

Vegetation of Deedwana Tehsil, Nagaur District, Rajasthan, India



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Abstract

The present paper deals with the vegetation of Deedwana tehsil which falls under central part of Rajasthan. A total of 331 species of angiospermic plants belonging to 218 genera and 65 families were recorded including four series of natural vegetation in Deedwana tehsil: 1. *Acacia nilotica-Maytenus emarginata-Balanites aegyptiaca* series 2. *Prosopis cineraria-Crotalaria burhia-Leptadaenia pyrotechnica* series. 3. *Prosopis cineraria-Capparis decidua-Tephrosia purpuria* series and 4. *Suaeda fruticosa-Cressa cretica-Heliotropium curassavicum* series: The last one is the characteristic of the salty wetland which is situated in the southern part of Deedwana tehsil. Deedwana salt lake which is a unique halophytic floristic tract. Such tracts are unfavourable to the native as well as introduced species, the principal exceptions to this being some salt tolerant members of the Chenopodiaceae. The study provides an understanding of vegetation distribution pattern in arid and semi-arid region alongwith area occupied by salt lake. In the present paper 15 plant species have been recorded as salt loving species of angiospermic plants. Many of these plant species have immediate attention for their conservation.

Keywords: Vegetation, Vegetation Series, Arid and Semi Arid Area, Halophytes Plants, Deedwana, Nagaur, Rajasthan.

Introduction

India occupies a special status in terms of ecosystem, species and genetic diversity because of its location in the tropical zone, physical features and eco-climatic conditions. Rajasthan is the largest state of India and is situated in the north-western part of India between 23°3'N and 30°12'N latitude and 69°30'E and 78°17'E longitude, occupying an area of 3,42,239 sq.km. The elevation of land surface varies from 214 to 1375 m. In shape, it is an irregular rhomb with north-south and east-west diagonals, the former about 784 km. and the latter 850 km. long. The remarkable feature of Rajasthan is the Aravalli range, perhaps the oldest folded mountain range in the world. It intersects Rajasthan from end to end, diagonally running from Delhi to the plains of Gujarat for a distance of about 692 km. It has a wide range of habitats, climatic factors, physiography, soil types and geological antiquity. Aravalli range divides the whole of Rajasthan into two natural divisions i.e. three fifth lying on north-west and two fifth on the east and south-east.

Nagaur district is located in the centre of the Rajasthan state between 26°23' and 27°42' north latitudes and 73°40' and 75°15' east longitudes. This district covers an area of 17,718 sq. km. which is about 5.177% of total area of the state. The present study is a report based on survey of angiospermic plants of Deedwana tehsil of Nagaur district (Fig.1). A total of three hundred thirty one species, grouped into two hundred eighteen genera, assigned to sixty five families according to Bentham and Hooker's system of classification have been recorded from Deedwana tehsil.

Review of Literature

In recent years a large number of publications dealing with the flora and floral composition of Rajasthan have been published. These have been reviewed by Jain (1970) Bhandari (1978), Sharma (1980). Publication of Flora of Indian Desert (Bhandari, 1990), Flora of north-east Rajasthan (Sharma & Tiagi, 1979) and Flora of Rajasthan (Shetty & Singh, 1987) have further added to our knowledge of the flora and floral composition of Rajasthan. District flora of Tonk (Shetty & Pandey, 1983) and Banswara (Singh, 1983) district of Rajasthan have been published. Quereishi (2002), Sharma & Aggarwal (2008) and Quereishi & Vyas (2017), have significantly contributed in the existing knowledge about the vegetation of Deedwana

and Nagaur. Intensive botanical exploration of Nagaur district of Rajasthan is in progress including study of phytodiversity of Deedwana tehsil.

Aim of the Study

Conservation and protection of natural wealth is urgent need of human being for survival. The phytodiversity study leads to an upto-date knowledge of the vegetation of the study area. In Rajasthan, many commercially and medicinally important species of tree flora such as *Commiphora wightii*, *Tecomella undulata*, and several others are facing severe threats of extinction due to grazing, lopping, mining and by the use of new instruments of agriculture. Some herbs specially Cucurbits like *Momordica dioica* and *Citrullus colocynthis* are also in same category i.e. over-exploited plants. The botanical researchers would play decisive role in conservation, bio-prospecting and sustainable utilization of plant diversity. Because of their knowledge of the requirements of the plants, their distribution status and their importance. The present work on the flora of Deedwana tehsil has been taken up by the authors for investigation along these lines. An enumeration of all the species of angiosperms occurring in Deedwana tehsil. A comparison of this flora with that of neighbouring areas viz. Delhi, upper Gangatic plains, Western Rajasthan has been taken up in the present study. Ecological studies including habitat-wise classification and distribution patterns of plant communities, effect of biotic and climatic stress conditions on this flora have also been discussed. This work will also be helpful in compilation of the district of Nagaur flora.

Research Methodology

The survey for plant collections and observation were conducted at regular interval throughout the year. Excursions were undertaken two to three times a month. field trips were arranged in such a way to cover all the locations at more or less regular intervals to collect most of the plants in flowering and fruiting stages. All the specimen collected were serially numbered. The field notes included habit, habitat, colour of flowers, associations etc. The present is also an attempt to work out the phytodiversity of this region. Herbarium methodology given by Jain & Rao (1976) was followed. Provisional identification was made by the help of Duthie's FUGP (Vol 1-2 repr. 1952), Santapau's Fl. Saur. (Vol 1952), Hooker's flora (Vol 1-7 repr. 1952) and Flora of North-Eastern Rajasthan (Sharma & Tiagi, 1979; Bhandari, 1990, and Shetty & Singh 1987). Further help was taken from many other monographs and revisions. These identification were later on confirmed by matching the plants with authentic specimens at the RUBL Jaipur and JAC Jodhpur.

Vegetation Types of Deedwana

Most of the area under investigation comes under arid and semi-arid climate. Consequently, it is characterized by sandy, salty and gravelly plain, more or less barren of vegetation except in the rainy season when multitudes of ephemerales come up and transform the bare land into a green carpet. These ephemerales complete their life- cycle before the

advent of summer heat and the bulk of the area is again transformed into open sandy, salty and gravelly plain.

In general the vegetation in the semi-arid region is sparse. Plants with only xerophytic adaptations are able to establish themselves. The bulk of vegetation consists of stunted, thorny or prickly shrubs and perennial herbs capable of drought resistance. These occur in open clump formations with plenty of vacant spaces between them. Distinctly scattered trees of stunted growth are found along depressions. Such type of vegetation is known as desert scrub. In the semi-arid region the vegetation mainly consists of dwarf grasses interspersed with few characteristic desert shrubs. Permanent vegetation of the entire area is, therefore, xerophytic in character and shows various xerophytic features like deep root, dry, hard and rod-like, thick or fleshy stems; spines and indumentum well-developed; leaves either absent or much reduced usually with a coating of wax or hair to prevent excessive evaporation.

The floral composition of the vegetation of western Rajasthan is fairly well- known through the exhaustive work of Blatter & Hallberg (1918-21), subsequent workers. Blatter & Hallberg call the main types of plant communities as formations which are exclusively controlled by edaphic factors. They divided these formations into smaller units known as associations and families. Almost all the subsequent workers have followed these authors in describing the vegetation of this region. Since the climate is more of less homogeneous, the vegetation can better be said to be edaphically controlled. Depending upon the rain water, the vegetation can also be distinctly divided into ephemerales and perennials.

Main series of natural vegetation in Deedwana tehsil have been categorized as follows:

Acacia nilotica- Maytenus emarginata- Balanites aegyptiaca series

This is most characteristic of lower hill fringes and foothills, extending to the sandy plains.

Prosopis cineraria- Crotalaria burhia- Leptadenia pyrotechnica series

This is characteristic of the sandy expands. The vegetation is extremely sparse with scattered trees and bushes.

Prosopis cineraria- Capparis decidua- Tephrosia purpuria series

This series occurs naturally in almost all the part of Deedwana tehsil.

Suaeda fruticosa-Cressa cretica-heliotropium curassavicum series

This is characteristic of the saline area which is situated in the southern part of Deedwana tehsil, mostly near the Deedwana salt lake and at Daulatpura.

Ephemerals, which constitute the bulk of vegetation of the area, appear suddenly above the ground just after first showers complete their life cycle in an incredibly short time. They die out as soon as the soil gets dry or perennate by underground stems. Plants, depending upon the sub-soil waters are well

adapted for xeric conditions. They generally possess well developed root system of extra ordinary length in comparison to their aerial parts. Most of these plants occur in open clump formations with plenty of vacant spaces between them, often occupied by ephemerals during monsoon period. Although rather poor in the number of species in a particular area, the whole region harbours a large number of well- defined plant associations confined to various edaphic conditions.

The plants growing on sandy habitats form some of the characteristic association of the region. *Cyperus arenarius*, *Crotalaria burhia*, *Aerva javanica* *Leptadenia pyrotechnica* etc. are some of the pioneer species to colonize these sandy areas. These associations consisting of a few leading perennials and many ephemerals are very variable in composition on different dunes. *Crotalaria burhia* is often a dominant perennial and together with *Aerva javanica* and *Leptadenia pyrotechnica* forms a characteristic association on low sand-dunes and plains.

Intermixed among these tufts are *Convolvulus arvensis*, *Polygala irregularis*, *Mollugo cerviana*, *Tephrosia purpurea*, *Cenchrus biflorus* and species of *Eragrostis*. *Clerodendrum phlomidis*, *Lycium barbarum* are other leading plants of such habitats, but of local distribution only. *Balanites aegyptiaca* intermixed with such plants also forms pure association. Gravel covers fairly large area of this district. Some of the common plants of this habitat are *Fagonia schweinfurthii*, *Indigofera linnaei*, *Heliotropium rariflorum*, *Leptadenia pyrotechnica*, *Blepharis sindica*, *Sericostoma pauciflorum*, *Salvia aegyptiaca* and *Corchorus depressus*. *Salvadora oleoides*, *Prosopis cineraria*, *Capparis decidua*, *Maytenus emarginatus* and *Zizyphus nummularia* are some of the more common elements forming scrub vegetation with isolated tree specimens intermixed. Most of these plants are often covered with characteristic ramblers like *Coccinia grandis* and *Melothria maderaspatana*. In such habitats the typical rock plant, *Euphorbia caducifolia* becomes prominent and along with *Acacia senegal* supports large number of climbers.

Seasonal vegetation includes those herbs as well as weeds that are commonly met with in fields and unused ground. Corresponding to the three distinct seasons of the year, one comes across winter, rainy and summer season. The optimum temperature and moisture conditions for plant growth are obtained during the rainy season when the vegetation attains a luxuriant monsoon aspect. Following the first fall of rains towards the end of June or early July, the almost bare ground begins greening up in patches. Among the pioneer plants, mention may be made of *Tribulus terrestris*, *Euphorbia hirta*, *Trianthema portulacastrum*, *Heliotropium ovulifolius*, *Cleome viscosa* *Cyperus rotundus*, *C. compressus*, *Brachiaria ramosa* and *Cynodon dactylon*. A little later, in about two or three weeks, the ruderal areas, fallow and cultivated fields become inhabited with a variety of plants belonging to the Tiliaceae, Papilionaceae, Aizoaceae, Rubiaceae, Acanthaceae, Labiatae, Amaranthaceae,

Euphorbiaceae, Cyperaceae and Poaceae. Most of the species of this season flower and fruit in September when the sky gets cleared and provides longer hours of sunshine. The following are the common monsoon species in fallow and cultivated areas: *Corchorus trilocularis*, *C. aestuans*, *C. tridens*, *Crotalaria medicaginea*, *Polycarpha corymbosa*, *Convolvulus arvensis*, *Solanum surrattense*, *Justicia simplex*, *Leucas aspera*, *Borreria hispida*, *Phyllanthus fraternus*, *digera muricata*, *Commelina forskalii*, *C. benghalensis*, *Perotis indica*, *Cenchrus setigerus*, *C. cilicaris*, *Aristida adscensionis*, *Eleusine verticillata*, *Dactyloctenium aegyptium*, *Eragrostis cilianensis*, *Digitaria setigera*, *Sporobolus coromandelianus*, *Desmostachya bipinnata*, *Celosia argentia* etc.

Among the rainy season annuals which are met in waste places and along roadsides, the following deserve mention: *Indigofera linifolia*, *I. hochstetteri*, *Tephrosia strigosa*, *Zornia gibbosa*, *Alysicarpus monilifer*, *Polygala erioptera*, *Mollugo cerviana*, *M. nudicaulis*, *Polygonum plebeium* etc. Besides, a number of twiners and climbers inhabit the trees and shrubs. The common ones are: *Rhynchosia minima*, *Coccinia cordifolia* etc.

The rainy season vegetation disappears during the month of October with the same rapidity as it came during the rains. As the cold season ensues and temperature becomes low and top soil as well as atmosphere become dry, species of colder altitudes, elevated regions, or of European genera make their appearance; the common ones are: *Fumaria indica*, *Coronopus didymus*, *Argemone mexicana*, *Stellaria media*, *Spergula arvensis*, *Melilotus alba*, *M. indica*, *Trigonella corniculata*. *Sonchus oleraceus*, *Launaea resedifolia*, *Gnaphalium indicum*, *Vernonia cinerea*, *Vicoa indica*, *Bergia ammanioides*, *Oxalis corniculata*, *Potentilla supina*, *Asphodelus tenuifolius* etc.

As the weather warms up in March, seeds of several annual herbs and weeds, that lie dormant in soil throughout the rainy season and winter, now germinate and they successfully occupy the unused ground and fields that remain fallow till the arrival of the monsoon. A number of these weeds grow abundantly and exhaust the soil. The plants during these dry months of the year show various xeromorphic features such as thorns, woolly tomentum, coating of wax, thick cuticle, leathery foliage, etc. Further it is during this time that some of the recently introduced, alien plants bear flowers and fruits. The common herbs that appear about the middle of April and occupy the area till or up to the monsoon period are: *Alhagi pseudohagi*, *Citrullus colocynthis*, *Glinus lotoides*, *Pulicaria crispa*, *Pluchea lanceolata*, *Echinops echinatus*, *Gomphrena celosioides*, *Cressa cretica*, *Phyla nodiflora* etc.

Discussion

In terms of ecosystem, species and genetic diversity, India occupies a special status due to its location in the tropical zone, physical features and eco-climatic conditions. The remarkable feature of Rajasthan is the Aravalli range. It has a wide range of habitats, climatic factors, physiography, soil types and geological antiquity. The vegetation of

Deedwana is sparse consisting mainly of stunted, thorny or prickly shrubs and perennial herbs capable of drought resistance. Trees are few and scattered. Distinctly scattered trees of stunted growth are found along depressions. Such type of vegetation is known as **desert scrub**. The ephemerales come up during rainy season, complete their life-cycle before the advent of summer heat and the bulk of the area is again transformed into open sandy, salty and gravelly plain. In the semi-arid region the vegetation mainly consists of dwarf grasses interspersed with few characteristic desert shrubs. The vegetation of Deedwana can be studied under the following heads:

Sand Dune and Interdunal Area Vegetation

The common trees and shrubs found on stabilized and unstabilised sand-dunes are *Clerodendrum phlomidis*, *Lycium barbarum*, *Acacia senegal*, *Prosopis cineraria*, *Salvadora persica*. The other common inhabitants are: *Aerva javanica*, *Crotalaria burhia*, *Farsetia hamiltonii*, *Indigofera cordifolia* and *Cenchrus biflorus* (Fig.2).

Sandy and Hummocky Plains Vegetation

This constitutes a major part of this tehsil and forms characteristic associations. Common trees and shrubs are: *Acacia senegal*, *Calotropis procera*, *Capparis decidua*, *Maytenus emarginatus*, *Prosopis cineraria*, *Salvadora persica* and *Zizyphus nummularia*. Undershubs and herbs are *Aerva javanica*, *Leptadenia pyrotechnica*, *Tephrosia purpurea*, *Cenchrus biflorus* and *Crotalaria burhia*. Most common creeper and climbers are *Citrullus colocynthus*, *Cucumis melo*, *Coccinia grandis*, *Momordica dioica* and *Mukia madaraspatana* (Fig.3).

Gravelly and Rocky Plains Vegetation

Gravel covers fairly large area. Some inhabitant plant are: *Cleome vahliana*, *C. gracilis*, *Fagonia schweinfurthii*, *Indigofera linnaei*, *Heliotropium rariiflorum*. The rocks in the area represent various geological formations. The rocky plains maintain sparse vegetation without any true forest. *Anogeissus pendula*, *Balanites aegyptiaca* and *Acacia Senegal* are common tree growing there along with common shrubs and herbs.

Isolated Hills and Rocks Outcrops Vegetation

The area on southern side of Deedwana tehsil consists of isolated hills of low elevation and of various origin. These hills are usually bare on the top. The hill slopes, however, maintain better vegetation due to accumulation of sand and better water holding capacity. Common plants of these habitats are: *Acacia senegal*, *Anogeissus pendula*, *Commiphora wightii*, *Euphorbia caducifolia*, *Grewia tenax*, and *Zizyphus nummularia*. etc (Fig.4).

Saline Tracts Vegetation

There are few saline tracts spread throughout this tehsil. The common plants of this habitats are: *Cleome gracilis*, *Tamarix dioica*, *Portulaca oleracea*, *Trianthema triquetra*, *Sesuvium sesuvioides*, *Glycyx lotoides*, *Cressa cretica*, *Suaeda fruticosa*, *Heliotropium curassavicum*, *Aristolochia bracteolata*, *Haloxylon recurvum*, *Salsola baryosma*, *Phyla nudiflora* etc (Fig.5).

6. Aquatic, Marshland habitat vegetation: These habitats supports a reasonable number of aquatic species like *Hydrilla verticillata*, *Vallisneria spiralis* and *Lemna minor* etc.

Conclusion

Phytogeographically this region is an area of the confluence of the western and eastern vegetations. Topographically this region is Arravallis ranges of varying heights, rocky terraces, valleys, ponds and lakes on one hand and sandy plains and stabilized dunes of varying nature on other hand. This varied topography associated with the peculiar phytography has resulted in a highly diverse nature of vegetation so that we can conclude that is sparse consisting mainly of stunted, thorny or prickly shrubs and perennial herbs capable of drought resistance. Trees are few and scattered. Distinctly scattered trees of stunted growth are found along depressions. Such type of vegetation is known as desert scrub or scrub jungle. The ephemerales come up during rainy season, complete their life-cycle before the advent of summer heat and the bulk of the area is again transformed into open sandy, salty and gravelly plain. Southern part of Deedwana tehsil is having salty wetland and is a unique halophytic floristic tract. Biological spectrum reveals that perennials are poorly represented in the area; geophytes and hydrophytes are less than those in normal spectrum. The dominance of the therophytes is probably due to the harse climate.

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Fig.1 Map of the Study Area

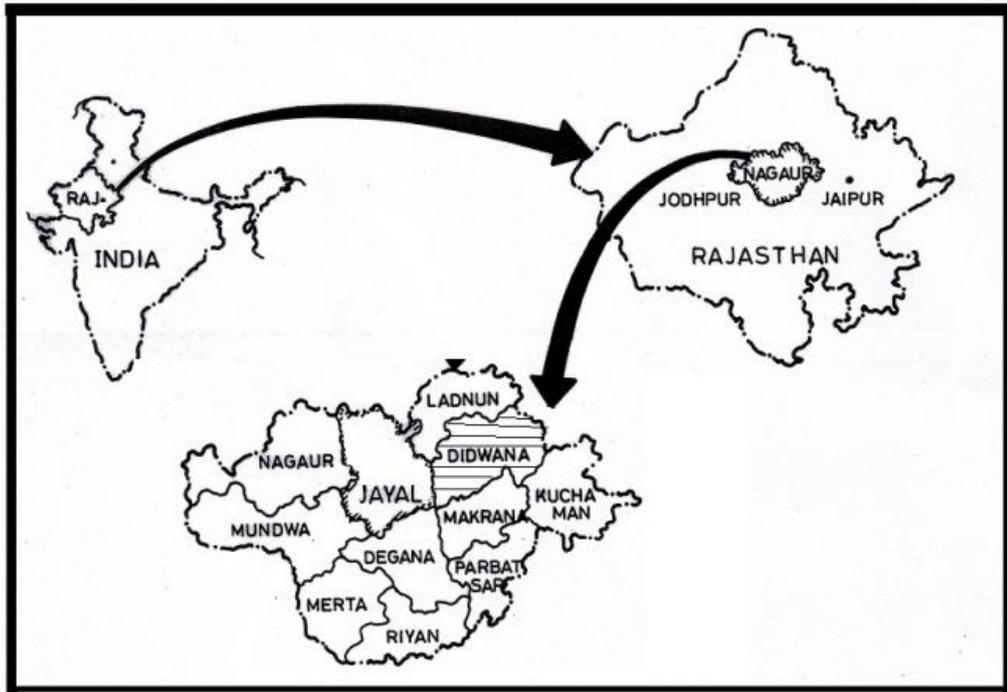


Fig.2. A View of Sand Dune and Interdunal Vegetation



Fig.3 A View of Sandy and Hummocky Plain Vegetation



Fig.4. A View of Gravelly and Rocky Plain Vegetation



Fig.5. A View of Saline Tract Vegetation near the Salt Lake, Deedwana.

