotalaria} 7
9b. Leaves pinnately 3-foliolate:

13a. Stamens monadelphous; pods more than 10 x 2 cm, dorsal suture 3 - keeled

**Canavalia 6**

13b. Stamens diadelphous; pods less than 10 x 2 cm, dorsal suture not 3 - keeled:

14a. Pods distinctly jointed

**Desmodium 9**

14b. Pods not jointed:

15a. Leaflets gland-dotted beneath; style not bearded; ovules and seeds 1 - 2

**Rhynchosia 15**

15b. Leaflets not gland-dotted beneath; style bearded along the inner face; ovules and seeds 3 - many

**Vigna 17**

1b. Trees:

16a. Leaves pinnately 3-foliolate; leaflets stipellate; flowers more than 3 cm long; fruits silky tomentose

**Butea 5**

16b. Leaves pinnately 3-7 foliolate; leaflets extipellate; flowers less than 1.5 cm long; fruits glabrous:

17a. Leaflets alternate; calyx teeth distinct; pods ligulate

**Dalbergia 8**

17b. Leaflets opposite; calyx nearly truncate, teeth obsolete; pods woody

**Pongamia 14**

1. **ABRUS Adans.**


Perennial climbers. Leaves up to 12 cm long; rachis bristle-tipped;
leaflets up to $22 \times 0.8$ cm, oblong, obtuse, mucronate. Flowers in dense racemes pink. Pods 2.5 $5.5 \times 1.0 - 1.5$ cm, oblong, beaked, pubescent, 3 - 5 - seeded. Seeds up to $8 \times 6$ mm, ovoid, shining, scarlet with a black spot at the hilum.

*Fl. & Fr.*: August - September.

Common on gravelly soil; Toda Rai Singh R. F.

2. *Alhagi* Gangnebin


Spiny undershrubs, up to 1 m. Leaves up to 1.1 $0.8$ cm, obovate or obovate - oblong, entire. Spines axillary, flower - bearing. Flowers red. Pods c. 3 mm long, pinkish red, usually falcate, 1 - 9 - seeded, strongly constricted between the seeds. Seeds c. $2 \times 1$ mm, subreniform, smooth, blackish brown.

*Fl. & Fr.*: February - May.

Very common on river beds and also in fallow fields; Uniyara village.


1a. Calyx longer then the 2 lowermost joints of the pod; pods glabrous ... *A. roxburghianus* 2

1b. Calyx shorter than the 2 lowermost joints of the pod; pods hairy with hooked hairs:

2a. Racemes dense; pods moniliform, densely hairy ... *A. monilifer* 1

2b. Racemes lax; pods not moniliform, faintly hairy ... *A. vaginalis* 3

Prostrate, much branched, perennial herbs; branches with spreading hairs. Leaves unifoliate; leaflets up to 2.5 × 1.8 cm, base rounded, often cordate, apex rounded or retuse, mucronate. Flowers in close, axillary racemes, red. Pods c. 0.5 – 2.3 cm long, distinctly moniliform, turgid, faintly reticulate, 2 – 7 seeded. Seeds smooth, rather shining, brown.

Fl. & Fr.: August March.

Rare; Bentheli village (Deoli) on loamy soil.


Diffuse or ascending herbs, c. 30 cm. Leaves unifoliate; leaflets up to 4.5 × 0.5 cm; linear to linear-lanceolate, the lower leaflets sometimes elliptic. Flowers in spike-like lax racemes, arranged in distant pairs, purple. Pods c. 1 cm long, slightly moniliform, 3 – 5 seeded. Seeds smooth, rather shining, yellow.

Fl. & Fr.: August September.

Rare; Tordi Sagar in moist places.


Prostrate or erect herbs, 30 – 60 cm. Leaves unifoliate; leaflets up to 8.0 × 2.8 cm, very variable, ovate orbicular to oblong or the upper ones ovate-lanceolate, sub cordate at base, apex obtuse, retuse minutely mucronate. Flowers in axillary or terminal racemes, red. Pods up to 2.5 cm long, joints 4 – 8, longer than broad. Seeds smooth, rather shining, pale brown.

Fl. & Fr.: August November.

Tonk (Maheshwari 52868, LWG).
4. **Atylosia** Wight & Arn.


Pubescent, herbaceous climbers or trailing plants. Leaflets up to 3.5 × 2.3 cm; elliptic or elliptic - obovate. Flowers in axillary, few - flowered racemes, yellow. Pods c. 2.3 cm long, oblong, compressed, apiculate, 3 - 6 seeded, conspicuously grooved between the seeds, densely pubescent. Seeds c. 4.0 × 2.5 mm, oblong, rounded at both ends, blackish brown, with a conspicuous divided strophiole.

*Fl. & Fr.*: April - June.

Common by the side of streams in rocky habitats on hills; Gaonri R.F., near Deoli.

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


Small or moderate sized, deciduous trees; bark pale grey. Terminal leaflets up to 20.0 × 17.5 cm, broadly obovate - rhomboid, obtuse or retuse, margins undulate; lateral leaflets slightly smaller than the terminal, obliquely ovate. Flowers in racemes fascicled on tubercles of rachis, showy, red or orange - red. Calyx brown - velvety outside, grey - silky within. Petals silky hairy outside. Pods c. 12.0 × 4.5 cm, pendulous, stalked within the calyx, dehiscent at apex, 1 seeded. Seeds c. 3.0 × 2.5 cm, subreniform, flat pale brown.

*Fl. & Fr.*: February - April.

Fairly common; Rajmahal hills and Sohela R. F.
6. Canavalia DC. *nom. cons.*


Large, perennial climbers. Leaflets up to 13 x 10 cm, ovate, cuneate, acuminate. Flowers in many-flowered, lax, axillary racemes on long peduncles, mauve or dark pink. Pods c. 13 x 3 cm, linear-oblong, flat shortly pointed at apex, dorsal suture 3 keeled, densely ferruginous pubescent at first, later more obscurely so. Seeds c. 1.9 x 1.1 cm, oblong-ellipsoid, yellowish-brown, marbled with black.

*Fl. & Fr.*: August March.

Common; Toda Rai Singh R. F.

7. Crotalaria L.

1a. Leaves trifoliate

1b. Leaves simple:

2a. Leaves small, inconspicuous, deciduous, exstipulate; pods scarcely longer than calyx, pubescent, 1-2 (-4) - seeded

2b. Leaves large and distinct, persistent, stipulate; pods longer than calyx, glabrous, many seeded

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Low, rigid, copiously stiffly branched, xerophytic undershrubs, up to 1 m, with appressed pubescence. Leaves up to 2.4 x 0.5 cm, oblong or lanceolate. Flowers in elongate, terminal racemes, yellow; standard with reddish veins. Pods c. 5 x 4 mm, oblong, villous. Seeds obliquely semi-lunar, notched at the hilum, shining.

*Fl. & Fr.*: August - April.

Abundant in wastelands on sandy soil; Niwai.

Perennial, appressed pubescent herbs, branching from a woody root-stalk. Leaflets up to $3.2 \times 1.0$ cm, obovate or oblanceolate, rounded, truncate or emarginate at the apex. Flowers in terminal or leaf-opposed racemes, yellow. Pods 4 - 5 mm across, obliquely subglobose, acutely beaked, pubescent, 2 seeded. Seeds suborbicular, notched at the hilum, shining.

*Fl. & Fr.*: August - December.

Common on gravelly sandy loam soil; Kacha Bundha near Tonk.


Suffrutiaceous herbs, c. 50 cm, clothed with long, spreading, silky hairs. Stipules linear - lanceolate. Leaves up to $8 \times 2$ cm, linear - oblong, obtuse. Flowers in lax racemes, light yellow; bracts foliaceous, linear - lanceolate; bracteoles beneath the calyx, linear - lanceolate; standard with brown or red veins. Pods c. $2.0 \times 1.2$ cm, oblong, inflated, reticulately veined. Seeds 20 - 30, obliquely semi lunar, notched at the hilum.

*Fl. & Fr.*: August - September.

Common; Sohela R. F.


Trees, 5 15 m. Leaf rachis zigzag; leaflets 3 - 5, up to $7.0 \times 5.5$ cm, broadly oval or obovate, abruptly acuminate. Flowers in axillary panicles, yellowish - white. Pods 3.5 - 8.0 \times 0.7 - 1.2$ cm, 1 - 3 seeded. Seeds reniform, flattened.

*Fl. & Fr.*: March - November.

Common; Kachha Bundha R. F. near Tonk.


*Desmodinium neomexicanum* A. Gray, Pl. Wright, 1: 53. 1852; Chavan

Erect or straggling, hairy herbs, 30-40 cm. Leaves stipulate, pedicellate, the terminal largest, up to 6.0×2.75 cm, ovate to ovate - lanceolate, mucronate, margins ciliate. Racemes terminal and axillary, lax. Flowers bracteate, pink. Pods 2.0-2.5 cm long, 2-4-jointed with sutures deeply indented, reticulately veined, hairy, margins ciliate, 2-4-seeded.

Fl. & Fr.: August November.

Common on hills; Rajmahal R. F. (Deoli).

10. GONIOGNYA DC.


Prostrate, much branched, pilose herbs. Leaves simple, subsessile, up to 2.2×1.0 cm, cordate - ovate, unequal at base, entire. Flowers in the axils of most of the leaves, solitary, yellow; standard with purple veins. Pods c. 0.5 cm long, oblong ovoid, pilose, 1-2-seeded. Seeds suborbicular reniform, brown.

Fl. & Fr.: September November.

Common on road sides; Sakrampur. Also found by the side of tank near Gar village on sandy clayey soil.

11. INDIGOFERA L.

1a. Leaves simple:

2a. Leaves ovate, base cordate; pods terete, obovate, generally 2-, rarely 1-seeded ... I. cordifolia 1

2b. Leaves linear; pods subglobose, 1-seeded ... I. linifolia 3
Ib. Leaves 3 to many - foliate:

3a. Leaves trifoliate; pods tetragonal

3b. Leaflets more than 3 per leaf; pods oblong, cylindric or obscurely 4 - angled:

4a. Racemes subcapitate; pods usually 2, rarely 1 - seeded

4b. Racemes elongate; pods many - seeded:

5a. Leaflets 7  13; racemes many - flowered; pods deflexed, slightly curved, hairy

5b. Leaflets 5  7; racemes up to 4 - flowered; pods patent, straight, glabrous

I. *trita* 6

I. *linnaei* 4

I. *tinctoria* 5

I. *glabra* 2


Decumbent, obliquely erect or erect, usually much branched, white hairy herbs. Leaves subsessile, up to 2.5 × 1.5 cm, obtuse, mucronate. Flowers in small, nearly sessile heads, red. Pods c. 4.5 mm long, beaked, densely appressed hairy, inner side of the pericarp with yellow spots. Seeds granular, pitted, yellow.

*Fl. & Fr.*: August November.

Common weed found almost throughout the district.


Suffrutiaceous, decumbent, sparsely appressed hairy herbs, 30 100 cm; branches pigmented red. Stipules lanceolate. Leaflets up to 1.8 × 1.4 cm, obovate to elliptic, obtuse or retuse, mucronate. Flowers distant in axillary,
distinctly peduncled racemes, red. Pods 1.2 × 2.7 cm long, obscurely 4-angled, beaked, brown, 10–12-seeded. Seeds cubical, brown.

*Fl & Fr.*: August - October.

Rare; found on sandy loam soil near Banetha village (Tonk).


Decumbent, obliquely erect or erect, appressed white hairy herbs, usually much branched from the base. Leaves up to 4.5×0.3 cm, acuminate. Flowers in dense, shortly peduncled, up to 12-flowered, short, axillary racemes, red. Pods c. 2 mm long, apiculate, densely appressed hairy. Seeds subglobose, uniformly minutely granular, grey.

*Fl & Fr.*: August - November.

Rare; found on low sand dunes in Tordi R. F.


Prostrate, appressed white hairy herbs. Leaflets usually 7–9, alternate, up to 1.3×0.5 cm, obovate, obtuse to retuse. Flowers bright red. Pods c. 5 mm long, terete, oblong, beaked, appressed hairy. Seeds ovoid globose, truncate at one end, shining, brown.

*Fl. & Fr.*: Almost throughout the year.

Common on sandy to sandy-loam soil; Haji Ki-Kothi (Niwai) and Amli R. F.


Appressed white hairy undershrubs, 1.0 - 1.5 m. Leaflets opposite, up to 2.3 x 1.0 cm, ovate, oblong or obovate, obtuse or retuse, mucronate. Flowers greenish pale red. Pods 2.5 - 3.5 cm long, linear pointed, thickened at the sutures, 8 - 12 seeded. Seeds subcylindrical, truncate at both ends, pale green to brown.

*Fl. & Fr.*: August March.

Common on river bed; Vijayapura, Deoli.


Undershubs, c. 1 m, with fine appressed hairs. Leaflets up to 4 x 3 cm, obovate-oblong, obtuse or retuse, mucronate. Flowers in spicate racemes, red. Pods c. 2.5 cm long, patent, sometimes deflexed, appressed pubescent, shortly beaked, 6-10 seeded. Seeds oblong, brown.

*Fl. & Fr.*: September February.

Common in wastelands; tank at Suntheli village.

12. *Medicago L.*


Procumbent or ascending herbs branching from the base. Stipules laciniate. Leaves trifoliate; leaflets up to 2.0 x 1.5 cm. obovate cuneate, obtuse, truncate or retuse at the apex. dentate at the upper third. Flowers in few-
flowered, dense racemes, yellow. Pods c. 6 mm across, discoid, or subglobose, of 2-4 spirals, face reticulately veined, margined with a double row of hooked spines. Seeds reniform, smooth, yellow or brown.

_Fl. & Fr._: January - March.

Common winter season weed in cultivated fields; Barni village.

13. _Melilotus_ Mill.

1a. Flowers white; seeds smooth...
   _M alba_ 1
1b. Flowers yellow; seeds finely verrucose...
   _M indica_ 2


Erect, annual herbs, 15-100 cm. Stipules linear subulate. Leaves 3-foliate; leaflets up to 3.0 × 1.5 cm, those of lower leaves obovate, leaflets of upper leaves often narrowly elliptic. Flowers 3.5-4.5 mm long, in many flowered, slender racemes, white. Pods c. 4 mm long, somewhat compressed, ovoid or ellipsoid, with a short, sharp, curved beak at the apex, reticulately veined. Seeds 1-2, ovoid.

_Fl. & Fr._: December-March.

Not common; winter season weed in fields Banas river bed near Benthali village.


Erect, annual herbs, 5-75 cm. Stipules lanceolate, broadened at base. Leaves 3-foliate; leaflets 3 × 2 cm, obovate or oblong-obovate, obtuse or retuse. Flowers c. 2-2.5 mm long, in many flowered, slender
racemes, yellow. Pods c. 3 mm long, minutely apiculate, reticulately veined. Seed 1, ovoid.

Fl. & Fr.: December-March.

Common winter season weed in fields; Banas river bed near Bentheli village.


Trees, about 10 m; bark grey or whitish grey. Leaves imparipinnate; leaflets 3-7, up to 13.0×10.5 cm, ovate, elliptic or elliptic oblong, shortly acuminate. Flowers in axillary racemes, pinkish white. Pods 3.2-5.5×1.1-2.0 cm, obliquely oblong, compressed, narrowed at the base, beaked, indehiscent, 1-seeded. Seeds 1.9-2.4×1.1-1.4 cm, oblong, reddish-brown.

Fl.: April May; Fr.: Throughout the year.

Very common on the banks of Banas river; Bisalpur.

15. Rhynchosis Lour. nom. cons.

1a. Glabrescent herbs; racemes lax; flowers c. 6 mm; pods oblong-falcate; seeds estrophiolate R. minima var. laxiflora 2

1b. Pilose herbs; racemes subcapitate; flowers c. 12 mm; pods suborbicular; seeds strophiolate R. capitata 1

1. Rhynchosis capitata (Heyne ex Roth) DC. Prodr. 2: 386. 1825;

Trailing, pilose herbs. Leaflets up to 4.7×4.7 cm, rhomboid-ovate or rhomboid-ovate. minutely pale yellow gland - dotted beneath. Flowers in axillary racemes, yellow, turning brown when old. Calyx teeth linear-subulate, 3-4 times as long as the tube. Pods 10-12 mm long, slightly compressed, mucronate, with close transverse wrinkles on the faces, clothed with long spreading hairs, 2 seeded. Seeds c. 6.0×3.5 mm, oblong, compressed, rounded at the ends, blackish.

Fl. & Fr.: August October.

Common weed in fallow fields; Rajmahal.


Climbing or trailing herbs. Leaflets up to 5.5×5.5 cm, the upper and lower halves subdeltoïd, acute, minutely yellow gland - dotted beneath. Flowers in axillary racemes, usually longer than leaves, yellow; standard with red streaks. Calyx teeth about twice as long as the tube. Pods c. 1.8×0.5 cm, usually 2 rarely 1 seeded. Seeds c. 4.5×3.5 mm, oblong-reniform, brown or blackish, mottled.

Fl. & Fr.: July November.

Common on gravelly soil; Rajmahal R.F. (Deoli).


1a. Leaves simple; flowers axillary, solitary or two together; seeds discoid...

T. strigosa 2
1b. Leaves pinnately compound; flowers in leaf - opposed, lax racemes; seeds subcylindric

_T. purpurea_ 1


Appressed - hairy undershrubs, 20–60 cm. Leaves imparipinnate; leaflets 5–15, up to 3.5 × 1.5 cm, elliptic - oblong, oblanceolate or obovate, obtuse or retuse, mucronate. Flowers in leaf - opposed, lax racemes, bright pink or purplish - red. Pods 3-6 cm long, linear, slightly upcurved, mucronate, appressed - pubescent, 9-6 - seeded. Seeds subcylindric, smooth, dark brown.

_Fl. & Fr._: July - February.

Common by the side of tanks: Tordi Sagar.


Erect, much branched, appressed - hairy annuals, 20-40 cm; stem and branches filiform. Leaves alternate, petiolate or subsessile, up to 7.5 × 0.8 cm, linear to linear - oblong, tapering at both the ends, apiculate, entire. Flowers on long, filiform pedicels, pale pink or violet. Pods c. 3.0 × 0.3 cm, linear oblong, often slightly falcate upwardly, beaked, clothed with appressed hairs, 5-9 (-10) - seeded. Seeds c. 2. mm across, discoid, glabrous, brown, mottled with black.

_Fl. & Fr._: August - November.

Common in wastelands; Tonk (Maheshwari, 53221, LWG).

17. _Vigna Savi_

_Vigna trilobata_ (L.) Verde. in Taxon 17: 172. 1968; Ali in Nasir &

Diffuse or trailing, more or less hairy herbs. Stipules ovate to ovate-lanceolate, peltate. Leaflets up to $5 \times 5$ cm, usually 3 lobed, the middle lobe spatulate. Flowers in few flowered, subcapitate racemes born on long peduncles, yellow. Pods 2.2 4.0 cm long, subcylindric, septate between the seeds. Seeds c. 3 mm long, subcylindric, truncate at ends, papillose, brown, mottled.

*Fl. & Fr.* : July November.

Common on sandy loam soil ; Sohela R.F.

81 ZORKIA GIHEI.


Prostrate, decumbent or suberect annuals. Stipules produced below their insersion, lanceolate, punctate. Leaflets up to $4.0 \times 1.2$ cm, lanceolate to ovate lanceolate, acute, punctate beneath. Flowers in lax racemes, yellow. Bracts foliaceous, produced below their insersion, elliptic ovate, punctate, margins ciliate. Pods 0.5 1.8 cm long, 1 6 joined, with retrorsely hairy bristles. Seeds c. 2.0 $\times 1.2$ mm, rather shining, pale yellow or brown.

*Fl. & Fr.* : August September.

Tonk (*Maheshwari* 52948, LWG).

28. CAESALPINIACEAE

1a. Leaves simple, 2 - lobed at the apex ; calyx spathaceous, splitting to the base down one side only . . . .

*Bauhinia* 1
1b. Leaves pinnate; calyx deeply divided

1. **BAUHINIA L.**


Deciduous trees, 3-5 m; bark dark grey, rough. Leaves up to 5.5×7.5 cm, broader than long, usually cordate at base, grey pubescent beneath. Flowers in terminal, leaf-opposed racemes, creamish-white, buds asymmetrically fusiform, pointed. Stamens 10, all perfect. Pods 7-20×1.5-2.5 cm, turgid, torulose, falcate, indehiscent, c. 15 seeded. Seeds c. 6×4 mm, oval, black.

*Fl. & Fr.*: April September.

Fairly common on gravelly soil; Amli R.F. (Aligarh) and Ghati R.F.

2. **CASSIA L.**

1a. Herbs, undershrubs or shrubs, foliar glands present:

2a. Plants viscid; leaflets in 2 pairs

2b. Plants not viscid; leaflets in 3 or more pairs:

3a. Leaflets in 3 pairs; pods subtetragonal when ripe:

4a. Glands present between each of the two lowest pairs of leaflets; all the 7 anthers rounded at the apex; areoles on both sides of the seed broad, 1.5-2.0 mm wide, extending up to the hilum...

4b. Glands present between the lowest pair of leaflets; the 3 large anthers narrowed into a neck; areoles on both sides of the seed narrow, linear, up to 0.5 mm wide, never extending up to the hilum...

3. **Cassia**

4. **Cassia obtusifolia**
3b. Leaflets in more than 3 pairs; pods flat when ripe:

5a. Herbs; stipules small; lanceolate; calyx segments acuminate; stamens 5 fertile...

5b. Shrubs; stipules foliaceous; broadly reniform; calyx segments obtuse; stamens 10, the 3 upper reduced to staminodes

1b. Trees; foliar glands on petiole or rachis absent:

6a. Flowers in long, pendulous racemes; stamens 10, all fertile; pods cylindric

6b. Flowers in stiff panicle of corymb; fertile stamens 7, 3 upper stamens much reduced; pods flat with thickened sutures

C. auriculata 2

C. fistula 3

C. siamea 6


Viscous glandular - hairy herbs or undershrubs, up to 60 cm, widely branching. Leaves 5-10 cm long; leaflets up to 5.0×2.5 cm, obliquely elliptic to obovate, obtuse, mucronate. Flowers in terminal or leaf-opposed racemes, red. Stamens 5, fertile. Pods 3.5–4.5×0.6–0.7 cm, short beaked, with oblique depressions between the seeds, hairy. Seeds up to 8, each c. 4.0×2.5 mm, obovate, glossy, brown.

Fl. & Fr.: August September.

Tonk (Maheshwari 52914, LWG).


Finely pubescent shrubs, 1–2 m. Leaves 2.5–10.0 cm long; rachis with a linear gland between each pair of leaflets; leaflets 5-12 pairs, up to
3.0 × 1.3 cm, oval or oblong obovate, obtuse or emarginate, apiculate. Flowers in corymbose racemes, large, showy, yellow. Petals long-clawed. Pods 7.0 - 12.5 × 1.4 - 1.8 cm, flat, oblong, mucronate, deeply impressed and septate between the seeds. Seeds 10 - 20, each 7 × 5 mm, oblong-ovate, blackish brown; areole c. 3 × 1 mm.

*Fl. & Fr.*: August - November.

Abundant on sandy loam soil; Toda Rai Singh R.F.

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Deciduous trees, 5 - 8 m. Leaves 15 - 40 cm long; leaflets 4 - 8 pairs, up to 16.0 × 7.5 cm, ovate to oblong ovate. Flowers showy, bright yellow. Pods 20 60 × 1.5 2.5 cm, transversely septate, dark brown. Seeds numerous, embedded in the sweetish pulp. c. 10 × 8 mm, obovate, shining, brown.

*Fl. & Fr.*: May February.

Common in forests in rocky habitats; Toda Rai Singh.

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Tall herbs or undershrubs, c. 1 m. Leaves 5 8 cm long; leaflets up to 3.5 × 2.1 cm, obovate, rounded or abruptly narrowed above to a usually mucronate apex. Flowers 1 2, yellow. Sepals ciliate. Pods 8 - 15 × 0.4 - 0.5 cm, obliquely septate within. Seeds many, each 5 × 3 mm, rhomboidal, slightly muricate, shining, dark brown with greenish areoles.

*Fl. & Fr.*: August November.
Common on gravelly soil; Mayola forest (Bisalpura R.F.).

*C. obtusifolia* has been very generally confused with *C. tora* L. Bentham in Trans. Linn. Soc. Lond. 27: 335. 1871 reduced the former to the synonymy of *C. tora* and this has been followed by many subsequent workers, including Baker (l.c.). Prain in J. Asiat. Soc. Bengal 66 (2): 347-518. 1897 considered *C. obtusifolia* and *C. tora* as distinct species, the former being characterised in having a gland between the lowest pair of leaflets and the latter in having glands between each of the two lowest pair of leaflets. This character, however, has been observed not to hold good in all cases since *C. obtusifolia* also sometimes has glands between each of the two lowest pair of leaflets.

*C. obtusifolia*, however, differs from *C. tora* in the 3 large anthers being narrowed shortly below their apex like the neck of a bottle, and in the seeds having narrow, linear areoles, which do not extend up to the hilum.


Prostrate or sometimes erect, hairy herbs, up to 50 cm. Leaves 2.5-8.0 cm long with a peltate, stipitate gland on the petiole below the leaflets, glands between the leaflets early deciduous; leaflets 6-30 pairs, subsessile, up to 18.0×3.5 mm, linear-oblong with the midrib close to the upper margin, apex rounded with a long mucro. Flowers usually solitary, sometimes 2-3 together, yellow. Pods 2.0-4.5×0.35-0.5 cm, flattened, torulose, with oblique partitions between the seeds, pubescent. Seeds up to 12, each c. 3.5×2.0 mm. subrhomboidal or obliquely ovate, brown or blackish-brown.

*Fl. & Fr.*: August September, Common on gravelly soil; Rajmahal R.F. (Deoli).

Trees, 4 - 8 m. Leaves 10 - 30 cm long; leaflets 5 - 12 pairs, up to 5.5 × 2.2 cm, oval oblong, mostly emarginate and mucronate. Flowers yellow. Sepals downy, obtuse. Pods 15 30 × 1.2 - 1.6 cm, strap shaped, indented between the seeds. Seeds c. 6 mm across, suborbicular or oblong, flat, shining, blackish dark brown.

*Fl. & Fr.*: August May.

Rare; Lava village, along Malpura Tonk road.


Tall, foetid herbs or undershrubs, c. 1 m. Leaves 5 17 cm long; leaflets up to 6.5 × 3.5 cm, obovate, rounded or abruptly narrowed above to a usually mucronate apex. Flowers 5 - 6, yellow. Pods 5 - 25 × 0.4 - 0.5 cm, obliquely septate within. Seeds many, each c. 5 × 3 mm, rhomboidal, shining, dark brown with greenish areoles.

*Fl. & Fr.*: August November.

Rare; Mayola forest (Bisalpura R.F.) on gravelly soil.

29. **MIMOSACEAE**

1a. Stamens definite, as many as or twice as many as petals:

2a. Flowers in heads:

3a. Plants without prickles; flowers 5-merous; fruits not prickly, straight, dehiscing at the sutures:

4a. Herbs, leaflets sensitive; heads, c. 5 mm in diam.; anthers gland-crested ...  

4b. Shrubs or trees, leaflets not sensitive; heads 1.5 - 2.2 cm in diam. ; anthers not gland-crested ...  

3b. Plants prickly; flowers 4-merous (in our specimens); fruits prickly, curved, with

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*Neptunia* 6

*Leucaena* 4
segmented valves and indehiscent sutures

2b. Flowers in spikes or spike-like racemes:

5a. All flowers of spike-like raceme bisexual; fruit straight or curved but not twisted

5b. Upper flowers of spikes bisexual, the lower neuter; fruits twisted - tortuous

1b. Stamens indefinite, more than 10:

6a. Plants armed with spines or prickles; leaflets less than 1 cm long; stamens free

6b. Plants unarmed; leaflets more than 2.5 cm long; stamens monadelphous

1. Acacia Mill.

1a. Spines long, straight; flowers in globose heads:

2a. Heads axillary, in fascicles of 2 - 8; pods distinctly stalked, moniliform with regular narrow constrictions between the seeds

2b. Heads in terminal panicles, numerous; pods sessile, sutures not indented

1b. Prickles short, hooked like rose thorns; flowers in ciongaic, cylindric spikes:

3a. Prickles 3 at each node; pinnae 3 - 7 pairs; leaflets up to 20 pairs

3b. Prickles in pairs at each node; pinnae 10 pairs or more; leaflets usually more than 20 pairs


Trees, 3 - 6 m; bark dark grey; young branchlets pubescent. Prickles brown or grey. Leaves up to 17 cm long, 2-pinnate with a large gland
above the middle of the petiole and several glands between the pinnae; pinnae 10 - 30 pairs; leaflets 20 - 50 pairs, subsessile, linear - oblong, subacute. Flowers pale yellow, mildly fragrant. Pods 5.0 - 8.5 × 1.2 1.5 cm, flat with a triangular beak at the apex, shining, brown.

*Fl. & Fr.* : May September.

Very common; on hills in rocky habitats; Toda Rai Singh, also found at Kachha Bundha (Tonk) and Aamlî R.F.

Differs from the closely allied *A. chundra* (Roxb.) Willd. (= *A. catechu* Willd. var. *sundra* Prain) by its pubescent leaf, calyx and corolla.


Trees, 3 - 7 m; bark whitish - grey; young branchlets pubescent. Stipular spines in pairs, 1.0 - 3.5 cm long, black or brown, less often whitish, pubescent at least when young. Leaves up to 8 cm long, 2 pinnate, glands on the rachis cup - shaped; pinnae 5 - 12 pairs; leaflets 10 - 30 pairs, subsessile, up to 8.0 × 1.5 mm, linear - oblong, obtuse. Flowers creamy - yellow, mildly fragrant. Pods 6 15 × 0.6 0.8 cm, narrowly ligulate, usually falcate, brown tomentose. Seeds 6 12, each c. 6 × 4 mm, ovate or rhomboid ovate, blackish brown.

*Fl. & Fr.* : September - March.

Common on sandy loam soil; Siras forest, Kachha Bundha R.F. (Tonk) and Aunwa forest.


Trees, 3 - 15 m ; bark dark grey ; young branchlets pubescent. Stipular spines in pairs, 1 5 cm long, white. Leaves up to 10 cm long, 2 pinnate with glands on the petiole and between the pinnae, especially the upper ones; pinnae 2 - 7 pairs; leaflets 10 - 25 pairs, subsessile, up to 6.5 x 1.5 mm, linear oblong, obtuse. Flowers bright yellow. Pods 10 x 20 x 1.2 1.5 cm, necklace-like, whitish or grey - pubescent. Seeds up to 16, each c. 8 x 7 mm, oval or subcircular, compressed, blackish - brown.

\textit{Fl. & Fr.} : September - March.


Trees, 3 6 m ; bark whitish, whitish grey or pale brown ; young branchlets pubescent, soon glabrescent. Prickles dark brown, the central hooked downwards. Leaves up to 7 cm long, 2 pinnate, rachis with one gland at the base and one between the uppermost pair of pinnae; leaflets 6 - 20 pairs, subsessile, up to 6.0 x 2.5 mm, linear to elliptic-oblong, obtuse. Flowers white or cream, fragrant. Pods 4 - 10 x 1.6 2.4 cm, oblong, flat, venose, rounded or with a small beak at the apex, sparcely pubescent, pale brown. Seeds 4 6, each c. 7 mm across, subcircular, disc-like, dark brown.

\textit{Fl. & Fr.} : July - January.

Common in plantation at Tordi R.F. (Malpura).

2. \textit{Albizia} Durazz.


Deciduous trees, 5-15 m; bark greyish pale brown. Leaves up to 40 cm long, 2 pinnate, with a large gland on the petiole; pinnae 1-4 pairs, usually with glands between the upper pair of pinnae; leaflets 4-10 pairs, up to 5.2 × 2.5 cm, the lateral leaflets elliptic oblong, the terminal obovate-oblong, unequal sided, obtuse. Flowers in peduncled, umbellate heads, greenish pale yellow, very fragrant. Stamens c. 4 cm long; anthers greenish. Pods 12 30 × 3 5 cm, straw coloured. Seeds up to 12, each c. 10.0 × 7.5 mm, ellipsoid oblong to subcircular, flattened, pale brown.

*Fl.*: March August; *Fr.*: August - February.

Common in forests and also planted as avenue tree; Tordi R.F., and on road sides along Niwai Tonk road near Pahari village.


Shrubs or small trees, 2-4 m; bark grey; branchlets usually ending in spines, pubescent. Leaves up to 6 cm long, 2 pinnate with stipiform glands at the insertion of pinnae; pinnae; 4-12 pairs; leaflets 12-24 pairs, up to 3 × 1 mm, linear from an oblique base, subacute, ciliate on the margins. Flowers numerous, sessile, in downwardly directed, stalked spikes, fragrant, the upper half with fertile flowers yellow, the lower half with neuter flowers pink or sometimes white. Pods 5 7 × 0.6 0.9 cm, compressed, pubescent, dark brown. Seeds c. 4.5 × 3.5 mm, avoid or suborbicular, compressed, shining, pale brown.

*Fl.* & *Fr.*: May February.

Common in forests on rocky and sandy - loam soil; Tonk R.F., Toda Rai Singh Forest and Banetha.
4. **Leucaena** Benth.


Large shrubs or small evergreen trees, 2–6 m; young branches densely greyish pubescent. Leaves up to 25 cm long, 2-pinnate, main rachis ending in a soft bristle; pinnae 3–8 pairs; leaflets 7–20 pairs, sessile, up to 14×3 mm, linear lanceolate, asymmetrical, acute and mucronate. Flowers cream. Stamens 10, anthers with scattered long hairs. Pods 10 16×1.3 1.8 cm, brown, flat, minutely pilose. Seeds 15–25 each c. 7.5×4.5 mm, ovalobovate, shining, dark brown.

*Fl. & Fr.*: September–February.

Rare; near Niwai Temple in marshy areas.

Native of tropical America.

5. **Mimosa** L.


Much branched, prickly, pubescent shrubs, 0.5–2.0 m. Leaves up to 4 cm long, 2-pinnate; pinnae 3–6 pairs; leaflets 6–10 pairs, up to 6×2 mm, ovate oblong, mucronate. Flowers in solitary or rarely paired, axillary, globose heads, pink. Stamens 8. Pods 2.5 9.0×0.7×1.3 cm, flat, falcate, pubescent, up to 8-jointed; sutures wavy, prickly. Seeds c. 6×5 mm, broadly ovoid to suborbicular, flattened, micurate, dark brown.
Fl. & Fr.: July October.

Very common; Gaunri village near Rajmahal R.F. (Deoli).

6. Neptunia Lour.


Low, diffuse, perennial herbs. Leaves up to 5 cm long, 2 pinnate; pinnae 1-3 pairs; leaflets 10-15 pairs, sessile, up to 7.5 × 2.0 mm, linear-oblong, obtuse, ciliate on the margins. Flowers yellow; peduncle with 1 or 2, large bracts. Pods 1.0-2.5 × 0.6-0.8 cm, oblong, rounded with a small beak at the apex, venulose. Seed 2-8, each c. 4.0 × 3.5 mm, oval to subcircular, compressed, polished, blackish brown.

Fl. & Fr.: September October.

Found in marshy places; Kakor village near Tonk.

7. Prosopis L.

1a. Internodes with prickles; ovary and petals glabrous; pods subcylindric

1b. Internodes without prickles; ovary and petals within villous; pods compressed

Trees, 3 12 m; bark grey, rough with deep fissures or cracks. Leaves up to 12 cm long, 2 pinnate; pinnae usually 2 pairs; leaflets 7 12 pairs, up to 15 × 5 mm, obliquely oblong, usually obtuse and mucronate. Flowers yellow. Stamens 10; anthers tipped with deciduous glands. Pods 8 20×0.5 - 0.7 cm, pendulous, slender, torulose, pointed at the apex, pale yellow. Seeds 10 15, each c. 6×5 mm, oblong to subcircular dull brown.

Fl. & Fr.: March - June.

Common throughout the district on sandy loam soil.


Large shrubs or a small trees, 2 - 5 m, generally armed with divergent, paired or solitary, axillary spines 0.5 - 4.0 cm long. Leaves up to 15 cm long, 2 pinnate; pinnae 1 2 (-3) pairs; main rachis ending in a soft bristle; leaflets 15 25 pairs, up to 17×4 mm, obliquely oblong, obtuse, sometimes mucronate. Flowers greenish yellow. Stamens 10; anthers tipped with deciduous glands. Pods 12 25×7 13 cm, pendulous, subfalcate, yellow. Seeds 10 25 each c. 6×4 mm, ovoid to ellipsoid, glossy, brown.

Fl. & Fr.: Almost throughout the year.

Common; Tonk R.F.

It is a native of tropical and subtropical America.

30. ROSACEAE

Potentilla L.


Ascending or prostrate, densely hairy annuals. Leaves pinnate; leaflets 3 - 9, up to 2.5×1.3 cm, obovate, oblong or cuneate, incise - dentate.

*Fl. & Fr.*: November - March.

Common in moist places by the side of tanks; Banetha and Gar village.

31. VAHLIACEAE

*Vahlia* Thunb. *nom. cons.*


Erect or diffuse, glandular - pubescent annuals, up to 35 cm. Leaves subsessile, up to 3.5×0.8 cm, oblong lanceolate to ovate. Flowers 1 - 2 in most of the upper axils of leaves, yellow or pale yellow. Calyx glandular-pubescent, tube hemispheric, entirely adherent to the ovary; lobes 5, triangular - ovate. Petals 5, shorter than the calyx lobes. Stamens 5. Ovary inferior; styles 2. Capsules c. 3 mm in diam., subglobose, dehiscing at the apex. Seeds many, minute, ovoid cylindric, straw coloured.

*Fl. & Fr.*: October - February.

Common in marshy places; forest near Banas river in Sopari village.

32. COMBRETACEAE

1a. Flowers in globose heads; fruits less than 1 cm long, subglobose, beaked
   ... *Anogeissus* 1

1b. Flowers in spikes; fruits more than 2 cm long, subglobose, not beaked
   ... *Terminalia* 2


Trees, 4 - 10 m, with pendulous branches; bark grey. Leaves up to 3.5 x 2.0 cm, elliptic or obovate, base narrowed, apex obtuse or acute, usually mucronate. Flowers greenish yellow. Petals 0. Stamens 10, biseriate. Fruits packed in dense heads, c. 5 mm long and broad excluding the beak which is about half as long as the nucleus, 2 winged, brown, upper portion of nucleus and beak hairy. Seed ovoid or ellipsoid.

*Fl. & Fr.:* July - November.

Common; Kachha Bundha near Tonk.

2. **Terminalia L. nom. cons.**


Deciduous trees, 10 - 20 m; bark ashy - grey. Leaves up to 18.5 - 15.0 cm crowded at the ends of branchlets, broadly elliptic or obovate - elliptic, base narrowed, often unequal; petioles 3 - 9 cm long. Spikes axillary with male flowers towards the apex and female towards the base. Flowers sessile, greenish - yellow, foetid. Petals 0. Stamens 10, biseriate. Fruits 2.5 - 3. 5 x 2.2 - 2.5 cm, subglobose, very finely pubescent. Seed l. c. 2.4 x 1.8 cm, oblong-ovoid, hard, ribbed, pale yellow.

*Fl. & Fr.:* May - November.

Rare; near Mataji temple at Rajmahal R.F. by the side of Banas river; planted.
33. MYRTACEAE

SYZYGIUM Gaertn. nom. cons.


Trees, 8 10 m ; bark light grey. Leaves up to 11 x 5 cm, broadly ovate elliptic, elliptic oblong or lanceolate, tapering at base, pellucid dotted, main lateral nerves numerous. Flowers many, small, in cymes arranged in panicles which arise from the scars of fallen leaves, greenish-white. Calyx truncate or obscurely lobed, broader than long, turbinate. Petals 4, orbicular, calyptrate. Stamens numerous. Berries ovoid or oblong, dark purple, 1 seeded.

Fl. & Fr. : May - July.

Common ; by the side of the dam, Chand Sen Bundha (Diggi) and near Niwai temple.

Fruits are edible.

34. LYTHRACEAE

1a. Paludose herbs ; inflorescence of short cymes ; petals when present not wrinkled, caducous

... Ammannia 1

1b. Shrubs, not paludose ; inflorescence of large, panicled cymes ; petals wrinkled, not caducous

... Lawsonia 2

1. AMMANNIA L.

1a. Leaves attenuate or rounded at base ; cymes sessile, dense ; hypanthium not ribbed ; style 0 - 0.5 mm long... A. baccifera 1

1b. Leaves subauriculate at base ; cymes pedunculate, lax ; hypanthium 8 - ribbed ; style c. 1 mm long...

... A. multiflora 2

Erect or suberect, glabrous herbs. 5 - 50 cm; branches angular. Leaves up to 5×1 cm, linear - oblong, oblong lanceolate or obovate, obtuse or acute. Flowers sessile or subsessile in condensed, axillary clusters. Petals 0. Stamens 4. Capsules c. 1.5 mm in diam., depressed globose, red. Seeds numerous, minute, sub hemispheric, excavated on the plane face, brown.

*Fl. & Fr.*: October - February.

Common in marshy places; near Niwai temple and elsewhere.


Erect, glabrous herbs; stem 4 - genous or almost 4 - winged. Leaves up to 1.5×0.3 cm, linear oblong or elliptic - oblong. Flowers pedicelled, in axillary, pedunculate, 3 - many - flowered, often compound cymes. Petals 4, obovate, violet, caducous. Stamens 4. Capsules c. 1.5 mm in diam., globose, red. Seeds numerous, minute, 1/2 obovoid, excavated on the plane face, brown to reddish brown.

*Fl. & Fr.*: September - October.

Common in marshy places; Kakor.

2. **Lawsonia** L.


Glabrous, much branched shrubs, c. 2 m. Leaves up to 4.0×1.6 cm, usually elliptic, narrowed into a short petiole. Flowers creamish, fragrant. Petals 4, very shortly clawed, suborbicular or subreniform. Stamens 8. Capsules c. 6 mm in diam., globose or depressed globose, veined, dark brown. Seeds many, pyramidal, brown.

*Fl. & Fr.*: May - November.
Commonly planted along hedges; Aligarh.

35. ONAGRACEAE

LUDWIGIA L.


Paludose, subglabrous annuals, 15 - 30 cm. Leaves up to 7.5 × 1.2 cm, narrowly elliptic or linear - lanceolate, narrowly cuneate at base. Flowers small, solitary, axillary, 4 - merous, yellow. Pollen shed in tetrads. Capsules c. 1 cm long, thin - walled, narrowed below, pale brown. Seeds pluriseriate in each locule of the capsule, more or less ellipsoid, brown with fine brown lines.

*Fl. & Fr.*: August September.

Common in marshy places; Kakor village.

36. CUCURBITACEAE

1a. Petiole base with a conspicuous, stipuliform bract fringed on the margin with long, filiform cilia:

2a. Anther thecae straight; seeds 2, one side concave and the other convex

... *Blastania* 1

2b. Anther - thecae inverted U - shaped; seeds 6 - 14, faces flat

... *Dactyliandra* 2

1b. Petiole base without a stipuliform bract:

3a. Petals fimbriate on the margins

... *Trichosanthes* 5

3b. Petals not fimbriate:

4a. Peduncle of male flower with spathaceous bract; anther - cells flexuose; fruits with soft, blunt spines or protuberances

... *Momordica* 4
4b. Peduncle of male flower without spathaceous bract; anther - cells straight; fruits without spines or protuberances  ...  *Melothria*  

1. **Blastania** Kotshy & Peyr.


Monoecious, slender climbers. Tendrils simple. Leaves up to $5 \times 5$ cm, scabrid punctate with white tuberculate dots, palmately 5 lobed almost to the base, lobes constricted at the base, margins denticulate. Stipuliform bracts suborbicular. Flowers pale yellowish white. Fruits 4 - 6 × 7 10 mm, hammer - shaped. Seeds c. 9.0 × 4.5 mm, oblong - obovate, base slightly attenuate, dark brown.

*Fl. & Fr.* : October November.

Rare; Kachha Bundha R.F. near Tonk on sandy loam soil.

2. **Dactyliandra** (Hook. f.) Hook. f.


Monoecious climbers. Tendrils simple. Leaves up to 8 × 8 cm, scabrid punctate with white tuberculate dots, palmately (3-) 5 lobed, margins denticulate. Stipuliform bracts nearly orbicular. Flowers white, greenish - white or greenish cream. Fruits 1.0 1.3 cm in diam., subglobose. Seeds c. 7 × 3 mm, compressed, basal end notched, narrowly winged or margined near the base, rugose, light brown.

*Fl. & Fr.* : August October.
Tonk (Maheshwari 52926, LWG).

3. Melothria L.


Monoecious, roughly bristly hairy climbers or trailing plants. Tendrils simple. Leaves up to 8 × 8 cm, ovate or subdeltoid, unlobed or 3–5 lobed, cordate at the base with a wide sinus, acute or acuminate, denticulate. Flowers yellow; male flowers fascicled on short peduncles; female flowers solitary or in clusters, subsessile. Fruits c. 6 mm across, globose, at first green and variegated with white, red when ripe. Seeds c. 4.5 × 3.0 mm, ovate, bordered, scrobiculate.

Fl. & Fr. : August November.

Common; Shoela R.F. on sandy loam soil and Banthali (Deoli).

4. Momordica L.


Climbers with tuberous roots. Tendrils simple. Leaves up to 8.5 × 7.5 cm, ovate. 3–5 lobed or unlobed, base cordate. Flowers solitary, yellow. Fruits c. 3 × 2 cm, ovoid, rostrate at apex, orange - coloured. Seeds many, c. 7 × 5 mm, broadly ovoid, pale brown.

Fl. & Fr. : August September.

Common on sandy soil; on the way to Banthali (Deoli) at Vijay-pura.
5. *Trichosanthes* L.


Large climbers. Tendrils 2 - 3 - cleft. Leaves up to $13 \times 12$ cm, broadly ovate, unlobed or 3 - 5 - lobed, cordate at base, denticulate, scabrid. Flowers white; racemed flowers with obovate, lacinate bracts; solitary flowers ebracteate or minutely bracteate. Fruits c. 5 cm in diam., ovoid, red when ripe. Seeds many, each c. $1.2 \times 0.6$ cm, oblong obovate.

*Fl. & Fr.* : August September.

Rare ; Toda Rai Singh R.F. in rocky habitats.

37. CACTACEAE

**Opuntia** Mill.


Straggling, branched, thorny, succulent bush up to 2.5 m; segments flat, thick, obovate or ob lanceolate, with many areoles bearing yellowish spines and numerous small bristles. Flowers pink, red or yellowish red. Berries globose, fleshy, areolar and glochidiate.

*Fl. & Fr.* : August May.

Common in wastelands and on rocky hills ; Kachha Bundha (Tonk). Native of S. America.
38. AIZOACEAE

ZALEYA Burm. f.


Prostrate, much branched, subsucculent, papillose or glabrous herbs. Leaves opposite, up to 4.0×2.5 cm, elliptic oblong to slightly obovate, narrowed at the base, rounded at the apex; petiole distinct, c. 1 cm long with a sheathing base. Flowers axillary, subsessile, glomerulate, greenish, tinged with pink or crimson. Sepals 5, margins white. Stamens 5. Styles 2. Capsules c. 4 mm long, brown, often tinged with crimson, operculate. Seeds 4, each c. 1.5 mm in diam., suborbicular, rugose, black.

Fl. & Fr.: August March.

Common; Haji-Ki-Kothi (Niwai) and Banas river bed near Banetha.

39. MOLLUGINACEAE

1a. Plants without raphides; carpels united; fruit a loculicidated capsule; seed with a distinct, filiform appendage

... Glinus 2

1b. Plants, especially the leaves with numerous raphides; carpels: free fruit of 5, one-seeded, indehiscent parts; seed without appendage

... Gisekia 1

1. GISEKIA L.


Prostrate or suberect, semi-succulent, glabrous herbs. Leaves mostly opposite, up to $4.5 \times 0.8$ cm, linear - lanceolate or oblanceolate - spatulate, obtuse or subacute; with raphides on the under surface. Flowers small in axillary umbellate cymes, greenish or greenish - white, often with pink or yellowish tinge, 5 - merous. Sepals with membranous margins. Petals O. Filaments dialated at the base. Achenes $1.2 \times 1.0$ mm. Seeds e. 1 mm long, subreniform, minutely punctate, shiny, black.

*Fl. & Fr.* : May November.

Very common by the side of tanks; Niwai.

2. *Glinus* L.


Prostrate, much branched, densely stellately pubescent herbs. Leaves subverticillate, up to $2.5 \times 1.8$ cm, broadly obovate or suborbicular, cuneate. Flowers in axillary clusters, greenish - white. Calyx enlarged in fruit. Capsules c. $6 \times 4$ mm, ovoid. Seeds many, minute, subreniform, granulate, shiny, reddish - black, strophiolate, with a curved, linear appendage which curves round the seed.

*Fl. & Fr.* : October May.

Common; near Niwai temple on sandy soil and Banas river bed.

40. **Rubiaceae**

1a. Plants woody, trees or shrubs; flowers in heads:

2a. Style with 2 linear branches (partly stigmatic); ovule solitary in each cell; fruit a fleshy syncarp

*Morinda* 3
2b. Stigma mitre-shaped; fruit a capsule splitting into 2 dehiscent cocci ... Mitragyna 2

1b. Plants herbaceous; flowers not in heads:

3a. Flowers in nodal whorls; ovule solitary in each cell; seeds grooved ventrally: ... Spermacoe 5

3b. Flowers solitary or in pedunculate inflorescence; ovules numerous in each cell; seed not grooved ventrally:

4a. Stipules bristly; corolla lobes entire; fruits nearly glabrous or with few short hairs ... Oldendania 4

4b. Stipules entire; corolla lobes with a tooth on each side; fruits with long, hollow, glassy hairs Dentella 1

1. DENTELLA J. R. & G. Forster


Slender, prostrate herbs, rooting at nodes. Leaves up to 10×3 mm, elliptic or subspathulate, gradually tapering into the petiole, subacute or obtuse. Stipules scarious. Flowers solitary in one axil only of a pair of leaves and in the forks of branches, white. Calyx with glassy hairs. Corolla narrowly infundibuliform. Fruits c. 2.5 mm in diam., globose, indehiscent, crowned by persistent calyx limbs. Seeds numerous, minute, angular, reticulate, dark brown.

Fl. & Fr.: May October.

Very common by the side of dam; Chand Sen Bundha near Diggi.

2. MITRAGYNA Korth. nom. cons.


Deciduous trees, 4 8 m; bark pale grey. Leaves up to 11×8 cm, variable in size and shape, suborbicular, oval or obovate. Stipules large, oblong spatulate. Flowers in usually solitary, 2.5 3.0 cm across (c. 1.5 cm. in diam. in fruit) heads, light yellow or reddish, fragrant. Corolla funnel shaped. Stigma much exereted. Seeds many, each c. 2.0×0.5 mm, flattened, winged all round, pale brown.

*Fl. & Fr.: May March.*

Common; in the valleys of hills at Toda Rai Singh and at the foot of hills at Bisalpura.

3. **Morinda L.**


Trees, 2 6 m; branchlets 4-angled, finely pubescent. Leaves up to 25×15 cm, elliptic or ovate, abruptly acutely attenuate in to and decurrent along the petiole, acute or shortly acuminate, tomentose, turning black when dry. Stipules bifid. Flowers in heads, usually opposite a leaf, white, fragrant. Syncarpium c. 2 cm in diam., bullate.

*Fl. & Fr.: May October.*

Common in rocky habitats; Toda Rai Singh.

4. **Oldenlandia L.**

1880 *pro parte*; Duthie, Fl. Upper Gang Pl 1: 413. 1905, *ex cl. syn.* 

Shortly bristly annuals, up to 20 cm or more high, but often diminutive. Leaves sessile, up to 3.0 x 0.4 cm, linear or linear lanceolate. Flowers solitary or 2-5 flowered on elongate peduncles, pinkish white; peduncle and pedicel filiform. Capsules c. 2.5 mm in diam., subglobose, loculicidal, crowned by the calyx limbs. Seeds numerous, minute, angular, testa reticulate, pale brown.

*Fl. & Fr.:* September January.

Common on field bunds and wastelands; Tordi Sagar and Bisalpura R.F.

5. *Spermacoce L.*


Semi-erect, hispid herbs; Stem quadrangular. Leaves up to 4.0 x 1.25 cm, elliptic to elliptic-lanceolate. Stipules 3-5-bristled. Flowers sessile, pale violet. Capsules c. 4 x 2 mm excluding the calyx teeth, ellipsoid, densely hispid. Seeds c. 2.5 x 1.5 mm, oblong-ellipsoid, plano-convex, ventrally with a longitudinal groove, testa minutely reticulate, brown.

*Fl. & Fr.:* July - November.

Common on low sand dunes; Bentrali village (Deoli).

41. **ASTERACEAE**

1a. Male and female capitula separate, monoecious;
female florets apetalous; anthers not syngenesious;
achenes only two per capitulum  

...  

*Xanthium* 23
1b. Male and female capitula not separate; outer female florets always petalous; anthers syngenesious; achenes either one or many per capitulum but never only two:

2a. Plants lactiferous; capitula ligulate with all the florets ligulate:

3a. Fistular, flexuous, hispid herbs; involucral bracts 2 - seriate; corolla pale blue; achenes obovate, angular; pappus of scales, persistent...

3b. Solid, erect, glabrous herbs; involucral bracts multiseriate; corolla yellow; achenes polymorphic, ribbed; pappus of hairs, deciduous ...

Cichorium 6

Launaea 15

2b. Plants not lactiferous; capitula discoid or disciform with all the florets tubular, or radiate with only the ray florets ligulate:

4a. Capitula aggregated into a compound head:

5a. Armed, cottony - woolly, herbs; capitula 1 - flowered; involucral bracts multiseriate, pungent ...

5b. Unarmed herbs, not woolly; capitula few to many - flowered; involucral bracts 1-seriate, not pungent:

6a. Stem winged; involucral bract more than two per capitulum; corolla reddish - violet or purple ...

6b. Stem not winged; involucral bracts two per capitulum; corolla white or yellow:

7a. Marshy plants; leaves alternate; capitula homogamous, white; achenes winged, notched at the apex, not enclosed in the involucre of bracts; pappus of two obovate scales ...

7b. Dryland plants; leaves opposite or pseudoverticillate; capitula heterogamous, yellow; achenes compressed, enclosed in involucre of bracts; pappus absent ...

Sphaeranthus 20

Caesulia 5

Flaveria 11

4b. Capitula simple, not aggregated into compound heads:

8a. Capitula homogamous, discoid:

9a. Involucral bracts 1 - seriate, margins coherent; ribs of achenes scabrid; pappus multiseriate, uniform ...

Emilia 10
9b. Involucral bracts multisieriate, margins free
achenes hairy throughout; pappus two
seriate, the outer short ...

8b. Capitula heterogamous:

10a. Pappus of 2 - 5 awns:

11a. Leaves opposite, 3 - 5-foliolate; ieanets
ovate - lanceolate; outer achenes laterally
compressed, inner 3 - 4 - angled,
ribbed; pappus of 3 - 5 awns ...

11b. Leaves alternate, bipinnatisect; pinnules
linear; all achenes laterally compressed;
pappus of 2 divericuate awns ...

10b. Pappus of scales, hairs or absent:

12a. Achenes enclosed in two horned,
hooked, spinous involucral bracts ...

12b. Achenes not enclosed in involucral
bracts:

13a. Achenes gibbous, enclosed in
rugose, pubescent, beaked paleae...

13b. Achenes not gibbous, not enclosed
in paleae:

14a. Corolla white or yellow:

15a. Involucral bracts 2 - seriate;
corolla white:

16a. Anthers obtuse at base; achenes transversely rugose, hairy,
those of female florets trigonous, those of bi-
sexual florets obovoid; pappus setae 2 - 5,
plumose ...

16b. Anthers sagittate: all
achenes similar, dorsi-
ventrally compressed,
narrowly winged, trans-
versely rugose and
tuberculate; pappus a
ring of thick scales,
forming a cone on top
of the achenes ...

15b. Involucral bracts more
than two seriate; corolla
yellow:

Vernonia 22
Bidens 2
Glossocardia 12
Acanthospermum 1
Sclerocarpus 19
Blainvillea 3
Eclipta 9
17a. Leaves pinnately lobed but not 
lyrate; achenes glandular; pappus 
cupular with fimbriate mouth ... 

17b. Leaves not lobed, if rarely lobed, 
then lyrate; achenes not glandular; 
pappus of hairs or absent :

18a. White - woolly herbs :
19a. Leaves cordate amplex-
icaul; capitula solitary or 
paired; achenes glabrous 
or hairy; pappus 2 - seriate

19b. Leaves not cordate - amplex-
icaul; capitula in clusters 
or in spike - like racemes; 
achenes papillose; pappus 
1 seriate ... 

18b. Glabrous or pubescent herbs 
undershrubs :
20a. Capitula solitary on a long 
peduncle; outer florets 
ligulate, 2 - 4- toothed or 
partite :
21a. Leaves opposite, base 
cuneate; anthers acute 
below; achenes oblong 
or turbinate; pappus 
bristles plumose ... 

21b. Leaves alternate, sessile, base 
cordate-hastate; anthers 
tailed; achenes terete; 
pappus hairs not 
plumose ... 

20b. Capitula arranged in 
branched panicles or in 
corymbbs; outer florets 
tubular :
22a. Anthers tailed; 
achenes ribbed or 
angled ... 

22b. Anthers obtuse 
below; achenes much 
compressed ...
FLORA OF TONK DISTRICT

14b. Corolla purplish - pink or violet:

23a. Corolla of outer florets ligulate, glabrous; pappus connate at the base in sterile achenes ...  

**Pluchea 17**

23b. Corolla of outer florets tubular, pubescent; pappus free at base  

**Blumea 4**

1. **Acanthospermum Schrank**


Erect, hispidely hairy herbs, 30–70 cm. Leaves opposite, sessile or short-petiolate, up to 5.0 × 2.5 cm, obovate - spatulate or elliptic, crenate or crenulate. Capitula born in the forks of the branches, yellow. Outer involucral bracts 2.5–4.0 mm long, densely hairy. Ray florets uniseriate, female, enclosed in the 2 horned inner involucral bracts, covered with many hooked spines. Disc florets tubular, enclosed in the palea. Achenes 5–10, each c. 5 mm long (excluding the terminal spines), triangular, compressed, glabrous. Pappus absent.

*Fl. & Fr.*: August November.

Rare; a weed in fields and wastelands; Ghati village near Tordi.

An introduced weed from S. America.

2. **Bidens L.**


Erect herbs, 10–50 cm; stem grooved, angular. Leaves petiolate; leaflets up to 5.0 × 2.2 cm; base narrowed, acute to acuminate, dentate. Capitula on a long peduncle, yellow. Involucral bracts pilose, the outer
short. Ray florets ligulate, often only one, sterile. Achenes c. 2 cm long, 
linear, obscurely 4 angled, ribbed, glabrous or hispid, black. Pappus awns 
retrorsely hispid, yellowish brown.

Fl. & Fr.: August September.

Common in the forests on hills; Rajmahal R.F. (Deoli.)


Erect, scabrid hairy herbs, 40–60 cm. Leaves opposite (upper ones 
alternate), petiolate, up to 10.5×6.0 cm, ovate, ovate - elliptic, rhomboid-
ovoate or ovate - lanceolate, cuneate or rounded, acute to acuminate, serrate. 
Capitula on long peduncle, 6–7 mm across. Involucral bracts hairy outside, 
the outer herbaceous; inner paleaceous, shorter. Ray florets ligulate, female. 
Achenes 3.5–4.0 mm long, cuneate, of bisexual florets laterally compressed.

Fl. & Fr.: August October.

Common; Banas river bed near Bentheli (Deoli).


1a. Stem and younger parts with stalked glands; leaves 
narrowed at the base; capitula in panicles; hairs on 
corolla lobes of bisexual florets unicellular; achenes 
ribbed ... B. membranacea 1

1b. Plant eglandular; leaves semi - amplexicaul; capitula 
soitary or in pairs; hairs on corolla lobes of bisexual 
florets multicellular; achenes not ribbed ... B. obliqua 2

Ind. 3: 265. 1881; Dut. Fl. Upper Gang. Pl. 1: 455. 1905. (Repr. ed. 1: 
Erect, pilose herbs, 25 - 40 cm. Leaves alternate, petiolate, up to 10.5 × 5.5 cm, elliptic - lanceolate or ovate lanceolate, usually lyrate lobed with the terminal lobe elliptic - ovate and the lateral ones more or less triangular, acute or acuminate, serrate dentate. Capitula 5 - 7 mm across, yellow. Involutcular bracts multi-serulate, pubescent outside, longer than the florets. Corolla of female florets tubular, obscurely 2 - 3 lobed. Achenes c. 1 mm long, oblong - ellipsoid, pubescent. Pappus 1-seriate, c. 2.5 mm long, white.

_Fl. & Fr._: September - November.

Common on hills in rocky or gravelly habitats; Toda Rai Singh forest.


Erect or diffuse, suffrutiaceous, villous, herbs, 30 - 50 cm. Leaves alternate, sessile, up to 5 × 1 cm, elliptic - oblong, oblong - lanceolate or spatulate apiculate or acute, serrate-dentate. Capitula terminal or axillary, pedunculate, c. 1 cm across, purple. Involutcular bracts multisierulate, longer than the florets, prolonged acuminate, margins scarious, pubescent outside. Female florets filiform, 2 - 3 - lobed, glabrous. Achenes c. 0.5 mm long, oblong to obovate, pubescent. Pappus 1-seriate, c. 3.5 mm long.

_Fl. & Fr._: October - February.

Found in marshy places; Tordi Sagar.

5. _Caesulia Roxb._


Prostrate or suberect, succulent, glabrous herbs, 15 - 75 cm; stem often red. Leaves sessile, up to 14.0 × 1.7 cm, linear - lanceolate, auricled at the base, acut serrulate. Capitula axillary, sessile. Involutular bracts 2, large, membranous, c. 9 × 7 mm, broadly ovate. Anthers dark purple or red, segittate. Achenes c. 3 mm long, obovoid, flat with a rib on each face, sparsely hairy with stout hairs.

_Fl. & Fr._: October - November.

Common in marshy habitats; Siras.
6. **Cichorium L.**

**Cichorium endivia** L. Sp. Pl. 813. 1753.

Decumbent herbs, c. 1 m. Cauline leaves sessile, c. 7×2 cm, lanceolate, semiamplexicaul, acute or obtuse with a short mucro, runcinate and often pinnatifid. Capitula axillary or terminal, clustered, homogamous, pale blue. Involutral bracts hairy outside, the outer shorter. Flowers ligulate. Corolla 5-lobed. Achenes 2.5-3.0 mm long. Pappus 0.5-1.0 mm long.

*Fl. & Fr.*: February – May.

Common weed in cultivated fields; Ghass village near Tonk.

7. **Conyza Less. nom. cons.**


Erect herbs, 30-60 cm; stem ribbed, bearing mixed indumentum of stiff spreading setulose hairs and softer adpressed hairs. Leaves alternate, up to 7.5×1.5 cm; lower ones larger, ob lanceolate spatulate, mucronate, serrate - incised; the upper ones linear - lanceolate, subentire or serrate. Capitula c. 8 mm across, pale yellow. Involutral bracts 3-4 mm long, pilose outside. Achenes c. 1.3 mm long, linear - oblong, sparsely pubescent. Pappus 1-seriate, c. 3.5 mm long, strigulose, dirty white.

*Fl. & Fr.*: November – July.

Common weed in cultivated fields; Ghass village near Tonk.

8. **Echinops L.**


Erect, much branched herbs, 50-100 cm. Leaves up to 30×10 cm, deeply pinnatifid; lobes sinuate and spinescent. Capitula homogamous, up to 4 cm in diam. (excluding the spines), globose, pale blue. Involucre with white bristles; outer bracts with sharp spines exceeding the compound heads, inner connate for more than half their length in to a tube which surrounds the achene. Anthers pale violet, tailed. Achenes c. 7 mm long, obconic,
densely villous. Pappus short, antrorsely hispid, yellowish, forming a cylin-
dic brush on the achenes.

*Fl. & Fr.*: October March.

Common on river bed and fallow fields; Banas river bed near Raj-
mahal and Panchewar.

9. **Eclipta L. nom. cons.**


Prostrate, decumbent or erect, appressed hairy herbs, 5-30 cm. Leaves opposite, subsessile, up to 8.0×2.3 cm, elliptic to lanceolate, cuneate, sub-
entire or distantly serrate. Capitula axillary and terminal, pedunculate, c. 6 mm across. Involucral bracts c. 5.0×2.5 mm, ovate, herbaceous. Ray florets ligulate, fertile, 2 dentate. Anthers blackish. Achenes c. 3 mm long, cuneate, brown.

*Fl. & Fr.*: Almost throughout the year.

A common weed in marshy habitats; TORDI SAGAR.

Linnaeus (l. c. 1753) simultaneously published the names *Verbesina alba* and *V. prostrata*. Later he published (l. c. 1771) *Eclipta erecta*, a superfluous name based on *V. alba* and *E. prostrata*, based on *E. prostrata*. The first author to unite these taxa was Hasskar (l. c.) who did so under the name *Eclipta alba* (L.) Hassk.

10. **Emilia Cass.**


Erect, delicate, glabrescent herbs, 20-60 cm. Leaves alternate, up to 9×5 cm; the lower ones petaled, obovate, suborbicular or lyrata, obtuse, subentire or toothed; the upper and middle ones sessile, ovate-triangular, often lyrata, sagittate and auricled, acute, dentate or subentire. Capitula in lax, pedunculate, corymbose inflorescence, c. 1 cm long, dark pink. Invol-
ucral bracts c. 9 mm long, glabrous. Achenes c. 3 mm long, narrowly oblong, ribbed. Pappus c. 9 mm long, white.

*Fl. & Fr.*: August September.

Common in wastelands; Tonk (*Maheshwari* 52987, LWG)

11. **Flaveria A. Juss.**


Erect, dichotomously branched herbs or undershrubs, 10-40 cm. Leaves up to 6×3 cm, elliptic, broadly elliptic or oblanceolate, 3-nerved, acute, coarsely serrate; petiole dilated at base. Capitula compound, heads fasciculate. Involucral bracts 2 per head, connivent, c. 3.5 mm long, oblong. Corolla of ligulate florets 2 lobed. Achenes c. 2.5 mm long, obovoid, c. 10-ribbed, black.

*Fl. & Fr.*: November February.

Common weed in fallow fields and wastelands; near Aligarh.

12. **Glossocardia Cass.**


Diffuse herbs. Leaves up to 2.5 cm long. Capitula pendunculate, c. 10×5 mm, yellow. Involucral bracts with scarious margins, the inner longer. Achenes c. 8 mm long (excluding the awn), narrowly oblong densely hairy, dark brown. Pappus awns c. 4 mm long.

*Fl. & Fr.*: July October.

Common on low hills in rocky habitats; Anwa R. F. (Deoli).
13. Gnephalium L.

1a. Leaves usually more than 15 mm long; heads in leafy, terminal, spikes ... \textit{G. polycaulon} 1

1b. Leaves usually less than 15 mm long; heads in rounded, leafy, axillary or terminal clusters ... \textit{G. pulvinatum} 2


Spreading, annual herbs, 5 15 (-25) cm, with numerous, lateral, ascending branches from near the base. Leaves up to 30 (-45) × 0.8 cm, linear-ovate or spatulate, apiculate. Involutural bracts 2–3 seriate, c. 2.5 mm long, pale brown. Florets yellow. Achenes c. 0.5 mm long, oblong. Pappus hairs c. 1.5 mm long, white.

\textit{Fl. & Fr.}: November - March.

common by the side of tanks on sandy clayey soil; Gar village.


Small, prostrate, annual herbs with numerous branches from the base. Leaves up to 15.0 × 0.3 cm, spatulate, mucronate. Involutural bracts c. 3 mm long, acute. Florets yellow. Achenes c. 0.5 mm long, oblong-ovate. Pappus hairs c. 2 mm long, white.

\textit{Fl. & Fr.}: December - March.

Found in marshy places; by the side of Tordi Sagar.


Prostrate, tufted, hairy herbs. Leaves alternate, sessile, up to 6 cm long, segments oblong, serrate dentate. Capitula solitary, leaf opposed or
terminal, c. 7 mm across, depressed subglobose. Involucral bracts c. 5 mm long, oblong, hairy. Achenes c. 2 mm long.

*Fl. & Fr.*: Almost throughout the year.

Common in moist habitats; Tordi Sagar and Banas river bed.

15. **Launaea Cass.**


Glabrous herbs. Leaves mostly radical, up to 20.0 × 4.5 cm, oblong or oblong ovate, pinnately lobed; lobes rounded or acute, spinulose with cartilaginous teeth. Capitula in subracemose inflorescence, homogamous, c. 1.5 cm long. Involucral bracts unequal, glabrous. Corolla 5 toothed. Anthers sagittate. Achenes 3 4 mm long, rugulose. Pappus hairs c. 8.5 mm long, homomorphic, white.

*Fl. & Fr.*: September March.

Common in wastelands and on low sand dunes; Bentheli village.

16. **Pentanema Cass.**


Erect, suffrutescent, glabrescent herbs, 30 - 45 cm. leaves up to 7.0 × 1.5 cm. oblong lanceolate or linear lanceolate acute or acuminate, subentire or crenate. Capitula solitary, terminal or leaf - opposed on a long peduncle, 1.1 1.4 cm across, yellow. Involucral bracts multiseriate, c. 3 mm long, hairy outside, 1 nerved with scarious margins. Ray florets female. Corolla 3 - toothed, revolute. Achenes c. 1.5 mm long, thinly hairy. Pappus 1 seriate in disc florets, c. 3 mm long, none in ray florets.

*Fl. & Fr.*: September November.
Common on hills in gravelly or rocky habitats; Kakor forest and hills at Suvari Village.

17. PLUCHEA CASS.


Erect, hoary undershrubs, 30–75 cm. Leaves alternate sessile, up to 6.0×1.5 cm, coriaceous, oblong or oblanceolate, tapering at the base, apiculate, acute or obtuse, subentire or obscurely subdentate at the apex. Capitula in compound corymbs, c. 8 mm across. Involucral bracts multiserrate, 2.5–4.0 mm long, densely pubescent outside. Achenes c. 1 mm long. Pappus c. 5 mm long, dirty white.

Fl. & Fr.: December May.

Common weed in fallow and cultivated fields; Banetha (Kakor) and Balunda (border of Tonk-Bundi districts).

18. PULICARIA GAERTIN.

1a. Plants white-woolly; ray florets ligulate; achenes glabrous; inner pappus hairs plumose at the apex ... P. crispa 1

1b. Plants villous; ray florets tubular; achenes sparsely appressed hairy; inner pappus hairs not plumose at the apex ... P. foliolosa 2


Erect or diffuse-herbs or undershrubs. Leaves alternate, sessile, up to 7.0×1.5 cm, diminishing in size towards the apex, linear or linear-oblung, obovate-oblung or subspathulate, subacute or obtuse, undulate-crisped or denticulate. Capitula solitary at the end of paniculate branches, pedunculate, c. 7 mm across, yellow. Involucral bracts 2–3 mm long, linear-
ceolate, recurved, margins scarious, pubescent outside. Achenes c. 0.9 mm long. oblong ellipsoid. Outer pappus cupular, flimbriate, the inner c. 2.5 mm long, ant dorsely scabrid.

*Fl. & Fr.*: Almost throughout the year.

Found in moist places by the side of tanks and on river beds; Tordi Sagar and Banas river bed.


Much branched herbs, c. 10 cm, with woody rootstalk. Leaves alternate, sessile, up to 3 (-7) × 0.8 (-1.0) cm, oblong, linear-oblong, spatulate, or oblanceolate, base half amplexicaul, obtuse. Capitula deciform, c. 0.8 cm across, yellow; peduncle villous, glandular. Involucral bracts subequal, acute, hairy, Ray florets 3, toothed. Achenes c. 0.7 mm long, oblong, terete, brown. The outer pappus a minute cup with flimbriate edges, the inner c. 2.0 mm long.

*Fl. & Fr.*: May August.

Common on river bed; Banas river bed near Fraser bridge (Tonk).


Erect, hispid, annual herbs, 25–40 cm. Upper leaves alternate, lower opposite, petiolate, up to 9.5 × 5.5 cm, ovate or ovate lanceolate, cuneate, acute or acuminate, crenate, serrate. Capitula terminal, solitary, sessile or peduncled, c. 1 cm across, yellow. Involucral bracts 2, seriate, hairy. Ray florets 3, ligulate; corolla 2, lobed, pubescent. Anthers sagittate. Achenes c. 5 mm long, black. Pappus absent.

*Fl. & Fr.*: August November.

Fairly common on hills in gravelly habitats; Toda Rai Singh R. F.
20. Sphaeranthus L.


Much-branched, prostrate or ascending, aromatic, glandular - hairy herbs. Leaves alternate, sessile, up to 5.5×1.3 cm, obovate, spatulate, obovate - oblong or oblong - elliptic, decurrent, apex acute with a short mucro or rounded, margins coarsely double spinous dentate. Heads terminal, solitary, heterogamous, ovoid or globose, 7 10 mm across; peduncle winged, Involutural bracts c. 2.5 mm long, linear obovate, ciliate. Disk-florets 2 3 ; anthers sagittate ; stigma undivided. Corolla of ray florets 2 - lobed ; stigma divided. Achenes stalked. Pappus absent.

*Fl. & Fr.* : December - March.

Common weed near dams ; Kachha bundha near Tonk.

21. Tridax L.


Procumbent or erect, hairy herbs, 30 60 cm. Leaves up to 6.0×3.5 cm, ovate, ovate - lanceolate, elliptic or elliptic - lanceolate, coarsely serrate, often incised. Capitula solitary, yellow or pale yellow. Outer involucral bracts herbaceous, very hairy, Achenes c. 2.5 mm long, silky pilose. Pappus c. 6.5 mm long.

*Fl. & Fr.* : Almost throughout the year,

Common in wastelands and on hills throughout the district.


Erect or rarely decumbent, pubescent herbs, 20–75 cm; stem striate. Leaves alternate, petiolate, up to 5.5×3.5 cm, ovate, ovate-lanceolate, rhomboid-ovate, obovate or ovate-elliptic, cuneate, acute or obtuse, subentire to crenate. Capitula in lax, terminal, compound corymbs, c. 6 mm across, purple or violet. Involutural bracts pubescent outside, gland-dotted, the longest c. 4.5 mm long. Achenes c. 1.5 mm long, oblong, narrowed at base, obscurely ribbed. Pappus white, the outer short; inner c. 4 mm long, antorsely barbellate.

*Fl. & Fr.*: Almost throughout the year.

Common weed in wastelands and in fallow fields; Tordi Sagar and Kotri village Aligarh road.

A highly polymorphic plant.

23. **Xanthium L**


Erect or diffuse, often gregarious, shortly hairy herbs or undershrubs, 25–200 cm. Leaves alternate, long petiolate, up to 8.5×10.0 cm, 3-5-lobed, broadly cordate, ovate or deltoid ovate, acute or acuminate, irregularly coarsely dentate. Functionally male capitula in the upper axil and the female towards the base. Male capitula many-flowered. Female capitula with 2 florets; involucral bracts connate, hard, tipped by two stout, curved beaks and covered by many hooked spines. Achenes 2, each c. 1.5 cm long, oblong-ellipsoid, compressed, pointed, glabrous, enclosed within hardened, tomentose involucre. Pappus absent.

*Fl. & Fr.*: October February.

Common weed in wastelands; Haji Kothi near Niwai.

42. **PLUMBAGINACEAE**

**Dyeroophytum Kuntze**


Subscandent, glaucous undershrubs or shrubs, 1 to 3 m; stem and branches terete, finely striate. scurfy. Leaves perfoliate. 2.0 5.5×2 5 cm, ovate, elliptic, oblanceolate or oblanceolate, obtuse or retuse with a mucro, undulate, coriaceous, glaucous - green, more or less covered with scurfy scales. Flowers in dense paniculate spikes, bright yellow. Bracts lanceolate. Calyx persistent, c. 8 cm long, tubular, strongly 5 ribbed, tube winged between the ribs; the wings transversely undulate, membranous. Corolla, c. 1.5 cm long; lobes 5, obovate oblong, emarginate. Style densely hairy at the base. Seed pear-shaped, smooth.

Fl. & Fr.: Almost throughout the year.

Common on rocky hills; Toda Rai Singh.

43. PRIMULACEAE

ANAGALLIS L.


Erect or decumbent, glabrous annuals, 10 30 cm, much branched from the base; stem quadrangular. Leaves opposite, sessile, up to 3.0×1.5 cm, ovate, cordate amplexicaule subacute or obtuse. Flowers axillary, solitary, pedicilate, dark blue, red at the centre. Sepals free, lanceolate, acuminate, keeled. Corolla lobes glandular hairy on the margins. Stamens 5; filaments bearded. Capsules with decurved pedicel, c. 4×4 mm, globose, circumscissile, with persistent style base and sepals. Seeds minute, trigonous, rugose, dark brown.

Fl. & Fr.: January March.

Common winter season weed in cultivated fields in moist places; Barni village.

44. SAPOTACEAE

MIMUSOPS L.

Mimusops elengi L. Sp. Pl. 349. 1753; Bedd. Fl. Sylv. t. 40. 1870;

Evergreen, glabrous trees, 10 - 20 m ; bark dark grey. Leaves alternate, up to 10×6 cm, elliptic, ovate - lanceolate, or ovate - elliptic, acuminate, margins undulate. Flowers axillary, solitary or clustered, pedicillate, star-shaped, white or creamish - white, sweet scented. Sepals 5, free, ovate-lanceolate, fulvous - pubescent. Petals many in two whorls. Stamens 8 ; staminodes ovate, acute, hairy on the back. Ovary appressed silky - pubescent. Berries c. 3 cm long, ovoid, bright yellow when ripe. Seeds solitary, ovoid, slightly compressed.

Fl. & Fr. : May - September

Common on hills in rocky habitats ; Rajmahal R. F., Tordi R. F. and mataji temple.

The small, fragrant flowers are made into garlands. The ripe fruits are edible. The wood is valuable, and an oil is extracted from the seeds.

45. EBENACEAE

DIOSPYROS L.


Deciduous trees, 4 - 6 m ; bark dark grey ; young parts tomentose. Leaves sub - opposite or alternate, petiolate, up to 16.5×11.5 cm, ovate - elliptic or oblong - ovate, obtuse or retuse, margins subentire, pubescent beneath. Male flowers in short, drooping cymes, tomentose. Female ones solitary, rather longer than the males. Fruits c. 3.5×3.0 cm, ovoid or globose, glabrous, pubescent when immature, yellow when ripe ; fruiting calyx thickly coriaceous, lobes often reflexed with undulate margins. Seeds many, each c. 1.5×0.8 cm, oblong, often obliquely truncate at the apex, some what compressed, testa shining, rugose.

Fr. : August - February.
Commonly found in dry deciduous forest; Toda Rai Singh.

The leaves are used for making bidis and the fruits are edible and sold in the market.

46. SALVADORACEAE

SAVLADORA L.


Trees or shrubs, 3–6 m, with short and twisted, whitish trunk. Leaves opposite, petiolate, up to 7.5 × 2.0 cm, linear - lanceolate, ovate - lanceolate or elliptic - lanceolate, acute or subobtuse, often mucronate, margins subentire. Flowers in erect, compact, axillary, paniculate spikes, white or cream, slightly fragrant. Calyx cup shaped with rounded lobes. Corolla lobes obovate or oblanceolate, reflexed. Stamens exserted. Stigma peltate. Drupes c. 4.5 mm in diam., ovoid globose with persistent calyx, red when ripe, 1-seeded. Seeds c. 4 mm in diam., globose.

Fl. & Fr.: February May.

Very common on sandy plains; Ghati R. F.

The fruits are edible. Wood is used as fuel and the tender branches and leaves are used as fodder. Seeds yield an oil of medicinal value.

47. APOCYNACEAE

1a. Small trees; calyx with glands or scales inside; throat of corolla with 1 - 2 series of coronary scales; base of seeds with deciduous coma ... 

1b. Herbs or small shrubs; calyx without glands or scales inside; throat of corolla without coronary scales; seeds not comose:
2a. Shrubs armed with spines; nectary absent; fruit a fleshy berry; seeds minutely pitted ... **Carissa 1**

2b. Unarmed herbs; nectary of 2 erect glands; fruit of paired follicles; seeds with mucinate ribs ... **Catharanthus 2**

1. **Carissa L. nom. cons.**


Evergreen shrubs, 2.0 - 2.5 m; stem and branches with paired, straight, sharp spines up to 2 cm long. Leaves up to 6.5 x 4.5 cm, very variable in shape, elliptic, obovate or orbicular, obtuse or retuse, often mucronate, margins entire. Flowers in terminal, pedunculate, puberulous, corymbose cymes, white or pinkish, Corolla tube 1.0 - 1.5 cm long, dilated at the top. Stamens 5, included. Stigma slightly penicillate at the apex. Berries c. 1.5 x 1.0 cm, ellipsoid, smooth, green, pigmented red, 4 or more seeded. Seeds peltately attached to the septum.

**Fl. & Fr.** : April August.

Rare; found in rocky habitat; Mataji temple at Tordi R. F., probably planted.

The fruits are sold in the market and are used as vegetable and for making pickle.

2. **Catharanthus G. Don**


Erect, glabrous herbs, 15 - 35 cm; stem quadrangular. Leaves opposite, petiolate, up to 6.5 x 1.5 cm, lanceolate, base attenuate, apex acute or acuminate, margins subentire; axillary glands numerous. Flowers axillary, solitary or in pairs, white. Calyx segments lanceolate subulate. Corolla tube 7 - 8 mm long, slightly dilated at the top; mouth pilose within. Follicles c.
FLORA OF TONK DISTRICT

5.5 × 0.2 cm, linear, subtortulose, glabrous. Seeds c. 3 × 1 mm, cylindric, black.

*Fl. & Fr.* : July September.

Common weed in fallow fields ; Haji Ki Kothi (Niwai).

3. **WRIGHTIA R. Br.**

1a. Follicles laterally compressed, connate throughout, grooved at the junction; corona 5-10, orange, broadly ovate, suborbicular or oblong .

1b. Follicles cylindric, distinct, connate at the apex only; corona numerous, white, linear, laciniate ...

*W. tomentosa* 2

*W. tinctoria* 1


Deciduous trees, 3-7 m; bark whitish grey; latex milky. Leaves opposite, shortly petiolate, up to 15.0 × 6.5 cm, elliptic, elliptic-oblong, elliptic-lanceolate or obovate-oblong, base rounded, apex acuminate, rarely rounded or retuse, subentire, pubescent on both the sides. Flowers in lax, terminal, dichotomous cymes, white, sweet scented. Calyx pubescent outside. Corolla tube short; lobes oblong, obtuse. Follicles up to 45 cm long, pendulous, paired, deep green with white tubercles. Seeds c. 2.0 × 0.3 cm, linear, glabrous, brown. Coma c. 7 cm long.

*Fl.* : April May; *Fr.* : Greater part of the year.

Common in deciduous forests in rocky habitats; Toda Rai Singh R. F.; Bisalpura R. F. and Banetha forest.

Leaves yield a blue dye used by the local people. Seeds are often eaten.

It resembles the valuable medicinal plant *Heliarrhena aniysenterica* (Roth) A. DC. in which the anthers are included in the corolla tube which are without a corona and the seeds have the coma at the apex. In *Wrightia tinctoria* R. Br. the anthers are exerted, coronary scales are present and the seeds bear the coma at the base.

Deciduous trees, 5 - 7 m; bark whitish - grey; latex milky; younger parts densely tomentose. Leaves opposite, shortly peltate, up to 12.0 × 6.5 cm, elliptic - oblong, ovate or ovate - oblong, base acute or rounded, acuminate, subentire. Flowers in terminal, corymbose cymes, creamish - yellow, slightly fragrant. Calyx pubescent outside. Corolla tube twice as long as calyx lobes; lobes oblong, rounded. Follicles up to 20.0 × 1.8 cm. Seeds c. 1.5 cm long, linear, brown. Coma at the lower end c. 2.5 cm long, white.

*Fl. & Fr.*: May February.

Common on hills; Toda Rai Singh R. F.

The bark of the stem and the roots are used as an antidote to snake-bite and the sting of scorpions. The wood is used for carving and turnery. The tender fruits are edible. The floss is used for stuffing.

Nerium indicum Mill. (*N. odorat* Soland.) ‘Kaner’ (Hindi).

Evergreen garden shrubs. Flowers showy, in terminal cymes, white, rosy red or pink, fragrant.

Plumeria rubra L. (*P. acutifolia* Poir.) ‘Champa’ (Hindi).

Small trees. Flowers white or creamish with a yellow centre, sweet-scented.

Native of America; planted for ornamental purposes.

48. ASCLEPIADACEAE

1a. Plants climbing or twining; seeds crenate or crenulate at the lower end:

2a. Inflorescence of corymbose cymes; calyx glandular inside; corona double, the inner spurred at the base, produced into the subulate horn incurved over the style apex; follicles reflexed, echinate

*Fergularia* 4
2b. Inflorescence of umbellate cymes; calyx glandular inside; corona single, neither spurred nor horned; follicles erect, glabrous

Pentatropis 3

1b. Plants erect; seeds not crenate at the lower end:

3a. Latex milky; calyx glandular inside; corona single; anthers with membranous appendages; follicles ellipsoid or ovoid, obtuse; seeds minutely tomentose

Calotropis 1

3b. Latex yellowish; calyx eglandular inside; corona double; anthers without membranous appendages; follicles terete, lanceolate, tapering to a long beak; seeds glabrous

Leptadenia 2

1. Calotropis R. Br.


Evergreen, glaucous shrubs or small trees, 2 - 4 m; latex milky. Leaves opposite, up to 18 × 12 cm, decussate, subamplexicaul, acute or acuminate, entire. Flowers in terminal and axillary, corymbose cymes, violet, pale pink or purple, pale shining silvery outside. Corona lobes compressed, exceeding the staminal column, obscurely bifid at the apex and with an upcurved spur at the base. Follicles in pairs, c. 7.5 × 3.0 cm. Seeds c. 8 × 5 mm, broadly ovate, flattened, thin - margined, pale brown. Coma up to 4 cm long, silky - white.

Fl. & Fr. : Almost throughout the year.

Common in wastelands and fallow fields near villages throughout the district.

Floss is used for stuffing purposes and the latex is highly medicinal.
2. **Leptadenia** R. Br.


Glaucous, much branched, nearly leafless, bushy undershrubs or shrubs, 1–2 m. Leaves sessile, present only on young shoots. Flowers in lateral, umbellate cymes. Calyx cupular, pubescent, ciliolate on the margins. Corolla deeply divided, rotate, pubescent. Follicles up to 15 cm long. Seeds c. 6 mm long, ovate - lanceolate, flattened, margined. Coma c. 3.5 cm long, silky - white.

*Fl.:* October - January; *Fr.:* March - May.

Common on low sand dunes; Tordi R. F.

Plants are used for making huts; stem fibres are used for making ropes.

3. **Pentatropis** Wight & Arn.


Perennial twiners with watery sap. Leaves opposite, petiolate, up to 4.5 × 3.2 cm, ovate or ovate lanceolate, cordate or narrowed at the base, acute, acuminate or rounded at the apex, entire. Flowers greenish - yellow with purple patches at the base within. Calyx deeply divided, sparsely pubescent. Corolla divided almost to the base; the lobes narrowly linear from a triangular base, pubescent within, the apex often curled. Corona
lobes shorter than column, deltoid ovate, acute. Follicles c. 8.0 × 1.5 cm, lanceolate, tapering to a beak. Seeds ovate, flattened. Coma c. 2.5 cm long.

*Fl. & Fr.*: August November.

Not common; found on loamy soil; Tordi Sagar dam.

4. **Pergularia L.**


Perennial, hispid climbers; latex milky. Leaves opposite, long-petioled up to 6 × 7 cm, broadly ovate, deeply cordate, acuminate, subentire, almost pubescent on both the surfaces. Flowers pale green or greenish-white. Calyx lobes ovate-lanceolate, pubescent. Corolla campanulate. Follicles paired, c. 6.0 × 1.2 cm, lanceolate, attenuated into a long beak, softly echinate. Seed c. 7.0 × 3.5 mm, ovate, truncate at the apex, densely velvety pubescent all over. Coma up to 3 cm long, silky white.

*Fl. & Fr.*: Almost throughout the year.

Common; Aamli R. F. (Aligarh).

49. **PERIPLOCACEAE**

**Cryptostegia R. Br.**

*Cryptostegia grandiflora* R. Br. in Edwards, Bot. Reg. 5. t. 435. 1820; Wight, Ic. 3 (2): 3. t. 832. 1844 45; Hook. f. Fl. Brit. Ind. 4:
6. 1883 ; Santapau & Irani in Univ. Bombay Bot. Mem. No. 4: 93. 1962 ;
Raizada, Suppl. Fl. Upper Gang. Pl. 152. 1976. ‘Chabuk - Chari, Rubber-
ki Bel’ (Hindi).

Large, evergreen, straggling, scandent or climbing, woody shrubs
with milky latex. Leaves opposite, petiolate, up to 10 × 6 cm, elliptic
or oblong, acuminate, obtuse or retuse at the apex, margins undulate.
Flowers in terminal, di- or trichotomous cymes, pale purple or pink, showy.
Calyx 5 lobed. Corolla funnel shaped, with 5 corolline appendages.
Follicles paired, c. 13.0 × 2.8 cm, divaricate, boat shaped, woody, angled
or winged. Seeds c. 0.8 cm long, oblong ovate, compressed, rugose.
Coma c. 2.5 cm long, silky white.

Fl. & Fr.: Almost throughout the year.

Common in moist, shaded habitats; Banas river bed at Sopari
village (Tonk).

50. GENTIANACEAE

ENICOSTEMA Blume nom. cons.

Enicostema hyssopifolium (Willd.) Verdoorn in Bothalia 7: 462.
Sp. Pl. 1: 640. 1798. Enicostema littorale Blume, Bijdr. 848. 1826 ; C.B.
Don, Gen, Syst. 4: 201. 1837 ; Wight, Ic. 2 (3): 8. t. 600. 1842.
‘Chota - Chirieta’ (Hindi).

Erect, perennial, glabrous herbs, 20 - 40 cm, branched from the base;
stem subquadrangular, ridges often denticulate. Leaves opposite, variable, up
to 7 × 2 cm, ovate, ovate lanceolate, linear or elliptic - oblong, 3 - nerved
from the base, denticulate or subentire. Flowers in axillary clusters, white.
Corolla tubular, lobes lanceolate. Stamens inserted at the middle ; fila-
ments filiform with a small, double - hooded, scaly gland at the base. Stigma
2 - lobed. Capsules c. 4.0 × 2.5 mm, apiculate, with persistent calyx
lobes. Seeds many, c. 0.5 mm across, subglobose, foveolate, brown.
**Flora of Tonk District**

*Fl. & Fr.*: July - November.

Common near marshy habitats; Siras R. F. and Gauri village near Rajmahal R.F.

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**51. MENYANTHACEAE**

**Nymphoides J. Hill**


Rhizomatous, floating aquatic herbs. Leaves up to 6.0 × 7.5 cm, suborbicular, deeply cordate, subentire; petiole up to 15 cm long. Flowers in clusters at the base of petiole, pedicellate, white with yellow centre. Sepals free, ovate-lanceolate, acute. Corolla lobes oblong, obtuse, fimbriate. Stamens 5. Stigma 2-lobed.

*Fl.*: February - March.

Rare; Banas river near Bisalpura.

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**52. BORAGINACEAE (Including EHRETIACEAE)**

1a. Trees or shrubs:

2a. Calyx tubular, teeth usually 5; filaments hairy at the base; style 4 - 5 - lobed; endocarp unlobed

2b. Calyx 4 - 5 parted; filaments glabrous; style 2 - 4 - lobed; endocarp 2 - 4 - lobed

1b. Herbs or undershrubs:

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* Cordia 3
* Ehretia 4
3a. Calyx 8.0 - 12.0 x 3.5 - 5.5 mm; anthers tomentose, apices subulate and contorted ... *Trichodesma* 7

3b. Calyx less than 6 x 2 mm; anthers glabrous, apices obtuse, apiculate or with a small disc, not subulate or contorted:

4a. Style arising from between the carpels:

5a. Plant clothed with short, stiff, pointed, appressed hairs with tuberculate bases; flowers white; corolla throat densely hairy; style undivided; stigma one ... *Sericostoma* 6

5b. Plant clothed with stout, pungent, spreading hairs with tuberculate bases and with soft, non-pungent, non-tuberculate hairs; flowers yellow; corolla throat glabrous; style 2 - partite; stigmas two *Arnebia* 1

4b. Style when present terminal on the entire ovary, not inserted between the carpels:

6a. Flowers spicate; style one, originating in a fleshy, annular ring; stigma conical ... *Heliotropium* 5

6b. Flowers solitary; styles two, without fleshy, annular ring; stigma capitate ... *Coldenia* 2

1. **Arnebia Forssk.**


Deep rooted, decumbent or erect herbs. Leaves sessile, up to 8.0 x 0.8 cm, linear - lanceolate to lanceolate, acute or subacute. Flowers in seced, many flowered spikes. Calyx segments divided up to the base, unequal. Corolla tubular, densely villulose outside; lobes oblong, obtuse. Nutlets 4, ovoid - conic, acute, tuberculate.

*Fl. & Fr.:* Almost throughout the year.

A xerophytic herb found on low sand dunes and sandy plains; Bentheli village.
The roots yield a purple dye.

2. **COLDENIA L.**


Hairy herbs; rootstalk woody. Leaves alternate, petiolate, up to 2.5 × 1.5 cm, obovate or oblong. Flowers yellowish - white or white. Corolla lobes 4, oblong, rounded. Stigma capitate. Fruits c. 2 mm long, 4 lobed pyramid, separating into 4, 1 seeded, beaked, muriculate pyrenes.

*Fl.*: February May; *Fr.*: June November.

Common near dam sites; Tordi Sagar.

3. **CORDIA L.**

1a. Leaves alternate, broadly elliptic, ovate, obovate or suborbicular; seeds lenticular. ... *C. dichotoma* 1

1b. Leaves opposite or subopposite, oblong or oblanceolate; seeds ovoid ... *C. gharaf* 2


Deciduous trees, c. 8 m; bark grey. Leaves up to 10 × 7 cm, undulate or subentire, scabrous when old, softly pubescent beneath when young. Flowers in lax, terminal or axillary, pedunculate, cymose inflorescence, white. Corolla lobes 5, recurved. Filaments hairy below. Drupes c. 1.5 cm long, ovoid, apiculate, yellow or pink when ripe, surrounded by accrescent, irregularly toothed calyx. Seeds c. 1 cm across, stony, rugose.
Fl. : February  April ; Fr. : May - July.

Commonly planted along road sides ; Tonk.

Fruits are edible and are used as vegetable and also for preparing pickle.


Erect trees, 3 - 8 m ; bark grey. Leaves up to 11. 0 × 3.5 cm, rounded, retuse or mucronate at the apex, subentire, scabrous on both sides. Flowers in lax, terminal or axillary, short, paniculate corymb, cream. Corolla lobes 5, reflexed. Filaments glabrous. Drupes c. 1.2 cm long, ovoid, apiculate, longitudinally striate, shining, orange, orange yellow or reddish-brown when ripe, surrounded by the persistent, saucer shaped, accrescent calyx. Seeds c. 8 mm long, stony, pale brown.

Fl. & Fr. : Almost throughout the year.

Rare ; found in rocky habitats ; Ghati R. F.

Fruits are edible ; bark is used for cleaning the teeth.

4. **Ehretia P. Br.**


Shrubs or small trees, 3 - 5 m ; bark ashy grey ; younger branches downy. Leaves alternate, petiolate, variable, up to 7.5 × 4.0 cm, elliptic-obovate, elliptic or obovate, acuminate, acute, retuse or rounded at the apex, persistently hairy beneath and shortly hairy above. Flowers white, fragrant. Calyx lobes hairy beneath and shortly hairy above. Corolla lobes oblong, obtuse. Stigma capitae. Drupes c. 5 mm across, depressed globose, orange when mature, blackish and wrinkled when dry.

Fl. & Fr. : March - May.

Common tree of deciduous forests ; Aamli R.F. and Sohela R.F.
FLORA OF TONK DISTRICT

5. HELIOTROPION L.

1a. Plants glabrous; corolla glabrous

1b. Plants hairy; corolla hairy:

2a. Calyx divided up to 1/4 of their length; fruits completely enclosed by the calyx...

2b. Calyx divided nearly to the base; fruits not completely enclosed by the calyx:

3a. Leaves obovate, oblanceolate, elliptic, oblong-elliptic or ovate, 3-6 × 2-4 cm; flowers ebracteate; anthers free; style absent or inconspicuous:

4a. Calyx lobes very unequal; corolla lobes acute with intermediate teeth, tube hairy on both sides; nutlets appressed hairy on the back...

4b. Calyx lobes almost equal; corolla lobes rounded, without intermediate teeth, tube glabrous inside, hairy outside; nutlets minutely verrucose, finely puberulous...

3b. Leaves lanceolate or linear-lanceolate, less than 2.0 × 0.2 cm; flowers distinctly bracteate; anthers connate by their produced connectives; style distinct...


Prostrate or decumbent, halophytic herbs. Leaves fleshy, subopposite, subsessile, up to 4 × 1 cm, elliptic, elliptic-lanceolate, oblanceolate or linear-lanceolate, cuneate, margins irregular. Flowers in pedunculate, scrobioid spikes, white. Calyx lobes subequal. Corolla lobes obtuse, crisped at the margins. Style very short. Nutlets 4, each c. 2 mm long, rounded on the back, rugulose, glabrous, pale brown.

Fl. & Fr.: Almost throughout the year.

Commonly found in saline, marshy habitats; Mavasi river bed along Tonk Malpura road near Natra village.

Native of West Indies and Tropical America now spread throughout the tropical and subtropical regions of both hemispheres.


Erect herbs, 25 80 cm, clothed with bulbous-based hairs; rootstalk woody. Leaves up to 6 × 4 cm, elliptic oblong, ovate or obovate, sub-entire. Flowers in binate or trinate, scorpoid spikes, white. Stigma conical, hairy. Nutlets 4, each c. 1.5 mm long, ellipsoid.

Fl. & Fr. : September May.

Common weed in wastelands, fallow fields and in dried up tanks; Haji-Ki-Kothi and Niwai.


Erect, decumbent or prostrate, perennial herbs; rootstalk woody. Leaves alternate to subopposite, petiolate, up to 3.5 × 3.0 cm, margins subentire. Flowers in forked, scorpoid spikes, white. Stigma conical. Nutlets usually 4, each c. 1 mm long.

Fl. & Fr. : Almost throughout the year.

Common on moist sandy-clayey soil; Tordi Sagar, Chand Sen bundha and Siras forest.


Decumbent or prostrate, appressedly hairy, perennial herbs; rootstalk woody. Leaves shortly petiolate, margins slightly revolute, entire. Flowers pedicellate or subsessile, in axillary or terminal spikes, white. Calyx lobes subequal. Corolla hairy outside, throat yellow; lobes broadly ovate, acute. Stigmatic ring conspicuous. Nutlets 4, each c. 2 mm, long with rounded back, appressedly hairy, surrounded by the enlarged calyx.

Fl. & Fr. : Almost throughout the year.

Common weed in cultivated and fallow fields and in dried up tanks; Niwai tank.

5. Heliotropium supinum L. Sp. Pl. 130. 1753 ; Wight, Ic. 4 (2) : 17. t. 1387. 1848 ; C.B. Clarke in Hook. f. Fl. Brit. Ind. 4 : 149. 1883 ; Dutrie,

Prostrate, spreading, much branched, villous herbs. Leaves up to 2.5 × 1.5 cm. elliptic obovate, ovate or suborbicular, entire or crenate. Flowers in simple or forked, villous, scorpioid spikes, white. Corolla hairy outside; lobes rounded. Style distinct; stigma conical, apex hirsute. Nutlets 1 - 4, each c. 3 mm long, rounded on the back, margined, obscurely tuberculate, brown.

*Fl. & Fr.*: Almost throughout the year.

Common in dried up tanks; Niwai.

6. **Sericostoma** Stocks ex Wight


Deep rooted, erect or straggling, strigose undershrubs, 20 - 35 cm. Leaves sessile, up to 2.0 × 0.3 cm, linear - lanceolate or oblong lanceolate, subobtuse. Flowers bracteate, in 2 - 4 (-5) flowered racemes. Calyx segments subequal. Corolla lobes equal to the tube, strongly veined. Stamens inserted at the sinuses of the corolla lobes. Nutlets usually 2, ovoid, keeled on the ventral face, rounded on the back, tuberculate, surrounded by the enlarged, persistent calyx.

*Fl. & Fr.*: Almost throughout the year.

Common on low sand dunes and in sandy wastelands; Bentheli and Siras village.

7. **Trichodesma** R. Br. *nom. cons.*


Erect or diffuse, much branched herbs or undershrubs with tubercle based hairs. Leaves opposite, crowded, sessile, up to 6.5 × 3.5 cm, ovate-oblong, lanceolate or linear lanceolate, base semiamplexicaul, margins revolute. Flowers solitary, leaf-opposed or in terminal, few flowered cymes, pale blue or sky-blue. Calyx lobes sagittate auriculate at the base. Corolla hairy inside; lobes ovate with filiform apices and brownish glandular swellings at the base. Nutlets 4, each c. 5.5 × 3 mm, ovoid with rounded, smooth back and scabrous or rugose inner face, white, surrounded by the accrescent calyx.

Fl. & Fr.: August March.

Common in rocky habitats; Tordi R. F.

The binomial *T. indicum* is often attributed to R. Br. (Prodr. 496. 1810) but he only stated that *Borago indica* L. belonged to *Trichodesma* and did not actually make the combination.

53. CONVOLVULACEAE

1a. Styles 2; stigmas 4. ...  
1b. Style 1; stigma 1 or 2:
   2a. Pollen smooth:
      3a. Stigmas 2, linear or filiform; corolla white or pink ...  
      3b. Stigmas biglobular, corolla bright yellow or white ...  
   2b. Pollen spinulose:
      4a. Corolla salver-shaped; stigmas 2, linear-oblong, fruits woody, apiculate, indehiscent or irregularly dehiscent ...  
      4b. Corolla campanulate or funnel-shaped; stigma capitate or biglobular; fruits neither woody nor apiculate, dehiscing by valves ...
1. **Convolvulus L.**

1a. Leaves petiolate, broadly oblong, obtuse or retuse, base hastate or sagittate; sepals glabrous; seeds glabrous ... *C. arvensis* 1

1b. Leaves subsessile, ovate lanceolate or lanceolate, acuminate, narrowed to the base; sepals densely hairy; seeds pubescent ... *C. prostratus* 2


   Creeping or twining, perennial herbs. Leaves up to 5.5 × 2.0 cm. Flowers bracteate, axillary, solitary or 2–3 on a long peduncle, pale pink. Sepals unequal. Corolla campanulate. Capsules c. 5 × 4 mm, ovoid-globose, glabrous, with persistent calyx and style base, 4 seeded. Seeds subtrigonus, dark brown, black or reddish brown.

   *Fl. & Fr.* : November March.

   Common weed in cultivated fields ; Deoli.


   Prostrate or suberect, fulvous villous, perennial herbs. Leaves up to 5.0 × 0.5 cm. Flowers bracteate, axillary, solitary or 2–3 together, sessile or on a short pedicel, pale pink or white. Sepals unequal. Corolla campanulate. Capsules c. 3.5 mm long, ellipsoid or subglobose, smooth, with persistent calyx, 4 seeded. Seeds ellipsoid, smooth, black.

   *Fl. & Fr.* : Almost throughout the year.

   Common in fallow fields and westelands ; Bentheli village and Tordi R.F.
2. **Evolvulus L.**


Decumbent, much branched, pilose, perennial herbs. Leaves up 3.5 × 1.3 cm, ovate, elliptic - oblong or lanceolate, narrowed to rounded the base, acute, acuminate or obtuse and mucronate at the apex, entir Flowers bracteate, axillary, solitary or 2 – 3 on a c. 4 cm long, filiform p duncle, blue. Sepals lanceolate, acuminate, pilose. Corolla rotate. Capsule c. 4 mm across, globular, 4 seeded. Seeds trigonously ovoid, glabrous dark brown.

*Fl. & Fr.* : August November.

Common ; Kakor R. F.

A polymorphic species.

3. **Ipomoea L.**

1a. Erect shrubs with milky latex ; midrib below with two small glands at the base of the leaf blade ; seeds comose atleast on margins ... _I. carnea ssp._ fistulosa 3

1b. Twining, trailing or prostrate herbs without milky latex ; leaf blade devoid of glands ; seeds glabrous or densely pubescent :

2a. Glabrous , aquatic or marshy plants ; stem fistular, spongy, rooting at the nodes ... _I. aquatica_ 1

2b. Hairy, dry-land plants ; stem solid, not rooting at the nodes :

3a. Leaves white tomentose beneath, capsules hairy ... _I. arachnosperma_ 2

3b. Leaves glabrous or hispid but not white - tomentose beneath ; capsules glabrous :
4a. Stem muricate; flowers ebracteate; sepals glabrous, awned; filaments hairy at the base; capsules more than 1.5 cm long ... *I. turbinata* 6

4b. Stem hispid, not muricate; flowers bracteate; sepals hispid, not awned; filaments glabrous; capsules less than 1 cm long:

5a. Peduncle very short, inconspicuous; bracts linear ... *I. sindica* 5

5b. Peduncle long and distinct; bracts foliaceous:

6a. Leaves palmately 5-9-lobed ... *I. pes-tigridis* 4a

6b. Leaves entire or shallowly lobed ... *I. pes-tigridis* var. capitellata 4b


Leaves variable, up to 9.0 × 4.5 cm, ovate-triangular or oblong-lanceolate, hastate or cordate at the base, acute or obtuse, subentire. Flowers bracteate, axillary, solitary or in few-flowered cymes, pale pink or purple; peduncle 3-7 cm long. Sepals subequal. Corolla funnell-shaped. Capsules ovoid to globose. Seeds densely soft pilose.

*Fl. & Fr.*: Almost throughout the year.

Common in tanks and marshy places; Banetha village.

The tender young shoots and leaves are used as vegetable by the local people.

Densely patently hairy herbs. Leaves up to 10.0 × 11.5 cm, obovate or cordate at the base, acuminate at the apex, entire or slightly lobed. Flowers few, axillary cymes, dark pink or red. Calyx lobes lanceolate, acuminated, setose. Corolla lobes acutely lobed, with hairy mid-petiole bands. Capsules c. 8 mm long, ovoid or subglobose. Seeds c. 4 long, valvate pubescent, black.

*Fl. & Fr.*: August - November.

Common; Tonk (*Maheshwari* 52955, LWG.)


Shrubs, up to 2.5 m; stem fistulose. Leaves up to 22 × 12 cm, broadly ovate or ovate-lanceolate, cordate at the base, acuminate at the apex. Flowers bracteate, in axillary and terminal, many-flowered cymes, showy, pale pink, lilac or purple. Sepals subequal, suborbicular or reniform with 5 nectaries between their bases. Stigma globose-capitate. Capsule c. 1.5 cm long, ovoid to subglobose, glabrous, with persisting calyx.

*Fl. & Fr.*: Throughout the year.

Common near streams, often cultivated as a hedge plant; near temple.

A native of America now naturalised in many parts of India.


Patently hairy herbs. Leaves compound, lobes up to $7 \times 3$ cm, oval to elliptic, oblong or obovate, narrowed or attenuate at the base, acute or acuminate. Flowers in axillary heads on a long peduncle, pale pink or white; bracts foliaceous. Sepals unequal, lanceolate, hairy. Capsules c. 1 cm long, ovoid, brown, 4-seeded. Seeds c. 4 mm long, trigonous with distinct hilum, tomentose, whitish grey.

*Fl. & Fr.* : August October.

Common in wastelands; Haji Ki Kothi (Niwai).


It differs from the type only in having undivided, ovate-cordate, acute leaves.

*Fl. & Fr.* : August October.

Haji-Ki-Kothi (Niwai).

Forms intermediate between the type and var. *capitellata*, having slightly lobed leaves are quite common.


Annual herbs. Leaves up to $6.5 \times 4.0$ cm, triangular-hastate or broadly ovate, base deeply cordate with rounded and often diverging lobes, acute or acuminate, subentire. Flowers in axillary, few flowered cymes, often solitary, shortly pedicellate, white. Capsules c. $8 \times 8$ cm, globose or ovoid, pale brown. Seeds c. 4 mm long, trigonous, minutely grey - velvety, black.

*Fl. & Fr.* : August November.

Common in gravelly/rocky habitats; Kacha Bundha near Tonk.
It closely resembles *I. eriocarpa* R. Br. but the latter can be distinguished by the hispid capsules and glabrous seeds.


Perennial shrubs. Leaves up to 8 × 10 cm, ovate - cordate to suborbicular, acuminate or acute, subentire. Flowers axillary, solitary or in few-flowered cymes, pale purple. Sepale subequal. Capsules c. 1.8 × 1.5 cm, ovoid, apiculate, pale brown, 4 seeded. Seeds c. 1.0 × 0.5 cm, glabrous, blackish.

*Fl. & Fr.*: August October.

Common on slopes of hills; Tonk (*Maheshwari* 52979, LWG).

4. **Merremia** Dennst. ex Endl. *nom. cons.*

1a. Twining or climbing, hirsute herbs; leaves palmately 5-lobed; flowers on a long peduncle, white; sepals densely hirsute; anthers spirally twisted; seeds trigonous.  

1b. Prostrate, glabrescent herbs; leaves simple; flowers subsessile or sessile, yellow; sepals fimbriate along the margins and more or less hairy on the back; anthers straight; seeds plano-orbicular

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Annuals. Lobes of leaves up to $8.5 \times 4.5$ cm, elliptic, subentire. Flowers bracteate, axillary, solitary, or 2 - 3 or more. Sepals unequal, ovate-lanceolate, acute. Corolla funnel shaped. Capsules 1.5 - 2.0 cm long, subglobose or ovoid, glabrous, papery, 4 - seeded. Seeds c. 5 cm long, shining, brown or black with white hylum.

*Fl. & Fr.* : September - November.

Common : Kacha Bundha (Tonk).

Very variable in respect of hairyness and size of leaflets. It resembles *M. dissecta* (Jacq.) Hall. in which the sepals are glabrous, while in *M. aegyptia* (L.) Urban the sepals are hirsute.


Perennials, rooting at nodes. Leaves up to $3 \times 3$ cm, reniform to broadly ovate, cordate at the base, obtuse, emarginate or rarely acute, roughly crenate or subentire. Flowers in bracteate, axillary, cymose clusters. Outer 2 sepals apiculate, inner 3 emarginate. Corolla tubular - campanulate. Capsules c. 4 mm across, subglobose, glabrous, 2 - 4 seeded. Seeds c. 2.5 mm across, glabrous, brown.

*Fl. & Fr.* : August - November.

Common in moist places ; Siras R.F.

5. *Rivea* Choisy


Large, woody, whitish grey - tomentose climbers. Leaves up to $6.5 \times 9.0$ cm, reniform - ovate or suborbicular, cordate at the base, shortly
acuminate, obtuse or retuse, entire, with a pair of glands at the base of lamina beneath. Flowers bracteate, axillary, 1-3 on a long peduncle, white or creamish-white. Sepals oblong ovate, obtuse, silky hairy. Corolla 7-9 cm long, caducous. Fruits c. 1.5-1.0 cm, subglobose or ovoid. Seeds c. 7.5-5.0 mm, trigonous with a distinct hilum, glabrous, brown.

Fl. & Fr.: August - November.

Common climber in forests; Sohela R.F.

54. CUSCUTACEAE

Cuscuta L.


Fleshy, leafless, glabrous, twining, stem parasites; branches yellowish-green or pale green, forming dense masses on host trees and shrubs. Flowers bracteate, solitary, clustered or in racemes, white or creamish. Calyx cupulate, 5-partite, subequal. Corolla campanulate tubular, 2-3 times longer than the calyx lobes; lobes reflexed; base of corolla tube with fimbriate scales. Stamens 5. Stigmas 2, divergent. Capsules 5.5-8.0 mm in diam., depressed globose, conical at the apex, glabrous. Seeds 2-4, each c. 3.5 mm across, suborbicular, glabrous, minutely pitted, brownish - black.

Fl. & Fr.: November - March.

Common on Ziziphus nummularia (Burm. f.) Wight & Arn.; Pachewar near Malpura.

55. SOLANACEAE

1a. Corolla rotate or broadly campanulate; anthers connivent in a short cone, dehiscing by apical pores or short silt ... Solanum 4
1b. Corolla tubular; anthers free, dehiscing longitudinally:

2a. Spinous, glabrous shrubs; flowers less than 1.5 cm long; fruit a berry

Lycium 2

2b. Unarmed, viscid - pubescent or tomentose herbs or undershrubs; flowers more than 3 cm long; fruit a capsule:

3a. Flowers in terminal racemes; fruiting calyx completely enveloping the fruit, lobes straight; capsules smooth

Nicotiana 3

3b. Flowers solitary; fruiting calyx not enveloping the fruit, lobes recurved; capsules spiny

Datura 1

1. Datura L.


Erect, stout undershrubs, 1.0 - 1.5 m; stem fistular, terete. Leaves alternate or subopposite, up to 20 × 12 cm, ovate lanceolate to broadly ovate, unequal at the base, acute or acuminate, entire or repand-dentate. Flowers axillary, pedicellate, white or dirty white. Calyx tubular, up to 11 cm long; lobes acute. Corolla twice as long as the calyx; limb 10-toothed. Stigma bilobed. Capsules c. 4 × 4 cm, ovoid to globose, deflexed. Seeds closely packed, c. 4 × 3 mm, subreniform, compressed, foveolate, yellowish brown.

Fl. & Fr.: Almost throughout the year.

Common weed of fallow fields and wastelands; Ghati village.

This is a S. American plant, introduced into India and now almost naturalized. It is regarded as the most poisonous of all the species of Datura.

2. Lycium L.


Suberect or erect, glaucous shrubs, 1 - 3 m ; branches whitish, armed with sharp spines which sometimes elongate and bear leaves and flowers. Leaves subsessile, variable, up to 4.5 × 1.3 cm, oblong - lanceolate, lanceolate, oblong - spathulate or elliptic, attenuate, entire. Flowers pedicellate, solitary or in fascicles of up to 5, funnel - shaped, white. Filaments hairy at the base. Ovary seated on cup shaped disc. Stigma mushroom head like. Fruits c. 4 mm in diam., subglobose, bright red when ripe, with persistent calyx. Seeds many, discoid or subreniform, minutely pitted, yellowish - brown.

*Fl. & Fr.* : August March.

Common in sandy habitats ; Padara village.

Berries are eaten by the local people. The leaves and tender branches are used as fodder for camels and goats.

3. *Nicotiana* L.


Frectangle herbs, 15 - 40 cm. Leaves sessile or subsessile, basal rosette, up to 12.5 × 9.0 cm, spatulate, cuneate, acute to obtuse, margins wavy to subentire ; cauline leaves alternate, subamplexicaule, lanceolate, elliptic, ovate - lanceolate or ovate - elliptic, acuminate, scabridly hairy particularly on midvein. Flowers bracteate, purplish pink or pale pink. Corolla tube c. 3.5 cm long, ventricose. Stigma capitate, bilobed. Fruits c. 1.0 × 0.6 cm, ovoid - conical, pale brown. Seeds numerous, minute, subglobose, rugose, pale brown.

*Fl.* : April May ; *Fr.* : October.

Common ; Banas river bed near Frazer bridge (Tonk).

An introduced weed from Mexico and West Indies.
4. Solanum L.

1a. Plant prickly; berries yellow, c. 2 cm in diameter ... *S. surattense* 2

1b. Plant not prickly; berries black, blackish purple or red, c. 0.8 cm in diameter ... *S. nigrum* 1


Erect or rambling, glabrous herbs, 50–75 cm. Leaves up to 10.5 × 6.0 cm, ovate or ovate-oblong, sinuate-toothed, lobed or entire, base cuneate, often incised. Flowers nodding, in extra axillary umbellate cymes, white. Calyx 5 lobed, sparsely puberulous. Filaments hairy at the base. Berries glabrous. Seeds discoid, minutely pitted, yellow.

*Fl. & Fr.*: Almost throughout the year.

Common weed in cultivated fields; Ghati village.

A highly polymorphic plant. It comprises diploid, tetraploid and hexaploid races.


Prostrate, decumbent ascending or diffuse perennials; stem with many, compressed, straight, yellow, shining prickles up to 1.8 cm long. Leaves up to 10.0 × 7.5 cm, ovate elliptic to oblong, pinnately lobed or sinuate, the midrib and often the main lateral nerves armed with long prickles. Flowers 1–5, in extra axillary cymes, deep violet or purple, rarely white. Calyx prickly and stellately hairy outside. Berries globose. Seeds discoid, minutely pitted, pale brown.

*Fl. & Fr.*: Almost throughout the year.

Very common weed in wastelands and in fallow fields throughout the district.
1a. Perfect stamens 2:

2a. Flowers in lax, axillary racemes; corolla 4-lobed, rotate

2b. Flowers solitary, in pairs or 1-3-nate; corolla subequally 5-lobed or 2-lipped with 5 unequal lobes:

3a. Erect herbs; flowers in distant pairs, bracteate; 2-lipped

3b. Prostrate herbs; flowers solitary or 1-3-nate, ebracteate; corolla subequally 5-lobed:

4a. Calyx 3-lobed; anthers 2-celled; seeds ovoid, smooth

4b. Calyx 5-toothed; anthers 1-celled; seeds angular, oblong, truncate at both ends, obscurely striate

5a. Herbaceous root-parasites; calyx distinctly ribbed; corolla tube abruptly incurved at or above the middle

5b. Non-parasitic herbs; calyx not ribbed; corolla tube straight:

6a. Leaves alternate, lower usually lobed or pinnatifid; filaments pubescent or bearded:

7a. Twining, procumbent or diffuse, villous herbs; flowers solitary; corolla 2-lipped, spurred; anthers 2-celled; seeds echinulate

7b. Erect, glandular pubescent herbs; flowers in lax racemes; corolla rotate, not spurred; anthers 1-celled; seeds warty

6b. Leaves opposite, not lobed; filaments glabrous:

8a. Erect, glandular-pubescent, dry land herbs; corolla 2-lipped; anther cells stipitate; seeds alveolate or reticulate:

9a. Aromatic herbs; flowers dark blue or violet; stamens included; capsules glabrous

9b. Non-aromatic herbs; flowers yellow; stamens exerted; capsules pubescent

8b. Prostrate, succulent, glabrous, marsh-land herbs; corolla not 2-lipped; anther cells not stipitate; seeds longitudinally striate


Herbs, rooting at nodes. Leaves sessile, up to 2.2 × 0.7 cm, obovate-oblong or spathulate, subentire. Flowers bracteate, axillary, solitary, on a long pedicel, pale purplish blue, purple violet, purplish pale pink, purplish white or white. Calyx lobes 5, free, unequal. Corolla campanulate; lobes 5, subequal. Capsules c. 0.6 mm long, ovoid, acute, pale brown. Seeds many, each c. 0.5 mm long, oblong or globose, pale brown.

*Fl. & Fr.*: Almost throughout the year.

Common in marshy/aquatic habitats; Niwai, Uniyara river bed and Banas river bed near Banetha.

For the nomenclature of this species reference may be made to Philcox (*l. c.*).

2. Dopatrium Buch. Ham. ex Benth.


Fleshy, glabrous annuals, 10 - 30 cm; stem red. Leaves opposite, sessile, up to 2.0 × 0.5 cm, obovate or oblong, acute or obtuse, entire. Flowers axillary, dark pink; lower flowers sessile, upper ones on long, filiform pedicel. Calyx 5 partite. Stigma 2 lamellate. Capsules c. 2 mm across, globose. Seeds many, each c. 0.5 mm long, oblong or ellipsoid, tuberculate, pale blackish brown.

*Fl. & Fr.*: August November.
An ephemeral plant found in marshy places; tank near Rampura village.


Tufted, glabrous, delicate herbs, rooting at nodes. Leaves membranous, opposite, sub sessile or petiolate, up to 7.0 x 1.5 mm, linear - spatulate, entire. Flowers minute, axillary, solitary, pale pink or bluish - white. Calyx campanulate. Stigma spatulate. Capsules 2.0 x 2.5 mm, globose, enclosed in the enlarged calyx. Seeds many, pale brown.

Fl. & Fr.: October - February.

Very common in moist, marshy and aquatic situations; Rampura village.

It is the tiniest plant of the family.


Perennial herbs. Leaves petiolate, variable in shape and size, up to 3.0 x 3.5 cm; lower leaves 5 - 7 lobed or triangular - hastate; uppermost usually sagittate, acute. Flowers ebracteate, axillary, pedicellate, yellow.
Calyx 5, free. Stigma capitate. Capsules c. 3.5 mm long, ovoid, pale brown. Seeds c. 0.25 mm long, oblongish, black.

Fl. : August - January ; Fr. : February May.


5. LINDENBERGIA Lehm.


Erect or straggling, polymorphic herbs. Leaves petiolate, up to 10.5 × 6.5 cm, broadly ovate, ovate or elliptic, acute or subacute, crenate-serrate; upper leaves smaller and passing into bracts. Flowers axillary, sessile or pedicellate, solitary or in pairs. Calyx campanulate; lobes 5. Stigma capitate. Capsules c. 6 mm long, slightly laterally compressed. beaked. Seeds many, each c. 0.5 mm long, oblong or ellipsoid, reticulate, brownish.

Fl. & Fr. : August - May.

Commonly found in rock crevices; Tordi R. F., Kakor R. F. and Anwa R.F.

6. PEPLIDIUM Delile

Succulent, glabrous herbs, rooting at nodes. Basal leaves rosulate, spatulate; upper opposite, up to 1.5 x 1.0 cm, obovate, spatulate or oval, entire; petiole scarious. Flowers solitary or 3 in axils. Stigma spatulate, recurved. Capsules 2.0 - 2.5 mm in diam., ovoid to globose, 2 - grooved along the sepa, surrounded by the persistent, enlarged, membranous calyx. Seeds many, minute, shining pale brown.

Fl. & Fr.: September - January.

Common in marshy habitats; Tordi Sagar.


Perennial herbs, up to 20 cm. Leaves sessile, up to 12.0 x 0.5 cm, oblong or obovate, auricled or amplexicaul at the base, acute, margins serrate or serrulate at the apex or subentire. Flowers bracteate, axillary, solitary or very rarely in few-flowered racemes. Calyx 5-partite, glandular-hairy and ciliate. Capsules c. 6 mm long, ovoid - oblong, acuminate, pale brown, enveloped by the persistent calyx. Seeds many, minute, ovoid or oblong - ellipsoid, alveolate, black.

Fl. & Fr.: January May.

Rare; found in dried up tanks; Niwai tank.

8. *Striga* Lour.

1a. Plants pink or reddish-pink, turning black when dry; leaves reduced to scales; calyx tube 4 - ribbed, teeth 4 ... *S. gesnerioides* 2

b1. Plants green, not turning black when dry; leaves not reduced to scales; calyx tube 15 - ribbed, teeth 5 ... *S. angustifolia* 1


Erect, scabrous herbs, 15 - 30 cm; stem ribbed. Leaves usually alternate, sessile, up to 4.5×0.4 cm, linear to linear lanceolate, acute, entire or sub-entire. Flowers axillary, subsessile, solitary, forming lax, leafy, terminal spikes, white. Corolla 2 lipped; throat hairy. Stamens included. Stigma capitate. Capsules c. 0.7 cm long, ovoid or ellipsoid, apiculate, glabrous. Seeds many, each 0.4 - 0.6 mm long, oblong, minutely reticulate, blackish.

Fl. & Fr.: August - October.

Common in fallow fields; Rajmahal R. F.

It is a root parasite on grass species.


Erect, glabrous or puberulous herbs, c. 40 cm. Leaves up to 1.5×0.3 cm. ovate oblong or ovate lanceolate, acute. Flowers bracteate, sessile, in terminal spikes, pale pink to pale white. Corolla 2 lipped, throat hairy. Stamens included. Stigma capitate. Capsules c. 4.5 mm long, ovoid oblong, glabrous, with persistent style base. Seeds many, each c. 0.4 mm long, oblong, minutely reticulate, pale brown.

Fl. & Fr.: July - November.

A common root parasite on Lepidagathis trinervis Nees; Tordi Sagar.

9. VERBASCUM L.


Annuals, 50 - 75 cm. Basal leaves rosette, long petioled, up to 15 x 5 cm, oblong - ovate, ovate or elliptic, lyrate pinnatifid, upper ones usually sessile, passing into bracts, subcordate to amplexicaul, crenate-dentate. Calyx 5, free. Corolla 5-lobed. Stigma capitate. Capsules c. 4 mm across, subglobose or ovoid, punctate. Seeds many, each c. 0.5 mm long, oblong, truncate, black.

Fl. & Fr.: November - March.

Common on sandy and sandy - loam soil and also in dried up tanks; Niwai, Tordi Sagar and Banas river bed, Tonk.

10. VERONICA L.


Erect, decumbent or creeping, glabrous or glandular - pubescent annuals, 10 - 25 cm high. Leaves opposite, lower petiolate, upper sessile, up to 6.0 x 1.5 cm, oblong, ovate - lanceolate or oblong - lanceolate, remotely serrate or subentire. Flowers bracteate, pedicellate, white or pinkish-white. Calyx 4, free, acute. Stamens exserted. Stigma subcapitate. Capsules c. 3 mm in diam., compressed, orbicular, notched, glabrous, surrounded by the calyx. Seeds many, minute, ovoid, more or less biconvex, rugulose, polished, pale brown.

Fl. & Fr.: Almost throughout the year.

Rare; found in moist situations; Banas river bed (Tonk).
57. BIGNONIACEAE

TECOMELLA Seem.


Trees, 3 - 8 m; bark grey to whitish - grey; branches drooping. Leaves up to 13.0 × 3.5 cm, narrowly oblong, obtuse or retuse, margins undulate or subentire. Flowers in corymbose racemes from short, lateral branches, showy, reddish yellow to orange - yellow. Calyx campanulate; teeth 5. Corolla tubular, subequally 5 lobed. Stamens 4, exserted; anther cells divergent. Stigma bi lamellate, spatulate - oblong. Capsules c. 26.0 × 1.3 cm, linear - oblong, slightly curved, glabrous. Seeds c. 0.9 mm across (excluding the wing), compressed, discoid, brown, winged; wing c. 2 cm long, membranous.

*Fl. & Fr.:* October - April.

Common on plains on sandy - loam and sandy soil; Sohela R. F.

The colour of the flower is very variable.

The wood is of high timber value. The leaves are used as fodder.


Commonly planted along road sides and also in gardens.

Native of Tropical Africa.

58. MARTYNIACEAE

MARTYNIA L.


Erect, glandular - tomentose herbs or undershrubs, c. 1.5 m ; stem fistular. Leaves up to 16 x 15 cm, broadly ovate, deeply cordate at the base, acute, distinctly dentate. Flowers in lax, terminal racemes, drooping, showy, pink with red patches on the corolla. Bracts and bracteoles petaloid, pink. Sepals 5, free, unequal. Corolla 5 lobed, the posterior lobe the largest. Stamens 2. Stigmas 2, flat. Capsules c. 3 cm long, ovoid, hard with 2 prominent curved hooks, glandular, 2 -valved, black.

_Fl. & Fr._ : August November.

Native of Mexico, now quite naturalized and found as a common weed ; Kacha Bundha near Tonk.

59. ACANTHACEAE

1a. Scapigerous, stemless herbs ; leaves radical, rosette. ... _Elytraria_ 4

1b. Plant with stem and cauline leaves :

2a. Fertile stamens 2 :

3a. Calyx 4 - partite :

4a. Armed undershrubs ; flowers yellow ; bracts and calyx spine - tipped ; calyx segments unequal ; capsules 2 - seeded ... _Barleria_ 1

4b. Unarmed herbs ; flowers white, pale pink or pale purple ; bracts and calyx not spine - tipped ; calyx segments equal ; capsules 4 - seeded ... _Rostellularia_ 9

3b. Calyx 5 - partite :

5a. Flowers in axillary or terminal, linear spikes or in clusters ; filaments pubescent at the base only ; lower anther cell spurred ... _Justicia_ 6

5b. Flowers in trichotomously branched, lax panicles or axillary, simple or branched unilateral racemes ; filaments sparsely hairy throughout ; anther - cells not spurred :

6a. Flowers in trichotomously branched, lax panicle ; corolla 4 lobed ; anther - cells not bearded ; capsules 4 seeded ; seeds discoid or
orbicular, slightly rugose, glandular-papillose, with a white aril

6b. Flowers in axillary, simple or branched, unilateral racemes; corolla 5-lobed; anther-cells bearded at the base; capsules many-seeded; seeds oblong, rugosely pitted, not arillate

2b. Fertile stamens 4, didynamous:

7a. Leaves in whorls of 4; bracteoles 8(-10) in opposite pairs, accrescent, upper margins with stiff, retrorsely scabrid bristles; calyx 4-partite; seeds echinate

7b. Leaves opposite; bracteoles less than 8, margins without bristles; calyx 5-partite; seeds clothed with white, silky, hygroscopic hairs:

8a. Flowers solitary, axillary; capsules elliptic-clavate, more than 2-seeded; seeds discoid or suborbicular

8b. Flowers in spikes or heads, often aggregated into radical or subradical heads; capsules compressed, ovoid or obovoid-lanceolate; 2-seeded; seeds ovoid-oblong or oblong

1. Barleria L.


Glabrous, bushy undershrubs, 50-75 cm. Leaves petiolate, up to 11.0 × 5.2 cm, elliptic or ovate-elliptic, tapering at the base, acuminate, bristle-tipped, entire; interpetiolar spines up to 4.5 cm long, whitish, acicular. Flowers in terminal spikes. Bracts foliaceous. Bracteoles 2, linear-subulate, keeled. Corolla infundibuliform, obscurely 2-lipped,
pubescent outside. Stigma entire. Capsules c. 1.5 cm long, ovoid, beaked, glabrous, brown. Seeds c. 6 mm across, ovoid, compressed, shining brown, clothed with silky, appressed hairs.

*Fl. & Fr.*: Almost throughout the year.

Common in rocky habitats; Tordi R.F. and Rajmahal R.F.

2. **Blepharis Juss.**


Semierect or prostrate, pubescent herbs or undershrubs. Leaves subsessile or petiolate, up to 8.5 × 3.5 cm. elliptic, ovate lanceolate or ovate - elliptic, cuneate, acute and finely apiculate, entire or serrulate. Flowers axillary, 2–3 together, sessile, whitish with purplish - pink veins and yellow patch on the lower lip. Lower lip of corolla 3 lobed; upper lip obsolete. Connective of lower pair of stamens produced; the larger cell of anthers densely bearded on the margins. Stigma shortly 2 - fid. Capsules c. 8 mm long, ellipsoid, shining brown, 2 seeded. Seeds c. 3.5 mm across, suborbicular, compressed.

*Fl. & Fr.*: September - January.

Common in rock crevices; Toda Rai Singh R. F.

3. **Dipteracanthus Nees emend. Bremek.**

Straggling, hoary pubescent undershrubs, up to 0.5 m; stem quadrangular. Leaves petiolate, up to 5 × 3 cm, ovate or ovate-elliptic, base rounded, apex obtuse or apiculate. Flowers white. Bract absent. Bracteoles 2, foliaceous. Corolla infundibuliform, caducous; lobes 5, rounded. Stigma 2 lamellate, unequal. Capsules c. 1.5 - 2.0 cm long, pointed, glabrous, brown. Seeds c. 3.5 - 4.0 mm across, one surface glabrous, the other pubescent, margins with hygroscopic white hairs, pale brown.

Fl. & Fr.: Almost throughout the year.

Common on hills in rocky habitats; Sopari and Toda Rai Singh.

R. F.

4. ELyTRARIA A. Michx. nom. cons.


Small herbs. Leaves petiolate, up to 20 × 8 cm, obovate or oblanceolate, base tapering, obtuse at the apex, crenate. Scapes many, up to 21 cm long; spike simple or branched. Flowers white. Bract 1. Bracteoles 2, smaller than the bract. Calyx segments 4, unequal, with scarious and ciliate margins. Corolla 2 lipped, 5-lobed. Stamens 2. Stigma slightly 2-lobed. Capsules c. 5 mm long, ovoid, acute, glabrous. Seeds many, minute, somewhat ovoid, minutely papillose, pale brown.

Fl. & Fr.: May - October.

Rare; found under the shade of trees on loamy soil; Banetha village near Tonk.

5. INDONEESIella Sreem.

Erect annuals, 15–50 cm; stem quadrangular, grooved, clothed with long, white, spreading hairs. Leaves opposite, decussate, sessile, up to 8.2 × 3.5 cm, oblong or elliptic-oblong, base cuneate or rounded, margins entire or subentire, ciliate. Flowers pinkish white, pale purple or white with red or purple spots on the lower lip; rachis glandular-hairy. Bracts linear-lanceolate. Bracteoles very small, subulate. Calyx enlarging in fruits. Stigma shortly 2-lobed. Capsules 1.0–1.2 cm long, elliptic-oblong, compressed, acute, hairy. Seeds c. 2.5 × 2.0 mm.

_Fl. & Fr._: August - November.

Common in rock crevices and on walls; Tonk (Maheshwari 52930, LWG).

6. **JUSTICIA L.**


Erect or straggling annuals, 10–50 cm. Leaves membranous, up to 4.5 × 2.8 cm, ovate-lanceolate or ovate, base rounded or cuneate, acute, entire, ciliate. Flowers sessile, few in axillary clusters, white with pinkish or purple throat. Bracts and bracteoles present or absent. Calyx linear-lanceolate, densely glandular-pubescent outside, ciliate on the margins. Stigma shortly bifid. Capsules dimorphic. Normal capsules c. 4 mm long, ellipsoidal, acutely beaked, pubescent, 4 seeded. Seeds tuberculate, glabrous. Abnormal capsules c. 3 mm long, with deeply dissected, c. 6 vertical wings; teeth densely retrorsely barbellate; 1-seeded. Seeds angled, glabrous, minutely punctate, bigger than those of the normal capsules.

_Fl. & Fr._: August - November.

Common at Toda Rai Singh (Maheshwari 52906, LWG).

7. **LEPIDAGATHIS** Willd.

1a. Leaves less than 5 mm broad, distinctly 3-nerved; flowers in one-sided spikes; bracts with a long, recurved spine equal to
the size of the lamina: calyx 5 - partite; anther - cells bearded

1b. Leaves more than 8 mm broad with only 1 midnerve; flowers in globose heads; bracts with a straight spine shorter than the lamina; calyx 4 - partite with one segment 2 - fid at the apex; anther - cells glabrous

\[ L. \text{ trinervis} \] 2


'Suffrericose, perennial herbs; branches procumbent, spreading. quadrangular, pubescent. Leaves sessile, up to 8.5 x 2.0 cm, linear-oblong or oblong - lanceolate, lineolate, acute. Flowers white or pale pink with brown or purple spots and streaks. Stigma slightly bifid. Capsules c. 5 mm long, ovoid, acute, glabrous, 2 seeded. Seeds c. 2.5 mm long, ovoid oblong, densely clothed with white, hygroscopic hairs.

*Fl. & Fr.*: September - November.

Common in gravelly places on sandy loam soil; Kakor forest.


Diffuse, suffrericose, perennial herbs; stem quadrangular. Leaves sessile, up to 5.5 x 0.3 cm, linear, base tapering, apex acute, margins scabrous. Flowers in axillary, sessile spikes; spikes solitary or many, packed together and forming a single head near the base; flowers pink, pale violet or pale purple, sometimes white; throat with transverse streaks and yellow, brown and purple spots. Stigma entire. Capsules c. 6.5 mm long, ovoid-lanceolate, compressed, beaked, glabrous, pale yellowish - brown, 2 seeded. Seeds c. 4 mm long, oblong, rounded at the apex, grey, covered with long silky white, hygroscopic hairs.

*Fl. & Fr.*: November - January.

Common in rocky habitats; Kachha Bundha (Tonk), Gar R.F. and Banetha forest.
8. Peristrophe Nees


Erect, much branched, pilose herbs or undershrubs, 0.5 - 2.0 m; stem sulcate or angular. Leaves up to 8.5 × 5.5 cm, ovate, ovate lanceolate or ovate elliptic, strongly lineolate. Flowers pink, violet or purple, throat with dark pink spots. Bracts 2, unequal. Bracteoles 4, almost equal, longer than the bracts. Corolla hairy outside; upper lip entire; lower lip longer with 3 lobes; throat hairy. Stigma shortly bifid. Capsules c. 7 mm long, ellipsoid, beaked, narrowed into a cylindric stalk, pubescent. Seeds c. 2 mm across, brown.

*Fl. & Fr.*: October January.

Common on loamy soil; Janakpura village near Tordi Sagar.


1a. Plants pubescent or hairy; bracts and bracteoles shorter than the calyx, acute or acuminate, margins ciliate; capsules pubescent on the upper part; seeds compressed, papillose or minutely tuberculate:

2a. Stem and branches patently hairy; leaves ovate, suborbicular or broadly elliptic; seeds minutely tuberculare ...

2b. Stem and branches pubescent; leaves ovate-lanceolate, elliptic - lanceolate or linear-lanceolate; seeds papillose ...

1b. Plants glabrous; bracts and bracteoles longer or equal to the calyx, obtuse, glabrous; capsules glabrous; seeds not compressed, reticulately rugose

**R. prostrata** 1

**K. vahiti** ... 3

**R. quinqueangularis** ...

**var. peploides** 2

Prostrate of decumbent, much branched herbs; branches subquadrangular. Leaves petiolate, up to 2.2×1.1 cm, base rounded, margins entire. Flowers in axillary and terminal, narrowly linear spikes up to 7.5 cm, white or pink Stigma entire. Capsules c. 4 mm long, ellipsoid or oblong-ellipsoid, beaked, grooved. Seeds c. 1 mm across, ovoid-orbicular, reddish-brown.

*Fl. & Fr.*: September February.

Common in moist places, fallow fields and in rocky habitats; Tordi Sagar, Haji Ki Kothi and Siras.


Erect or procumbent ascending annuals; branches subquadrangular. Leaves petiolate, up to 4×2 cm, oblong elliptic or ovate oblong, lineolate, base attenuate, apex obtuse, margins subentire. Flowers in axillary and terminal, linear spikes up to 4.5 cm long, pink or white with purple streaks. Stigma entire. Capsules c. 6 mm long, ellipsoid, beaked, glabrous. Seeds c. 1.5 mm across, suborbicular, brownish.

*Fl. & Fr.*: July October.

Common in marshy habitats; Kakor R.F.

Straggling or suberect, much branched herbs, c. 0.5 m; branches quadrangular. Leaves sessile or shortly petiolate, up to 5.5 x 1.5 cm, cuneate, acute, entire. Flowers in axillary and terminal, narrowly linear spikes up to 12 cm long, pink or pale purple; lower lip with red streaks. Stigma entire. Capsules 4 - 5 mm long, oblong - ellipsoid, beaked, grooved, 4 - seeded. Seeds c. 1 mm across, ovoid or orbicular.

*Fl. & Fr.*: August November.

Common weed; Sohela R.F.

60. VERBENACEAE

1a. Flowers in capitae, ovoid or cylindric spikes; stamens included; stigma oblique, subcapitate:

2a. Prostrate or creeping herbs; leaves obovate - spatulate or oblanceolate; calyx deeply 2 - cleft; corolla 2 - lipped, falling off as a calyptra

2b. Shrubs; leaves ovate; calyx truncate; corolla tubular, not falling off as a calyptra

Phyla 3

Lantana 2

1b. Flowers in paniculate cymes; stamens exserted; stigma shortly 2 - fidd:

3a. Leaves simple; corolla tubular; filaments glabrous; drupes broadly obovoid, 4 - lobed, glabrous

Clerodendrum 1

3b. Leaves digitately 3 - 5 - foliolar; corolla 2 - lipped; filaments hairy at the base; drupes globose; pubescent...

Vitex 4

1. CLERODENDRUM L.

Shrubs or small trees 1 - 4 m; bark grey; young parts pubescent. Leaves opposite, petiolate, up to $6.0 \times 5.5$ cm, broadly ovate to rhomboid ovate, base subcordate or truncate, apex obtuse or acute, margins entire, undulate, or crenate - dentate. Flowers white. Bracts foliaceous. Calyx campanulate, 5 - lobed. Corolla 5 - lobed. Stamens 4, didynamous. Drupes c. 10 mm long, separating into 4, 1 seeded pyrenes, shining black, enclosed by the persistent, enlarged calyx. Seeds c. 7 mm long, oblong, pointed at the base, whitish.

_Fl. & Fr._: Almost throughout the year.

Common in wastelands, fallow fields and along hedges of cultivated fields; Ghati and Sohela R.F.

2 _Lantana L._


Erect, sparsely pubescent shrubs; stem 4 angular. Leaves opposite, petiolate, up to $9.0 \times 4.5$ cm, base narrowed, cordate or truncate, crenate-serrate. Flowers bracteate, axillary, white, fragrant. Corolla 4 - lobed; throat yellowish. Stamens 4, didynamous. Drupes c. 3 mm across, globose, violet or purple when ripe, with 2, 1 seeded pyrenes, enclosed in the thin, transparent calyx.

_Fl. & Fr._: Almost throughout the year.

Common on low rocky hills; Kacha Bundha (Tonk).

3. _Phyla Lour._


Appressed puberulent or glabrescent, perennial herbs, rooting at nodes. Leaves fleshy, opposite, petiolate, up to 1.5 × 1.4 cm, margins serrate dentate at upper half. Spikes globose cylindric at first, elongated later, up to 4.5 × 0.5 cm; peduncle up to 3 cm long. Flowers bracteate, pale pink, purple or white. Stamens 4, didynamous. Pyrenes 2, each c. 1.2 mm long, globose oblong, plano convex, pale brown, 1 seeded.

Fl. & Fr.: Almost throughout the year.

Common near moist places; Tordi Sagar and Banas river bed near Tonk.

4. Vitex L.


Shrubs, 1.5 2.0 m; branches sub quadrangular, densely whitetomentose. Leaves opposite, up to 14.0 × 3.5 cm, lanceolate, acuminate or acute. Inflorescence tomentose. Flowers bracteate, lavender, dull white, bluish purple or purplish - pink. Calyx teeth 5. Stamens 4, didynamous. Drupes c. 3 mm across, globose, slightly pubescent, black when ripe, surrounded by the enlarged, persistent calyx.

Fl. & Fr.: Almost throughout the year.

Common in wastelands; Mayola forest (Bisalpura).

61. LAMIACEAE

1a. Perfect stamens 2, ascending or erect; connective linear, long, transverse to and articulate with the filament

... Salvia 6
1b. Perfect stamens 4, declinate; connective not transverse; anthers confluent:

2a. Calyx tubular, 5-12-toothed; upper lip of corolla pubescent or woolly:

3a. Flowers in whorls, forming a spikate inflorescence, crimson - red, pinkish - purple or purple; calyx gland - dotted, mouth straight, teeth 5; upper lip of corolla oblong; stamens exerted; filaments bearded... *Anisomeles* 2

3b. Flowers in verticillasters, forming globular heads, white; calyx not gland - dotted, mouth oblique, teeth 6 - 12; upper lip of corolla saccate, hooded or concave; stamens included; filaments not bearded... *Leucas* 3

2b. Calyx 2-lipped, 5-toothed, upper lip deflexed; upper lip of corolla glabrous:

4a. Flowers in interrupted whorls; fruiting calyx deflexed, upper lip suborbicular, not closing the mouth of calyx tube, lower lip strongly awned; nutlets punctate:

5a. Aromatic herbs; stigma 2-fid; nutlets ellipsoid... *Ocimum* 4

5b. Inodorous herbs; stigma clavate or capitulate; nutlets globose or subglobose, compressed... *Orthosiphon* 5

4b. Flowers in compact, cylindric spikes; fruiting calyx not deflexed, upper lip ovate - lanceolate, deflexed over and closing the mouth of calyx tube, lower lip truncate, not awned; nutlets smooth... *Anisochilus* 1

1. **Anisochilus Wall. ex Benth.**


Erect annuals, 40 - 60 cm; stem fistular, quadrangular, finely pubescent. Leaves opposite, petiolate, up to 8×8 cm, broadly ovate, crenate. Flowers bracteate, purplie or violet. Calyx glandular - pubescent. Corolla
pubescent outside. Style 2 ftd. Nutlets c. 1 mm long, ovoid, 3 - angled with one face convex, shining, brown.

*Fl. & Fr.*: september - October.

Fairly common in rocky habitats; Toda Rai Singh R.F.

2. ANISOMELES R. BR.


Erect, pubescent, aromatic herbs or undershrubs, c. 1 m; stem 4-angular. Leaves opposite, petiolate, up to 13.5 × 11.0 cm, broadly ovate or ovate, cordate or truncate at the base, acuminate, crenate serrate. Bracts foliaceous. Nutlets c. 1.75 mm long, ovoid, apiculate, 3 angled with one face convex, smooth, shining, nearly black.

*Fl. & Fr.*: May October.

Common in rocky gravelly habitats; Toda Rai Singh R.F.

3. LEUCAS R. BR.

1a. Mouth of calyx much produced on the lower side; corolla tube not annulate within; middle lobe of the lower lip 2-fld; nutlets distinctly glandular at the apex ... *L. urticaefolia* 4

1b. Mouth of calyx produced on the upper side; corolla tube annulate within; middle lobe of the lower lip rounded or truncate; nutlets not glandular at the apex:

2a. Bracts 1 - 2 cm long; mouth of the calyx densely villous with the villi as long as the teeth; nutlets 3 mm or more long ... *L. cephalotes* 2
2b. Bracts less than 1 cm long; mouth of the calyx not villous or the villi shorter than the teeth; nutlets 2.5 mm or less long:

3a. Bracts ovate-lanceolate or lanceolate; calyx teeth 10, c. 2.5 mm long, lanceolate ... *L. nutans* 3

3b. Bracts linear; calyx teeth c. 12, c. 0.5 mm long, triangular ... *L. aspera* 1


Erect or diffuse, hispid annuals, 20 - 50 cm. Leaves opposite, subsessile, up to 6.0 × 1.8 cm, elliptic, linear-lanceolate or linear-oblong, crenate or entire. Heads terminal and axillary, up to 2.5 cm across. Calyx strongly ribbed. Lower lip of corolla 3 lobed, twice as long as the upper lip. Style 2 fid. Nutlets oblong, subtruncated at the apex, triquetrous, outer face rounded, smooth, brownish.

*Fl. & Fr.*: September - May.

Common weed in fallow and cultivated fields; Haji Ki Kothi, Siras R.F. and Ghati R.F.


Erect, hispid annuals, 5 - 50 cm. Leaves opposite, petiolate, up to 7.5 × 2.5 cm, ovate, ovate-lanceolate or elliptic, crenate-serrate, glandular-punctate. Heads usually terminal, up to 4.5 cm across. Bracts foliaceous, ovate-lanceolate. Calyx teeth c. 10, triangular-subulate. Middle lobe of the lower lip of corolla truncate. Style 2 fid. Nutlets obovoid-oblong, sub-truncated at the apex, triquetrous with the outer face rounded, smooth, shining, spotted brown.

*Fl. & Fr.*: August - March.
Common in fallow fields; Sakarampura.


Small, diffusely branched, hispid annuals. Leaves opposite, sessile, up to 4.5×1.2 cm, oblong lanceolate or ovate lanceolate, serrate, glandular punctate. Heads terminal and axillary, up to 1.5 cm across. Calyx strongly ribbed. Middle lobe of lower lip of corolla obovate, rounded. Style 2-fid. Nutlets oblong-ellipsoid, subtruncate at the apex, triquetrous, outer face rounded, smooth, brown.

Fl. & Fr.: October - November.

Common in forests on gravelly sandy soil; Kakor forest.


Erect, hairy annuals, 60–150 cm. Leaves opposite, petiolate, up to 9.5×5.5 cm, ovate, rounded or tapering at the base, coarsely crenate-serrate. Heads terminal and axillary, up to 2 cm across. Bracts linear-lanceolate. Style 2-fid. Nutlets c. 2 mm long, obovoid oblong, obliquely truncate, trigonous with the outer face rounded, polished, smooth, brown.

Fl. & Fr.: July - February.

Common at the foot of hills on gravelly soil; Tordi R.F. near Malpura.

4. **OCIMUM** L.

5. Orthosiphon Benth.


Erect or diffuse herbs, up to 20 cm or more high; stem quadrangular, glabrescent or finely pubescent. Leaves opposite, petiolate, up to 3.5×2.5 cm, ovate, cuneate, crenate or serrate, gland dotted. Flowers bracteate, creamish-white; lower lip suborbicular, concave. Stamens included; filaments glabrous. Nutlets c. 1 mm across, pale brown.

Fl. & Fr. : May - August.

Common in wastelands; Kotri village.

6. Salvia L.

Small, much branched, spreading, hispid, aromatic, perennial herbs. Leaves opposite, subsessile, up to 2.2 × 0.5 cm, linear - lanceolate or elliptic-lanceolate, crenate - serrate. Flowers in long racemes, bracteate, white or blue with purplish dots. Calyx campanulate, 2 lipped with transparent gland tipped hairs. Corolla throat annulate within; lower lip 3 lobed; upper lip slightly notched. Nutlets c. 1.75 cm long, oblong - ellipsoid, minutely rugose, black.

*Fl. & Fr.*: March November.

Common on low rocky hills; Banetha forest.

In fruiting calyx, gland - tipped hairs are few.

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62. NYCTAGINACEAE

**Boerhavia L.**


Diffuse or decumbent - ascending, glabrescent or pubescent and stalked glandular - hairy, perennial herbs. Leaves in unequal, opposite pairs. 1 - 4 × 0.8 3.5 cm, ovate, broadly ovate, ovate lanceolate, ovate oblong or suborbicular, usually cordate or rounded at the base, acute or obtuse, subentire undulate, often white beneath. Inflorescenc a panicle of subcapitate umbels. Flowers pink to rose. Perianth c. 3 cm long, infundibuliform, constricted below the middle, glandular hairy; lobes 5. Stamens 2 - 4. Anthocarp c. 4 mm long, clavate, 5 ribbed, with stalked glandular hairs throughout.

*Fl. & Fr.*: Almost throughout the year.

A very common weed in wastelands in rocky and gravelly habitats; Toda Rai Singh R. F.

It is a highly polymorphic species in respect of habit, degree of hairiness, size and shape of leaves and colour of flowers.
FLORA OF TONK DISTRICT

63. AMARANTHACEAE

1a. Fertile flowers (at least the lower ones) subtended by modified sterile flowers:

2a. Plants glabrous; leaves alternate; sterile flowers represented by antler-like scales; tepals glabrous; filaments free; stigmas 2; fruit a crustaceous nut, muricate ...

Digera 6

2b. Plants pubescent; leaves opposite; sterile flowers represented by stellately spreading hooked spines; tepals woolly on the back; filaments connate to form a cup; stigma capitate; fruit a membranous utricle ...

Pupalia 2

1b. Fertile flowers not subtended by any sterile flowers:

3a. Leaves alternate:

4a. Flowers silvery - white to pinkish, hermaphrodite; fruits 2 - many - seeded ...

Celosia 5

4b. Flowers green or lanate, unisexual or polygamous; fruits 1 seeded:

5a. Plants tomentose; flowers lanate, polygamous; filaments alternating with pseudo-staminodes and connate to form a cup ...

Aerva 2

5b. Plants glabrous, papillate or slightly pubescent; flowers glabrous, unisexual; filaments free; pseudo-staminodes absent...

Amaranthus 4

3b. Leaves opposite:

6a. Stigma capitate; utricle falling off with the perianth:

7a. Spikes dense, sessile; bracteoles acuminate or aristate; anthers 1 - celled, 2 - locellate; utricle orbicular or obcordate; seeds suborbicular ...

Alternanthera 3

7b. Spikes lax, pedunculate; bracteoles spinous, the spine winged at the base; anthers 2 - celled, 4 - locellate; utricle oblong or ovoid; seeds cylindric ...

Achyanthes 1

6b. Stigmas 2; utricle not falling off with the perianth:
8a. Flower hermaphrodite; bracteole with a dorsal crest; anthers 1 - celled, 2 - locellate; filaments entirely connate, the tube toothed at the apex

8b. Flowers polygamous; bracteole not dorsally crested; anthers 2 celled, 4 locellate; filaments connate at the base; the tube not toothed

1. *Achyranthes* L.


Erect or straggling, stiff - hairy herbs or undershrubs, 0.25 1.0 m; stem sulcate. Leaves petiolate, up to 8.5 × 7.0 cm, obovate rounded or oval obovate, cuneate, obtuse, acute or acuminate, margins entire or wavy. Spikes 20 40 cm long. Tepals 5, subequal, ovate lanceolate. Stamens 5; scales of pseudo staminodes fringed. Utricle rounded at the base and truncate at the apex. Seeds reddish brown.

*Fl. & Fr.*: Almost throughout the year.

A common weed in cultivated fields; Niwai.

Very variable in habit, size and shape of leaves and the length of the spikes.


1a. Leaves linear or linear-oblong; spikes arranged in panicle; outer tepals with the midrib ceasing well below the apex ...

... *A. javanica* var. *bovet* 1
1b. Leaves elliptic - obovate or ovate - elliptic - obovate; spikes 1 - 4 in the axils of leaves; outer tepals with the midribs excurrent into a distinct mucro ... \( A. \) \textit{lanata} 2


Erect herbs or undershrubs, 30 - 150 cm. Leaves sessile or shortly petiolate, up to 7.0 \( \times \) 0.6 cm, attenuate, acute, margins plain or involute. Spikes 4 - 20 mm long, cylindrical or globose. Bracts and bracteoles broadly ovate. Tepals 5, elliptic lanceolate. Stamens 5. Seeds round, slightly compressed, smooth, shining, brown to black.

\textit{Fl.} \& \textit{Fr.} : Almost throughout the year.

Common on low sand dunes ; Tordi R.F.


Prostrate or straggling, perennial herbs, c. 30 cm. Leaves shortly petiolate, up to 2.0 \( \times \) 0.8 cm, cuneate, rounded and apiculate at the apex, entire. Spikes 0.5 - 1.5 cm long. Bract and bracteole persistent, ovate, concave. Tepals 5, oval oblong. Stamens 5. Utricle ovoid, acute. Seeds c. 0.75 mm across, round, compressed, shining, black - brown.

\textit{Fl.} \& \textit{Fr.} : May - September.

Found in rocky habitats ; Toda Rai Singh R.F.

3. \textbf{ALTERNANTHERA} Forssk.


Prostrate or decumbent herbs, rooting at nodes; stem and branches angular, with a line of hairs down each side; nodes and leaf axils with tufts of white hairs. Leaves up to 6.0 × 1.5 cm, elliptic - obovate, oblongate, linear - oblong or linear - oblongate, obtuse or rounded, entire or obscurely dentate, glabrous. Spikes 1 - 4 in the axils of leaves, 0.5 - 1.5 cm long, globose - cylindric. Tepeals 5, free, ovate, acute. Fertile stamens 3; pseudo-staminodes 2. Utricle brown. Seeds c. 1 mm across, shining, yellowish or reddish - brown.

*Fl. & Fr.*: Almost throughout the year.

A common weed in moist places; Banas river bed near Sopari village.

4. Amaranthus L.

1a. Leaf axils with paired, sharp spines; tepals 5; anthers 5; capsules ovoid - urceolate, without any ribs ... *A. spinosus* 1

1b. Leaf axils without spines; tepals 2; anthers 2; capsules ellipsoid with 4 - 5, prominent, raised, green, longitudinal ribs ... *A. tenutifolius* 2


Erect, armed annuals, 0.5 - 0.75 m; stem angular. Leaves long petiolate, up to 7 × 5 cm, ovate - lanceolate, ovate or oblong - elliptic, cuneate, retuse, finely mucronate or obtuse. Spines c. 1.5 cm long. Flowers in axillary or terminal, globose to cylindrical, dense spikes, green; lower flowers of the spikes entirely female, upper ones male. Bracts and bracteoles deltoid - ovate, awned by the excurrent midrib. Seeds c. 1 mm in diam., suborbicular, lenticular, shining, black to brownish - black.

*Fl. & Fr.*: Almost throughout the year.
A common weed in cultivated fields; Banas river bed at Bentheli village.


Erect, diffuse or prostrate annuals, 5 - 45 cm ; stem sulcate. Leaves petiolate, up to 2.5 × 0.6 cm, linear - oblanceolate to linear - oblong, attenuate, rounded to emarginate, mucronulate, entire or slightly undulate. Flowers in axillary cymose clusters, green ; male and female flowers intermixed or male mostly towards the top. Bracts and bracteoles oblong - elliptic, concave with median green vitta and hyaline margins. Seeds visible through the capsule, suborbicular, lenticular, smooth, shining, reddish - brown.

*Fl. & Fr.* : Almost throughout the year.

Common weed in moist places ; Tordi Sagar and Kacha Bundha.

5. *Celosia L.*


Erect, fistular, glabrous annuals, 0.5 - 1.5 m ; stem sulcate. Leaves up to 8.0 × 3.5 cm, rhomboid, elliptic - obovate, elliptic - lanceolate or obovate, acute or obtuse, shortly mucronate, entire or subentire. Flowers in dense, cylindrical, long peduncled spikes 1 15 cm long. Bracts and bracteoles subequal, aristate with excurrent midrib. Tepal 5. Stamens 5. Fruits c. 3 mm long, obovoid, with an acute tip. Seeds c. 1.25 mm across, lenticular, very finely reticulate, shining, brownish - black to black.

*Fl. & Fr.* : August - November.

A common weed in cultivated and fallow fields ; Banetha village.


Erect or spreading, glabrous herbs, 12 - 50 cm. Leaves up to 6×4 cm, ovate or ovate-lanceolate, cuneate or rounded at the base, acute or obtuse, subentire ; petiole 0.5 - 4.0 cm long. Flowers in loose, axillary, peduncled spikes up to 20 cm long, pink or dark pink. The central flower fertile, surrounded by 2 sterile flowers. Bracts and bracteoles 1-nerved. Tepals 5, unequal. Stamens 5. Nuts c. 2 mm across, subglobose. Seeds c. 1 mm across, subglobose, pale brown.

*Fl. & Fr.*: July - December.

Common weed in cultivated and fallow fields and in moist places; by the side of Tordi Sagar.

7. *Gomphrena L.*


Prostrate or decumbent, deep - rooted, appressedly white - pilose herbs. Leaves up to 3.0×1.2 cm, elliptic, oblong - elliptic, obovate or obovate-lanceolate, cuneate. mucronate. Flowers in sessile, ovoid - oblong to elongate spikes 1.0 - 2.5 (-4) cm long, white with a tinge of pink. Tepals 5, lanceolate, acutely mucronate, 1 - nerved, clothed with long fine white hairs. Stamens 5. Fruits c. 2 mm long, ovoid. Seeds compressed ovoid.

*Fl. & Fr.*: February - October.

Common weed in fallow fields; Nayagaon and Haji - Ki Kothi (Niwai).


Erect, diffuse or subscandent, pubescent, perennial herbs or under-shrubs, 30 - 100 cm. Leaves up to 12.0×4.5 cm, ovate to elliptic, attenuate, apiculate. Spikes 3 - 15 cm long, erect or erecto patent, densely pilose. Flowers in clusters, each cluster with 2 - 3 hermaphrodite flowers and modified flowers consisting of a number of sharply hooked spines with villous base, upper often solitary, without rudimentary flowers. Bracts and bracteoles woolly on the back. Tepals 5, acicular, 3 - nerved, woolly on the back. Stamens 5. Seeds oblong - ovoid, shining, dark brown.

Fl. & Fr. : Almost throughout the year.

Common in gravelly habitats ; Kakor R.F.

64. CHENOPODIACEAE

CHENOPODIUM L.

1a. Seeds dull black, papillate, distinctly keeled ... C. murale 2

1b. Seeds shining blackish - brown or black, smooth, not keeled... C. album 1


Erect, much branched, annuals, 10 - 50 cm ; younger parts densely covered with white powdery vesicles. Leaves 1.5 - 4.0×0.2 - 1.5 cm, elliptic-oblong to lanceolate or ovate - rhomboid, cuneate, acute or obtuse, entire or dentate serrate. Flowers in terminal or axillary, panicled clusters, 5 - merous. Tepals connate at the base, oval, obtuse, concave with a strong midrib. Stigmas 2. Fruits depressed - globose, finely papillate, enclosed by the persistent tepals. Seeds c. 1.0 - 1.5 mm across, lenticular.

Fl. & Fr. : November - February.

A common winter season weed in cultivated fields and in wastelands ; Bentheli and Haji - Ki Kothi (Niwai).
The leaves and tender twigs are used as vegetable and a preparation in curd, known locally as "Raita" is made. It is also used as fodder.

It is a highly variable plant in respect of habit and size and shape of leaves.


Erect or ascending, slightly foetid annuals, 40-60 cm; younger parts clothed with white powdery vesicles. Leaves 1.5-6.0 × 0.7-5.5 cm, ovate rhomboid, elliptic, oblong or lanceolate from cuneate base, irregularly coarsely dentate serrate. Flowers in axillary or terminal, panièled clusters, 5 merous. Tepals connate at the base, oval, tip rounded, concave with a distinct midrib. Stigmas 2. Fruits depressed globose, tightly enclosed by incurved, persistent tepals; pericarp not readily separating from the seed. Seeds c. 1.0-1.5 mm across.

Fl. & Fr.: November March.

A common winter season weed in moist sandy soil; Haji-ki-Kothi (Niwai).

65. BASELLACEAE

Basella L.


Trailing or climbing, succulent, glabrous, perennial herbs. Leaves 3.0 - 6.5 × 2 - 6 cm, broadly ovate, cordate at the base, acute or acuminate. Spikes axillary. Flowers bracteate, sessile, pink, sometimes white below. Tepals fleshy, obovate, connate in the lower half. Stamens 5. Styles 3. Utricle c. 4 mm in diam., broadly ovoid, enclosed by the persistent tepals. Seeds subglobose.

Fl. & Fr.: September February.

Common in marshy places near ponds; Banetha village.

The plant is used as vegetable.
1a. Erect herbs; leaves more than 5 cm long; ocreae sheathing the stem, mouth truncate; flowers more than 5 in paniculate, slender racemes; styles 2; nuts suborbicular, biconvex ... *P. glabrum* 1

1b. Diffusely branched, prostrate or decumbent herbs; leaves less than 3 cm long; ocreae irregularly lacerately fringed; flowers 1 - 5 in the axils of leaves; styles 3; nuts acutely trigonous *P. plebeium* 2


Glabrescent annuals, 0.5 - 1.0 m. Ocreae membranous, 2.5 - 3.5 cm long. Leaves up to 20 × 3 cm, lanceolate or elliptic - lanceolate, attenuate, acuminate, glandular - punctate. Flowers in paniculate, slender racemes, 2.5 - 8.0 cm long, bracteate, pink. Perianth lobes 5, oblong obovate. Stamens 7 - 8. Nuts c. 2 mm long, pointed at the tip, smooth, shining, dark brown or reddish - brown.

*Fl. & Fr.*: Almost throughout the year.

Very common in marshy places; Banas river bed at Golian and Tonk.

The leaves and tender branches are used as vegetable.


Annual herbs. Leaves up to 1.2 × 0.2 cm, linear, oblong, lanceolate - spatulate or obovate - elliptic, mucronate, margins revolute, glabrous. Ocreae 3.0 - 4.5 mm long, silvery hyaline, membranous. Flowers pink or red. Perianth lobes 5, with a dark median streak. Stamens 7 - 8. Nuts c. 2 mm long, smooth, shining, black.

*Fl. & Fr.*: November - March.

Common throughout the district in moist, sandy places; Banas river bed at Bentheli, Banetha tank and Siras forest.

It is a highly polymorphic species in respect of habit, size and shape of leaves, number of flowers in each cluster, length of pedicel and size and shape of perianth lobes.
67. ARISTOLOCHIACEAE

ARISTOLOCHIA L.


Twining, glabrous herbs. Leaves 2.5 - 11.5 × 1.5 - 8.5 cm, obovate, oblong or subpandurate, cuneate or subcordate at the base, acute or acuminate, entire, 3 nerved at the base. Flowers in few - flowered, axillary, bracteate racemes; tube inflated, mouth oblique, trumpet-shaped, greenish; limb purple or brownish - red. Stamens 6. Styles 6 - lobed. Capsules 2.5 - 3.2 × 1.2 - 2.0 cm, obovoid or oblong, opening from below upwards, 6 - valved; pedicel splitting into 6 filaments. Seeds many, each c. 5 × 6 mm, deltoid, ovate, flat, winged, pubescent, brown.

Fl. & Fr.: August - October.

Common climber in gravelly habitats; Toda Rai Singh R.F.

Subterranean rhizomes are used in medicine.

68. LORANTHACEAE

DENDROPHTHOE Mart.


Branched, glabrous, leafy, stem parasites with lenticels. Leaves 4 - 10 × 1.5 - 4.0 cm, elliptic oblong, elliptic obovate, obovate oblong or falcula, cuneate, obtuse, margins undulate or entire, midrib distinct. Flowers in axillary, second racemes 3.5 - 4.0 cm long, bracteate, pedicellate, red, orange - red or yellowish - red. Calyculus 3 mm long, glabrous, truncate or shallowly 4 - 5 - lobed. Perianth tube 2 - 3 cm long, 5 - lobed; lobes c. 1 cm long, linear - oblong, reflexed. Stamens 5, epipetalous; anthers c. 7 mm
long; filaments red. Style c. 3.5 cm long, red; stigma capitate. Berry c. 1.0 x 0.5 cm, ovoid - oblong, crowned by the persistent calyxulus.

_Fl. & Fr._: August February.

Rare; found as a stem parasite on _Boswellia serrata_ Roxb. ex Colebr.; Toda Rai Singh R.F.

69. EUPHORBIACEAE

1a. Flowers in cyathia

1b. Flowers solitary or fascicled or in spikes or racemes:

2a. Plants stellately hairy; leaves 2-glandular at the base:

3a. Inflorescence a spike-like raceme; pedicels of the female flowers with 2 glands at the base; seeds oblong, carunculate

3b. Inflorescence a raceme; pedicels of the female flowers without glands; seeds ovoid or subglobose, scurfy, ecarunculate

2b. Plants not stellately hairy; leaves eglandular at the base:

4a. Stamens c. 8; capsule enclosed by accrescent, leafy bract; seeds globose, ovoid

4b. Stamens usually 3; capsule not enclosed by bract; seeds trigonous

1. _ACALYPHA_ L.

1a. Bract of female flowers fimbriate with 15-20 ciliate teeth

1b. Bract of female flowers dentate with 10-15 non-ciliate teeth

Erect, pubescent annuals, 20 60 cm. Leaves 2 7×1 - 4 cm, ovate to ovate elliptic, base rounded or cuneate, caudate acuminate, finely serrate; petiole 0.5 6.0 cm long. Spikes 0.5 1.5 cm long with the male flowers at the top and the female at the base. Male flowers few, ebracteate, sessile. Tepals 4. Stamens 8; anthers divaricate. Female flowers with 3 tepals. Seeds 1.5×1.0 mm, very minutely pitted, brown.

*Fl. & Fr.*: August October.

Common on sandy loam soil; Baisalpura R.F.


Erect, pubescent herbs or undershrubs, 0.5 1.0 m; branches spreading or ascending. Leaves 1 6×0.6 5.0 cm, rhomboid - ovate to ovate, cuneate, acute, acuminate or obtuse, crenate - serrate; petiole 1.5 - 9.0 cm long. Spikes up to 10 cm long with the male flowers clustered towards the top and the female at the base. Capsules hispid. Seeds c. 1 mm long, minutely pitted, pale brown.

*Fl. & Fr.*: May October.

Common weed in fallow fields; Kachha Bundha.

2. **Chrozophora A. H. L. Juss. nom. cons.**

1a. Ovary and capsule covered with silvery lepidote scales and stellate tomentum; stamens 5 ... *C. hierosolymitana* 1

1b. Ovary and capsule covered with only stellate tomentum; stamens 15 in two whorls:

2a. Erect herbs; leaves c. 10 cm long, 2 - glandular at the base; stigma red ... *C. rotteri* 3

2b. Prostrate herbs; Leaves c. 3 cm long, eglandular at the base; stigma orange or yellow ... *C. prostrata* 2


Erect, densely tomentose herbs, 25 - 50 cm. Leaves 2.0 - 5.5×1.0 - 3.5 cm, ovate or subrhomboid, subobtuse, wavy, undulate or distinctly toothed; petiole 1.0 5.5 cm long. Flowers in axillary or terminal, bracteate racemes. Male flowers crowded at the top of the raceme, sessile. Sepals 5, linear-elliptic, densely stellate - tomentose. Petals 5, ovate - lanceolate, lepidote. Female flowers scattered at the lower part of the raceme, pedicellate. Sepals 5, linear lanceolate, densely stellate - tomentose. Petals 5, linear-lanceolate, densely stellate tomentose. Capsules trilobed. Seeds c. 3.5 mm in diam., roughly tuberculate, scurfy, silvery - grey.

*Fl. & Fr.* March May.

Very common on dry sandy bed of streams; Ghati village.


Diffuse, stellate - tomentose herbs, 5 - 40 cm. Leaves 0.3 - 3.0×0.3 - 1.5 cm, broadly ovate to suborbicular, obtuse at the apex; petiole 0.5 - 3.0 cm long. Flowers in axillary racemes, bracteate. Male flowers: Sepals 5, ovate. Petals 5, ovate lanceolate. Female flowers: Sepals 5, linear. Petals 5, linear, shorter than the sepals. Capsules trilobed, non - tinctorial. Seeds c. 2.5 mm in diam., scurfy, grey.

*Fl. & Fr.* : Almost throughout the year.

Common in rocky habitats; Tordi Sagar.


Diffusely branched, densely stellate - tomentose herbs, 25 - 50 cm. Leaves 3 10×3.3 - 8.5 cm, entire or trilobed, broadly ovate or suborbicular, truncate or cuneate, obtuse, undulate - crenate; petiole up to 9 cm long. Racemes axillary or terminal, 2 - 6 cm long; bracts linear. Male

*Fl. & Fr.*: February May.

Common on sandy loam soil; Mohamadpura near Aamli and on Banas river bed at Bisalpura.

3. **CROTON L.**


Erect or diffusely branched, annual herbs or undershrubs, 40 - 50 cm; stem ribbed, clothed with stellate hairs. Leaves 2.0 - 4.5 × 0.3 - 2.0 cm, ovate - lanceolate or ovate, serrate, 3 - nerved at the base. Inflorescence with female flowers at the base and male at the top. Male flowers pale white. Stamens 10 - 15. Female flowers with 2 glands at the base of the pedicel. Capsules trigonous, stellately hairy. Seeds c. 3 mm long, rugose, grey.

*Fl. & Fr.*: May September.

Common in wastelands and fallow fields; Malpura.

It is a native of S. America, naturalised in many parts of India.

4. **EUPHORBIA L.**

1a. Succulent, dendroid shrubs, armed with two stipular spines; involucral glands 5; seeds globose ... *E. caducifolia* 1

1b. Unarmed herbs; involucral glands 4; seeds ovoid or or ellipsoid:

2a. Erect herbs; leaves alternate or opposite; involucral glands 2 - horned or semilunar; seeds with a thin crest on one side and a faint furrow on the other ... *E. dracunculoides* 3
2b. Prostrate or ascending herbs; leaves all opposite; involucral glands not horned; seeds angular:

3a. Plants clothed with long, yellowish, transparent hairs; leaves 1.2 - 4.5 cm long: \[E. hirta 5\]

3b. Plants glabrous or clothed with whitish pubescence; leaves less than 1.2 cm long:

4a. Plants and capsules glabrous or nearly so:

5a. Stipules setaceous from a broad toothed base; seeds rugose \[E. clarkeana 2\]

5b. Stipules bipartite, lanciately toothed; seeds smooth \[E. heyneana 4\]

4b. Plants pubescent; capsules pubescent or hirsute:

6a. Branches hispidly pubescent all round; stipules elongate, fimbriate; capsules pubescent or hirsute throughout \[E. thymifolia 7\]

6b. Branches hispidly pubescent on the upper side only; stipules deltoid-ovate; capsules with stiff and spreading hairs only on the keel \[E. prostrata 6\]


Glaucous, perennial shrubs, up to 2 m; latex milky; branches cylindrical with small, distant, non-confluent tubercles; each tubercle with a black areole bearing a pair of 4 – 10 mm long, blackish, divergent spines. Leaves fleshy, caducous. Cyathia more than one together, bracteate, pedicellate, red. Involucre c. 6 mm in diam., transversely oblong; lobes 5, fimbriate; glands sessile, transversely oblong. Anthers bilobed. Capsules 9 – 11 mm in diam., sharply 3 lobed, glabrous. Seeds c. 3 mm in diam., greyish brown with a distinct marginal line, scurfy.

*Fl. & Fr.*: February - April.

Very common in rocky habitats throughout the district.

This species closely resembles *E. neriifolia* L. but it can easily be identified by the non-confluent, distant tubercles; ovate or oblong-ovate, non-apiculate, caducous leaves and oblong, didymous anthers. In *E. neriifolia* L. the tubercles are spirally arranged and confluent; leaves obovate or obovate-oblong, apiculate; anthers sagittate, apiculate.
The leaves are used as vegetable and are sold in the market. The milky juice is used as a cure for cough and is applied to the skin for the treatment of blisters.


Prostrate or suberect annuals. Leaves 1.5 10.0 × 0.5 - 4.0 mm, obliquely oblong or linear oblong with the base almost auricled on one side, entire or toothed at the tip. Cyathia usually solitary, sometimes two together in each axil. Involucre stalked, c. 0.8 mm in diam., campanulate, glabrous; lobes 5, lanceolate, toothed, longer than the glands; glands minute, orbicular, pink. Capsules c. 1.2 mm in diam., trigonous. Seeds c. 1 mm long, ovoid, distinctly 4 angled, scurfy, reddish.

*Fl. & Fr.*: Almost throughout the year.

Common in sandy habitats; Niwai to Haji - Ki - Kothi.


Dichotomously branched, deep rooted, glabrous, glaucous herbs, 20 - 45 cm. Leaves 0.5 - 4.5 (-9) × 0.2 0.5 cm, sessile, linear - lanceolate or rarely ovate lanceolate, ovate or oblong, acute, subacute or rarely obtuse, entire. Cyathium solitary in each axil. Involucre shortly stalked, c. 3 mm in diam., campanulate, glabrous outside, hairy inside; lobes 5, ciliolate. Male flower a stalked stamen. Female flower with ovary on a long stalk. Capsules c. 4.5 mm in diam., glabrous. Seeds c. 3 mm in diam., ellipsoid, rugose, scurfy, strophicolate.

*Fl. & Fr.*: August February.

A common winter season weed in cultivated and fallow fields; Deoli and Siras R.F.

Used as fodder.

FLORA OF TONK DISTRICT

Prostrate, spreading, glaucous herbs; internodes ribbed. Leaves 1.5 6.0 × 1 4 mm, obliquely oblong or obovate oblong, apex retuse or subtruncate, serrate, margins entire at the base. Cyathia reddish - green. Involucre stalked, c. 1 mm across, campanulate, glabrous; lobes 5, triangular. Capsules c. 1.5 mm in diam., obtusely keeled. Seeds c. 1 mm long, ovoid, obtusely tetragonal, apex blunt, pale brown, red when rubbed.

Fl. & Fr. : Almost throughout the year.

Commonly found in rock crevices in marshy places; Banas river bed at Baisalpura.


Procumbent, ascending or erect, hispid annuals. Leaves obliquely oblong - elliptic or ovate elliptic, acute, serrate. Cyathia numerous in each axil. Involucre stalked, c. 1.5 mm in diam., cup shaped; glands stalked, globose, pink. Ovary on a long stalk, hairy or puberulus. Capsules c. 1 mm in diam., globosely trigonous, appressed hairy. Seeds c. 1 mm long, ovoid with 3 sharp and one blunt angles, transversely rugose, reddish.

Fl. & Fr. : Almost throughout the year.

A very common weed throughout the district in fallow and cultivated fields; Kakor R.F. and Aamli R.F.

A very variable plant particularly in respect of habit and in the shape and size of leaves.


Porstrate or decumbent annuals. Leaves 0.2 0.7 × 0.1 0.4 cm, obliquely oblong, obovate oblong or elliptic oblong, rounded at the apex, minutely serrate especially in the upper half, glabrous above, with scattered hairs beneath. Involucre stalked, c. 0.5 mm in diam., campanulate, pubescent; lobes 5, deltoid ovate, ciliate. Capsules c. 1.0 1.5 mm in diam., usually deflexed, subglobose trigonous; coccid prominently keeled. Seeds c. 1 mm long, ovoid, 4 angled, transversely furrowed, scurfy, reddish.

Fl. & Fr. : Almost throughout the year.
Common on moist, sandy clayey soil; by the side of tank at Gar village.

This species closely resembles *E. thymifolia* L. but it can easily be identified by the capsule being long stalked and hairy only on the keel, while in *E. thymifolia* L. the capsule is shortly stalked and hirsute throughout. *E. heyneana* Spreng. subsp. *heyneana* also resembles *E. prostrata* Aiton but it can be identified by the entirely glabrous capsules.


Prostrate, annual herbs. Leaves 1.5 - 8.0×1 - 4 mm, obliquely oblong or oblong-elliptic, obtuse, crenulate, glabrous above, usually slightly pubescent beneath. Cyathia more than one in each axil. Involucre shortly stalked, c. 1 mm in diam., campanulate. Capsules c. 1.5 mm in diam. Seeds c. 1 mm long, ovoid, 4 angeld, transversely furrowed, scurfy, reddish brown.

*Fl. & Fr.*: August November.

Common weed on loamy soil; Mayola forest near Bisalpura.

5. *Phyllanthus* L.


Erect or decumbent - ascending, perennial herbs, 15 - 40 cm. Leaves 0.6 - 2.5×0.2 - 0.8 cm, linear oblong or elliptic oblong, glabrous; stipules ovate, sagittate. Male flowers usually solitary. Tepals 5 - 6, oblong-ovate, obtuse, 1 nerved. Filaments free; anthers didymous. Female flower solitary. Tepals 6, ovate oblong, obtuse. Styles short, 2 fids, recurved. Disc cup-shaped. Capsules c. 3 mm in diam., globose, obscurely 3 lobed, crustaceous. Seeds trigonous, rounded on the back, finely warty, dark brown.

*Fl. & Fr.*: August September.

Found on loamy soil; Rampura.
A very variable plant in respect of habit and shape and size of leaves.

70. ULMACEAE

*Holoptelea* Planch.


Deciduous trees, 6 - 10 m; bark whitish - grey; younger parts pubescent. Leaves 5 - 15×4 - 10 cm, elliptic or broad ovoid, acuminate; petiole up to 1.5 cm long. Flowers in numerous fascicles with male and hermaphrodite flowers mixed. Perianth cleft nearly to the base; segments 5, hairy. Stamens up to 8; anthers hairy. Ovary stipitate, compressed, hairy. Samara c. 2.5 cm in diam., obliquely elliptic or suborbicular, notched at the apex and crowned by persistent styles; wings reticulately veined.

*Fl.* & *Fr.*: March - May.

Common on sandy Banas river bed; Kakor R. F. Also observed elsewhere on sandy river beds.

The wood is chiefly used for fuel and charcoal. The leaves are lopped for cattle fodder.

71. MORACEAE

*Ficus* L.

1a. Plants with many aerial roots; leaves obtuse or subacute; basal bracts more than 5 x 10 mm, semilunate ... 

1b. Plants without aerial roots; leaves caudate - acuminate tailed or acuminate; basal bracts less than 5 x 10 mm:

2a. Leaves broadly ovate to ovate - rotund, caudate - acuminate tailed; syconia sessile or with a short, glabrous pedicel:

*F. benghalensis* 2
3a. Leaf base deeply cordate, tail 1/4 as long as the blade; syconia depressed at the apex; basal bracts c. 1 x 2 mm, semilunar, glabrous; perianth lobes of the gall and fertile female flowers united and completely investing the ovary ... F. arnottiana 1

3b. Leaf base rounded or truncate, tail 1/2 as long as the blade; syconia with a protuberance at the apex; basal bracts c. 5 x 6 mm, ovate - suborbicular, silvery pubescent; perianth lobes of the gall and fertile female flowers 5, free ... F. religiosa 3

2b. Leaves ovate - lanceolate, elliptic - ovate or ovate, shortly acuminate; syconia with a distinct, pubescent pedicel ... F. virens 4


Glabrous trees, 5 - 8 m; bark pale brown. Leaves 5 18 x 5 - 13 cm, alternate, undulate, tail 1.5 - 5.0 cm; petiole 5 - 15 cm long; stipules ovate-lanceolate, caducous. Syconia 0.5 - 1.0 cm across, in pairs or in clusters, smooth, dark purple; basal bracts 3, membranous. Male flowers few, sessile, situated near the mouth. Gall and fertile female flowers sessile or pedicellate. Style elongate.

Fl. & Fr.: September - March.

Found on rocky hills; Toda Rai Singh R.F.

This species closely resembles F. religiosa L. but it can easily be distinguished by the base of leaf being deeply cordate; syconia pedicelled to subsessile; perianth lobes in gall and fertile female flowers united and completely investing the ovary. While in F. religiosa L. the base of the leaf is rounded to truncate or slightly cordate; syconia sessile; perianth lobes in gall and fertile female flowers 5, free. F. religiosa L. also closely resembles F. rumpii Bl., but F. rumpii can be separated by its leaves being narrowed at the base, with a less suddenly acuminate and shorter tailed apex; the globular syconia not depressed at the apex and the perianth lobes 3, free.


Trees, 7 25 m; latex milky. Leaves 6 22×4.5 - 14.0 cm, ovate, ovate-orbicular or elliptic, base rounded or subcordate; petiole 1.5 3.5 cm long, triangular, acuminate, caducous. Syconia in pairs, sessile, 1.5 - 2.0 cm across, depressed globose, silky - pubescent, bright red when ripe; basal bracts 3. Male flowers many. Perianth lobes 4, lanceolate. Stamen 1. Gall and fertile female flowers with elongate style.

*Fl. & Fr.*: Almost throughout the year.

Tordi R.F.; planted.


Glabrous trees, 7 20 m; bark grey. Leaves 8 - 15 × 6 - 10 cm, undulate, tail 3 - 5 cm long; petiole 6 10 cm long; stipules small, ovate, acute, caducous. Syconia in pairs, sessile, c. 1 cm across, depressed - globose with a protuberance at the apex, pinkish; basal bracts 3. Male flowers very few, sessile, situated near the mouth (absent in many). Gall and fertile female flowers sessile or pedicellate.

*Fl. & Fr.*: Almost throughout the year.

Commonly planted along road sides and by the side of tanks and dams.

This is the sacred Bo tree, especially sacred to Buddhists and Hindus.

Trees, c. 10 m; bark grey. Leaves 5 12 × 2.0 4.5 cm, entire or sub-undulate; petiole 2.5 3.0 cm long; stipules broadly ovate, acute. Syconia in pairs on c. 1 cm long pedicel, 0.5 0.8 cm across, globular, pubescent; basal bracts 3, c. 1.5 × 2.0 mm, ovate rotund. Male flowers sessile with a single stamen. Perianth lobes 4 5, small, linear lanceolate. Gall and fertile female flowers with 3 4, linear lanceolate perianth lobes. Stigma elongate.

*Fl. & Fr.*: December September.

Found in rocky habitats on hills; Toda Rai Singh R. F.

72. CERATOPHYLLACEAE

Ceratophyllum L.


Submerged, much branched, aquatic herbs. Leaves more than 5 in a whorl, up to 1.5 cm long, dichotomously forked, each segment filiform, minutely toothed. Flowers axillary, solitary, sessile or subsessile, unisexual. Perianth - segments linear, ciliate at the apex. Stamens many. Ovary sessile. Fruits laterally compressed, ellipsoid, with persistent subulate style, subtended by two basal spines.

*Fl. & Fr.*: September - February.

Common in ponds and tanks; Tordi Sagar.

MONOCOTYLEDONS

73. HYDROCHARITACEAE

1a. Stem stoloniferous; leaves radical, rosette; peduncle of the female flower spirally coiled ... *Vallisneria* 3
1b. Stem leafy, branched; leaves cauline, whorled or alternate; peduncle of female flower not spirally coiled:

2a. Leaves in whorls; male flower solitary in the globose spathe provided with subulate appendages; stamens 3; fruit cylindric or narrowly conical; seeds smooth

**Hydilla 1**

2b. Leaves alternate; male flowers many, densely crowded in an ovoid, 2-fid spathe; stamens 2; fruit an ovoid utricle; seeds scrobiculate

**Nechamandra 2**

1. **Hydilla L. C. Rich.**


Slender, submerged, aquatic herbs. Leaves in whorls of 3, 8, 2 10×1 2 mm, oblong or linear, sharply serrate - dentate. Flowers unisexual. Male flowers shortly pedicellate. Female flower solitary, sessile; spathe tubular, bifid at the apex. Sepals obovate, whitish with reddish spots. Petals spathulate, apex rounded, whitish. Fruits softly echinate. Seeds 3-6, each c. 2 mm long, fusiform, dark brown.

*Fl. & Fr.* : September - November.

Abundant in temporary pond near Sandalai village.

2. **Nechamandra** Planch.


Submerged, perennial, aquatic herbs. Leaves sessile, 1.0 4.5×0.3 cm, linear lanceolate, amplexicaul, acute, minutely serrulate, striate. Flowers unisexual. Male flowers minute. Female flowers solitary,
enclosed in a tubular, 2-fid spathe. Perianth tube filiform, limb 3-partite, lobes spreading, orbicular. Stigmas 3, finely papillose. Fruits 6-8 mm long. Seeds numerous, minute, c. 1 mm long; ascending, oblong - obovate, scrobiculate.

Fl. & Fr.: September - April.

Common in Tordi Sagar.

3. VALLISNERIA L.


Submerged, tufted, aquatic herbs. Leaves up to 30×0.8 cm, linear, ribbon-like, subacute, entire or dentate, 5-nerved. Flowers unisexual. Male flowers many, enclosed in shortly peduncled, 3-lobed spathe. Sepals 3. Petals absent. Stamens 1-3, mostly 2. Female flower solitary; spathe 2-cleft. Sepals 3, oblong-ovate, with reddish spots. Petals 3, scarious. Styles 3. Fruits 4-6 (10) cm long, linear, with long, coiled peduncle. Seeds numerous, c. 1 mm long, obconic to fusiform.

Fl. & Fr.: February - November.

Common in Banas river near Rajmahal and in Tordi Sagar.

74. ORCHIDACEAE

Zeuxine Lindl. nom. cons.

Slender, erect, terrestrial herbs, 5–20 cm. Leaves 1.5–6.0 cm long, linear-lanceolate, acute to subacuminate, entire. Inflorescence 2–5 cm or more long, dense. Bracts 0.5–1.5 cm long, ovate-lanceolate, acuminate. Sepals unequal, lateral ones ovate-lanceolate, cymbiform; the dorsal broadly ovate. Petals falcate-lanceolate or oblong, pale pink, united with the dorsal sepal to form a hood over the column. Lip narrowly panduriform, saccate at the base, papillate. Column very short. Anthers very short-ly beaked, covered by the wings of the column. Stigmas 2. Capsules c. 0.7 mm long, ovoid. Seeds minute, fusiform, yellowish brown.

*Fl. & Fl.*: January March.

Common in marshy places near Niwai.

75. AGAVACEAE

**Agave L.**


Scapigerous undershrubs, up to 4 m. Leaves rosette, 80–120×5–6 cm, linear-lanceolate, pale green, often glaucous, marginal prickles falcate, ascending, 3 mm long or more, terminal prickle needle-like, reddish, c. 2.0 cm long. Inflorescence a branched panicle; pedicel jointed. Tepals 6, greenish; lobes linear-lanceolate, obtuse. Stamens 6.

*Fl.*: May.

Planted along the hedges of cultivated fields; Golian village near Tonk.

The plant yields fibres used by the villagers. This species is useful in reclothing bare hills where the soil is poor.

76. LILIACEAE

1a. Thorny climbing or straggling undershrubs; roots tuberous; leaves absent; fruit a berry, red when ripe ...

1b. Erect, scapigerous herbs; roots not tuberous; leaves present; fruit a capsule, brownish when ripe:
2a. Bulbiferous, perennial herbs; leaves flat, linear; 
scapes not branched; pedicels not jointed; capsules 
smooth; seeds obovate - oblong, winged ... **Urginea 3**

2b. Non-bulbiferous, annual herbs; leaves fistulosus, 
terete; scapes branched; pedicels jointed near the 
middle; capsules transversely wrinkled; seeds 
acutely trigonous, transversely wrinkled ... **Asphodelus 2**

1. **Asparagus L.**

t. 2056. 1853 ; Hook. f. Fl. Brit. Ind. 6 : 316. 1892 ; Duthie, Fl. Upper 
(Hindi).

Stem terete. Spines erect or slightly curved, 3 - 8 mm long. Cladodes 
slender, whorled, deciduous during flowering and fruiting. Racemes 2.0 - 5.5 
cm long, fascicled, whitish red or white, fragrant; pedicels c. 3 mm long, 
filiform; bracts 1.5 - 2.0 mm long, ovate, acute, hyaline. Tepals 6, obovate, 
 solitary, globose, shining black.

*Fl. & Fr.*: November February.

Common in rocky habitats; Rajmahal and on sandy soil at Sohela.

2. **Asphodelus L.**

*Asphodelus tenuifolius* Cav. in Anal. Cienc. Nat. 3 : 46. t. 27, f. 2. 
flor us* Wight, Ic. 6 : 27. t. 2062. 1853 (*A. pauciflorus* in text). 'Piazi' 
(Hindi).

Scapigerous herbs. Leaves radical, sessile, 10 - 20 cm long, acute, 
scabrid. Scapes many. Flowers bracteate, in lax racemes, white. Pedicels 
3 - 6 mm long, jointed below the middle. Tepals 6, oblong-ovate, obtuse 
with a distinct, green, brownish - green or reddish brown mid vein. 
Anthers 6, orange. Capsules 2 - 4 mm in diam. Seeds c. 3 mm long, black.

*Fl. & Fr.*: December March.
A very common winter season weed in cultivated and fallow fields; Haji Ki Kothi (Niwai) and Banas river bed near Bentheli village.

The European *A. fistulosus* L. which was hitherto treated as a synonym of *A. tenuifolius* Cav. is now generally considered as a distinct species. *A. fistulosus* is recognisable by the plants being perennial, scape glabrous and leaves scabrid only on the marginal nerves. Backer in Fl. Trop. Africa treats *A. tenuifolius* Cav. as a variety of *A. fistulosus* L.


Scapigerous herbs, up to 1 m. Bulbs 3-7×2.5-5.5 cm, fleshy, tunicated, hysteranthous. Leaves subbifarious, whorled at the base, 15-40×1-3 cm, linear-lanceolate, acute. Racemes simple, lax. Flowers bracteate, greenish brown; pedicels 2.0-3.5 cm, longer than bracts or become longer in fruits. Perianth lobes 6, biseriate, oblong lanceolate, obtuse. Stamens 6. Stigma trilobed. Capsules c. 2.5×0.8 cm, ellipsoid, trilocular. Seeds many, each c. 1.0×0.5 cm.

*Fl. & Fr.*: December - May.

Common in rocky loamy habitats; Kotri village along Aligarh-Aamli road.

77. *COMMELINACEAE*

1a. Cymes enclosed in spathaceous bracts ... *Commelina* 2

1b. Cymes not enclosed in spathaceous bracts:

2a. Flowers in cymes reduced to axillary fascicles enclosed in inflated sheaths; stamens 6, all fertile ... *Amischophacelus* 1

2b. Flowers in lax cymose panicles; fertile stamens 2 ... *Murdannia* 3
1. **Amischophacelus** Rolla Rao & Kammathy


Prostrate or suberect, somewhat fleshy annuals. Leaves sessile, up to 8×1 cm, linear-lanceolate or ovate, acute. Sheaths ciliate on the margins. Flowers sessile, blue-violet. Filaments bearded. Capsules c. 6.5 mm long (including the beak), oblong-ellipsoid with 3 erect, bilobed, pubescent beaks. Seeds c. 2.0×1.5 mm, subcylindric, truncate at base, rounded at apex, pitted, grey.

*Fl. & Fr.*: September - December.

Common in marshy places by the side of pond in Kakor village.

2. **Commelina L.**

1a. Spathes sessile or nearly so in terminal heads; all cells of the ovary 1 - ovule
    ... 
    *C. erecta* 1

1b. Spathes pedunculate, solitary, axillary; the 2 anticous cells of the ovary 2 - ovule, the posticus 1 - ovule:

2a. Leaf margins usually undulate; spathes broadly ovate; posticus cell of the capsule not keeled
    ... 
    *C. forskalaei* 2

2b. Leaf margins not undulate; spathes ovate - lanceolate; posticus cell of the capsule keeled
    ... 
    *C. hasskarlil* 3


Profusely branched, erect or decumbent, perennial herbs, 30 - 70 cm. Leaves up to 13.0×3.5 cm, lanceolate, acuminate. Sheaths ciliate along the margin at the mouth. Spathes 2 - 5 together, funnel-shaped, closed at
one end and beaked at the other, accompanied by 2 to 4 smaller leaves in addition to the 2 mature leaves. Cymes bifid, inner represented by a stump, outer 3 to 6 flowered. Flowers violet. Capsules 2 to 3 in each spathe, c. 6 mm long, oblong, 3 seeded. Seeds c. 3.5×3.0 mm, oval, black with membranous margin.

*Fl. & Fr.*: August September.

Found in Nayagaon on the way to Gar R.F. (Deoli) on sandy soil.

This species is often confused with *C. paludosa* Blume but can be distinguished by the 2 to 4 smaller leaves accompanying the spathes, in addition to the 2 mature leaves subtending the spathes and by the absence of rusty brown hairs along the margins of leaf sheaths.


Much branched, diffuse annuals, rooting at nodes. Leaves up to 7.5×1.7 cm, narrowly oblong elliptic, often rather strongly undulate. Sheaths pubescent, ciliate along the margins of mouth. Spathes sparsely hairy with long, slender hairs. Cymes with inner branch bearing a single male flower and outer 2 to 3 flowers. Flowers blue. Capsules c. 5 mm long, lateral cells 0 to 1 seeded, posterior cell 1 seeded, indehiscent. Seeds of lateral cells c. 3.0×2.5 mm, subglobose or subdiscoid, orange brown; seed of indehiscent cell oblong, rounded at both ends.

*Fl. & Fl.*: August November.

Common weed in cultivated fields on the way to Rajmahal R.F. (Deoli); also common in marshy places on the way to Siras forest.


Herbs, up to 125 cm. Leaves up to 8.5×1.8 cm, lanceolate or ovate lanceolate, acute. Mouth of sheath oblique, ciliate. Cymes pubescent, the inner branch 1 (-2) flowered, the outer 2 (-4) flowered. Flowers dark blue. Capsules c. 8 mm long, apiculate. Seeds c. 3×2 mm, truncate at one end, rounded or subacute at the other, brown.

*Fl. & Fr.*: September October.

Common weed in cultivated fields on the way to Rajmahal R.F. (Deoli).
3. **Murdannia Royle nom. cons.**


Erect or decumbent herbs, 10–20 cm. Leaves sessile, up to 13.0×0.9 cm, linear - lanceolate, acute or acuminate. Sheath ciliate on the margins. Flowers pink. Filaments bearded. Capsules c. 3 mm long, subglobose, mucronate, 3 loculed with 2 seeds in each locule. Seeds c. 1.2×1.0 mm, subtriangular, angular on the inner and rounded on the outer face, tuberculate, dark brown.

*Fl. & Fr.*: August September.

Common in fallow fields on the way to Rajmahal R.F. (Deoli).

78. **JUNCACEAE**

**JUNCUS L.**


Slender, tufted annuals, up to 15 cm. Leaves basal and cauline, grass-like, channelled above, lower up to 8 cm long, the higher shorter. Inflorescence taller than the leaves, branched, consisting of 1 sided cymes. Flowers laxly arranged, solitary or in clusters of 2–6. Bracts and bracteoles membranous, ovate. Tepals lanceolate, very acute, green with membranous margins. Stamens 6, often 3 in terminal flowers. Capsules shorter than the tepals, obovate, trigonous. Seeds numerous, minute, c. 0.4 mm long, ellipsoid, brown.

*Fl. & Fr.*: February March.

Common weed in wheat fields; Tordi Sagar.
79. ARECACEAE

Phoenix L.


Trees, 10 15 m. Trunk rough due to the persistent bases of the leaf stalk. Leaves 2 3 m long; petiole bearing a few spines reaching 8 10 cm long. Pinnules numerous, fascicled, 10 35 × 1.5 2.5 cm, ensiform, spinous pointed, glaucous. Inflorescence a spadix. Spathe about the size of inflorescence, woody, scurfy, separating into boat-shaped valves. Male flowers numerous, cream, fragrant. Female flowers distant, roundish. Fruits scattered, 2 3 cm long, oblong ellipsoid, orange yellow, surrounded at the base by persistent calyx. Seeds 1.0 2.0 cm long, rounded at the ends, deeply grooved on one side.

Fl. & Fr. : February May.

Common in wastelands and in moist shaded or dry situations; Nayagaon near Aligarh and Tordi village near Malpura.

Wild date palm is tapped in many parts of India for its sap which is converted into palm jaggery (Gur). Fresh unfermented sap (Nira) is a refreshing, sweet drink. The sap after it has undergone spontaneous fermentation for 8 to 10 hours is a common beverage (toddy) in certain parts of India. The fruits are edible, but are of an inferior quality. The leaves are widely used for thatching and for making mats, fans, baskets, bags, brooms, fishing nets etc. The petioles are beaten and made into ropes, used for drawing water from wells. Female spadix forms a good brush for white washing.

80. TYPHACEAE

Typha L.

Erect, perennial, rhizomatous herbs, c. 2 m. Leaves spongy, thick, linear, acute, convex beneath. Spikes c. 0.5 m long, cylindrical; the upper male and the lower female spikes often separated by long interval, dark brown. Stamens 2–3 on a minute common stalk, intermixed with narrowly linear or narrowly spatulate hairs; connective produced; pollen grains simple, free. Female flowers intermixed with many bracteoles; bracteoles shorter than stigma, clavate, acuminate. Ovary borne on gynophore, surrounded by close set white hairs at the base. Achenes elongate ovoid with obtuse apex and acute base. Brownish.

*Fl. & Fr.*: August May.

Abundant in marshy/aquatic places; Chandlai and Frazer bridge near Tonk.

Leaves are used for making mats and screens.

81. ARACEAE

**Pistia L.**


Free floating, stemless, stoloniferous, aquatic herbs. Leaves up to 5.5×4.0 cm, rostrate, sessile, base covered with membranous, pubescent sheath, obovate cuneate, apex retuse, truncate or rounded, nerves many, flabellate. Spathe greenish or yellowish-white, obliquely campanulate, gibbous.

*Fl. & Fr.*: September November.

Common in fresh water streams; Niwai temple.

82. LEMNACEAE

1a. Fronds with 2 or more roots, conspicuously 5-18-nerved; anthers longitudinally dehiscent; ovary winged

... *Spirodea* 2
1b. Fronds with a solitary root, nerveless or faintly 1-3-nerved; anthers transversely dehiscent; utricle smooth, not winged

... *Lemna 1*

1. **Lemna L.**


Minute, floating, aquatic herbs. Fronds up to 3.0 × 1.5 mm, flat, obovate, obovate oblong or suborbicular, asymmetric at the base, entire. Spathe membranous, with two male flowers and a female flower.

*Fl. & Fr.*: July - September.

Common in ponds, canals and in stagnant water; Mor village (Malpura).

This species can be distinguished form *L. minor* L. in having root cap acute, root - sheath slightly winged at the base and fronds asymmetric at the base.

2. **Spirodela Schleid.**


Minute, aquatic herbs. Fronds up to 8 × 7 mm, flat, orbicular or broadly ovate obovate, opaque, dark green above and purplish beneath. Spathe open at the top, with 2 male flowers and a female flower.

*Fl. & Fr.*: July September.
Rare; found in ponds and in stagnant water; Mor village (Malpura).

83. ALISMATACEAE

SAGITTARIA L.


Laticiferous, aquatic or semiaquatic herbs. Leaves floating. 2.0 - 5.5 × 1.5 - 3.5 cm, ovate, base deeply cordate with subacute basal lobes, apex rounded; petiole 6-25 cm long. Peduncles 2 - 5, more or less as long as the petiole. Racemes with 2 - 4 whorls of 2 - 3 flowers; lower whorls with bisexual and upper whorls with male flowers. Bracts 3 in each whorl, connate at the base. Pedicels up to 1 cm long. Sepals 6 - 9 mm long, broadly ovate-triangular, obtuse, keeled. Petals delicate, 1.0 - 1.3 cm long, obovate - orbicular, denticulate at the apex, white. Stamens 8 - 12 in bisexual flowers, 7 - 10 in male flowers. Carpels many, with a dorsal and a ventral, undulate, membranous crest. Achenes many, 3 - 4 × 3.0 - 3.5 mm, obovoid - elliptic, shortly stalked, with broad, blunt, spiny crest; spines connected by a thin membrane. Seeds c. 1.5 mm long, pale brown.

Fl. & Fr.: September - November.

Common in marshy places near Banetha village.

The subsp. lappula differs from the subsp. guayanensis, which is confined exclusively to tropical America, by compressed, larger, deeply crested achenes. In the typical subsp. the achenes are plump, wings shallowly crested, faces 1 - 3 winged and usually strongly echinate.

84. POTAMOGETONACEAE

POTAMOGETON L.

1a. Leaves, at least the upper ones, floating, broad, elliptic - lanceolate with a very long petiole; stipules free; flowers in dense spikes ... P. nodosus 1
1b. Leaves all submerged, narrowly linear or filiform, sessile; stipules adnate to the sheath; flowers in interrupted spikes. ... *P. pectinatus* 2


Submerged, aquatic herbs, rooting at nodes. Leaves 3-8 cm long; petiole 3-15 cm long. Stipules scarious, somewhat sheathing. Spikes dense, 3-7 cm long, reddish-brown, projected above the surface of water; peduncle up to 6 cm long. Perianth lobes 4, clawed, suborbicular, concave. Stamens 4, sessile. Carpels 4, free, sessile. Drupelets 2.5×3.0 mm, oblique, shortly beaked and keeled. Seeds subreniform.

*Fl. & Fr.* : May September.

Abundant at Chandlai dam near Tonk.


*Fl. & Fr.* : February November.

Common in Banas river near Bisalpura.

85. ZANNICHELLIACEAE

ZANNICHELLIA L.


Highly variable, fragile, submerged, fresh or brackish water herbs; stem slender, filiform. Leaves opposite or in whorls, linear or filiform. Spathe with 1 male and 2 - 5 female flowers. Male flower without perianth. Stamen solitary. Female flowers with a cupular, hyaline perianth. Carpels 1 - 9; stigma peltate. Achenes stipitate, 4.5 - 6.0 mm long (including the beak and stipe), rostrate, back curved, tuberculate. Seeds pendulous, terete.

*Fl. & Fr.* : November  February.

Common in Banas river near Rajmahal.

86. ERIOCAULACEAE

**ERIOCAULON** L.


Stemless, tufted, glabrous annuals, 5 - 8 cm. Leaves basal, rosette, up to 3 cm long, linear - subulate, entire, opaque. Peduncles many, slender, up to 8 cm long. Heads 2 - 3 mm across, ovoid - globose, grey. Involucral bracts many, scarious, the outer oblong or oblong - lanceolate, obtuse, the inner narrower, 1.2 - 1.5 mm long. Floral bracts 1.2 - 1.5 mm long, oblong - lanceolate, subacute. Receptacle columnar. Male flowers stipitate. Sepals conuate into a glabrous cucullate spathe, 3 - toothed at the apex. Corolla tubular, apex irregularly tridentate; lobes minute with apical glands. Stamens 6. Female flowers stipitate. Sepals 2, free, linear, acute, hyaline. Petals O. Ovary stipitate, trilocular; style long; stigmas 3, filiform. Seeds 0. 3 - 0.4 mm long, ellipsoid - ovoid, smooth, pale brown.

*Fl. & Fr.* : August  November.

Common in marshy/aquatic places near Rampura village.
1a. Glumes distichous:

2a. Nut triquetrous or dorsiventrally flattened with one side facing rhachilla  ...  *Cyperus* 1

2b. Nut laterally flattened with one angle facing rhachilla  ...  *Pycreus* 3

1b. Glumes spirally arranged:

3a. Style ciliate, basally constricted or articulated above the nut; hypogynous bristles absent  ...  *Fimbriostylis* 2

3b. Style glabrous, base neither constricted nor articulated but continuous with the ovary; hypogynous bristles present or absent  ...  *Scirpus* 4

1. *Cyperus* L.

1a. Plants more than 1 m tall; leaves and involucral bracts 10 - 15 mm wide; inflorescence usually more than 10 cm long  ...  *C. alopecuroides* 1

1b. Plants less than 1 m tall; leaves and involucral bracts 1.5 - 4.5 mm wide; inflorescence up to 10 cm long:

2a. Inflorescence capitate or a cluster of sessile spikelets, terminal or pseudo - lateral; rays absent:

3a. Inflorescence pseudo - lateral; rhachilla quadrangular; glumes c. 1.5 mm long, dotted with red spots within  ...  *C. laevigatus* 6

3b. Inflorescence terminal; rhachilla terete; glumes 3.0 - 4.5 mm long, not dotted with red spots:

4a. Spikelets in subglobose or 1 - 3 - lobed head; stamens 1 - 2:

5a. Spikelets in subglobose head; anther 1, muticous; stigmas 2 - 3; nut trigonous or plano - convex  ...  *C. pygmaeus* 10

5b. Spikelets in a head of 3 (rarely 1) spikes; anthers 2, not muticous; stigmas 2; nut biconvex, laterally compressed  ...  *C. triceps* 11

4b. Spikelets in a subglobose head of 3 - 6 (- 9) spikelets or in a single sessile cluster; stamens 3:
6a. Annual sedge; spikelets more than 10; filaments ligulate; nut c. 1.5 mm long, obovoid ... *C. compressus* 4

6b. Perennial, rhizomatous sedge; spikelets 3-6 (-8); filaments not ligulate; nut c. 0.7 mm long, obovoid - ellipsoid ... *C. niveus* 7

2b. Inflorescence with spikelets in more than one cluster or spikes, terminal; rays present:

7a. Glumes orbicular or suborbicular; anthers 2, c. 0.25 mm long; nut equal to the subtending glumes:

8a. Spikes subglobose, brown on drying; spikelets, stellately spreading; rachilla straight, glabrous; anthers muticous; nut yellow or straw coloured ... *C. difformis* 5

8b. Spikes oblong - ovoid, golden yellow on drying; spikelets spicately arranged; rachilla flexuous, hispid; anthers with short reddish appendage of the connective; nut dark brown ... *C. alulatus* 2

7b. Glumes ovate, elliptic or oblong; anthers 3, 0.5 mm or more long; nut shorter than the subtending glumes:

9a. Plants annual; anthers muticous; style as long as the stigmas ... *C. compressus* 4

9b. Plants perennial; anthers with red appendage of the connective; style shorter than the stigmas or hardly any:

10a. Glumes apiculate or mucronate; nut obovoid or obovate:

11a. Spikelets more than 12 mm long, each more than 15 - flowered; glumes more than 3 mm long; filaments ligulate; style shorter than the stigmas ... *C. atkinsonii* 3

11b. Spikelets less than 7 mm long, each up to 10 - flowered; glumes less than 2 mm long; filaments not ligulate; style hardly any ... *C. nutans var. eleusinoides* 8

10b. Glumes obtuse; nut linear - oblong or linear - obovate ... *C. pangorei* 9

Rhizomatous perennials. Leaves with the midrib prominent beneath, two lateral nerves marked above. Involutural bracts leaf-like, 3-7, longer than the inflorescence. Inflorescence compound or decompound; primary rays 5-8, unequal. Spikes digitately arranged, straw coloured. Spikelets 3-7 mm long, ovate to oblong lanceolate, 10-25 flowered. Rhchilla straight, narrowly winged. Glumes c. 2 mm long, ovate-elliptic, apiculate, 5-7-nerved. Stamens 2; connective produced. Stigmas 2-3; style longer than the stigmas. Nut c. 0.6×0.6 mm, plano convex, sometimes sub-trigonal, obovoid, shortly apiculate, golden yellow to straw coloured.

Fl. & Fr. : September November.

Common in ponds and by the side of ponds at Banetha village.


Erect, tufted annuals, 15-40 cm. Leaves basal, longer than the stem. Involucral bracts 3-5, leaf-like, unequal, the longest sometimes reaching 15-20 cm. Inflorescence umbellate; rachis flexuous, hispid on the angles. Spikes 1.0-2.5 (-3) ×1.0-1.8 (-3) cm. Spikelets 3-10×2.0-2.2 mm, patent, compressed, ovate to oblong-linear, 5-15 flowered. Glumes 1.5-2.0 mm long, membranous, ovate or suborbicular, emarginate, 7-nerved; keel narrowly winged, spinously ciliate on the back. Stamens 2. Nut c. 1.7×1.0 mm, obovate-ellipsoid, triquetrous with concave, smooth sides, broadly stipitate, apiculate, brown to dark brown.

Fl. & Fr. : September November.

Common in moist, sandy and marshy places on Banas river bed at Sopari village and near Haji Ki Kothi (Nilwai).

Tufted perennials, 6 - 70 cm, with woody rhizomes. Leaves basal, shorter than the stem. Involucral bracts 2 - 3, leaf-like. Inflorescence an umbel, often contracted into a head. Spikes up to 14 × 4 mm, compressed, narrowly linear, acute, brown. Glumes ovate, cymbiform, with a strong, sharp mucro beyond the obtuse tip. Nut c. 1.2 mm long, trigonous, obovate, brown.

*Fl. & Fr.*: August - October.


Tufted annuals, 8 - 15 cm or more tall. Leaves longer or shorter than the stem, mid nerve prominent. Involucral bracts 4 - 5, leaf-like, patent. Spikelets 5 - 20, 2.0 - 2.5 cm long, digitately clustered, oblanceolate, 10 - 30 or more flowered. Glumes c. 4 mm long, chartaceous, ovate, keel produced into a slightly recurved, laterally compressed mucro. Nut trigonous, broadly stipitate, shining dark brown to blackish.

*Fl. & Fr.*: September - February.

Common in moist, sandy places on Banas river bed; Bentheli village.


Tufted annuals or perennials, 15 - 50 cm. Leaves shorter or equal to the stem, with prominent mid nerve. Involucral bracts 2 - 3, leaf-like, unequal, spreading, up to 15 cm long. Spikelets 2 - 5 mm long, oblanceolate, with 10 - 20 flowers. Glumes c. 0.5 mm long. Nut c. 0.75 × 0.5 mm, elliptic to obovoid, broadly stipitate, conically apiculate.

*Fl. & Fr.*: September - February.

Common in moist, sandy places on Banas river bed at Bisalpura. Niwai and Chandlai village.

Perennials with horizontally creeping rhizomes. Leaves usually shorter than the stem or scarcely any. Involucral bracts 2, one erect, conspicuous, the other spreading, small. Spikelets 2.6 mm long, oblong-lanceolate, subacute, 5-15 flowered, straw-coloured. Rrachilla wingless. Glumes broadly ovate, minutely mucronulate. Stamens 3; connective produced into an acute reddish brown tip. Nut c. 1.25 × 1.0 mm, obovoid, plano convex, stipitate, shortly apiculate, minutely papillose, grey.

*Fl. & Fr.* : February September.

Common in moist, sandy places on Banas river bed near Bentheli and Banetha village.


Tufted perennials, up to 18 cm, with woody, creeping rhizomes, base covered with brownish sheaths. Leaves basal, flat, shorter or equaling the stem. Involucral bracts 3-4, leaf-like, unequal, acuminate. Inflorescence a solitary, globose head, white or straw-coloured. Spikelets up to 1.5 × 0.4 cm, ovate lanceolate. Glumes ovate, many nerved, keeled. Anthers mucronate. Stigmas 3. Nut triquetrous, apiculate, dark brown.

*Fl. & Fr.* : August - October.

Common in wastelands ; Tonk (*Maheshwari* 52943, LWG).


Plants 0.5-0.75 m. Leaves shorter or equal to the stem, coriaceous, mid-nerve prominent beneath, two lateral nerves marked above. Involucral bracts 3-6, leaf-like. Spikelets 3-6 mm long, linear or narrowly elliptic
with 8 10 flowers. Rhachilla flexuous. Glumes 2.0 - 2.5 mm long, 5 7-nerved with straight or recurved apiculus. Nut c. 1.25 × 0.5 mm, shortly stipitate, apiculate.

Fl. & Fr. : August September.

Common in marshy places near Niwai temple and by the side of Tordi Sagar.


Tall, glaucous, rhizomatous perennials, c. 1 m ; base of the stem covered with reddish - brown scales. Leaves few, shorter than the stem ; sheath papery. Involutrular bracts 2 3, leaf - like, Spikes with 10 15 spikelets. Spikelets 0.5 1.25 cm long, linear, acute, with 10 20 flowers, reddish - brown. Rhachilla flexuous. Glumes c. 2.25 mm long, oblong or elliptic, many nerved. Nut c. 1.5×0.5 mm, stipitate, minutely papillose.

Fl. & Fr. : August November.

Abundant in moist, sandy places on Banas river bed, Gar R.F. (Deoli).

It is used for making mats etc.


Tufted annuals, 5 15 cm. Leaves numerous, usually as long as the stem. Involutrular bracts 2 6, leaf - like, with dilated base. Heads 1.0 1.5 cm in diam. Spikelets lanceolate, many flowered. Glumes c. 3 mm long, ovate - lanceolate, keeled, mucronate, 3 4 nerved. Anthers muticous. Stigmas 2 3 ; style usually shorter than the stigmas. Nut trigonous or plano - convex, slightly apiculate and papillose, straw coloured.

Fl. & Fr. : February - November.
Common in marshy places on the sandy bed of Banas river and on silty soil at Tordi Sagar.


Tufted perennials, 10 - 25 cm, with short rhizomes. Leaves basal, flat, as long as or longer than the stem. Inflorescence a dense, ovoid, cylindrical spike, up to 0.8 cm long, white or straw - coloured. Involucral bracts 3 - 5, leaf - like, unequal, longest up to 10 cm. Glumes ovate - lanceolate, keeled, 7 - 8 - nerved. Stamens 2. Stigmas 2. Nut c. 1 mm long, oblong, apiculate, yellowish, brown to brown.

*Fl. & Fr.* : August November.

Common in sandy places in Sohela plantation, Tonk (*Raizada* 18/55, DD).

2. **Fimbristylis** Vahl *nom. cons.*

1a. Inflorescence consisting of 1 - 2 spikelets ; stamens 3  

1b. Inflorescence consisting of many spikelets ; stamen 1 :

2a. *Plants hairy*; stigmas 2 ; style flat, ciliate; nut lenticular ;

3a. Leaves eliagulate; glumes pubescent, distinctly micro - nate; filaments c. 1.25 mm long, ligulate; style base fringed with a whorl of long, pendent hairs; nut smooth  

3b. Leaves ligulate; glumes glabrous, micrornulate; filaments indistinct; style base not fringed with pendent hairs; nut distinctly trabeculate by 5 - 7 longitudinal ribs on each face  

2b. *Plants glabrous*; stigmas 3 ; style triquetrous, glabrous; nut obtusely trigonous  

Rhizomatous perennials, 3 - 30 cm. Involucral bracts 2 - 5, leaf - like, longer than the inflorescence. Spikelets 2 8 mm long, ovate, brown. Rhachilla narrowly winged. Glumes c. 1.5 mm long, broadly ovate, strongly keeled. Anthers minutely apiculate; style longer than the stigmas. Nut c. 0.6 × 0.5 cm, pale straw - coloured, shining.

*Fl. & Fr.* : February - May.

Common on moist, sandy bed of Banas river near Banetha (Bisalpura), on silty soil in Tordi Sagar, near Frazer bridge and near Niwai temple.

The leaves are used as forage.

Closely allied to *F. dichotoma* (L.) Vahl, but can easily be distinguished from it by the sharply keeled, mucronate glumes, shorter style and smaller nut.


Tufted annuals, 10 20 cm or more tall. Leaves flat, eligulate. Involucral bracts 2 5, leaf - like, shorter than the inflorescence. Spikelets solitary, 2.0 3.5 mm long, ovoid, acute, dark brown. Rhachilla narrowly winged. Glumes broadly ovate, obtuse, keeled. Style equal to the stigmas. Nut 0.5 - 0.6 × 0.5 mm, obovate, stipitate, verruculose, pale stramineous.

*Fl. & Fr.* : July September.

Common in marshy places ; Tordi Sagar.


Glabrous perennials, up to 25 cm. Leaves ligulate with involute margins. Involucral bracts usually glume - like, erect. Spikelets 5 6 mm long, oblong ovoid, brown. Rhachilla narrowly winged. Glumes c. 3 mm long, broadly ovate, shortly apiculate. Anthers minutely apiculate.
Stigmas 2; style longer than the stigmas, flat, ciliate. Nut c. 1.25 × 1.0 mm, obovate, lenticular, finely longitudinally striate with rows of isodiametric cells, stipitate, pale straw coloured.

*Fl. & Fr.*: July September.

Common in marshy places; Saroi village near Deoli.


Tufted annuals, 2 10 cm. Leaves filiform. Involucral bracts 4 5, leaf-like, longer than the inflorescence. Spikelets 3 5 mm long, oblong-lanceolate, greenish pale brown. Rhachilla narrowly winged. Glumes 3 4 mm long, ovate with recurved mucro. margins with red spots within. Anthers apiculate. Style longer than the stigmas, hairs at the base closely appressed to the nut and covering 1/2 3/4 of it. Nut c. 0.5 × 0.5 mm, pale stramineous.

*Fl. & Fr.*: February May.

Common in marshy places; Tordi Sagar.

Closely allied to *F. aestivalis* (Retz.) Vahl, but can easily be distinguished by the much longer, strongly recurved mucros of the glumes, by the long hairs of the style base and by the slightly longer style and nut.

3. **Pycreus** P. Beauv.

1a. Glumes c. 2 mm long, obtuse, muticus; style shorter than the stigmas; nut apiculate

\[ P. \text{flavidus} \]

1b. Glumes c. 1.5 mm long, retuse at the tip, mucronate; style equal to the stigmas; nut truncate at the apex

\[ P. \text{pumilus} \]


Tufted, often short rhizomatous sedge, 30 - 50 cm. Leaves setaceous. Involucral bracts 2 - 3, leaf-like. Spikes ovoid with 6 - 15 spikelets or more. Spikelets 1 - 2 cm long, spreading, linear to linear-lanceolate, 20 - 35 flowered, brown. Rhachilla straight, stout, tetragonal, wingless. Stamens 2. Nut 0.1 × 0.5 mm, broadly obovoid, distinctly apiculate, papilllose, dark chestnut brown.

Fl. & Fr.: Almost throughout the year.

Common in marshy place at Tordi Sagar and near Niwai temple.


Tufted annuals, 5 - 30 cm. Leaves shorter or longer than the stem, mid-nerve prominent. Involucral bracts 3 - 5, leaf-like, up to 10 cm long. Spikes subglobose, dense, with 5 - 20 spikelets. Spikelets 1.0 - 1.5 cm long, divergent, oblong to linear, compressed, 10 - 20 flowered. Rhachilla straight, wingless. Stamens 2; anthers muticous. Nut c. 0.75 × 0.5 mm, ellipsoid obovoid, shining brown to castaneus.

Fl. & Fr.: September November.

Common in marshy places near Niwai temple and around Tordi Sagar.

Stamens 2 in the upper half and 1 in the lower half in the same spikelet are often found.

4. Scirpus L.

1a. Inflorescence terminal with or without rays, or pseudo-lateral with rays present; hypogynous bristles 3 - 6; nut smooth:

2a. Hypogynous bristles unequal, retrorsely scabrid, slender; glumes bifid at the apex:
3a. Inflorescence capitate, rays absent; spikelets shining yellowish pale brown; glumes red - spotted; stigmas 2; nut compressed, two sided ... S. affinis 1

3b. Inflorescence umbelliform, rays present; spikelets dark reddish - brown; stigmas 3; nut trigonous ... S. tuberosus 5

2b. Hypogynous bristles equal, plumosely fringed in the upper half with antrorse moniliform hairs; glumes slightly notched at the apex ... S. litoralis 2

1b. Inflorescence a lateral, sessile head; hypogynous bristles absent; nut rugose with transverse wavy lines: ... S. supinus 4

4a. Leaves present; spikelets 3-6 mm long, greenish; glumes 2.0 - 2.5 mm long, smooth with red spots on the inner side; nut globose obovoid ... S. roylei 3


Rhizomatous perennials, 10 30 cm or more tall. Leaves 15 20 × 0.3 0.5 cm, mid nerve prominent. Involucral bracts 3 - 5, leaf - like, longer than the inflorescence. Spikelets in clusters of 1 5, c. 0.75 - 2.0 cm. long. Glumes 6 8 mm long, oblong, puberulous, strongly keeled. Stamens 3; anthers with bristly pappillate appendage. Nut c. 2.5 × 2.0 mm, obovoid, distinctly apiculate, pale yellow to dark brown.

Fl. & Fr.: February May.

Very common in marshy places at Tordi Sagar and on Banas river bed near Frazer bridge.


Tall, rhizomatous perennials, c. 2 m. Leaves reduced to bladeless or shortly laminate sheaths. Involucral bracts erect, continuous with the stem.
Spikelets solitary, c. 0.6 1.5 cm long, oblong ovoid, brown. Glumes scarious, elliptic to oblong with a distinct mucro. Stamens 3; anthers muticus, Stigmas 2. Nut c. 1.75 × 1.0 mm, broadly ovoid, plano-convex, distinctly apiculate, dull brown.

Fl. & Fr. : August November.

Very common in marshy areas on the Banas river bed at Banetha and Chandlai and on Uniyara river bed along Aligharh - Tonk road.


Erect, tufted sedge, 25 40 cm; stem transversely septate. Involutural bracts absent. Spikelets 2 10, sessile, 0.5 1.25 cm long, ovoid - oblong. Glumes elliptic, concave, keeled. Stamens 3. Stigmas 3. Nut c. 1.5 × 1.0 mm, triquetrous, distinctly apiculate, shining blackish dark brown.

Fl. & Fr. : September November.

Common in marshy places around Tordi Sagar and on the way to Siras Forest.


Fl. & Fr. : July - September.

Rare; found in marshy places around Tordi Sagar.

This species is closely allied to S. roylei (Nees) Parker, but the latter can easily be recognised by the absence of lamina and by the larger, multi-striate, golden yellow glumes.

Erect sedge, 25 50 cm or more tall; rhizomes horizontally creeping, forming hard, ovoid tubers at the nodes. Leaves often as long as the stem, 3 8 mm wide. Involucral bracts 1,3, leaf-like. Spikelets 1.5 3.0 cm long, oblong ovoid. Glumes 6 7 mm long, broadly ovate, puberulous, strongly keeled, mucro antrorsely scabrid. Stamens 3; anthers apiculate. Nut c. 2.5 × 1.5 mm, obovoid, apiculate, pale straw coloured.

Fl. & Fr.: February - August.

Common in water logged places at Barndi and Uniyyara villages.

In most of the older Indian floras this species is described under the name Scirpus maritimus L. But according to Bectle (I. c.) true S. maritimus L. is an European plant, found occasionally in Asia.

S. S. Hooper in Saldanha and Nicoslon, Flora of Hassan district 658 (1976) includes the species of the genus Scirpus of earlier workers under Bolboschoenus, Hemicarpha, Rikilila and Schoenoplectus, based largely on differences in embryo structure. Scirpus maritimus L. is treated as Bolboschoenus maritimus (L.) Palla. She, however, pointed out that further work is needed to establish satisfactory boundaries for some of the genera mentioned above.

88. POACEAE

1a. Spikelets 2-flowered; usually dorsally compressed, falling entire at maturity:

2a. Spikelets paired or in groups of threes, dissimilar with one sessile and the other pedicelled; glumes more or less similar, as long as the spikelets, more or less rigid; upper lemma often with a geniculate awn:

3a. Spikelets in pairs, one sessile and the other pedicelled:

4a. Inflorescence a simple, spiciform raceme or of digitate spike-like racemes:

5a. Inflorescence a simple spiciform raceme:

6a. Rhizomatous grass; joints of inflorescence semi-cylindric; spikelets indistinct, awnless; sessile spikelet fitted in the hollow cavity of the pedicel ... Hemarthria 18
6b. Grass not rhizomatous; joints of inflorescence cylindric; spikelets distinct, awned; pedicel cylindric:
7a. Raceme usually supported by a spathe-like sheath; glumes equal, lower one pitted, not channelled; grain oblong - elliptic

... **Eremopagon 16**

7b. Raceme not supported by a spathe-like sheath; glumes subequal, lower one without a pit, channelled; grain oblong

... **Sehima 30**

5b. Inflorescence of digitately arranged spike-like racemes

... **Dichanthium 12**

4b. Inflorescence a panicle:

8a. Panicle silvery plumose; spikelets of each pair pedicelled or one sessile and the other pedicelled, both hermaphrodite:

9a. Rhizomatous grass; rhachis of racemes tough or tardily breaking up; spikelets of each pair pedicelled; stamens 2; grain oblong - ellipsoid or ellipsoid

... **Imperata 19**

9b. Grass not rhizomatous; rhachis of racemes breaking up; each pair of spikelets with one sessile and the other pedicelled spikelet; stamens 3; grain oval

... **Saccharum 28**

8b. Panicle not plumose; spikelets of each pair dissimilar, one sessile and the other pedicelled, the sessile hermaphrodite, the pedicelled male or neuter:

10a. The basic unit of the inflorescence a pair of erect or epinastic racemes, one sessile and the other pedicelled, supported by a spathe

... **Cymbopogon 7**

10b. The basic unit of the inflorescence a pair of spikelets, one sessile and the other pedicelled, not supported by a spathe:

11a. Rhizomatous grass; roots often aromatic; lower glume muriculate or tuberculate all over the back; grain oblong, slightly oblique at the top

... **Vetiveria 36**

11b. Grass not rhizomatous; roots not aromatic; glumes smooth; grain obovoid

... **Sorghum 32**
3b. Spikelets in groups of threes, one sessile and the other two pedicelled:

12a. Panicle leafy; triplet enclosed in a spathe; callus absent; upper glume of sessile spikelet gibbous, 5-nerved, bifid at the apex, not keeled ...

12b. Panicle not leafy; triplet not enclosed in a spathe; callus very distinct, hairy; upper glume of sessile spikelets not gibbous, less than 5-nerved, acuminate at the apex, keeled

2b. Spikelets solitary; glumes dissimilar, shorter than the spikelets, membranous, the lower glume smaller or sometimes suppressed; upper lemma usually awnless:

13a. Spikelets subtended by bristles or involucre of bristles:

14a. Spikelets enclosed in an involucre of bristles united at the base into a cup and falling with it; upper lemma smooth; grain enclosed but free within the lemma and palea ...

14b. Spikelets surrounded by free bristles; upper lemma transversely rugose; grain tightly enclosed by the hardened lemma and palea ...

13b. Spikelets naked i.e. not subtended by bristles or involucre of bristles:

15a. Inflorescence an open panicle; spikelets scattered; rachis slender, not strap-like, pedicel more than 4 mm long ...

15b. Inflorescence consisting of two or more (rarely one) racemes, spike-like racemes or spike of spikelets attached to a slender strap-like rachis; spikelets 2- or 3-nate, not scattered; pedicel less than 2 mm long:

16a. Inflorescence branches arranged in racemes, spike-like racemes or spikes; upper lemma crustaceous or coriaceous, margins narrow, inrolled or involute and exposing the palea; spikelets 2-nate, glabrous or pubescent:

17a. Spikelets with a bead-like swelling at the base; lower glume reduced to a minute cupular rim clasping the thickened, bead-like swelling ...

17b. Spikelets without a bead-like swelling at the base; lower glume
shorter, mucronate, cuspidate or awned or lower glume almost absent:

18a. Lower glume present; upper glume acuminate or awned:

19a. Ligule generally present; spikelets less than 3 mm long, glabrous; upper lemma mucronate; grain broadly orbicular ... Paspalidium 23

19b. Ligule mostly absent; spikelets more than 3.5 mm long, hairy; upper lemma obtuse or apiculate; grain broadly elliptic ... Echinochloa 14

18a. Lower glume absent; upper glume acute, not awned ... Paspalum 24

16b. Inflorescence branches digitate, whorled or verticillate; upper lemma thinly cartilaginous, usually with flat, hyaline margins, not exposing the palea; spikelets 3-nate, covered with clavate hairs ... Digitaria 13

1b. Spikelets 1-many-flowered, usually laterally compressed or terete, breaking up at maturity above the more or less persistent glumes or if falling entire then not 2-flowered:

20a. Plants arborescent; culms covered with white, waxy powder; leaves with a petiole-like base and articulated with the sheath; lemmas several; flowering and fruiting rarely ... Dendrocalamus 10

20b. Plants herbaceous; culms not covered with waxy powder; leaves sessile, not articulated with the sheath; lemmas few; flowering and fruiting usually annually:

21a. Tall, reed-like grass, more than 2 m high; culms hollow; inflorescence plumose; rachilla and internodes bearing long silky hairs which envelop the lemmas ... Phragmites 26

21b. Small grass, less than 1.5 m high; culms solid; inflorescence not plumose; rachilla and internodes glabrous or pubescent, hairs not enveloping the lemmas:

22a. Glumes minute and represented by two inconspicuous lips; stamens 6; grain with distinct linear hilum ... Oryza 21
22b. Glumes distinct and conspicuous; stamens 1 - 3; grain with hilum of various types but not linear:

23a. Inflorescence a spike, spike-like raceme, spike of spikes or with groups of spikelets spaced on the rhachis:

24a. Upper glume furnished with rows of hooked spines or tubercles ... \textit{Tragus 35}

24b. Upper glume smooth or scabrid but without rows of hooked spines or tubercles:

25a. Leaf - blades subamplexicaul; inflorescence a delicate, "bottle-brush" like, simple spike: spikelets 1 - flowered; grain linear, terete ... \textit{Perotis 25}

25b. Leaf - blades not subamplexicaul; inflorescence a spike of spikes or consisting of groups of spikelets spaced upon a rhachis; spikelets 2 - many-flowered; grain obovate - elliptic or obliquely ovoid:

26a. Inflorescence of a series of dense spikes arranged on an erect, strap-like rhachis; spikelets laterally compressed, not awned, many-flowered; grain obliquely ovoid ... \textit{Desmostachya 11}

26b. Inflorescence consisting of groups of spikelets spaced on a thin rhachis; spikelets dorsally compressed, awned, 2 - flowered; grain obovate - elliptic ... \textit{Melanocenchris 20}

23b. Inflorescence of digitate spikes or an effuse or compact panicle or in heads:

27a. Inflorescence of digitate spikes (rarely spikes solitary in \textit{Tetrapogon}):

28a. Spikelets awned:

29a. Spikelets 1 - flowered, with a flexuous, 2.0 - 3.5 cm long awn; lemma narrow-ed upwards ... \textit{Schoenefeldia 29}
29b. Spikelets 2 - many - flowered with a less than 1.5 cm long awn; lemmas widen-
ed upward:

30a. Spikes 1 - 3; fertile florets 2 or more ... *Tetrapogon* 34

30b. Spikes more than 4; fertile floret only one ... *Chloris* 4

28b. Spikelets not awned:

31a. Spikelets 1 - flowered; tip of rhachis not produced; grain ellipsoid, laterally compressed ... *Cynodon* 8

31b. Spikelets many - flowered; tip of rhachis produced; grain oblong to globose, angled ... *Dactyloctenium* 9

27b. Inflorescence an effuse or compact panicle or a dense head:

32a. Inflorescence an ellipsoid or ovoid dense head, heads supported by the inflated sheath ... *Crypsis* 6

32b. Inflorescence an effuse or compact panicle, not supported by the inflated sheath:

33a. Panicle effuse, branches long and spreading:

34a. Lemmas awned; awn tripartite ... *Aristida* 2

34b. Lemmas not awned:

35a. Spikelets fusiform, 1 - flowered ... *Sporobolus* 33

35b. Spikelets laterally compressed, many - flowered ... *Eragrostis* 15

33b. Panicle compact, broadly cylindrical, branches very short ... *Polypogon* 27
1. *Apluda L.*


Erect perennials, 1.0 - 1.5 m. Ligule membranous, short, rounded. Sessile spikelets scatted upon the bulbous base of the rhachis, 2 - flowered, upper male, lower hermaphrodite. Upper lemma ovate, hyaline, cleft half way down, awned.

*Fl. & Fr.* : September - March.

Common in gravelly habitats with sandy loam soil ; Tordi Sagar, Kakor R. F. and Anwa R. F.

It is a good fodder grass during younger stages.

2. *Aristida L.*


Tufted, erect or geniculately ascending grass, 25 - 75 cm. Leaves up to 12.0 × 0.2 cm, convolute or flat, linear, scabridulous on the upper surface, base ciliate ; ligule a short ciliate rim. Panicle up to 20 cm long, linear. Spikelets c. 2.5 cm long, green or pale brown, base of callus pointed. Lower glume slightly longer than the upper, linear with scabrous mid-nerve. Lemma awned ; awn up to 6 cm long, situated on a long column which is articulated at the base.

*Fl. & Fr.* : July September.
Common in sandy habitats; Deoli and Sohela (Patil 406; Raizada 15/55, DD); Tonk plantation (Maheshwari 53209, LWG).

3. Cenchrus L.

1a. Bristles connate at the base only; inner bristles ciliate, very slender, slightly widened and thickened downwards, more than 8 mm long; outer numerous, filiform ...

C. ciliaris 1

1b. Bristles connate into a 1 - 3 mm long cup; inner bristles not ciliate, flattened, rigid, subulate, grooved on the back, less than 5 mm long; outer few or absent ...

C. setigerus 2


Erect or decumbent, tufted perennials, 20 - 50 cm; rootstock often nodose, the sheath of which woolly. Leaves up to 25.0 × 0.5 cm; ligule reduced to a ciliate rim. Inflorescence 1.5 - 7.0 cm long, purple. Spikelets (1-) 2 - 4 in each involucre, sessile, 4.0 - 4.5 mm long. Upper and lower glumes 1 - nerved, hyaline.

Fl. & Fr.: August March.

Common in sandy areas; Haji Ki Kothi and Sohela R.F.

It is a valuable fodder grass.


Erect or ascending from a geniculate base perennials, 15 - 40 cm, sometimes rooting at nodes. Leaves up to 20.0 × 0.8 cm, sparsely pilose; ligule a narrow ciliate rim. Inflorescence 2 - 8 cm long, pale green or
purple. Spikelets 2-3 in each involucre, sessile, 3.5-4.0 mm long. Upper and lower glumes 1-nerved, hyaline.

*Fl. & Fr.*: August-March.

Common in sandy areas; Pachewar village.

It is a good fodder grass with high yielding capacity.

4. **Chloris Sw.**

1a. Perennials; spikes usually 20-25 cm long, widely spreading;
upper glume 5-7 mm long  ...  *C. dolichostachya* 1

1b. Annuals, rooting at the nodes; spikes up to 6 cm long,
closely crowded; upper glume c. 3 mm long  ...  *C. virgata* 2


Tufted grass, c. 0.5 m. Leaf-sheath prominently hairy down the margins; ligule a rim of hairs. Spikelets 4-5 mm long, lanceolate. Rachilla between the glumes and lemma flattened, hairy, forming the bearded callus. Lemma terminating into a 8-10 mm long awn. Grain 2-3 mm long, enclosed by the persistent lemma and palea.

*Fl. & Fr.*: September-March.

Common in rocky habitats; Toda Rai Singh R.F.

It is a good fodder grass before flowering.


Erect or geniculately ascending grass, c. 1 m. Leaf-sheath smooth. Spikes silky hairy, sometimes partly enclosed in the uppermost leaf-sheath. Spikelets 2-3-flowered, shortly 2-awned. Lemma thickly ciliate on the margins in the upper half with long hairs.
Fl. & Fr.: August November.

Common on sandy - loam to clayey soil; Tordi Sagar.

It is a good fodder grass.

5. CHRYSOPOGON Trin. nom. cons.


Tufted perennials. 1.0 1.5 m. Leaves up to 30.0 × 0.8 cm, often folded; ligule a very shallow rim. Panicle 5 10 cm long, the lower axis and whorls very shortly hairy, the upper glabrous; callus bearded with stiff golden hairs. Pedicelled spikelets c. 7 mm long, slightly longer than the sessile one.

Fl. & Fr.: September February.

Common in gravelly habitats; Kachha Bundha and Toda Rai Singh R. F.

6. CRYPIS Ait. nom. cons.


Profusely branched annuals with at first prostrate, finally ascending culms. Leaves up to 5.0 × 0.3 cm, glabrous or sparsely hairy, hairs
mostly with bulbous base. Spikelets 2.0 × 2.5 mm long, lanceolate. Glumes 1 nerved, ciliate on the keel. Grain c. 1.5 mm long, obovate - elliptic, brownish.

*Fl. & Fr.* : September - November.

Common in moist places ; Banns river bed at Bentheli village.

7. **Cymbopogon Spreng.**

1a. Non aromatic grass ; basal sheath woolly to sparsely hairy ; lowest pedicel of the sessile raceme swollen, shining and hairy ...  

C. parkeri 2

1b. Aromatic grass with woody rootstock ; basal sheath glabrous, shining ; lowest pedicel of the sessile raceme neither swollen nor hairy ...  

C. martinii 1


Erect perennials, c. 2 m. Leaves up to 40.0 × 2.5 cm, lanceolate, broadly rounded or cordate at the base, margins scabrid ; ligule 1 × 2 mm long, oblong. Sessile spikelets of the lowest pair male or neuter, others hermaphrodite, awned. Pedicelled spikelets male ; florets reduced to a small scale enclosing 3 stamens only.

*Fl. & Fr.* : September March.

Common near moist places ; Tordi Sagar.

It is not a good fodder grass. Rusa oil which is used in medicine as a remedy for rheumatism is obtained from this grass.

There are two forms of this species “Motia” and “Sofia”. They can only be distinguished from one another in the field by certain vegetative characters and also by their odours when crushed. In the herbarium material it is not possible to distinguish them from each other. The form “Motia” yields the “Palmarosa oil” which is exported to Europe and America, while “Sofia” yields “Ginger - Grass oil” (Raizada et al., l. c.).

Densely tufted perennials, c. 1 mm. Leaves up to 15.0 × 0.3 cm, very narrow, almost filiform, flexuous. Lowest pair of spikelets of the sessile racemes homogamous, of the other heterogamous. Sessile spikelets hermaphrodite, awned. Palea absent. Pedicelled spikelet male.

*Fl. & Fr.*: March May.

Common in sandy areas; Gar R. F. near Banas river, Deoli.


Creeping, stoloniferous and sometimes rhizomatous perennials up to 35 cm, with erect flowering culms. Leaves up to 10.0 × 0.4 cm; ligule a rim of short hairs. Spikelets crowded, secund, c. 2 mm long. Stamens 3.

*Fl. & Fr.*: Almost throughout the year.

Very common grass forming a carpet in cultivated and fallow fields; Ghati village and elsewhere.

9. **Dactyloctenium** Willd.

1a. Annuals; spikes 2 - 6 cm long, straight ... *D. aegyptium* 1

1b. Perennials; spikes 0.5 - 1.8 cm long, falcate ... *D. scindicum* 2

Erect or prostrate, hispid grass, 20–60 cm. Leaves up to 20.0 × 0.6 cm, margins and nerves covered with bulbous-based hairs; ligule a ring of white hairs. Produced tip of rhachis 2–4 mm long. Spikelets c. 4 mm long. Glumes subequal, compressed, with curved muco. Grain c. 1 mm across, compressed, subglobe, surface coarsely scultped.

*Fl. & Fr.*: July November.

Found in moist, sandy areas; Sohela plantation (*Raizada* 1/55, DD).


Stoloniferous perennials, 8-40 cm. Leaves up to 11.0 × 1.5 cm, glau- cous, sparsely hairy, margins ciliate with bulbous-based hairs; liquele membranous with a minute fringe of hairs. Tip of the rhachis shortly produced into a 2–3 mm long muco. Spikelets c. 3.2 mm long. Glumes unequal. Upper glume aristate with ciliate keel. Grain c. 9 mm long, ovoid, transversely rugose, pale brown.

*Fl. & Fr.*: Almost throughout the year.

Common in sandy habitats and forming thick tufts of plants matted with the soil; Sohela (*Raizada* 5/55, DD).

10. **Dendrocalamus Nees**


Densely tufted bamboo with strong stem; nodess wollen; lower stem-sheaths covered on the back with golden-brown, stiff hairs. Leaves up to 12 × 2 cm; liquele narrow, serrate. Spikelets crowded at the nodes of the inflorescence axis; perfect florets 2 or 3. Lemma densely hairy towards the tip, ending in a sharp spine. Palea fringed on the keel and hairy near the tip.

Fairly common in valleys; Toda Rai Singh R. F.
It is used for building purposes, matting and basket work, punting poles, furniture etc. The leaves are used as fodder. The tender young shoots are pickled and eaten.

11. Desmostachya Stapf


Robust, tufted, rhinomatous perennials. Leaves up to 40.0 × 0.6 cm, convolute. Inflorescence 30 40 cm long. Spikelets 20 25 per spike, 2 3 mm long, shining. Glumes very unequal.

Fl. & Fr.: August November

Common in moist places; Sohela R. F. near Tonk.

Cheap ropes, baskets and mats are prepared from it. It is a useful sand and soil binder.

12. Dichanthium Willemet

1a. Nodes glabrous; joints and pedicels grooved; lower glume of the sessile spikelets pitted ... D. pertusum 2

1b. Nodes bearded; joints and pedicels not grooved; lower glume of the sessile spikelets not pitted ... D. annulatum 1

Erect or geniculately ascending, tufted perennials, 30-40 cm. Leaves up to 15.0 \times 0.5 \text{ cm}, margins scabrid; ligule a shallow membrane. Sessile spikelets c. 2.75 mm long, hermaphrodite, awned. Lower glume 7-11 nerved, upper 3 nerved. Upper lemma with a c. 2 mm long awn. Pedicelled spikelets male or neuter, more or less similar to sessile.

*Fl. & Fr.*: September - February.

Common in moist and marshy habitats; Barndi near Frazer bridge.


Tufted, rhizomatous perennials, rooting at nodes; cataphylls glabrous. Leaves up to 12.0 \times 0.3 \text{ cm}, ciliate in the throat; ligule a shallow membrane surrounded by long ciliate hairs. Sessile spikelets 3.0 - 3.5 mm, oblong; callus 2.0 - 2.5 mm long. Glumes equal.

*Fl. & Fr.*: September - February.

Common in moist, sandy habitats; Banetha; Kachha Bundha R. F. and Frazer bridge.

It is a good fodder grass and can be made into hay.


Erect or decumbent annuals, 20 - 40 cm. Leaves up to 20.0 \times 0.3 \text{ cm}, scabrid; ligule membranous, lacerate on the upper margins. Inflorescence branch up to 10 cm long. Spikelets in triads, c. 1.5 mm long, elliptic. Lower glume absent; upper glume scaly, one third the length of the spikelet.

*Fl. & Fr.*: July - September.

Rare; Deoli (S.C. Agrawal 412, 416, DD).
14. ECHINOCLOA P. Beauv.

1a. Spikelets 3.5 - 4.0 mm long; glumes cuspidate or acuminate and lower lemma produced into a considerable awn; pedicels of spikelets with prominent bulbous-based white setae ... *E. crusgalli* 2

1b. Spikelets 2 - 3 mm long; glumes and lemmas neither awned nor cuspidate; pedicels of spikelets devoid of any setae ... *E. colonum* 1


Decumbent annuals of variable size, rooting at nodes. Leaves up to 15.0 × 0.8 cm, flaccid, scabrid or smooth, marked by a purplish-brown band at the junction of the blade and sheath. Inflorescence branches 2 - 3 cm long, appressed or ascending. Spikelets sessile, 2.5 - 3.0 mm long, elliptic ovate.

*Fl. & Fr.* : March - August.

Common in moist and marshy habitats; Banas river bed near Bentheli.

It is a good fodder grass. The grain is eaten by poor people in times of scarcity.


Erect, rather stout annuals, 1 - 2 m, rooting at the lower nodes. Leaves up to 30 cm long, flat, margins scaberulous. Inflorescence either solitary or 2 - 3 together.

*Fl. & Fr.* : August - November.

Common in marshy habitats; Tordi Sagar.

Before flowering it is a good fodder grass. The grain is eaten by poor people in times of scarcity.
15. **Eragrostis** N. M. Wolf.

1a. Panicle compact, dense, spiciform, cylindrical; keel of palea ciliate, cilia longer than the width of floret, basal glands of the cilia conspicuous

*E. ciliaris* 1

1b. Panicle open, effuse or loose; keel of palea smooth, scabrid or if ciliate then the cilia not exceeding the width of floret, basal glands of the cilia either absent or inconspicuous:

2a. Plants glandular:

3a. Only lower branches of the panicle glandular below the node; keel of palea smooth; stamens 3; grain ellipsoid, smooth.

*E. pilosa* 4

3b. Leaf margins, sheath and pedicels of spikelets with raised crateriform glands; keel of palea scabrid; stamens 2; grain subglobose, obscurely rugose

*E. minor* 3

2b. Plants eglandular:

4a. Spikelets breaking up from above downwards; rhachis fragile; stamens 3:

5a. Panicle loose with spreading branches

*E. tenella* var. *tenella* 5a

5b. Panicle contracted with ascending branches

*E. tenella* var. *insularis* 5b

4b. Spikelets breaking up from below upwards; rhachis tough; stamens 2:

6a. Panicle branches long, capillary; spikelets 40 - 50 or more flowered; grain obscurely rugose

*E. tremula* 6

6b. Panicle branches short, not capillary; spikelets 10 - 15 - flowered; grain smooth

*E. gangetica* 2


Geniculately ascending annuals, 8 - 35 cm. Leaves up to 7.5 × 0.25 cm; ligule a fringe of long hairs at the mouth of the sheath. Panicle 0.5-7.5 cm long. Spikelets 8 - 12 - flowered, clustered, each 1.0 - 1.25 mm long, strongly compressed. Glumes subequal, c. 1 mm long, ovate - lanceolate, acute, 1 - nerved. Lemma c. 1 mm long, obtuse, 3 - nerved. Stamens 2. Grain c. 0.6 mm long, ellipsoid, brown.
**Fl. & Fr.** : March November.

Common weed in fallow fields and wastelands, Deoli. *(B. D. Patil, 407, DD).*


Glaucous perennials. Leaves up to 15.0 × 0.5 cm, linear, flat or inrolled; ligule reduced to a rim with prominent fine hairs. Spikelets greenish grey. Glumes 0.8 0.9 mm long, lanceolate, acute, 1 nerved, nerve scabrid on the back. Lemma boat shaped, 3 nerved. Grain sub-globose, dark brown.

**Fl. & Fr.** : August November.

Common on sandy - loam soil; Rampura.


Erect or geniculately ascending annuals, c. 0.5 m. Mouth of sheath bearded. Panicle 5 15 cm long. Spikelets 1.5 - 2.2 mm long, more than 10 - flowered. Grain dorsally flattened, pale brown.

**Fl. & Fr.** : July November.

Common in moist places; Banas river bed near Bentheli village.

It is a good fodder grass.

Erect or geniculately ascending grass. Leaves up to $10.0 \times 0.5$ cm, flaccid; ligule reduced to a narrow rim. Lower branches of the inflorescence verticillate, pilose in the axils. Spikes 6-8 or more flowered. Glumes unequal. Lemma 1.0-1.2 mm long, narrowly ovate, acute or subobtuse, 3-nerved. Palea 2-nerved. Grain c. 0.5 mm long, yellowish-brown.

*Fl. & Fr.:* July-February.

Common in moist, sandy places; Banas river bed at Bentheli village.


Erect or geniculately ascending annuals. Leaf sheath with a few long hairs near the blade; ligule reduced to a narrow rim of hairs. Panicle 3-7 cm or more long; the branches of rhachis with prominent, long, white hairs in the axils. Spikelets 1.0-1.5 mm long, 5-9-flowered. Lower glume longer than the upper. Lemma 3-nerved, ovate. Palea ciliate on the keel with spreading, long, setose hairs, the hairs clasping the floret above. Grain ovoid.

*Fl. & Fr.:* August-November.

Common in rocky places; Kachha Bundha near Tonk.

It is a good fodder grass.


Panicle contracted with ascending branches; axis glabrous.

*Fl. & Fr.:* August-November.

Common in moist places; Banas river bed near Bentheli and Rampura.

It is used as fodder.

Tufted, erect or geniculately ascending grass. Leaves up to 15.0 × 0.5 cm, sparsely hairy. Panicle 10–20 cm long. Spikelets 1.5–2.0 mm long. Lemma 2.0–2.2 mm long, broadly ovate, obtuse. Grain nearly globose, yellowish brown.

*Fl. & Fr.*: August–November.

Common weed in cultivated and fallow fields; Rampura village.

It is a good fodder grass.

16. **EREMOPOGON** Stapf


Erect or decumbent, densely tufted perennials, 50–75 cm; nodes bearded; basal sheath silky, woolly or villous. Leaves up to 10.0 × 0.2 cm, linear; ligule truncate, ciliate. Racemes 2.5–3.5 cm long. Sessile spikelets hermaphrodite, 3–4 mm long, awned; the pedicelled one male, awnless.

*Fl. & Fr.*: August–November.

Common in rocky habitats; Banatha forest.

Serves as a good fodder grass.
**Flora of Tonk District**

17. **ERIOCHLOA H. B. K.**


Erect, tufted grass, c. 1. m; nodes swollen and slightly pubescent. Leaves up to $15 \times 1$ cm, glabrous, involuted when dry; ligule a rim of very short hairs. Inflorescence $5 \times 15$ cm long; rachis angular, minutely hairy. Spikelets 3.0 - 3.2 mm long, not awned. Palea absent. Grain free within the hardened lemma, compressed, lenticular, smooth.

*Fl. & Fr.* : September - November.

Not common; occurs in marshy habitats; Tordi Sagar.

18. **HEMARTHRIA R. Br.**


Spreading perennials, rooting at the lower nodes. Leaves up to $12.0 \times 0.3$ cm, folded when dry; ligule a very shallow rim fringed with hairs. Inflorescence $4 - 8$ cm long. Sessile spikelets 4.0 - 4.5 mm long. Pedicelled spikelets longer than the sessile.

*Fl. & Fr.* : August - November.

Common grass in moist and marshy places; Rampura and Tordi Sagar.
19. Imperata Cyr.


Very variable perennials, c. 60 cm; nodes with long white hairs. Leaves up to 15.0 × 0.4 cm, tapering at both the ends, villous at the base. Spikelets 2.5–3.0 mm long. Lower and upper lemma hyaline, denticulate.

*Fl. & Fr.:* May July.

Very common in marshy, shaded habitats; Tordi Sagar.

In younger stage it is used as fodder. The grass is also used for making low, rough screens and brushes, the leaves for thatching and the floss for stuffing cushions.

20. Melanocenchris Nees


Erect or geniculately ascending, tufted grass, 15–25 cm. Leaves up to 5.5 × 0.1 cm, filiform, margins convolute, scabridulous; sheath covered with scattered tubercle-based hairs; ligule a thick row of short white hairs. Spikelets c. 1 cm long including the awns, many-flowered. Glumes villous at the base. Lemma 3-nerved. Grain c. 1 mm long; hilum punctiform.

*Fl. & Fr.:* August October.

Found in rocky habitats; Sohela and Bani plantation (*Raizada, 6/55, DD).*
21. **Oryza L.**


Tufted, marshy or aquatic perennials, 75 - 100 cm. Leaves up to 30.0×0.8 cm; ligule 8 - 12 mm long, membranous, finally splitting. Spikelets c. 1 cm long, usually deciduous. Sterile lemma 1 - nerved, keeled. Fertile lemma with a conical callus, coriaceous, sparsely hispid, apex glandular and terminating into about 6 cm long, scabrid awn with jointed base.

*Fl. & Fr.* : September - December.

Rare; found in marshy places; Saroi village near Deoli.

22. **Panicum L.**


Erect or geniculately ascending annuals, 25 - 50 cm. Leaves up to 12.0×0.7 cm, margins with long white hairs; ligule a lacerate ring. Panicle up to 20 cm long. Spikelets solitary or binate, 2.5 - 3.0 mm long, ovate-lanceolate; pedicel longer than spikelets. Lower glume c. 1 mm long, acute, 3 - 5 nerved; upper glume and lower lemma equal, 2.5 - 3.0 mm long, acuminate, many - nerved. Grain c. 1.75 mm long, ovoid, smooth.

*Fl. & Fr.* : July - September.

Rare; Tonk (*Raizada* 17/55, DD).

23. **Paspalidium** Stapf


Creeping annuals, 1.0 - 1.5 m, rooting at nodes. Leaves up to 15.0 × 0.8 cm, linear, finely acuminate. Racemes 1 - 2 cm long, longer than the internodes, adpressed to the common axis. Spikelets c. 2.5 mm long, acute. Lower lemma coriaceous, shining, granular.

*Fl. & Fr.*: September - March.

Common in wet and marshy places; near Niwai temple.

24. *Paspalum* L.


Creeping, stoloniferous and rhizomatous perennials, rooting at nodes. Leaves up to 8.0 × 0.8 cm, sparsely hairy; ligule short, membranous. Spikes usually 2 (rarely 3), one sided, divaricate, 3 - 6 cm long; rachis flattened, 1.5 - 2.0 mm wide, hispidulous. Spikelets 2 - 3 mm long. Upper glume acute, 5 - nerved, pubescent. Lower lemma 3 - nerved.

*Fl. & Fr.*: September - March.

Common in moist and marshy habitats; Tordi Sagar.

25. *Perotis* Ait.


Tufted, decumbent annuals, 50 - 75 cm. Leaves up to 3.5 × 0.6 cm, ovate - lanceolate, margins with cartilaginous teeth. Spikelets 2.5 - 3.0 mm
long, narrowly linear, purplish. Lower glume 1-nerved, with longitudinal lines of shining white hairs on the dorsal surface; upper glume similar to the lower. Grain pale brown.

*Fl. & Fr.*: July October.

Common on low sand dunes; Bentheli (Deoli).

26. **Phragmites Trin.**


Rhizomatous perennials, up to 3 m. Leaves c. 50.0 × 2.5 cm, lanceolate, broadly auricled at the base. Spikelets hermaphrodite. Lower and upper glumes 3-nerved. Lemmas progressively shorter. Grain oblong, cylindrical.

*Fl. & Fr.*: November February.

Common in moist and marshy places; Niwai temple.

It is a good soil binder. The young leaves are used as fodder and the old stem for thatching purposes. The stem is also used for making baskets and screens.

27. **Polygogon** Desf.


Geniculately ascending or erect, tufted annuals, up to 0.5 m. Leaves up to 10.0 × 0.5 cm, flat. Spikelets 2–3 mm long. Glumes notched at the apex, hairy on the margins, with two or three times long, antrossely barbellate awn. Lemma half the length of the glumes, smooth, awned.
Fl. & Fr. : March - September.

Common in moist places; Banas river bed.

28. Saccharum L.


Rhizomatous perennials c. 2.5 m. Leaves up to 50.0 × 0.5 cm, margins scabridulous; ligule a membranous rim, with a few long hairs on the auricles. Panicle up to 50 cm long, spreading, with the callus hairs closely appressed to the branches of the panicle. Spikelets 3.0-4.5 mm long, sessile and pedicelled similar, hermaphrodite.

Fl. & Fr. : August - November.

Common in marshy habitats; Gar R. F.

It is a good fodder grass when it is in younger condition. The leaves and culms are used for thatching purpose. It is also a good soil binder.

29. Schoenefeldia Kunth


Geniculately ascending grass, 40-60 cm. Leaves up to 25.0 × 0.3 cm, narrow, flaccid, tips capillary. Spikes 1-5, up to 15 cm long, golden yellowish - green. Spikelets densely 2 - seriate on either side of the flattened, puberulous rhachis. Glumes subequal, acuminate, 1 - nerved, keel ciliate, tip bearing a minutely antrorsely barbellate, curved, c. 3.5 cm long awn.
30. **Sehima Forssk.**


Erect, tufted perennials, c. 1 m. Ligule a line of short, white, stiff hairs. Spikelets in pairs, one sessile and the other pedicelled. Sessile spikelets 8 - 9 mm long ; callus bearded, Lower glume bidentate, deeply grooved ; upper glume keeled and with 1 2 cm long awn. Upper lemma hermaphrodite, 3 - nerved, awned ; awns up to 3 4 cm long. Pedicelled spikelets 8 - 10 mm long, glabrous. Upper and lower lemmas empty or male, hyaline.

*Fl. & Fr.* : August February.

Common in moist places ; Kachha Bundha R.F. and Kakor R.F.

It is an excellent fodder grass.

31. **Setaria P. Beauv. nom. cons.**


Geniculately ascending, tufted annuals, 25 - 45 cm. Leaves up to 20.0 × 0.4 cm, flat or infolded ; ligule hyaline, truncate, ciliate. Inflorescence
0.5 - 3.0 cm long, green. Spikelets solitary, c. 2.1 mm long; bristles 6 - 8 to each involucre, up to 6 mm long, fine, rigid, antorosely barbed. Upper lemma yellowish. Grain c. 1.8 mm long, elliptic - rotundate, plano - convex.

Fl. & Fr.: July - September.

Common in rocky habitats; Tonk (Maheshwari 53231, LWG).
The grain is eaten in times of scarcity.

32. Sorghum Moench, nom. cons.


Tall annuals, 50 - 80 cm; nodes pubescent. Leaves 30 - 50 cm long, linear from a broad rounded and often clasping base, hairy just behind the ligule, otherwise glabrous; sheath silky. Sessile spikelets 4 5 mm long, awned, straw - coloured; callus bearded.

Fl. & Fr.: September - November.

Common on sandy - loam soil; Haji Ki Kothi.

33. Sporobolus R. Br.

1a. Plants stoloniferous; spikelets more than 2 mm long;
grain 0.8 × 0.6 mm, obovate or narrowly wedge - shaped,
pericarp loose ... S. ioclados 2

1b. Plant not stoloniferous; spikelets less than 1.5 mm long;
grain 0.5 × 0.3 mm, globose or ellipsoid, pericarp adherent ... S. helvolus 1

Tufted perennials, 30 - 40 cm; culms wiry. Leaves up to 10.0 × 0.3 cm, flat, glaucous, tapering to a filiform tip. Panicle 5-16 cm long. Spikelets c. 1.5 mm long. Glumes narrowly lanceolate, as long as the spikelets or the lower little shorter, acuminate, smooth.

*Fl. & Fr.*: August November.

Common on moist, clayey soil; Bada village on the way to Kakor R.F.


Tufted perennials, 25-80 cm; rootlets often covered with minute sand particles. Leaves up to 22.0 × 0.5 cm, convolute or flat, linear-lanceolate, margins finely ciliate serrulate; sheath glabrous; ligule a ring of white hairs. Panicle spreading, up to 22.5 cm long; lower branches whorled. Spikelets c. 2 mm long, pale green to pale brown, shining. Lower glume much shorter than the upper.

*Fl. & Fr.*: September December.

Found on sandy and sandy-clayey soil; Deoli (S.C. *Agrawal* 401, 422, DD).

34. **Tetrapogon** Desf.


Loosely tufted, weak annuals, up to 60 cm. Sheath loosely flabellate at the base of culms. Spikes 3.0 - 4.5 cm long. Spikelets awned. Glumes hyaline, acute, 1-nerved. Grain 1.5 - 2.0 mm long, oblong, brown.

*Fl. & Fr.*: July November.
Common on sandy - loam soil ; Amli R.F.

It is a good fodder grass.

35. Tragus Haller nom. cons.


Erect or geniculately ascending, tufted grass, 7 25 cm, often rooting at nodes. Leaves up to 4.0×0.4 cm, acuminate, margins with spaced, tubercle based bristles; ligule a thick row of short white hairs. Inflorescence up to 5.5 cm long. Spikelets paired, c. 3 mm long. Lower glume very minute; upper glume coriaceous, 5 - nerved, ribbed. Grain c. 1.5 mm long, oblong - elliptic to elliptic, slightly compressed.

Fl. & Fr.: July September.

Found in rocky habitats; Tonk (Raizada 8/55, DD).


1a. Aromatic grass ; sessile spikelets awnless ; joints and pedicels glabrous ; lower glumes spinulose - muriculate ... V. zizanioides 2

1b. Grass not aromatic ; sessile spikelets distinctly awned ; joints and pedicels with a basal tuft of silky hairs ; lower glume with a row of upwardly directed, white, transparent, marginal tubercles which become spinulose at the tip ... V. lawsonii 1

Perennial grass, up to 2 m. Leaves up to 40.0 × 0.6 cm, margins ciliate; ligule a ridge of hairs. Inflorescence up to 25 cm long. Sessile spikelets 4–5 mm long; callus bearded with silky hairs. Upper glume cymbiform, awned. Lower lemma 2 dentate, awned. Pedicelled spikelets male, awned, longer and narrower than the sessile; callus naked; pedicel nearly equalling the spikelets.

Fl. & Fr.: September - March.

Common in moist, sandy places; Bisalpur R. F.

It is a good pasture grass.


Stout grass, c. 1 m. Leaves c. 30.0 × 1.5 cm, glaucous. Inflorescence 20–30 cm long. Sessile spikelets 3.0–3.5 mm long, with well developed hairless callus. Lower and upper glumes 3-nerved. Lower lemma retrorsely ciliate, upper lemma notched. Pedicelled spikelets 3–4 mm long, male.

Fl. & Fr.: August - March.

Common in moist habitats; Banetha village.

The roots of this grass yield an aromatic oil known as ‘Vetiveria oil’, a large quantity of which is exported from India. The roots are woven into curtain or "tatties" and the latter, when moistened, cool and scent the air at the same time.
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