

A SURVEY OF THE FLORA OF MARATHWADA

V. N. NAIK

Marathwada University, Aurangabad

TOPOGRAPHY

Marathwada region in the Deccan plateau comprising five districts *viz.* Aurangabad, Bhir, Nanded, Osmanabad and Parbhani ($74^{\circ} 5'-78^{\circ} 5'$ E and $17^{\circ} 5'-28^{\circ} 5'$ N) forms one of the four divisions of Maharashtra State. The total area of about 64,798 sq. km is bounded by the Vidarbha region in the north, by Andhra Pradesh in the east and southeast; by Karnataka in the south and by Western Maharashtra in the west.

The entire region is situated at an average height of about 650 m above mean sea level, gradually sloping from west to east, and is traversed by hill ranges originating from the Sahyadris in the west, the northern being Ajanta—Satmala ranges and the southern, the Balaghat ranges. There are also scattered hillocks of varying heights throughout the region, the highest peak, Surpal Nath (960 m above m. s. l.) being situated near Kannad in Aurangabad District.

The main river Godavari flows from the west to east and south-east, collecting waters on its way from several large and small tributaries like the Purna, Penganga, Shivna, Dudhna, Manjra, Terna, Tavarja and others. It enters Andhra Pradesh on the south and ultimately empties into the Bay of Bengal. Most of the tributaries are seasonal and dry up soon after the monsoon. The region has also a few lakes and ponds formed between the hillocks. Some of these collect considerable amount of water during the monsoon and serve as perennial water reservoirs.

In spite of these water resources, the region suffers from heavy drainage due to west-east slope ultimately considerably affecting agriculture. The rivers and rivulets which are mostly dry but swell during monsoon and flow with great force wash off the soil cover and expose bare rocks at many places. Recently there have been some serious efforts to control this soil erosion, by construction of major and minor dams in certain places. This is expected to improve agriculture of the region in the near future.

GEOLOGY AND SOIL

The geological formations of the region are characterized by the Deccan traps (Upper Cretaceous to Lower Eocene). The granitic rocks have given rise to red as well as black cotton soils. Major part of the region has deep black soils derived from the trap rock. Certain variations occur due to exposure and protection. A mixture of laterite and black soils, for example, is encountered in the eastern parts together with sandy soil along river banks. Most of the hill tops are bare or covered by coarse gravel while the low lying areas accumulate clay and loam. Chemically the soils are rich in calcium and magnesium carbonates and are deficient in nitrogen and phosphorus. This chemical composition is mainly responsible for the cracking of the soil during summer.

CLIMATE AND RAINFALL

The weather in general can be said to be dry. The average day temperature ranges from 27.7° C to 38° C while it falls from

26.95° C to 20° C during night. Similarly summer and winter temperatures also vary greatly. The highest during a summer day being about 42.9° C while the lowest during winter nights being about 10° C. Relative humidity is extremely low for major part of the year (between 35 to 50%) while it is highest (85%) during the monsoon.

The rainy season from middle of June to the end of September is followed by a sultry period stretching to the middle of November. Then the short winter season up to January end is followed by a dry hot summer from February to the middle of June. Summers are, in general, full of gusty winds.

The region receives rain from the South West monsoon. Like the rest of the Deccan trap the rains start by the middle of June, become intense in July, August and cease by September. The normal average rainfall is about 90 cm but is rather variable from year to year. The major amount of S.W. precipitation is received on the Western Ghats of India due to the Sahyadris and only a small amount escapes through high hills which is then received by the Deccan plateau. The region thus falls in the rain-shadow of the Sahyadris.

HISTORY OF BOTANICAL EXPLORATION

Marathwada formed a part of old Hyderabad State, which remained a separate territory up to 1956. The botanical exploration in the area has been comparatively poor.

Bradely, a surgeon from Hyderabad State Infantry, was the pioneer in this field. He published the results of his studies on plants and animals in "Madras Journal of Science" in 1839-1840 which were later incorporated in the District Gazetteer of Aurangabad (1884). The first fairly comprehensive information on the plant wealth of the area was furnished by Campbell (1898). David Prain (1909) contributed to the knowledge of the forest plants of the state. Patridge (1911), another forest offi-

cer, published a consolidated account of the forest plants of the state. This was revised with addition of grasses and ferns. Sayeeduddin (1935, 1940), Saxena (1947) and their colleagues in the Department of Botany, Osmania University, Hyderabad, also contributed to the study of the ground vegetation of the state.

After the reorganization of states in 1956, the Marathwada region was merged into Maharashtra and since then there have been some efforts towards the floristic studies of the region. Tilak (1963) enumerated the plants of Aurangabad District. But on the flora much remained to be done and this led the Botany Department, Marathwada University to undertake intensive as well as extensive survey of the flora of this region. Work started in 1962 with the exploration of the flora of Osmanabad District, which was completed in 1968. Subsequently, the author of this paper and his students have undertaken exploration of the entire region and as a result have published several papers covering various aspects of the flora (*c. f.* Naik, 1966 to 1973; Naik & Patunkar, 1973; Pardeshi & Pokle, 1974, 1975; Patunkar, 1975; Wadood Khan, 1975). The department of Botany of this University has built up a herbarium from these collections as also from other parts of the country. About 1200 species of flowering plants are recorded from this region alone. On the basis of this collection, two more floristic accounts have been compiled, namely, the Flora of Parbhani District (Vaidya, 1975) and the Grasses of Marathwada (Patunkar, 1976). Some of these have been published in the recent years.

The present paper, which is mainly based on the collections mentioned above, deals with the preliminary survey of flora of the entire region.

GENERAL CHARACTERISTICS OF THE VEGETATION

The vegetation of this region can conveni-

ently be divided into 1) Tropical dry deciduous forests, 2) Open scrub jungles and 3) Grasslands.

1) Tropical dry deciduous forests :

The forests are confined to the Ajanta-Satmala range in Kannad and Sillod talukas of Aurangabad District and Kinwat, Bhokar and Hatgaon talukas of Nanded District. In addition, there are small pockets here and there in the valleys of hilly ranges, while the hill tops are more or less barren due to gusty winds prevailing during summer. Small trees and shrubs are the chief woody components of such forests. The most dominant tree species in the order of their dominance in Kannad forests are *Anogeissus latifolia* Wall., *Tectona grandis* L. f., *Boswellia serrata* Roxb. and *Terminalia bellirica* Roxb. In Ajanta they are *Hardwickia binata* Roxb., *Cochlospermum religiosum* (L.) Alston, *Dalbergia latifolia* Roxb. and *Sterculia urens* Roxb. The most natural and least disturbed forests of Kinwat, Bhokar and Hatgaon talukas have *Tectona grandis* L. f., *Dalbergia latifolia* Roxb., *Lannea coromandelica* (Houtt.) Merr., *Buchanania lanzan* Spreng., and *Terminalia arjuna* W. & A. as dominants. Other scattered forests are much disturbed and have tree species like *Boswellia serrata* Roxb., *Lannea coromandelica* (Houtt.) Merr., *Wrightia tinctoria* Roth, *Holarrhena antidysenterica* Wall., and others. There are also many sub-dominants like *Azadirachta indica* Juss., *Ailantus excelsa* Roxb., *Aegle marmelos* Corr., *Bauhinia racemosa* Lam., *Bridelia stipularis* Bl., *Butea monosperma* (Lam.) Taub., *Capparis grandis* L., *Cordia macleodii* Hook. f. & T., *Dalbergia sissoo* Roxb., *Dolichandrone falcata* Seem., *Ficus* spp., *Lagerstroemia parviflora* Roxb., *Limonia acidissima* L., *Pterocarpus marsupium* Roxb., *Semecarpus anacardium* Linn. f., *Soyimida febrifuga* Juss., *Stereospermum personatum* Chatt., *Syzygium cuminii* (L.) Skeels., and *Terminalia* spp.

A large number of bushy as well as scan-

dent shrubs occupy considerable areas in small and disturbed forests. *Annona squamosa* L., is the most dominant in many parts. Other common species are *Acacia chundra* Willd., *A. leucophloea* Willd., *A. torta* Craib., *Canthium parviflorum* Lamk., *Capparis brevispina* DC., *C. zeylanica* L., *C. decidua* (Forsk.) Edgew., *Combretum ovalifolium* Roxb., *Flacourtia indica* Merr., *Grewia tiliifolia* Vahl, *Helicteres isora* L., *Ixora parviflora* Vahl, *Lantana aculeata* L., *Maytenus emarginata* (Willd.) Ding Hou., *Mimosa hamata* Willd., *Rhus mysorensis* Heyne, *Securinega leucopyrus* Brand., *Spermadictyon suaveolens* Roxb., *Vitex negundo* L., *Ventilago denticulata* Willd., etc. A few twiners like *Cocculus hirsutus* Diels., *Cryptolepis buchananii* R. & S., *Dioscorea oppositifolia* L., *Dregea volubilis* Benth., *Hemidesmus indicus* Br., *Jasminum roxburghianum* Wall., *Tylophora indica* Merr., etc., grow on the small trees and bushes in these forests.

2) Open scrub jungles :

On the well drained plateau and isolated hills, open scrubland vegetation has developed. There are thorny and unpalatable species; dominant among them are *Acacia chundra* Willd., *Carissa congesta* Wt., *C. spinarum* A. DC., *Cissus pallida* DC., *Dichrostachys cinerea* W. & A., *Euphorbia antiquorum* L., *E. nivulia* Ham., *Opuntia elatior* Mill., *Ziziphus mauritiana* Lam., and *Z. oenoplia* Mill., and others.

3) Grasslands :

With the exclusion of the cultivated areas, the forest pockets and the open scrub jungles mentioned above, the vegetation is predominantly of a grassland type. The grasses are interspersed with fire resistant trees and shrubs like *Butea monosperma* (Lamk.) Taub., *Carissa congesta* Wt., *Rhus mysorensis* Heyne and a large number of unpalatable thorny bushes. Dominant grass species in order of dominance are *Heteropogon contortus* Beauv., *Aristida funiculata* Trin. & Rupr., *Andropogon pumilus*

Roxb., *Chrysopogon fulvus* (Spreng.) Chiov., *Eremopogon foveolatus* (Del.) Stapf, *Iseilema* spp., *Themeda quadrivalvis* (L.) O. Ktze., and *Sehima nervosum* (Rottl.) Stapf. Other common species *Arundinella tuberculata* Munro, *Brachiaria deflexa* (Schumach.) Hubb., *B. setigera* (Retz.) Hubb., *Cymbopogon martinii* (Roxb.) Wats., *Eragrostis* spp., *Panicum trypheron* Schult., *Setaria tomentosa* (Roxb.) Kunth, *Sorghum deccanense* Stapf, *Sporobolus* spp. etc., together with numerous leguminous species including *Alysicarpus* spp., *Crotalaria liniifolia* L. f., *C. orixensis* Rottl., *Desmodium gangeticum* DC., *Indigofera linnaei* Ali, *I. trita* L. f., *Psoralea corylifolia* L., *Tephrosia pumila* Pers. and *Zornia diphylla* Pers. Still others are *Abutilon indicum* G. Don, *Achyranthes aspera* L., *Alternanthera pungens* H. B. & K., *Cyanotis fasciculata* Schultes f., *Aerva sanguinolenta* Bl., *Mollugo pentaphylla* L., *Oldenlandia* spp., *Trinathema portulacastrum* L., etc.

STATISTICAL ANALYSIS OF THE FLORA

About 1200 species are distributed in 600 genera and 128 families of flowering plants. Ten families in the order of dominance are Gramineae, Papilionaceae, Compositae, Euphorbiaceae, Cyperaceae, Acanthaceae, Convolvulaceae, Labiatae, Malvaceae and Rubiaceae. This, when compared to Hooker's assessment of the floristic areas of this country roughly corresponds to the position for the Upper Gangetic plain and the Deccan.

Most prominent genera in the area appear to be *Eragrostis*, *Cyperus*, *Crotalaria*, *Euphorbia*, *Panicum*, *Hibiscus*, *Indigofera*, *Alysicarpus*, *Brachiaria* and *Acacia*.

Proportion of the dicotyledons to the monocotyledons is roughly 3 : 1 and that of the herbaceous to woody species is also 3 : 1. There are no endemic species except for those which have been described recently from the region. It can, therefore, be safely concluded that Marathwada does not have a flora of its

own but analysis of the species common to surrounding areas indicate that it is under great influence of the migratory elements from the Western, North-Western and South-Eastern India. In conclusion, it may be remarked that the region has a far better potential of plant wealth than was supposed by the earlier explorers and therefore needs further detailed investigations.

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