

**FLORA OF INDIA
SERIES-3**

**FLORA OF
AKOLA DISTRICT
MAHARASHTRA**

**S. Y. KAMBLE
S. G. PRADHAN**

BOTANICAL SURVEY OF INDIA

**Flora of
Akola District, Maharashtra**

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and
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FOREWORD

As a part of floristic survey and inventory of plant wealth at the national, regional and district levels, the Botanical Survey of India has been publishing the Flora of India under four series. The printing of the District Floras under series 3 would ultimately form the base work for State Floras. In this context "The flora of Akola District" is one of the districts that has been intensively explored during the years 1977—79 and it has been successfully completed.

The District of Akola is situated in the northern part of Maharashtra and borders Madhya Pradesh. The District is phytogeographically interesting and has few pockets of good reserve forest.

The introductory chapter gives topography and general features, general vegetation types, plants of medicinal, economical and horticultural importance. The systematic treatment deals with 651 species spread out under 391 genera and 96 families which includes 11 species of ferns and other Pteridophytes. Interesting species of Pteridophytes include *Ophioglossum lucitanicum* L. and *O. petiolatum* Hook. which also constitute new records for Maharashtra State. The dominant families are Poaceae, Fabaceae, Asteraceae, Euphorbiaceae, Cyperaceae and Acanthaceae. From this district 6 species of angiosperms have been recorded for the first time from Maharashtra State. These include *Vicia hirsuta* (L.) S. F. Gray, *Ipomoea petaloidea* Choisy, *Datura ferox* L., *Pancratium longiflorum* Roxb., *Alectra thomsoni* Hook. f. and *Allmania nodiflora* (L.) R. Br. var. *dichotoma* (Roth) Hook. f. *Alectra parasitica* A. Rich. is a new record for India and besides is ethnobotanically important. The vegetation of the district is adversely affected due to biotic factors. Twenty three rare and endangered species with restricted distribution have been listed. All these specimens are housed in the regional herbarium of Western Circle, Botanical Survey of India at Pune (BSI).

I trust this flora will be useful to the students and teachers of Botany, officials of the forest and agricultural departments, persons concerned with plant products as raw materials and environmentalists interested in the protection and conservation of threatened species and natural plant wealth. This flora provides comprehensive coverage of floristics of the district and the authors would welcome any useful suggestions from the users of this flora for its improvement and incorporation in future editions.

Botanical Survey of India,
Calcutta.

10 May, 1988.

M. P. NAYAR
DIRECTOR

P R E F A C E

The impetus for plant exploration increased with the reorganisation of Botanical Survey of India in 1954. The main objective has been to concentrate on under-explored and unexplored regions and after intensive floristic survey of those areas, prepare floras at state/district levels. These accounts of district floras would form the basis of state floras and eventually lead to the completion of Flora of India. Against the above background the Flora of Akola district in Maharashtra was taken up and has been completed after intensive explorations during the years 1977-79.

The Akola district has a total area of about 10600 sq. km of which nearly 810 sq. km are covered by reserve forests. The flora deals with 651 species (including the Pteridophytes) spread out under 96 families and 391 genera. It is based on our present collections which are deposited in the regional herbarium of Botanical Survey of India, Pune (BSI). Requisite information about the district pertaining to its topography and general features, forest biota, vegetation types, floristic analysis, plants of medicinal, economic and horticultural importance, new records of interesting plants, endangered plants etc. have been incorporated in the text. Keys to the genera and species, correct nomenclature, selected synonyms, brief botanical description and notes on habitat, phenology, distribution and vernacular names etc. have been included.

This flora will be helpful to students of Botany at undergraduate and postgraduate levels, forest officials, pharmacologists, agriculturists etc. in their research and management programme.

It is our pleasant duty to express our deep sense of gratitude to Dr. M. P. Nayar, Director, Botanical Survey of India, for facilities, constant encouragement and keen interest in the publication of the flora. We are indebted to Dr. B. D. Sharma, Deputy Director, Dr. V. S. Agarwal, Ex-Editor of Publications, Botanical Survey of India, Dr. R. S. Raghavan, Scientist 'SD', Dr. N. P. Singh, Scientist 'SD' and other fellow officers for their useful suggestions and encouragements during the preparation of this book. Thanks are also due to the Divisional Forest Officer and other forest officials in Akola district for their co-operation during our exploration work. Our thanks are due to our technical staff especially mounters and fieldmen who have assisted in collections and processing of specimens.

Any suggestions for the improvement and presentation of the flora are welcome for incorporation in future edition.

Botanical Survey of India,
Western Circle, Pune.
1988.

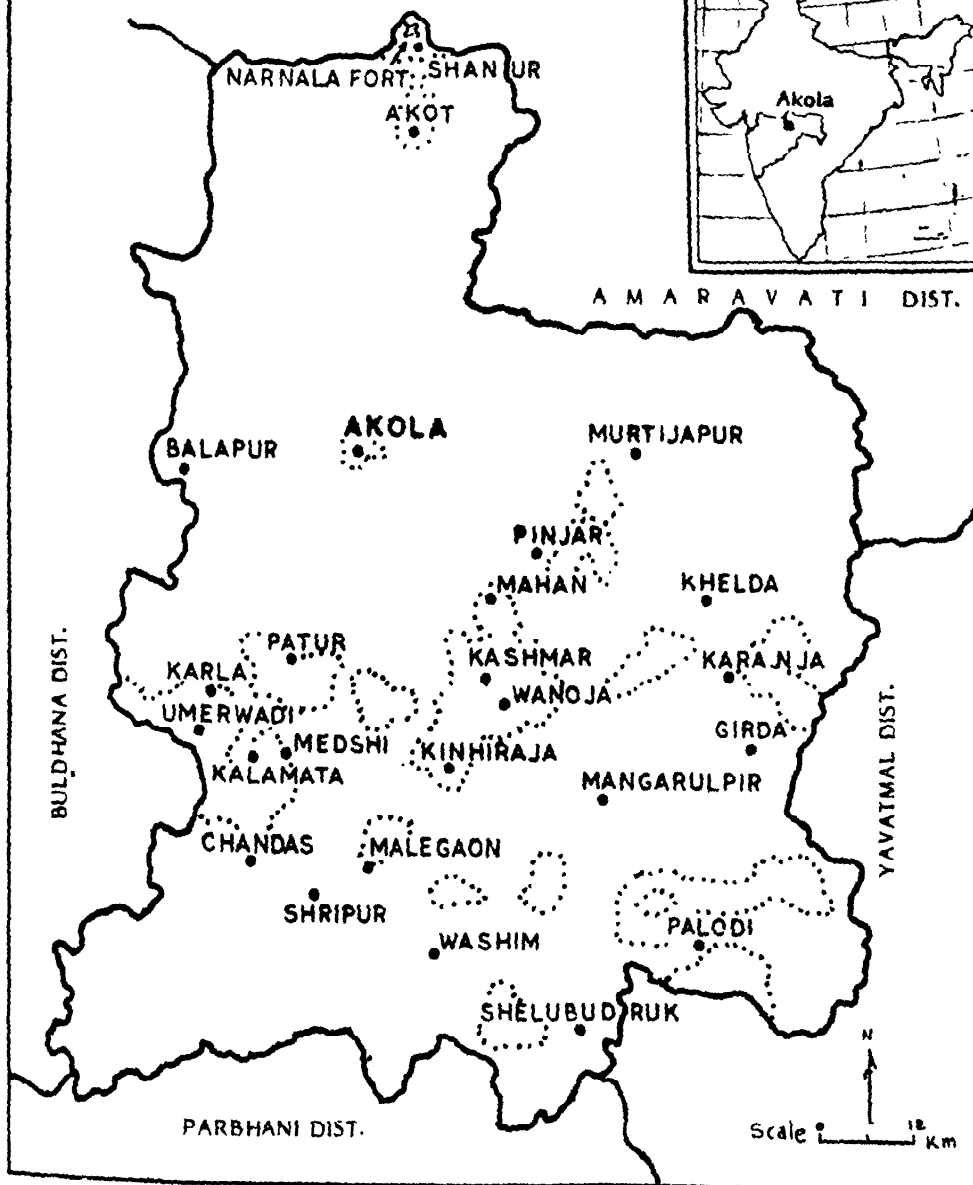
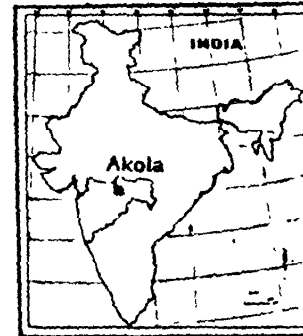
S. Y. KAMBLE
and
S. G. PRADHAN

ABBREVIATIONS

Bedd. Fl. Sylv.	Beddome, R. H. Flora Sylvatica for Southern India. 2 Vols., 1867-1874. Madras.
Bedd. Ic.	Beddome, R. H. Icones Plantarum Indiae Orientalis, or plates and description of new and rare plants from Southern India and Ceylon. Vol. I, Pts. I-15. 1868-1874. (cited as 1874). Madras.
Ann. Miss Bot. Gard.	Annals of Missouri Botanical Garden, St. Louis, U. S. A.
Curr. Sci.	Current Science, Bangalore, Karnataka.
Indian For.	Indian Forester, Dehra Dun, U. P.
Indian J. For.	Indian Journal of Forestry, Dehra Dun, U. P.
J. Bombay Nat. Hist. Soc.	Journal of Bombay Natural History Society, Bombay, Maharashtra.
J. Econ. Tax. Bot.	Journal of Economic and Taxonomic Botany, Jodhpur, Rajasthan.
J. Indian Bot. Soc.	Journal of Indian Botanical Society, Howrah, West Bengal.
Pflanzenfam.	Die naturlichen Pflanzen familien, etc. by Engler, A. & Prantl, K. (Ed. 2, 1924).
Pflanzenr.	Das Pflanzenreich Regni Vegetabilis Conspectus, etc. by Engler, A.(1900-1937).
Proc. Indian Acad. Sci. (Plant Sci.)	Proceeding of Indian Academy of Sciences (Plant Science). Bangalore.
Proc. Indian Nat. Sci. Acad.	Proceedings of the Indian National Science Academy. Allahabad.
<i>p. p.</i>	Pro parte
Sant. Fl. Khandala	Rev. Fr. Dr. H. Santapau, Records of the Botanical Survey of India, 16(1), ed. 3, 1967, Delhi.
Sci. & Cult.	Science & Culture, Calcutta, W. Bengal.
Wight, Icon.	Wight, R. Icones Plantarum Indiae Orientalis; or figures of Indian Plants, 6 Vols. 1838-1853. Madras.
Wight, Illus.	Illustrations of Indian Botany. 2 Vols. 1840-1850. Madras.

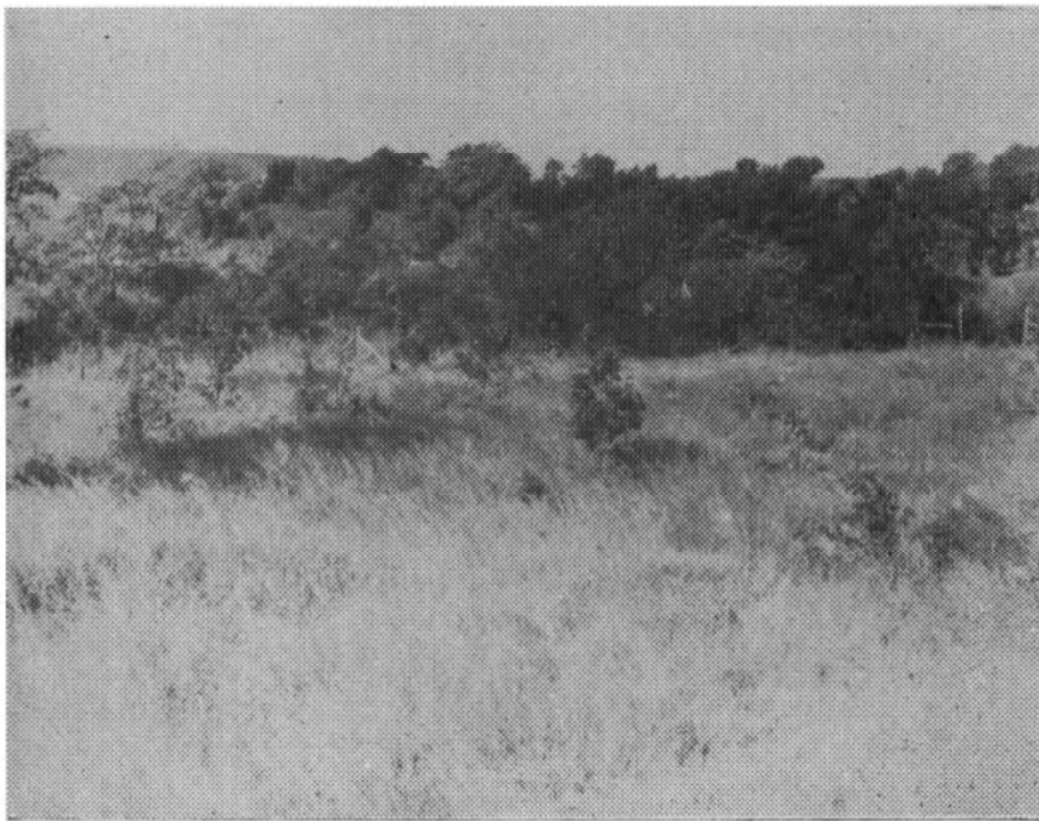
AKOLA DIST

AREA EXPLORED

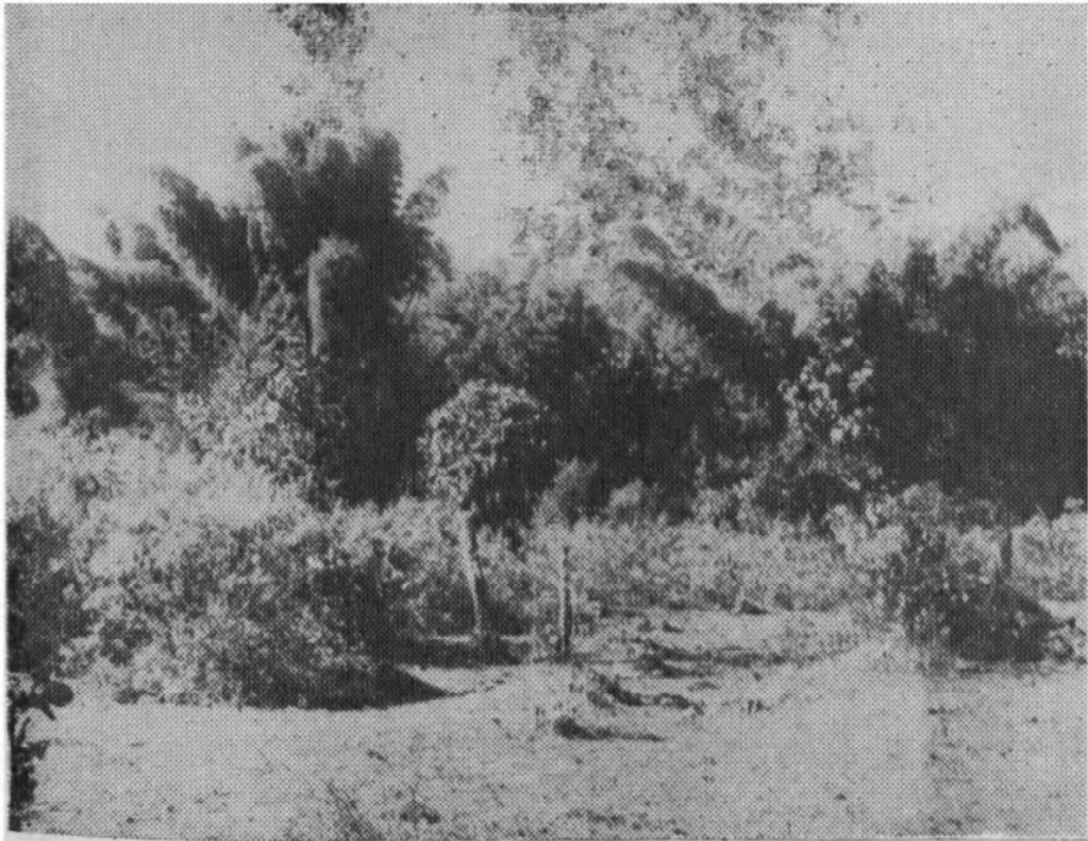




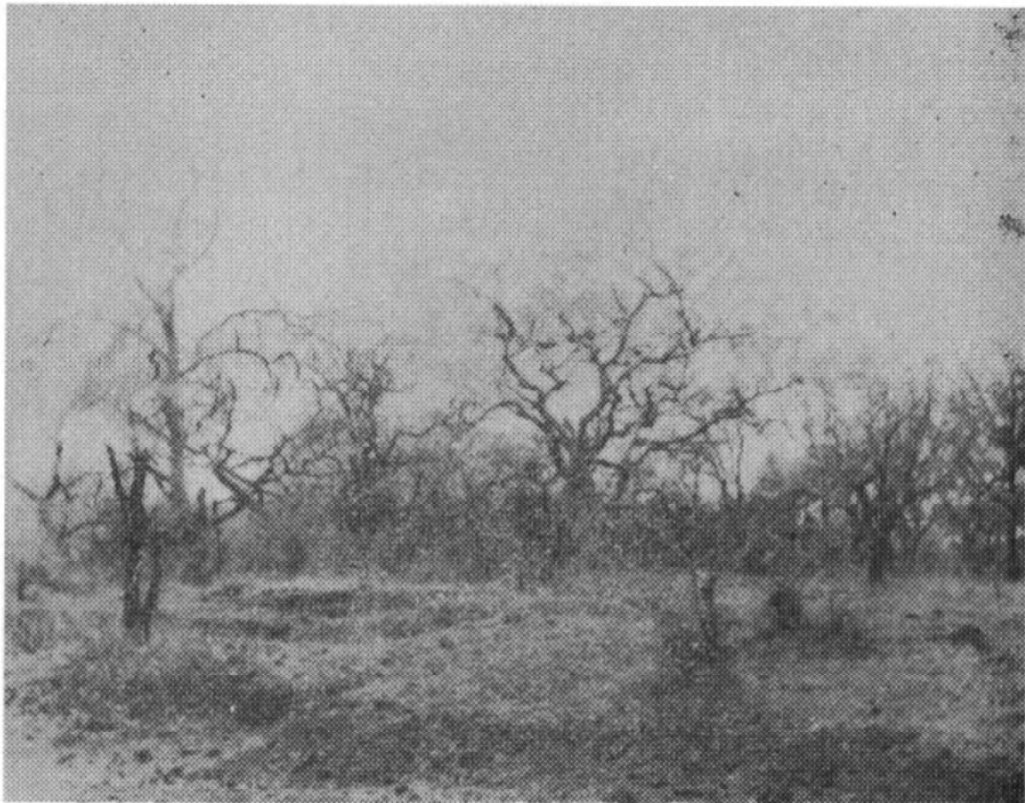
Vegetation near Chikhalwal showing ***Santalum album***, ***Tectona grandis***, ***Butea* sp.**, ***Terminalia* sp.**, ***Garuga pinnata***, ***Mitragyna parvifolia***, ***Buchanania lanzan***, ***Vitex negundo*** etc.



Vegetation in open areas showing grasses **Themeda**, **Cymbopogon**, **Iseilema**, **Chrysopogon**, **Apluda** in foreground and **Ficus sp.** & **Tectona sp.** etc. in background.



Bamboos along the side of a nala near Chikhalwal intermingled with **Tectona** and **Vitex**.



Boswellia serrata in the deciduous forest at the foot of the Narnala Fort.

INTRODUCTION

General and Floristic Note

Akola is one of the thirty districts of Maharashtra, situated at the Northern border. The district is situated between the meridians of longitudes $76^{\circ}51'$ and $27^{\circ}44'$ East and between the parallels of latitudes $19^{\circ}51'$ and $27^{\circ}17'$ North. It is surrounded on the north by district Amravati, on the east by Amravati and Yavatmal, on the south by Parbhani and Yavatmal and on the west by Buldhana. Its maximum length from North to South is about 145 km (90 miles) and its maximum breadth is about 100 km (62.5 miles). Its total area is about 10,606 sq.km (4,095 sq. miles). There is, considerable variation in the topography, geology and climate. It has about 812 sq. km (313 sq. miles) area of reserved forests which is not much as compared to its total area.

There is no reference of previous literature on the Flora of the Akola District proper. The district is thus remained botanically unexplored.

Reasons for Undertaking the Present Work and Its Importance

After the reorganisation of the Botanical Survey of India, its main function was the intensive survey of the country's flora. Keeping in view of the ultimate objective of Botanical Survey of India, it was planned to botanically explore areas which were not explored or under-explored. In this connection, it is obvious that for a satisfactory knowledge of our plant resources or floristic accounts, it was more appropriate that small areas should be comprehensively studied first and all resulting data pooled, reviewed and summarised for entire country. The floras of small areas such as district in the state will be helpful in writing State Flora and eventually State Floras in turn, will help to accomplish the fulfilled "Flora of India" which is the goal before Botanical Survey of India.

In view of this the present work on the 'Flora of Akola District' was undertaken and completed after detailed, intensive field studies and collections in the district to assist in the ultimate assembling of all plant inventories and plant wealth in the Flora of India.

PAST AND PRESENT WORK

1. Earlier work :

Akola District is the Northernmost district of the Vidarbha region in Maharashtra. There is up till now neither previous work on the Flora of

Akola District nor mention of botanical collections made from the Akola District proper.

2. Present work :

The present work is the result of planned plant explorations during the year 1977 to 1979 in the selected botanically rich areas of Akola District, together with the data on the habit, habitat and distribution of plants. During the exploration work, care was taken to cover different vegetational zones and to visit all areas in almost all the seasons so as to collect plants in flowering and fruiting and to give satisfactory coverage of the flora of the whole district. Observations were noted in the field book, specially prepared to elicit complete information from which the specimens collected were serially numbered. Field data covered notes especially of those characters that cannot be studied from the pressed specimens such as habit, pubescence, colour of a flower, odour if any, association and frequency etc. Specimens of the same species were collected from different localities in view of obtaining its distributional data. Apart from naturally occurring wild plants the flora includes many cultivated as well as exotic plants. Some bulbous and other herbaceous plants were cultivated in the experimental garden of Botanical Survey of India, Pune and studied. The careful exploration and critical studies yielded some new records for the Maharashtra State and India also.

B. Plan of the Flora :

For families the system and order followed in this flora is after Bentham and Hooker's system of classification with slight modification in the treatment of families.

The genera within families and the species within genera are arranged in simple alphabetical sequence. The key to the families has been prepared only for the plants reported from the district. Similarly key to the genera and species apply mostly to the plants included in the present study. Keys are dichotomous, based mostly on macroscopic characters. Efforts have been made to give most recent and correct nomenclature. While enumerating the species, the valid name is followed by the basynonym and synonyms relevant to proper understanding of the species. A reference to Hooker's Flora of British India and Cooke's Flora of Presidency of Bombay, irrespective of synonymy has also been made. Local names in inverted commas after citation have been given. Brief description of important characters has been given based on our own collections. It is followed by flowering and fruiting period, a reference to good illustration, distribution and frequency. While giving distribution, in case of rare taxa, the locality of collection is followed by the authors collection number.

TOPOGRAPHY AND GENERAL FEATURES

Configuration of the ground :— The chief hills of the divisions are the parts of Ajanta System towards the south and Satpudas in the North. The Balagat plateau situated on the Ajanta hills, covers the southern half of both the Akola and Buldhana divisions. Its surface is undulating with general slope towards south. The altitude of plateau in Akola District varies from 390-540 meters (1300-1800 feet) above mean sea level. On the slopes and the ridges of the plateau and in the valleys, intervening, lie the main blocks of forests.

The vast fertile plain of the river Purna is known as Payanghat. The area is quite monotonous with undulation just enough to maintain a natural system of drainage.

Towards the North of Payanghat is the third and the last natural feature, the ranges of Satpuda hills popularly known as Melghat, only a small part of the hills fall in Akola. The slopes of these hill ranges are generally steep and precipitous. The maximum elevation is 3,046 feet above the mean sea level, the average being 2,300 feet.

Geology and soil :— Only two geological formations are known to occur in this division viz. the Purna alluvium and the Deccan trap. The former is restricted to Purna valley and sometimes mixed up with a calcareous conglomerates. Efflorescence of soda salt occur in some of the babul (*Acacia nilotica* ssp. *indica*) forest situated on the Purna alluvium.

The Deccan trap which covers almost entire division belongs to the cretaceous period, when sheets of semimolten trap broke through the cretaceous strata and is found in this area in more or less horizontal layers. The underlying rock consists of hard gray basalt and numerous samples of amygdaloidal with zeolite vesicles.

The soil over the entire trap area varies from a light reddish sandy loams on the ridges and hill sides to black cotton soil in valleys and depressions and some plateaus. The reddish sandy loams of varying consistency intervened with the rounded fragments of the underlying rocks covers most of the forest areas. On the slopes the soil varies from Murrum to light black. Usually the hill slopes, flanking ravines are covered with boulders strewn over the surface. Teak especially grows well in such localities as these afford a safe lodgement for seeds and good foot-hold for tree growth. The basalt whenever in the form of hard impenetrable rocks or granular lateritic beds devoid of moisture is unsuitable for tree growth. The growth on such rocks is scanty, stunted and malformed.

The Purna alluvium consists of black cotton soil with calcareous conglomerates which lie immediately below it. It is invariably found along

the river courses along with a soil of light brown colour called Kunkery which contain high percentage of soda salts. The depth of these alluvial deposits exceeds, in some places 45 meters. In breadth it extends 15 miles to the North and 10 miles to the South of the river Purna. Patches of babul bans lie in these fertile plains.

Climate :— The tract shows a considerable variation in climate especially in summer temperature. In Akola district the summer is long and hot with 48.85°C as highest temperature on record reached in May 1878. The average mean daily maximum temperature recorded at Akola in 1919-69 is 38.33°C for the month of May and average mean daily minimum temperature is 12.8°C for the month of December. The winter in the district is moderate. The average daily mean temperature rarely goes below 4.4°C . It is of short duration from November to January. The increase in temperature is noticeable during February and the hot season seems to be extending from beginning of March to the end of October, hottest months being May and June.

In general the northern most part which comes under Melghat has cooler climate with occasional frost, than rest of the area in the district.

Rainfall :— The average rainfall varies from 75 to 100 cm. The bulk of the rainfall is received from south-west monsoons, which usually breaks in the latter half of June. It continues for nearly three months and usually end in the latter half of September.

FOREST BIOTA

The forest of Akola can be grouped together in an irregular strip of varying width extending from the western boundary towards east half way across it a distance of about 45 miles (72.5 km.). This includes the Chikhalwal, Medshi, Patur, Morna, Pangra and Rai reserves having area of 142.5 sq. miles (366.5 sq. km) in extent, while Khapardari, Palodi and Sendona reserves form another group of 25.62 sq. miles lying in the south-east corner.

A few small blocks aggregating to about 8.059 sq. miles (20.72 sq. km) lie scattered, They are Wanoja, Fetra, Kasmar etc.

The Narnala reserves enclaves a block of 7.5 sq. miles (19.42 sq. km) of forest covering very mountainous country and lies in the extreme north of the district.

Acacia nilotica ssp. *indica* forests of the division called as babul-bans lie in scattered patches along fertile plains of Purna river. The total area of the forest is about 15.0 sq. miles (38.85 sq. km).

There are grass ramnas or fodder reserves totalling 98.42 sq. miles lying scattered all over the division.

The range-wise distribution of forest is as follows :

Range	'A' Class	'B' 'C' Class	Protected	Total
Akola	29,737.17	18,199.00		48,436.17
Medshi	50,016.02	3,807.00	3,053.11	56,876.13
Karanja	28,821.17	30,546.00		59,367.17
Washim	31,855.38	7,097.00		38,952.38

The above table shows that the Medshi range has very good 'A' Class forest.

The total area of the reserved forest of Akola district is 313.42 sq. miles (811.75 sq. km), percentage of reserved forest being 7.79.

The maximum area of forests is in Washim, Akola and Murtizapur talukas. In some areas such as Chikhalwal and Shahanur the biotic factors such as continuous grazing by the herds of cows of Kathiawari people has played an important role in preventing natural regeneration. Also the local inhabitants have cut trees illicitly for their firewood and grasses have been used as top food for their livestock. Thus the vegetation has been considerably modified by the biotic factors operating on it.

GENERAL VEGETATION TYPES

The major concentration of forests is found towards the Narnala fort which marks the northern border of the district and hilly portions of Patur Medshi and Palodi range. The plains are mostly devoid of forest cover.

The forest of the districts can be divided into following types.

(1) Dry deciduous forests and (2) Scrub forests.

The former type occurs in the hilly region of Fetra, Kasmar, Narnala fort etc. and latter type in the plain areas of Morna, Chikhalwal, Karanja etc. The rivulets and streams are covered with open grasslands with a few scattered shrubs and trees. These occur in patches in the hilly parts. The hill tops in some of these areas are barren. Thorny scrub jungle mixed with dry deciduous forest type is seen in small valleys and on slopes of hills.

(1) Dry deciduous forests

In dry deciduous forests small trees and shrubs are the chief woody components. Following trees are common in dry deciduous forests.

Anogeissus latifolia, *Boswellia serrata*, *Ziziphus mauritiana*, *Ficus glomerata*, *Ficus benghalensis*, *Tectona grandis*, *Anona squamosa*, *Cochlospermum religiosum*, *Bauhinia racemosa*, *Butea monosperma*, *Dalbergia latifolia*, *Lagerstroemia parviflora*, *Terminalia bellirica*, *Lannea coromandelica*, *Wrightia tinctoria*, *Diospyros melanoxylon*, *Madhuca longifolia*, *Sterculia urens*, *Hardwickia binata*. They are scattered and form the canopy of the area. Understorey of the slopes and other deciduous forest consist of mainly shrubby species and some trees. Common shrubs in such forests are *Grewia* species *Acacia*, *chundra*, *Meytenus emarginatus*, *Securinega leucopyrus*, *Clerodendrum serratum*, *Abrus precatorious*, *Ziziphus oenoplia*, *Helicteres isora*, *Morinda tomentosa*, *Wrightia tomentosa*, *Gardenia resinifera*, *Xeromphis spinosa* etc. In hill forests there are some climbers and woody twiners which include *Hemidesmus indicus*, *Celastrus paniculatus*, *Ceropegia bulbosa*, *Abrus precatorius*, *Tylophora fasciculata*, *Cocculus hirsutus*, *Combretum ovalifolium*, *Rivea hypocrateriformis*, *Jasminum roxburghianum*, *Dregea volubilis*, *Ventilago denticulata*, *Aspidopteris cordata* etc.

In these forests, small herbs starts appearing just after the first rains. For example, *Scilla hyacinthina*, *Drimia indica*, *Iphigenia indica*, *Iphigenia pallida* and some of the grasses. During August and December herbaceous plants show their existence maximum and floor of the forest and open area also becomes green and forests look delightful. After the rainy season the herbaceous plants start drying and colour of the green carpet on the ground changes to pale brown. In the month of August-October herbs seen are *Alysicarpus* species, *Chlorophytum tuberosum*, *Chlorophytum laxum*, *Crotalaria* species, *Cassia pumila*, *Borreria verticillata*, *Aristida depressa*, *Fimbristylis ferruginea*, *F. dichotoma*, *F. tenera*, *Iseilema antheophoroides*, *Heteropogon contortus*, *Kyllinga triceps*, *Lavandula bipinnata*, *Polygala chinensis*, *Impatiens balsamina*, *Alysicarpus vaginalis*, *Ageratum conyzoides*, *Enicostema hyssopifolium*, *Polycarpea corymbosa*, *Bibens biternata*, *Sida* species, *Celosia argentea*, *Setaria glauca*, *Trichodesma amplexicaule*, *Aristida adscensionis*, *Echinochloa colonum*, *Eragrostis tenella* etc.

The vascular cryptogams are very few and represented by *Actiniopteris radiata*, *Cheilanthes farinosa*, *Adiantum caudatum* etc.

(2) Scrub forests

In the areas of rivulets and streams and some plain areas, there are savannah formations and area is covered with open grass lands with few scattered shrubs and trees.

Trees in such areas are *Dolichandrone falcata*, *Acacia nilotica* subsp. *indica*, *Ziziphus mauritiana*, *Acacia senegal*, *Balanites aegyptiaca*, *Capparis*

decidua, *Dicrostachys cinerea*, *Mimosa hamata* etc. The typical members of scrub forests are shrubs. Most common among shrubs are *Canthium parviflorum*, *Morinda tomentosa*, *Cassia auriculata*, *Ziziphus oenoplia* and *Z. nummularia*. In addition, some members typical of deciduous forests like *Diospyros melanoxylon*, *Butea monosperma*, *Bombax ceiba*, *Tectona grandis* etc. are found in the scrub forest.

Herbaceous species are abundant during August-October and very few during summer i.e. March-May.

The grasslands

As the rains commence the ground is covered by several grasses interspersed with other herbaceous species. After few summer showers in May and June, few bulbous or cormatus ephemerals like *Iphigënia indica*, *Scilla hyacinthina*, *Drimia indica*, *Crinum defixum* etc. come in flowers, some of them even before the leaves appear. Herbaceous species found in this area show maximum flowering in the month of August to October. The principle herbaceous species of such grasslands include *Alysicarpus tetragonolobus*, *A. rugosus*, *Borreria articularis*, *Boerhavia diffusa*, *Apluda mutica*, *Blepharis repens*, *Bothriochloa pertusa*, *Arthraxon prionodes*, *Cassia pumila*, *Cyanotis fasciculata*, *Desmodium triflorum*, *Digitaria* spp. *Cyperus* species, *Cyanotis tuberosa*, *Glossocardia bosvallea*, *Tridax procumbens*, *Tephrosia purpurea*, *Melanocercis jaquemontii*, *Lophopogon tridentatus*, *Iseilema antheophoroides*, *Sehima nervosum*, *Trichodesma amplexicaule*, *Lagascea mollis*, *Zornia diphylla*, *Urochloa panicoides*, *Striga gesnerioides*, *Sopubia delphinifolia* etc.

There are some tall grasses which form the patches or scattered here and there. These include *Cymbopogon martinii*, *Chrysopogon fulvus*, *Themeda quadrivalvis*, *Heteropogon triticeus*.

In addition to these main types of vegetation there are certain characteristic association which are as follows :—

(i) Vegetation of ponds and ditches

Most of the ditches and temporary ponds are filled up with water during monsoon. Around these ponds, herbs and grasses start appearing by the beginning of monsoon. The herbs include *Alternanthera sessilis*, *Caesulia axillaris*, *Echinochloa colonum*, *Aeschynomene indica*, *Urochloa panicoides*, *Marsilea minuta*, *Fimbristylis ovata*, *Hygrophila auriculata*, *Ammannia baccifera*, *Ageratum conyzoides* etc. There are few floating aquatics which include *Eichhornia crassipes*, *Nelumbo nucifera*, *Nymphoides cristatum* etc. There are few submerbered aquatics like *Vallisneria spiralis* and *Ceratophyllum demersum*.

After the monsoon is over pools start drying up because of rise in temperature. Species like *Commelina benghalensis*, *C. forskalaei* make their first appearance on the wet mud. Afterwards species other than hydrophytes like *Glinus lotoides*, *Heliotropium supium*, *Chrozophora prostrata*, *Polygonum plebejum*, *Cyathocline purpurea*, *Merremia prostrata*, *Caesulia axillaris* grow on dry mud.

(ii) Vegetation along river and stream banks

The river beds are moist alluvial or sandy but at some places they are stony or rocky. The rivers, rivulets and streams are flooded during monsoon only and remain dry for major part of the year.

In the stony, rocky river beds some of the common plants are *Cryptocoryne retrospiralis*, *Homonoia riparia*, *Crinum defixum*, *Tamarix ericoides*, *Vitex negundo* etc. Along the banks of rivers, the trees generally seen are *Pongamia pinnata*, *Syzygium cumini*, *Acacia nilotica* subsp. *indica* and *Terminalia arjuna* etc. some of the shrubs grow there are *Vitex negundo*, *Kirganelia reticulata*, *Clerodendrum phlomidis* and *Woodfordia fruticosa*.

During monsoon, in the beds of rivers and rivulets herbaceous species found are *Eclipta prostrata*, *Alysicarpus bupleurifolius*, *Cyperus* spp., *Alternanthera sessilis*, *Alysicarpus tetragonolobus*, *Paspalidium flavidum*, *Hygrophila auriculata*, *Echinochloa colonum* etc.

(iii) Waste-land flora

The plants common in waste-land around villages are *Achyranthes aspera*, *Alternanthera pungens*, *Boerhavia diffusa*, *Amaranthus spinosus*, *A. tricolor*, *A. viridis*, *Ageratum conyzoides*, *Lagascea mollis*, *Abutilon indicum*, *Setaria tomentosa*, *Cassia sophera*, *Gomphrena celosioides*, *Tephrosia hirta*, *Tridax procumbens*, *Tribulus terrestris*, *Datura metal*.

The plants found common in the waste-land along roadsides are *Acanthospermum hispidum*, *Cynodon dactylon*, *Baliospermum montanum*, *Heteropogon contortus*, *Kyllinga triceps*, *Cleome viscosa*, *Eragrostiella brachyphylla*, *Argimone mexicana*, *Tridax procumbens*, *Aristida* spp., *Triumfetta rotundifolia*, *Iseilema antheophoroides*, *Eleusine indica*, *Euphorbia hirta*, *Xanthium strumarium*, *Calotropis procera* etc.

In addition salai forest (*Boswellia serrata*) covers extensive part of Narnala fort area. The Babul forests are found in scattered blocks along river nala banks. These are formed of *Acacia nilotica* subsp. *indica* and *A. ilotica* subsp. *vediana*.

FLORISTIC ANALYSIS

The present work enumerates 651 species belong to 390 genera and 96 families of flowering plants, ferns and other pteridophytes. It also includes 12 varieties and four subspecies belonging to these species.

TABLE No. 1

List of families in Akola district with their respective genera, species, subspecies and varieties.

Families	Genera	Species	subspecies	varieties
1. RANUNCULACEAE	1	1	—	—
2. ANNONACEAE	1	1	—	—
3. MENISPERMACEAE	3	3	—	—
4. NYMPHAEACEAE	1	1	—	—
5. PAPAVERACEAE	1	1	—	—
6. FUMARIAEAE	1	1	—	—
7. BRASSICACEAE	3	3	—	—
8. CAPPARACEAE	1	4	—	—
9. CLEOMACEAE	1	2	—	—
10. COCHLOSPERMACEAE	1	1	—	—
11. FLACOURTIACEAE	2	2	—	—
12. POLYGALACEAE	1	2	—	—
13. CARYOPHYLLACEAE	3	3	—	—
14. PORTULACACEAE	1		—	—
15. ELATINACEAE	1	1	—	—
16. MALVACEAE	7	10	1	—
17. BOMBACACEAE	1	1	—	—
18. STERCULIACEAE	4	5	—	—
19. TILIACEAE	3	10	—	—
20. LINACEAE	1	2	—	—
21. MALPIGHIACEAE	1	1	—	—
22. ZYGOPHYLLACEAE	1	1	—	—
23. OXALIDACEAE	1	1	—	—
24. BALSAMINACEAE	1	1	—	—
25. RUTACEAE	3	3	—	—
26. SIMAROUBACEAE	1	1	—	—
27. BURSERACEAE	1	1	—	—
28. CELASTRACEAE	3	3	—	—
29. MELIACEAE	1	1	—	—
30. RHAMNACEAE	2	4	—	—
31. VITACEAE	3	4	—	—

	Families	Genera	species	subspecies	varieties
32.	LEEACEAE	1	1	—	—
33.	SAPINDACEAE	2	2	—	—
34.	ANACARDIACEAE	3	3	—	—
35.	MORINGACEAE	1	2	—	—
36.	FABAEAE	29	62	1	2
37.	CAESALPIN – ACEAE	7	15	—	—
38.	MIMOSACEAE	6	13	1	—
39.	COMBRETACEAE	3	6	—	—
40.	MYRTACEAE	1		—	—
41.	LECYTHIDACEAE	1	1		—
42.	LYTHRACEAE	5	7	—	1
43.	CUCURBITACEAE	8	9	—	—
44.	MOLLUGINACEAE	3	4	—	—
45.	APIACEAE	3	3	—	—
46.	RUBIACEAE	11	17	—	—
47.	ASTERACEAE	31	38	—	—
48.	PRIMULACEAE	1		—	—
49.	SAPOTACEAE			—	—
50.	EBENACEAE	1	1	—	—
51.	OLEACEAE	2	2	—	—
52.	APOCYNACEAE	1	2	—	—
53.	ASCLEPIADACEAE	7	9	—	2
54.	PERIPLOCACEAE	3	3	—	—
55.	GENTIANACEAE	6	7	—	—
56.	BORAGINACEAE	5	11		
57.	CONVOLVULACEAE	6	17	—	—
58.	CUSCUTACEAE	1	2	—	—
59.	SOLANACEAE	3	9	—	—
60.	SCROPHULARIACEAE	12	17	—	—
61.	BIGNONIACEAE	1	1	—	—
62.	PEDALIACEAE	1	2	—	—
63.	MARTYNIACEAE	1	1	—	—
64.	ACANTHACEAE	14	26	—	—
65.	VERBENACEAE	6	8	—	1
66.	LAMIACEAE	13	21	—	—
67.	NYCTAGINACEAE	1	2	—	—
68.	AMARANTHACEAE	9	16	1	3
69.	CHENOPODIACEAE	2	2	—	—
70.	POLYGONACEAE	2	4	—	1
71.	ARISTOLOCHIACEAE	1	1	—	—
72.	SANTALACEAE	1	1	—	—

Families	Genera	species	subspecies	varieties
73. LORANTHACEAE	3	3	—	—
74. EUPHORBIACEAE	14	28	—	—
75. ULMACEAE	2	2	—	—
76. MORACEAE	1	6	—	—
77. CANNABINACEAE	1	1	—	—
78. CERATOPHYLLACEAE	1	1	—	—
79. HYDROCHARITACEAE	2	2	—	—
80. ORCHIDACEAE	3	7	—	—
81. ZINGIBERACEAE	1	1	—	—
82. AMRYLLIDACEAE	3	3	—	—
83. AGAVACEAE	1	1	—	—
84. DIOSCORIACEAE	1	2	—	—
85. LILIACEAE	9	15	—	—
86. COMMELINACEAE	4	13	—	—
87. TYPHACEAE	1	1	—	—
88. ARACEAE	3	3	—	—
89. POTAMOGETONACEAE	1	1	—	—
90. ERIOCAULACEAE	1	1	—	—
91. CYPERACEAE	12	28	—	—
92. POACEAE	49	86	—	2

PTERIDOPHYTES

93. MARSILIACEAE	1	1	—	—
94. OPHIOGLOSSACEAE	1	6	—	—
95. ADIANTACEAE	2	3	—	—
96. PTERIDACEAE	1	1	—	—
	390	651	4	12

Table No. 1 gives the familywise list of the genera, species, subspecies and varieties. It is evident from this table that Leguminosae (*sensu lato*) and Poaceae are the largest families amongst the Dicotyledons and Monocotyledons respectively. Leguminosae (*sensu lato*) is represented by 12 genera and 90 species whereas 17 families are represented by a single genus each and 32 families by a single species each. There are 28 families having minimum five species each. Following are the ten dominant families in this district with genera/species in parenthesis. 1. Poaceae (49/86), 2. Fabaceae (29/62), 3. Asteraceae (31/38), 4. Euphorbiaceae (14/28), 5. Cyperaceae (12/28), 6. Acanthaceae (14/26), 7. Lamiaceae (13/21), 8. Scrophulariaceae (12/17), 9. Rubiaceae (11/17), and 10. Convolvulaceae (6/17).

The following table shows the total number of families, genera and species in the district.

	Dicot		Monocot		Pteridophytes		Total
	No.	%	No.	%	No.	%	
Families	78	81.2	14	14.5	4	4.2	96
Genera	294	75.4	91	23.3	5	1.3	390
species	477	73.3	163	25.0	11	1.6	651

During botanical explorations of the district, few plants were recorded for the first time from Maharashtra. These include *Vicia hirsuta*, *Ipomoea petaloidea*, *Datura ferox*, *Alectra thompsoni*, *Allmania nodiflora* var. *dichotoma*, *Pancratium longiflorum*, *Ophioglossum lucitanicum* and *Ophioglossum petiolatum*. Only one plant *Alectra parasitica* A. Rich has been found to be new record for India.

PLANTS OF MEDICINAL, ECONOMIC AND HORTICULTURAL IMPORTANCE

A large number of plants collected from this district have either medicinal or economic use. Some of the exotic plants which now naturalised in India have also grown in gardens as ornamental plants. Here about 52 species belonging to the 33 families have been enumerated and arranged familywise in order of Bentham & Hooke's system of classification.

ANNONACEAE

Annona squamosa (L.) Diels.—A native of South America and West Indies has been cultivated for sweet edible fruits. It grows as an escape. The powder of seeds and leaves used as insecticides.

MENISPERMACEAE

Cocculus hirsutus (L.) Diels. — Pest of powdered leaves has cooling effect on gonorrhoea and eczema. Roots used as laxative demulcent.

Tinospora cordifolia (Willd.) Miers—Starch from roots and stem used in diarrhoea and dysentery. Dried stem and bark is used as tonic and aphrodisiac.

PAPAVERACEAE

Argemone mexicana L. — Seeds are used in semi drying oils useful as an illuminant and lubricant.

BRASICACEAE

Raphanus sativus L.—Growing as an escape and mainly cultivated for vegetable.

MALVACEAE

Hibiscus cannabinus L.—Used as a vegetable. The fibres from the stem are used for making ropes, cartage and paper pulp.

Kydia calycina Roxb.—A small ornamental tree. The bark fibre is used for cartage and ropes and the mucilaginous substance from the stem is used for clarifying sugar.

LINACEAE

Linum usitatissimum L.—Oil from the seeds is used in making paints, waxes, soft soap and printing ink.

RUTACEAE

Limonia acidissima L.—Fruits are edible and the gum is obtained from the stem and branches.

Aegle marmelos (L.) Corr.—Ripe fruits are edible and unripe fruits are used as astringent and also in the treatment of diarrhoea.

CELASTRACEAE

Celastrus paniculatus Willd.—Leaves are used as an antidote for opium poisoning.

RHAMNACEAE

Ziziphus mauritiana Lamk. & **Z. oenoplea** (L.) Miller—The fruits are edible. The bark is used for tanning.

SAPINDACEAE

Sapindus laurifolius Vahl.—The fruits of plant are used for washing woolen cloths and as a hair shampoo.

ANACARDIACEAE

Buchanania lanzan Spreng.—The bark is used for tanning. The seeds are edible and carry a great market value. The gum obtained from the stem is used for printing cloths and dyeing.

Semecarpus anacardium L.f.—The black resin obtained from the seeds is used as marking ink for cloths. The seed is used as the protection from white ants and for floor dressing. The nuts are also used for tanning.

MORINGACEAE

Moringa oleifera Lamk.—The green fruits are used as vegetable and the oil obtained from the seeds is used medicinally in acute rheumatism.

FABACEAE

Abrus precatorious L.—Decoction of leaves and roots useful for cough and cold.

Butea monosperma Lamk.—Flowers are the source of a yellow dye and leaves are woven and used as a substitute for plates.

Clitoria ternatea L.—Roots are used as purgative and diuretic. Blue flowers yield dye.

Crotalaria retusa L.—The fibre obtained from the stem and bark is used for cartage and canvas.

Dalbergia sissoo Roxb.—The wood being very hard and heavy is used for furniture, carving etc.

Derris indica (Lamk.) Bennett.—Leaf juice is used for dyspepsia and diarrhoea and for treatment of leprosy. Stem bark for treatment of bleeding piles. Flowers in diabetes and seed oil in soap making and in the treatment of rheumatism.

Indigofera tinctoria L.—Used in the preparation of indigo (blue dye).

Psoralea corylifolia L.—Seeds yield oleo-resinous substance which is used in the treatment of leucoderma and leprosy.

CAESALPINIACEAE

Cassia fistula L.—A tree cultivated as an ornamental. The pulp of the fruit is used as a purgative.

Tamarindus indica L.—Tree grown as an avenue. The fruits are edible and are also used medicinally as laxatives and carminative. The unripe fruits yield tartaric acid. The bark and leaves are used for tanning

MIMOSACEAE

Acacia nilotica (L.) Del.—Pods are used as a fodder. The barks used in tanning and the gum obtained from the bark is used in confectionery.

COMBRETACEAE

Terminalia bellirica (Gaertn.) Roxb.—Fruits are used in indigestion and diarrhoea, as a brain tonic and for soothing eyes. It is one of the ingredients of ' Triphala '.

T. chebula Retz.—Fruits are used as mild laxative, stomachic tonic alternative for tanning. It is also one of the ingredients of 'Triphala'.

MYRTACEAE

Syzygium cumini (L.) Skeels—Fruits are edible.

LYTHRACEAE

Woodfordia fruticosa (L.) Kurz.—Drug consists of dried fruits, flower buds and broken inflorescence used in haemorrhages & seminal weakness. Leaves and bark yield tannin. Flowers yield red dye.

CUCURBITACEAE

Momordica charantia L.—Fruits are edible and eaten as vegetables.

Momordica dioica Roxb. ex Willd.—Fruits used as vegetable.

ASTERACEAE

Blumea eriantha DC.—This plant yields essential oil.

Zinnia elegans Jacq.—Used as an ornamental in gardens.

SAPOTACEAE

Madhuca longifolia (Koen.) Macbride—Bark decoction useful in curing itch, bleeding, ulcers. Flowers for tonic, expetorant and also used in liquor preparation.

PERIPLOCACEAE

Hemidesmas indicus (L.) R. Br.—Dried roots used in fever, skin diseases, loss of appetite, syphilis, rheumatism and as a blood purifier.

BORAGINACEAE

Cordia dichotoma Forsk. f.—Stem bark as an astringent, mild tonic, decoction in dyspepsia & fevers. Fruits edible, as astringent, anthelmintic, diuretic, demulcent and expectorant and also used in urinary troubles.

SOLANACEAE

Withania somnifera (L.) Dunal—Dried roots (drug) used as diuretic in sexual weakness and general weakness. Leaves used as anthelmintic & feb-ifuge.

SANTALACEAE

Santalum album L.—Oil from wood is used in perfumary. Wood is highly valuable.

EUPHORBIACEAE

Mallotus philipensis Muell. Arg.—Red dye obtained from the seeds, also a remedy for thread worm.

Ricinus communis L.—Seeds are the source of castor oil which is mainly used as a lubricant and as a purgative. The seed cake is used as a fertilizer.

MORACEAE

Ficus benghalensis L.—Latex applied externally in muscular pain, rheumatism and lumbago. Bark used as an astringent.

HYDROCHARITACEAE

Ottelia alismoides (L.) Pers. & *Vallisneria spiralis* L. are used for decorating tropical fish aquaria.

ZINGIBERACEAE

Curcuma longa L.—Rhizome is aromatic, stimulant tonic, carminative, antiperiodic, blood purifier and used as a condiment and as a dye stuff.

AMARYLLIDACEAE

Crinum asiaticum L.—Bulb is bitter and used as a tonic, laxative, expectorant. Roots are emetic. Leaves applied to reduce inflammations.

DIOSCOREACEAE

Dioscorea hispida Dennst.—Tubers are poisonous and used for the production of industrial starch.

LILIACEAE

Iphigenia stellata Blatt.—Seeds yield 1.5—2% colchicine a commercially important chemical.

POACEAE

Chionachne koenigii (Spreng.) Thw.—The nuts are used for rosaries, beads and ornamental purpose.

Coix lacryma-jobi L.—Fruits decoction used for catarrhal. Seeds used for rosaries and necklaces.

Cymbopogon martinii (Roxb.) Watson—Yield rosha oil which is used in lumbago, baldness, skin diseases and bilious complaints. Plant is also used as mosquito repellent.

INTERESTING PLANTS OF BOTANICAL VALUE

During botanical exploration of Akola district from August 1977 to December, 1979 some botanically noteworthy plants were found. They have botanical significance because some of them are reported for the first time from Maharashtra. Only one plant i.e. *Alectra parasitica* A. Rich. var. *parasitica* proper has been reported for the first time from India.

Teretologically interesting specimen of *Ophioglossum gramineum* was collected from the district which has a bifurgated spike.

Following are the plants which form new records for the State of Maharashtra.

OPHIOGLOSSACEAE

Ophioglossum lucitanicum L.—A rare plant was collected from Medshi (S. Y. Kamble, 154098) and is new record for the State. It is 2.5-5 cm tall with elliptic-lanceolate tropophylls and 0.6-1 cm long strobilus on 2-3 cm long stalk.

O. petiolatum Hook.—This is rhizomatous herb with lanceolate to ovate-lanceolate tropophylls. Strobilus upto 1.5 cm long on 2-3 cm long stalk. It was collected from Morna which occasionally grows on road side. This also forms new record for the State.

FABACEAE

Vicia hirsuta (L.) S. F. Gray —A slender trailing herb with tendrillar leaves. Flowers blue in capitate racemes; pods flat upto 1 cm long. It was collected from cultivated fields near Patur. It also forms new record for the State.

CONVOLVULACEAE

Ipomoea petaloidea Choisy—A shrubby climber with ovate elliptic, shallowly cordate leaves. Flowers yellow in 1-many flowered cymes. It is rare plant and was collected from Morna (S. Y. Kamble, 152761). It is also new record for the State of Maharashtra.

SOLANACEAE

Datura ferox L. An undershrub upto 1.5 m tall, found it wast places near village. Leaves angular sinuate, glabrous; flowers white, solitary, axillary, capsules ovoid 5-8 cm long, with thick conical spines.

Rare at Medshi (S. Y. Kamble, 150101) and forms new record for Maharashtra.

AMARANTHACEAE

Allmania nodiflora (L). R. Br. var. **dichotoma** (Roth) J. Hooker— A branched diffuse herb upto 50 cm tall with alternate, shortly petioled, broadly elliptic, glabrous leaves. Flowers in globose or ovoid, sessile or peduncled, axillary or terminal heads.

It was collected from Medshi and Palodi growing occasionally along road sides. This also forms new record for the State.

AMARYLLIDACEAE

Pancratium longiflorum Roxb. —A scapigerous herb with tunicated bulbs and narrow, linear lanceolate leaves. Scape 10-15 cm long, shorter than the leaves. Flowers white with petaloid membranous cup. It is new record for the State which grows occasionally at Kalamata and Narnala fort.

LILIACEAE

Iphigenia magnifica Ansari et Rolla Rao—An erect herb upto 60 cm tall with linear leaves and dark purple flowers. This species occurs frequently in Chikkalwal, Karnja and Morna region. Recently this was described as new species from Dhulia district and our collection confirms its extended distribution towards the east of Dhulia ie. Akola district.

SCROPHULARIACEAE

Alectra thomsoni Hook. f. —An erect, somewhat branched, parasitic herb found under *Barleria* sp. This is rare at Shahanur (S. Y. Kamble, 150497) and forms new record for the State.

A. parasitica A. Rich. Var. **parasitica** proper —An erect unbranched herb, upto 25 cm tall, found under *Vitex negundo* with dark purple stem and bright orange-red rhizome. Leaves scaly. Flowers yellow and filaments glabrous.

Found occasionally under *Vitex negundo* as a root parasite at Shahanur and Kalamata.

ENDANGERED PLANTS

The majority of the best forests of the district are restricted to the hilly regions and are irregular strips of which Narnala reserve enclaves a block of 7.58 sq. miles (19.42 sq. km.) of the district. Many of the plants collected from Narnala reserve show restricted distribution because these plants were not collected from other parts of the district. These plants not only show restricted distribution but are also rare and appears to be endangered because some plants such as *Alectra parasitica* and *A. thomsoni* being medicinally useful, are invariably collected by the tribals and other local people. All such rare and endangered species have been listed below :

Clematis triloba Heyne ex Roth—Occasionally found growing on the fort wall, Narnala.

Fumaria indica (Haussk.) Pugsley, *Vaccaria pyramidata* Medic. and

Spergula arvensis L.—are rare in cultivated fields at Akot.

Casearia graveolans Dalz.—very few plants were noticed at Narnala fort only.

Melochia corchorifolia L.—Rare in the marsh places near Rhishi lake, Karanja.

Ougenia oogenesis Roxb.—Rare at Morna.

Ipomoea petaloidea Choisy—Rare at Mahan.

Euphorbia perbracteata Gage and *Aspodelus tenuifolius* Cav. are rare at Patur. Only few plants of *Dipacadi ursulae* Blatt. and *Urginia indica* (Roxb.) Kunth, were collected from Khaperdari.

Following are the few more plants collected from Narnala fort which are rare and appears to be endangered.

Linum mysorense L., *Crotalaria filipes* Benth., *Rotala oculitiflora* Kochne., *Sesili diffusum* (Roxb. ex Em.) Sant., *Pimpinella candolleana* W. & A., *Habenaria gibsonii* Hook. f., *H. longicorniculata* Graham., *H. multiflora* Sedgew., *Naravelia aragoana* Gaud., *Chloris dolychostachya* Lagasca., *Ophioglossum lucitanicum* L. and *O. petiolatum* Hook.

CLASSIFICATION OF THE NATURAL ORDERS OF FLOWERING PLANTS REPRESENTED IN THE FLORA OF AKOLA

The sequence of Natural Orders in this work is adopted from **Benth**am and **Hooker's** 'Genera Plantarum' (1862 - 1883) with some modifications.

KEY TO THE FAMILIES

1. **Plants** with 2 cotyledons; flowers usually 4-5 merous; venation usually reticulate
 2. **Perianth** differentiated into calyx and corolla :
 3. **Petals** free; flowers dichlamydeous :
 4. **Calyx** of distinct sepals; ovary superior or immersed in the disc :
 5. **Torus** small or elongated
 6. **Stamens** few (not more than 10) :
 7. **Carpels** free; trailing shrubs MENISPERMACEAE
 7. **Carpels** united; herbs, shrubs or trees :
 8. **Flowers** zygomorphic :
 9. **Sepals** 5, two inner enlarged, petaloid, stamens 8, filaments united for their lower half, placentation axile POLYGALACEAE
 9. **Sepals** 2, scale like, not enlarged, stamens 4 or 6 in 2 bundles, placentation parietal FUMARIACEAE
 8. **Flowers** actinomorphic :
 10. **Placentation** parietal :
 11. **Petals** cruciform, stamens 6, tetradynamous; disc in the form of four glands opposite sepals BRASSICACEAE
(Cruciferae)
 11. **Petals** not cruciform; stamen if 6, not tetradynaous; disc never in the form of glands CAPPARACEAE
 10. **Placentation** free-central :
 12. **Sepals** 2; petals 4-5; leaves fleshy PORTULACACEAE

- 12. Sepals & petals 5 each.
leaves not fleshy .. CARYOPHYLLACEAE
- 10. Placentation axile or some-
times basal
 - 11. Leaves opposite; sepals
imbricate; plants not stel-
lately hairy .. ELATINACEAE
 - 13. Leaves alternate; sepals
valvate; plants stellately
hairy
 - 14. Stamens monadal-
phous .. STERCULIACEAE
 - 14. Stamens free .. ILLIACEAE
- 6. Stamens numerous (more than 15) :
 - 15. Gynoecium apocarpus, usually many :
 - 16. Plants aquatic .. NYMPHAEACEAE
 - 16. Plants terrestrial :
 - 17. Herbs; if woody twiners, style long, persis-
tent, feathery; leaves simple & variously
lobed .. RANUNCULACEAE
 - 17. Trees or shrubs, if climbing, style not as
above; leaves simple, never lobed .. ANNONACEAE
 - 15. Gynoecium syncarpous, carpels 2 or more :
 - 18. Placentation free-central or basal central .. PORTULACACEAE
 - 18. Placentation usually axile sometimes basal :
 - 19. Stamens free, arising from a raised or con-
tracted torus, 2-celled .. TILIACEAE
 - 19. Stamens monadelphous; anthers 1-2-
celled :
 - 20. Anthers one celled :
 - 21. Mostly herbs or shrubs; fruit a
dehiscent capsule or of indehiscent
cocci, carpels 5-many; pollen
rough .. MALVACEAE
 - 21. Trees; fruit a capsule or woody
berry; carpels 2-5; pollen smooth .. BOMBACACEAE
 - 20. Anthers two celled .. STERCULIACEAE
 - 18. Placentation parietal, sometimes spuriously 2
or more celled by prolongation of the placentas :
 - 22. Ovary raised on a gynophore .. CAPPARACEAE
 - 22. Ovary sessile :
 - 23. Plants usually with yellow or milky sap;
flowers bright-yellow or red; petals
present :

- 24. Trees with palmately or digitately divided leaves; sepals 5 .. COCHLOSPERMACEAE
- 24. Herbs; leaves not as above; sepals 2-3 .. PAPAVERACEAE
- 23. Plants without sap; petals absent; flowers pale greenish-yellow .. FLACOURTIACEAE
- 5. Torus thickened or expanded into fleshy disc :
 - 25. Placentation parietal; fruit a 3-valved capsule; seeds winged MORINGACEAE
 - 25. Placentation axile or axile-pendulous; fruit not elongated; seeds not winged :
 - 26. Flowers zygomorphic :
 - 27. Flowers spurred; anther syngenesious; leaves simple .. BALSAMINACEAE
 - 27. Flowers not spurred; anther free; leaves ternately compound SAPINDACEAE
 - 26. Flowers actinomorphic :
 - 28. Ovary syncarpous with 1-5 free styles :
 - 29. Plants usually woody , twining or sarmentose; fruits winged .. MALPIGHIACEAE
 - 29. Plants not twining or sarmentose; fruits not winged :
 - 30. Leaves simple .. LINACEAE
 - 30. Leaves compound .. OXALIDACEAE
 - 28. Ovary syncarpous but styles more or less connate or solitary :
 - 31. Plants usually climbing or twining :
 - 32. Inflorescence usually leaf-opposed, often tendrilar .. VITACEAE
 - 32. Inflorescence not as above, plants tendrilar :
 - 33. Fruit indehiscent, winged or not; seeds exarillate .. RHAMNACEAE
 - 33. Fruit a dehiscent capsule, not winged; seeds arillate .. CELASTRACEAE
 - 31. Plants usually herbs, shrubs or trees; if twining, plants armed :
 - 34. Leaves aromatic, gland-dotted .. RUTACEAE
 - 34. Leaves not gland dotted :
 - 35. Stamens monadelphous MELIACEAE
 - 35. Stamens free :
 - 36. Plants usually with acrid resinous juice .. ANACARDIACEAE

36. Plants not as above :
37. Inflorescence leaf-opposed LEEACEAE
37. Inflorescence not as above :
38. Leaves simple:
39. Plants usually armed with prickles; flowers in axillary fascicles; ovule one in each locule RHAMNACEAE
39. Plants unarmed; flowers cymose; ovules 2 or more in each locule :
40. Calyx accrescent; stamens 3 OLEACEAE
40. Calyx not accrescent; stamens 4-5 ORLASTERACEAE
38. Leaves compound :
41. Plants not resinous; leaves gland-dotted BURSERACEAE
41. Plants not resinous; leaves not gland-dotted :
42. Herbs or under shrubs; ovules 2 in each loculus - ZYGOPHYLLACEAE
42. Trees; ovule one in each loculus :
43. Flowers regular; styles 2-5, connate; ovary lobed SIMAROUBACEAE
43. Flowers irregular; style one, simple, sometimes divided above; ovary not lobed .. SAPINDACEAE
4. Calyx of united sepals; ovary included in calyx tube or inferior :
44. Leaves mostly compound, rarely simple; fruit a legume :
45. Flowers actinomorphic, in heads or dense spikes .. MIMOSACEAE

45. Flowers zygomorphic; not in heads :
46. Flowers papilionaceous; odd petal adaxial FABACEAE
46. Flowers not papilionaceous; odd petal not adaxial .. CAESALPINIACEAE
44. Leaves simple; fruit a capsule, achene, drupe, berry, nut or schizocarpic :
47. Plants always tendril-bearing .. CUCURBITACEAE
47. Plants without tendrils :
48. Stamens usually indefinite :
49. Calyx free from the ovary (ie. ovary superior) .. LYTHRACEAE
49. Calyx adnate to the ovary (ie. ovary inferior) :
50. Leaves opposite, glandular-punctate; with intramarginal nerves .. MYRTACEAE
50. Leaves alternate, without intramarginal nerves and not glandular punctate .. LECYTHIDACEAE
48. Stamens usually definite not more than 10:
51. Ovary inferior or half inferior :
52. Flowers in simple or compound umbels; foliage aromatic; fruit of 2 indehiscent mericarps .. APIACEAE
52. Flowers axillary, solitary or in racemes, spikes or cymes :
53. Herbs .. ONAGRACEAE
53. Trees, shrubs or woody climbers COMBRETACEAE
51. Ovary superior
54. Petals absent; seeds reniform, variously striate, rugulose .. MOLLUGINACEAE
54. Petals usually present, seeds not reniform, smooth .. LYTHRACEAE
3. Petals united
55. Ovary inferior or half inferior :
56. Inflorescence on involucre head; calyx absent or modified; anthers united; ovary 1-celled .. ASTERACEAE
56. Inflorescence various but not involucre head; calyx present; anthers free or connivent in a ring around the style; ovary 2 or more celled .. RUBIACEAE
55. Ovary superior :
57. Leafless, non-green, root or stem parasite :

- | | |
|--|------------------|
| 58. Stem parasites .. | CUSCUTACEAE |
| 58. Root parasites .. | SCROPHULARIACEAE |
| 57. Plants green, not parasites : | |
| 59. Carpels more than 2 : | |
| 60. Flowers usually unisexual; stamens inserted on the receptacle .. | EBENACEAE |
| 60. Flowers bisexual; stamens inserted on the corolla .. | SAPOTACEAE |
| 59. Carpels 2 (rarely 3-4 and then plants aquatic) : | |
| 61. Plants with milky latex or greenish-yellow sap : | |
| 62. Pollen masses not agglutinated into pollinia; style 1; anthers sagittate; stigma dumbel-shaped .. | APOCYNACEAE |
| 62. Pollen masses agglutinated into pollinia; style usually 2; anther and stigma not as above : .. | |
| 63. Filaments united; anthers with horny wing .. | ASCLEPIADACEAE |
| 63. Filaments free; anthers without horny wings .. | PERIPLOCACEAE |
| 61. Plants without milky-latex or greenish-yellow sap | |
| 64. Flowers actinomorphic : | |
| 65. Inflorescence usually secund or one sided cymes .. | BORAGINACEAE |
| 65. Inflorescence not as above : | |
| 66. Leaves usually alternate : | |
| 67. Plants erect or diffuse but not twining; ovary 2-celled; ovules many in each loculus | SOLANACEAE |
| 67. Plants twining, at times trailing, diffuse or erect; ovary 2-celled; ovules 2 in each loculus or 4 celled with one ovule in each loculus | CONVOLVULACEAE |
| 66. Leaves opposite or atleast lower ones opposite : | |
| 68. Stamens 2 | OLEACEAE |
| 68. Stamens 4-5 : | |

- 69. Ovary 1- celled
 - 70. Placentation free central; stamens opposite the petals PRIMULACEAE
 - 70. Placentation parietal; stamens alternate with petals GENTIANACEAE
- 69. Ovary 2- celled; placentation axile SCROPHULARIACEAE
- 64. Flowers zygomorphic
 - 71. Leaves usually compound; if simple seeds winged; fruit elongated BIGNONIACEAE
 - 71. Leaves usually simple; seeds not winged; fruit not elongated
 - 72. Flowers with conspicuous bracts and bracteoles; bracts seldom absent; stem often with swollen joints ACANTHACEAE
 - 72. Flowers without bracts and bracteoles or bracts & bracteoles inconspicuous; stem not nodose : ..
 - 73. Flowers with extra floral glands at base of pedicels :
 - 74. Placentation axile; fruit a capsule or indehiscent and spinous PEDALIACEAE
 - 74. Placentation parietal; fruit with hooked prongs MARTYNIACEAE
 - 73. Flowers without extra floral glands at base of pedicels :
 - 75. Ovules many in each loculus SCROPHULARIACEAE
 - 75. Ovules 1-2 in each loculus :
 - 76. Inflorescence a verticillaster; style gynobasic plants aromatic LAMIACEAE
 - 76. Inflorescence not as above; style terminal plants not aromatic VERBENACEAE
- 2. Perianth generally calycine, single or absent :
 - 77. Ovary superior :
 - 78. Flowers bisexual :
 - 79. Leaves with ochreate stipules POLYGONACEAE
 - 79. Leaves exstipulate :
 - 80. Perianth petaloid NYCTAGINACEAE

80. Perianth not petaloid; if petaloid bracts and bracteoles scarious ..
81. Bracts & bracteoles absent, or if present, plants herbaceous .. CHENOPODIACEAE
81. Bracts & bracteoles scarious .. AMARANTHACEAE
78. Flowers unisexual or polygamous :
82. Trees or shrubs
83. Ovary 3- celled .. EUPHORBIACEAE
83. Ovary 1- celled :
84. Plants with milky juice; anthers inflexed in bud; leaves not oblique at base; fruit commonly multiple MORACEAE
84. Plants with watery sap; anther erect in bud; leaves oblique at base; fruit a samara, nut or drupe .. ULMACEAE
82. Herbs
85. Aquatics; leaves verticillate, dichotomously cleft into filiform minutely toothed lobes; stamens 20-30 with 2-toothed or truncate connective .. CEROtopHYLLACEAE
85. Terrestrials; leaves not as above; stamens definite, if indefinite connective not as above :
86. Ovary 3- celled EUPHORBIACEAE
86. Ovary 1- celled :
87. Leaves exstipulate .. AMARANTHACEAE
87. Leaves stipulate .. CANNABACEAE
77. Ovary inferior :
88. Parasites, shrubs or trees; flowers actinomorphic; fruit a drupe or berry :
89. Root parasites; flowers unisexual; disc epigynous or perigynous .. SANTALACEAE
89. Stem parasites; twiggy shrubs; flowers bisexual or unisexual; disc absent .. LORANTHACEAE
88. Plants not parasitic, trailing or twining, perennial herbs or shrubs; flowers zygomorphic; fruit a capsule .. ARISTOLOCHIACEAE
1. Plants with one cotyledon; flowers usually trimerous; venation usually parallel :
90. Perianth present, usually of 2 series, atleast the inner one petaloid, not of bristles or scales :
91. Ovary superior :

- 92. Plants aquatic .. POTAMOGETONACEAE
- 92. Plants terrestrial :
 - 93. Plants climbing or twining .. LILIACEAE
 - 93. Plants not as above :
 - 94. Flowers in terminal, solitary compact head; leaves radical .. ERIOCAULACEAE
 - 94. Flowers and leaves not as above :
 - 95. Plants usually xerophytic; leaves mostly fibrous and thick in a dense tuft .. AGAVACEAE
 - 95. Plants not as above :
 - 96. Outer segment of perianth calyx like and different from the inner corolla segment .. COMMELINACEAE
 - 96. Outer and inner segment of perianth essentially alike, petaloid .. LILIACEAE
- 91. Ovary inferior :
 - 97. Plants usually xerophytic; leaves mostly fibrous & thick or fleshy in dense tuft; flowers in large panicles .. AGAVACEAE
 - 97. Plants and inflorescence not as above :
 - 98. Flowers regular (rarely irregular) and then stamens 3 or more; no petaloid staminodes ..
 - 99. Submerged herbs .. HYDROCHARITACEAE
 - 99. Terrestrials :
 - 100. Plants twining; flowers unisexual; capsule winged or not, but seeds winged; leaves reticulately veined .. DIOSCOREACEAE
 - 100. Plants not twining; flowers bisexual; fruit and seeds not winged; leaves parallel veined .. AMARYLLIDACEAE
 - 98. Flowers zygomorphic; fertile stamens 1-2, at times only half anther fertile the other becoming petaloid staminodes and more conspicuous than the perianth :
 - 101. Corolla spurred; ovary spirally twisted; gynostemium typical; pollinia present; epiphytic or terrestrial plants .. ORCHIDACEAE
 - 101. Corolla not spurred; ovary not twisted; gynostemium absent; pollinia absent; plants terrestrial .. ZINGIBERACEAE

90. Perianth none, at least in male flowers (if the flowers unisexual) or rudimentary or of scales or bristles, not petaloid :
102. Perianth represented by scales or bristles; if perianth absent, inflorescence not made of spikelets; flowers not subtended by dry chaffy bracts (glume or scales) .. ARACEAE
102. Perianth 0; flowers subtended by dry, chaffy usually imbricating bracts (glumes); inflorescence various, of spikelets :
103. Stem. trigonous, mostly solid; leaves not ligulate; leaf sheaths not split; fruit a compressed or trigonous nut .. CYPERACEAE
103. Stem mostly hollow, cylindrical or flattened; leaves ligulate; leaf sheaths split; fruit a caryopsis .. POACEAE

SYSTEMATIC TREATMENT

RANUNCULACEAE

CLEMATIS L.

Clematis triloba Heyne ex Roth. Nov. Pl. Sp. 251. 1821; Hook. f. & Thoms. Fl. Brit. India 1 : 3. 1872; Cooke, Fl. Pres. Bombay 1 : 2. 1958 (Repr. ed.).

Climbers with sulcate stem, young branches sericeo villous; leaves trifoliate, leaflets 1-3 lobed, lamina ovate-elliptic with mucronate apex, puberulous on both sides. Flowers white, showy, 3 cm across, in axillary panicles. Achenes ovoid, upto 0.6 cm long. with feathery tail.

Fls. & Frts. : October-February.

Illus. : Gupta in Bull. Nat. Bot. Gard Lucknow, No.54. t.18. 1961.

Distrib. : Rare in open thickets and on Fort walls; Akot, Kamble 152840, BSI.

ANNONACEAE

ANNONA L.

Annona squamosa L. Sp. Pl. 537. 1753. Hook. f. Fl. Brit. India 1 : 78. 1872; Cooke, Fl. Pres. Bombay 1 : 15. 1958 (Repr. ed.).
Mar. : *Sitaphal*.

Shrubs or small trees with grey scaly bark. Leaves oblong-lanceolate, 1.5—9.0 × 1.5—3.0 cm, glabrous. Flowers greenish-yellow, solitary or more in a short leaf opposed peduncle. Fruits fleshy, globular, cordate, syncarp; pulp sweet.

Fls. & Frts. : May-October.

Illus. : Mart. in Fl. Bras. 13 : 14. t. 5. fig. 1. 1841.

Distrib. : An escape, naturalised on hill slopes, Patur, Mahan.

MENISPERMACEAE

- | | |
|--|--------------------|
| 1. Woody climbers; bark corky; stems glabrous; leaves deciduous.. | <i>Tinospora</i> |
| 1. Herbaceous twiners; bark not corky; stem hirsute; leaves persistent : | |
| 2. Leaves peltate, female flowers with foliaceous bracts; sepals & petals 4 .. | <i>Cocculus</i> |
| 2. Leaves not peltate, female flowers without any bracts; sepals & petals 6 .. | <i>Cissampelos</i> |

CISSAMPELOS L.

Cissampelos pareira L. Sp. Pl. 1031. 1753; Hook. f. and Thoms. Fl. Brit.

India 1 : 103. 1872; Cooke, Fl. Pres. Bombay 1 : 24. 1958 (Repr. ed.)

Mar. : *Pahadvel*’.

Slender shrubby climbers. Leaves peltate, 3.2—7.0 × 3.2—8.0 cm, alternate, orbicular or reniform, slightly broader than long, pubescent beneath, minutely mucronate at apex, petiolate. Flowers minute, greenish. Male flowers in axillary cymes; sepals 4. Female flowers in pendulous racemes; sepal & petal one each. Drupes subglobose, glabrescent, red.

Fls. & Frts. : August - October.

Illus. : Engler & Prantl, Pflanzenf. 3 (2) : 84-85. fig. 62 and Mahesh., Illus. Fl. Delhi fig. 2. 1966.

Distrib. : Common in hedges; Akot.

COCCULUS A. P. de Candolle *nom. cons.*

Cocculus hirsutus (L.) Deils in Engl. Pflanznr. 46 : 236. 1910. *C. villosus* DC. Syst. 1 : 525. 1818; Hook. f. Fl. Brit. India 1 : 101. 1872; Cooke, Fl. Pres. Bombay 1 : 22. 1958 (Repr. ed.). *Menispermum hirsutum* L. Sp. Pl. 341. 1753. Mar. : *Vasan-vel*’.

Herbaceous climbers, young parts densely and softly villous. Leafblade ovate, obtuse or acute, mucronate at the apex, densely tomentose beneath. Drupelets reddish-purple, 2.0-3.0 mm across.

Fls. & Frts. : February - August.

Distrib. : Common in fields. Akot, Chikhalwal, Karla, Medshi, Patur.

TINOSPORA Miers.

Tinospora cordifolia (Willd.) Miers ex Hook. f. & Thoms. Fl. Ind. 184. 1855. *et* Hook. f. Fl. Brit. India 1 : 97. 1872; Cooke, Fl. Pres. Bombay 1 : 20. 1958 (Repr. ed.). *Menispermum cordifolium* Willd. Sp. Pl. 4. 826. 1806. Mar. : *Gulvel*

Deciduous climbing shrubs, bark grayish-white, lenticellate, grooved. Leaves membranous, cordate; petiole upto 8 cm. Racemes axillary or terminal or from the old wood. Drupes dorsally convex, ventrally flat, 0.4-0.5 cm across, deep-red, turning black on drying.

Fls. & Frts. : January - May.

Distrib. : Not very common, on hedges and on shrubs. Karla, Narnalafort, Akot.

NYMPHAEACEAE

NELUMBO Adans.

Nelumbo nucifera Gaertn. Fruct. 1 : 73. t. 19. f. 2. 1788. *Nelumbium speciosum* Willd. Sp. Pl. 2 : 1258. 1800; Hook. f. & Thoms. Fl. Brit. India 1 : 116. 1872; Fl. Pres. Bombay 1 : 28 (Repr. ed.). Mar. : *Kamal*

Large aquatic, perennial, rhizomatous herbs with slender, creeping stems. Leaves orbicular, glaucous-green, glabrous, petiolate. Flowers 10-20 cm across, solitary, above water, white or rosy in colour. Sepals small, petals 5-14 cm long; thalamus 3-6 cm broad, fleshy.

Fls. & Frts. : July - October.

Illus. : Wealth of India, 7 : 7. Pl. 2 (Col.) & ff. 4-5. 1966.

Distrib. : Abundant in ponds. Karanja. Scarcely distributed,

PAPAVERACEAE

ARGEMONE L.

Argemone mexicana L. Sp. Pl. 508. 1753. Hook. f. and Thoms. Fl. Brit. India 1 : 117. 1872; Cooke, Fl. Pres. Bombay 1 : 27. 1958 (Repr. ed.).

Mar. : *Pivala-dhotra* '.

Prickly herbs upto 90 cm tall. Leaves cauline and radical, bluish-green, variegated white, pinnatisect, spiny on margins and veins. Flowers bright-yellow, 3-4 cm across, solitary, terminal. Capsules 2-3.5 cm long, spinous; erect. Seeds black, globose, reticulately veined.

Fls. & Frts. : Almost throughout the year.

Illus. : Wight, Illus. f. 11. 1840.

Distrib. : Weed in waste places. Karla, Manora, Medshi, Mangrulpir: Palodi.

FUMARIACEAE

FUMARIA L.

Fumaria indica (Haussk.) Pugsley in Journ. Linn. Soc. 44 : 313. 1919. *F. parviflora* Wight & Arn. Prodr. 18. 1834. (non. Lamk.). *F. parviflora* Lamk. var. *vaillantii* auct. Pl. (non *F. vaillantii* Loisel 1809); Hook. f. & Thoms. Fl. Brit. India 1 : 258. 1855; Cooke, Fl. Pres. Bombay 1 : 30. 1958 (Repr. ed.). Mar. : 'Pitpada'.

Erect or spreading, 20-30 cm tall herbs. Leaves pinnatisect, 1-2.5 cm long, narrowly linear. Flowers pale pink, 0.5-0.6 cm long congested in 3-6 cm long, terminal racemes. Fruits round, papilose upto 2 mm across, apiculate at apex, pale yellowish-green.

Fls. & Frts. : December - February.

Illus. : Syme, Eng. Bot. 1 (ed. 3) : 113. t. 77 and Mahesh., Illus. Fl. Delhi fig. 4. 1966.

Distrib. : Found in cultivated fields and waste places. Akot.

BRASSICACEAE (Cruciferae)

- | | | |
|---|----|-----------------|
| 1. Pods indehiscent | .. | <i>Raphanus</i> |
| 1. Pods dehiscent : | | |
| 2. Pods long and terete or compressed; replum broad | .. | <i>Rorippa</i> |
| 2. Pods short and broad,; replum narrow | .. | <i>Lepidium</i> |

LEPIDIUM L.

Lepidium sativum L. Sp. Pl. 649. 1753; Hook. f. & Thoms. Fl. Brit. India 1 : 159. 1872; Cooke, Fl. Pres. Bombay 1 : 37. 1958 (Repr. ed.).
Mar. : ' Haliv '.

Erect, slender herbs upto 30 cm tall. Leaves $1.5-6 \times 0.4-1$ cm, petiolate, glabrous, basal ones pinatipartite, gradually becoming entire. Flowers white, in 5-10 cm long terminal racemes; pods $0.3-0.5 \times 0.2-0.3$ cm, broadly elliptic-oblong, glabrous, compressed. Seeds minute, reddish brown.

Fls. & Frts. : January - April.

Distrib. : A weed in cultivated fields. Akot.

RAPHANUS L.

Raphanus sativus L. Sp. Pl. 669. 1753; Hook. f. & Thoms. Fl. Brit. India 1 : 166. 1872; Cooke, Fl. Pres. Bombay 1 : 37. 1958 (Repr. ed.).
Mar. : ' Mula '.

Biennial herbs, 40-70 cm tall, hispidly hairy. Leaves radical or cauline, radical ones $20-40 \times 5-8$ cm, lyrate pinnatifid, petiolate, cauline ones $2.5-7 \times 0.5-2$ cm, linear to linear-lanceolate. Racemes 10-20 cm long, terminal; seeds ellipsoid, reticulately veined, brown.

Fls. & Frts. : November - April.

Distrib. : Cultivated or as an escape. Akot.

RORIPPA Scop.

Rorippa indica (L.) Hiern, Cat. Afr. Pl. Welw. 26. 1896. *Nasturtium indicum* (L.) DC. Prodr. 1 : 139. 1824; Hook. f. & Thoms. Fl. Brit. India 1 : 134. 1872 pro parte (excl. var. *benghalense*); Cooke, Fl. Pres. Bombay 1 : 31. 1958 (Repr. ed.).

Erect, glabrous herbs upto 50 cm tall. Lower leaves petioled, pinnatifid with 1-4 segment on either side; upper leaves sessile, lanceolate-oblong. Flowers pedicellate, yellow, in racemes. Pods 1-1.6 cm long, linear, shortly beaked. Seeds sub-reniform, reddish-brown, glabrous.

Fls. & Frts. : January - June.

Distrib. : Common in agricultural fields and watersides of irrigational canals. Medshi, Narnalla (Akot), Palcdi.

CAPPARACEAE

- | | | |
|---|----|-----------------|
| 1. Erect or climbing shrubs; fruits berry | .. | <i>Capparis</i> |
| 1. Annual herbs; fruits capsule | .. | <i>Cleome</i> |

CAPPARIS L.

- | | | |
|---|----|---------------------|
| 1. Leafless shrubs | .. | <i>C. decidua</i> |
| 1. Leafy shrubs or trees : | | |
| 2. Fruits upto 1 cm across; inflorescence umbel | .. | <i>C. sepiaria</i> |
| 2. Fruits more than 1 cm across; inflorescence not as above : | | |
| 3. Inflorescence corymb | .. | <i>C. grandis</i> |
| 3. Inflorescence supra-axillary | .. | <i>C. zeylanica</i> |

Capparis decidua (Forsk.) Edgew. in Journ. Linn. Soc. 6 : 184. 1862. Jacobs in Blumea 12 (3) : 424. 1965. *Sodada decidua* Forsk. Fl. Aegypt-Arab. 81. 1775. *Capparis aphylla* Roth, Nov. Pl. Sp. 238. 1821; Hook. f. & Thomas. Fl. Brit. India 1 : 174. 1872.; Cooke, Fl. Pres. Bombay 1 : 49. 1958 (Repr. ed.). Mar. : 'Nepti'.

Straggling glabrous shrubs 2-5 m tall, grayish green in colour, armed with straight sharp stipular spines. Leaves linear-oblong, spinous tipped, glabrous, nearly sessile. Flowers scarlet red in short corymbs. Fruits 0.8-1.5 cm across, spherical, red when ripe.

Fls. & Frts. : February - July.

Illus. : Pax in Engl. & Prantl., Pflanzenf. 3(2) : 230 & 231. fig. 139 (not of Edgew.) and Mahesh., Illus. Fl. Delhi fig. 12. 1966.

Distrib. : Common on roadsides.

Capparis grandis L. f. Suppl. 263. 1781. Hook. f. & Thoms. Fl. Brit. India 1 : 176. 1872; Jacobs in Blumea 12 (3) : 456. 1965; Cooke, Fl. Pres. Bombay 1 : 50. 1958 (Repr. ed.)
Mar. : 'Panchundra'.

Large shrubs or small trees upto 10 m tall, often with longitudinally fissured yellowish-brown bark. Leaves 2.5—7 × 2—6 cm, young parts brownish tomentose becoming glabrous with age, petiolate. Flowers white, in corymbs upto 2.5 cm across. Fruits globose, rusty-brown.

Fls. & Frts. : February - June.

Distrib. : Occasional near villages. Patur, Kamble 152810.

Capparis sepiaria L. Syst. Nat. ed. 10. 2 : 1071. 1759. Hook. f. & Thoms. Fl. Brit. India 1 : 177. 1872; Jacobs in Blumea 12(3) : 489. 1965; Cooke, Fl. Pres. Bombay 1 : 51. 1958 (Repr. ed.).

Woody climbing shrubs. Leaves elliptic-ovate, glabrous, 1—1.25 × 1—5 cm, coriaceous, emarginate or apiculate. Flowers white, pedicellate, in axillary & terminal umbels. Fruits smooth, globose, black when ripe.

Fls. & Frts. : February - June.

Illus. : Woodr. Journ. Bomb. Nat. 11 : 123. 1897 and Mahesh., Illus. Fl. Delhi fig. 13. 1966.

Distrib. : Common on hedges. Akot, Medshi, Shegaon.

Capparis zeylanica L. Sp. Pl. (ed. 2) 720. 1762; Jacobs in Blumea 12 (3) : 505. 1965. *Capparis horrida* L. f. Suppl. 264. 1781; Hook. f. & Thoms. Fl. Brit. India 1 : 178. 1872; Cooke, 1 : 51. 1958 (Repr. ed.).
Mar. : 'Tarati'.

Climbing shrubs with hooked spines and reddish-brown tomentum in younger parts. Leaves 2.5—6.5 × 2—5 cm, ovate, obovate or elliptic oblong. Flowers white, solitary or 2-3, pedunculate. Fruits ellipsoid or nearly globose, glabrous.

Fls. & Frts. : January - July.

Distrib. : Not common. Chikhalwal, Patur.

CLEOME L.

- | | | |
|--|----|-------------------------|
| 1. Glandular herbs with yellow flowers | .. | <i>C. viscosa</i> |
| 1. Glabrous herb with pink or purple flowers : | | |
| 2. Leaves simple | .. | <i>C. simplicifolia</i> |
| 2. Leaves 3-7 foliate | .. | <i>C. chelidonii</i> |

Cleome chelidonii L. f. Suppl. 300. 1781; Hook. f. & Thoms. Fl. Brit. India 1 : 170. 1872; Cooke, Fl. Pres. Bombay 1 : 42. 1958 (Repr. ed.); Jacobs in Van Steen. Fl. Malesiana Ser. 1 (2) : 102. 1962.

Annuals upto 60 cm tall, glabrous. Leaves palmately compound, petioate; petioles upto 9.5 cm long. Leaflets oblanceolate to obovate or linear-

lanceolate, $1-5 \times 0.2-2.0$ cm. Flowers bright-rosy, 2.2-2.5 cm across. Capsule 5-10 cm long, linear, glabrous with parallel, wavy striations. Seeds warty, brownish-yellow.

Fls. & Frts. : June - August.

Distrib. : A weed in moist places of irrigated cultivated fields. Kinhiraja, Morna, Palodi.

Cleome simplicifolia (Camb.) Hook. f. & Thoms. Fl. Brit. India 1 : 169 1872; Cooke, Fl. Pres. Bombay 1 : 40. 1958 (Repr. ed.). *Polonesia simplicifolia* Camb. in Jacq. Voy. Bot. 20 t. 20. 1844.

Scabrid herbs 5-20 cm tall. Leaves obovate-oblong to oblanceolate, $1-3.5 \times 0.2-2.0$ cm, scabrid. Flowers pink upto 0.5 cm across. Capsules 1.5-2.5 cm long linear, beaked, glabrous, bent at angle with pedicel. Seeds brownish yellow, smooth, glabrous.

Fls. & Frts. : July - September.

Illus. : Camb. in Jacq. Vou. Bot. P. 20. 1844.

Distrib. : Occasional, along dried nalas; Kalakamta, Medshi, Pinjar.

Cleome viscosa L. Sp. Pl. 672. 1753; Hook. f. & Thoms. Fl. Brit. India 1 : 170. 1872; Cooke, Fl. Pres. Bombay 1 : 41. 1958. (Repr. ed.). *C. icosandra* Jacobs in Van Steen. Fl. Malesiana Ser. 1 (2) : 103. 1962.

Viscous-pubescent upto 1.5 m tall herbs. Leaves 3-5 foliate; leaflets $1-4 \times 0.5-2$ cm, elliptic oblong, glabrous above and pubescent beneath. Flowers 1-1.5 cm across, axillary, solitary or in lax racemes. Capsules 4-9 cm long, cylindrical, viscidly hairy. Seeds 0.1 cm across, dark brown, reniform.

Fls & Frts. : Throughout the year.

Illus. : Mahesh., Illus. Fl. Delhi fig. 9. 1966.

Distrib. : Common in wet places and in cultivated fields.

COCHLOSPERMACEAE

Cochlospermum religiosum (L.) Alston in Trimen, Handb. Fl. Ceylon 6 : 14. 1931. *Bombax religiosum* L. Sp. Pl. 552. 1753. *Cochlospermum gossypium* DC., Prodr. 1 : 527. 1824; Hook. f. & Thoms. Fl. Brit. India 1 : 190. 1872; Cooke, Fl. Pres. Bombay 1 : 56. 1958 (Repr. ed.).
Mar. : 'Ganer'.

Small trees upto 20 feet tall with ash coloured bark. Leaves palmately 3-5 lobed, glabrous above and tomentose beneath, petiolate. Flowers 3"-5" in diameter, showy, bright yellow, in terminal corymbose panicles, appearing before leaves. Petals obovate, deeply emarginate, veined; anthers basifixed, many.

Fls. & Frts. : February - April.

Distrib. : Occasional; Medshi, Narnala, Patur.

FLACOURTIACEAE

- | | |
|--|-------------------|
| 1. Flowers bisexual; plants unarmed; fruit capsule; seeds arillate .. | <i>Casearia</i> |
| 1. Flowers unisexual; plants thorny; fruit a drupe; seeds without arial .. | <i>Flacourtia</i> |

CASEARIA N. Jacquin.

Casearia graveolens Dalz. in Kew Journ. Bot. 4 : 107. 1852; Hook. f. Fl. Brit. India 2 : 592. 1872; Cooke, Fl. Pres. Bombay 1 : 553. 1958 (Repr. ed.). *Casearia glomerata* Talb., For. Fl. 2 : 69. 1911 (*non* Roxb. 1814). Mar. : 'Bokhada'.

Trees upto 9 m tall with pale-yellowish lenticellate bark. Leaves broadly elliptic or elliptic-oblong, petiolate, glabrous. Flowers greenish-yellow, fascicled, axillary or in leafless branches. Fruit subglobose or ellipsoidal, smooth, many seeded.

Fls. & Frts. : February to July.

Distrib. : Occasional in deciduous forest; Narnala fort.

FLACOURTIA L'Heritier

Flacourtia indica (N. Burman) Merrill, Interpr. Rumph. Herb. Amb. 377. 1917; Sant. Fl. Khandala ed. 3, 10. 1967. *Gmellina indica* Burm. f. Fl. Ind. 132. t. 39 f. s. 1768. *Flacourtia ramontchi* L. Herit., Strip. Nov. 3 : 59, t. 30 & 30 : 13. 1785; Hook. f. & Thoms. Fl. Brit. India 1-193. 1872; Cooke, Fl. Pres. Bombay 1 : 59. 1958 (Repr. ed.). Mar. : 'Girgot'.

Small armed trees, 4 m tall. Leaves obovate, acute, acuminate or sometimes emarginate, crenate, serrate, glabrous or hairy. Tepals 4, greenish-yellow; stamens many with hairy filament; anthers versatile. Fruits fleshy, globose, edible berry turning red with age.