



Biological spectrum of the flora of Ajmer sand dunes

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ABSTRACT

Analysis of life forms of the vegetation of Ajmer (Rajasthan) was carried out based on the data collected from the field. The biological spectrum of Ajmer (covering different habitats in and around Ajmer) represent 7% phanerophytes, 10% nanophanerophytes, 16% chamaephytes and 20% hemiscryptophytes, geophytes are 6% while therophytes forms the largest class of total flora. Lianas are a poorly represented class with 2% of the total flora. According to life form classification, the plant communities are regarded as therophytic, which is a characteristic feature of vegetation in desert and semi desert condition of Rajasthan.

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Introduction

Charan et al (1978) has divided western Indian desert into the five major phytogeographical division (PHD) i.e. sand dunes, sandy plains, stony & hilly tracts, gravel & compact tracts and saline areas. Basically these PHD'S differ from each other in their floristic composition due to topographical and geological formations. Being the position of Ajmer in central Aravallis and just on the line of demarcation between western arid and middle semiarid zone (Fig-1) the climate conditions are slightly favorable and the area shares the floristic elements of both sandy and hilly tracts. Therefore Ajmer region is represented by all kinds of habitats. The area is rich in flora and this aspect has not been studied so far except a list of trees and shrubs given by Sharma (1985) and Sharma (1980). In the present investigation floristic composition was studied in terms of life form classes. When working with a species list, every species has the same weightage in the biological spectrum. This is called a floristic biological spectrum (Raunkiaer, 1934; Costa et al., 2007). However when the number of individuals, instead of species, of each life form is counted each class can be weighted by its density, giving rise to the vegetation biological spectrum, which indicates phenomena relative to the vegetation rather than to the flora (Batalha and Martins, 2002).

Biological Spectrum

Seasonal fluctuations in arid and semiarid parts considerably influence the pattern of vegetation distribution. Size and density of a plant usually not only vary from season to season but also from one site to another in the locality and in the same season. In the ecotone such as the Ajmer region data pertaining to floristic richness, which is also known as gamma diversity, are important to assess the vegetation characteristics, particularly the vegetation diversity of this region. This characteristic depends upon the adaptability of the species in the particular community. Singh and Joshi (1982) have indicated that in community, each species has its relationship with the environment and to the other species in vicinity. Life

form/Biological spectrum represents the sum of the adaptation of the plants in relation to climate, which can be expressed by the statistical distribution of life forms in the flora of a region (Raunkier, 1934)

Methods of Study

Raunkier (1934) proposed a life form system for the description of vegetation on physiognomic basis. On the basis of field surveys conducted during the study period, floristic list was prepared. About 71 plant species are recorded belonging to 33 families as given in Table-1 and were categorized in to following life form classes.

- | | |
|--------------------------|---|
| 1. Phanerophytes (Ph) | Includes trees with perennating bud located upright |
| 2. Nanophanerophytes (N) | Includes under trees and shrubs with perennating bud located about 1-3 meters height. |
| 3. Chamaephytes (Ch) | Plants with buds located little above the ground. |
| 4. Hemiscryptophytes (H) | Plants with perennial shoots and buds close to surface. |
| 5. Geophytes (G) | Plants with perennating buds buried in soil substratum. |
| 6. Hydrophytes (HH) | Includes all water plants except planktons. |
| 7. Therophytes (Th) | All annual species including of lower plant group. |
| 8. Lianas (L) | Includes species, which needs external support for their upright growth. |
| 9. Phytoplankton and | Phytoedaphous (P) Microscopic plants in air water and soil. |
| 10. Epiphytes (E) | Plants growing on other plants |
| 11. Halophytes (HL) | Includes plants species inhabitant to high salinity levels in soil. |

Site of Study

The area of present study is located at a distance of 10 Km N-W to Ajmer, a centrally situated city of Rajasthan lies between 26° 29' and 26° 29' N latitude and 74° 37' and 74° 42' E longitude. The area is represented by Aravalli hillocks, and dunes, sandy plains agriculture fields and fresh water bodies (F 1 & 2). The region may be regarded as 'ecotone' between NW drier and SE humid climate. The sand dunes selected for present investigation i.e. Puskar Valley Base, Leela Sewri and Pachkund are situated in 48 Sq.km area in the north west foot hills of Nagaphar, a prominent mountain belt of central Aravallis. So the present investigation was carried out in and around Ajmer.

Results and Discussion

Data on percentage of plant species belonging to each life form class for Ajmer region are given in Table-2. Out of the list of angiospermic flora, 7% are phanerophytes, 10% of flora represented by Nanophanerophytes. Chamaephytes and Hemicryptophytes are medially represented by 16 and 20% respectively. Geophytes are 6% while Therophytes is the largest class represented by 39% of the total flora of Ajmer region. Life form class of lianas is poorly represented by only 2% of the total flora.

The percentage of species in various life form classes is different with that too normal spectrum. In Ajmer Tehsil the percentage of Therophytes is three times more than that of Therophytes in the normal biological spectrum. Chamaephytes and Geophytes categorized in the present study are also in greater percentage (less than twice) than the normal spectrum. Other life form classes (ph, N, H, and E) of normal spectrum are larger as compared to the present study. From life form classification point of view, the flora of this division may be regarded as Therophytic, which is a characteristic feature of desert and semi desert conditions of Rajasthan. This finding supports that in a region of about 9-10 months of dryness, only those life forms are retained which are capable of surviving and completing their cycle under stress conditions.

The biological spectrum of Ajmer was compared with that of Rajasthan desert, North Indian semi arid region and Western Rajasthan (Table-3). This study also shows that ephemeral and other herbs under Therophytes constitute a large portion of flora. Charan et al (1978) reported 45% therophytes, while Mehar-Homji (1964) reported 33% and Sarup (1951) 41% of Therophytes respectively. Data presented for this study may be exactly comparable to the finding of the Workers because they infact studied large regional climate of Rajasthan. Joshi (1956 a, b and 1957) reported a maximum number of xerophytes during the rainy season. Winter and summer seasons, however had comparatively a low species number than that of found in the rainy season. The distribution of the species in monsoon grasslands depends on the variations in seasons, (Singh and Yadava, 1974). It has been pointed out the strength of apparent vegetation in response to water regime is strongly affected by the life forms of the plant species involves (Olsvig et al, 1983).

With increasing degree of dune stabilization in the Aravalli gaps, more species both from sandy and gravel habitats invade and establish themselves. The plant species that found in extremely adverse environmental conditions are also find better opportunities for growth in these sand dune areas. Next to lianas, Geophytes are poorly represented in the region, which indicates stress conditions for a major part of the year.

It may be concluded that from life form point of view, Ajmer region (Aravalli hillocks and sand dunes in gaps) also

contains flora of comparatively humid regions and therefore, the active sand dunes may be stabilized without much difficulty.

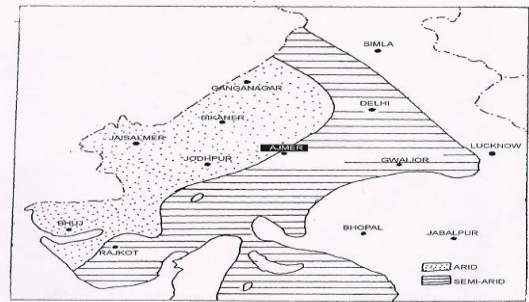


Fig. 1 : North-west part of India showing arid (dotted area) and semi-arid (horizontal lined area) of Rajasthan. Ajmer is situated in the transitional zone between arid and semi-arid

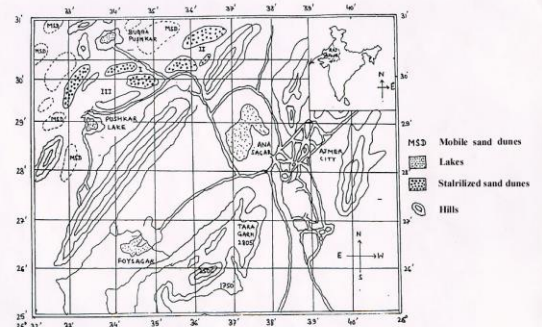


Fig. 2 : Map of Ajmer Aravalli region showing sites of study I Leela Sewri, II Puskar Valley Base, III Pachkund area

References

- Batalha, M.A. and Martins, F.R. 2002. Biological spectra of Cerrado sites. *Flora* 197, pp 452-460.
- Charan, A.K. Sen D.N. and Rojpurhit, K.S. 1978. Biological spectrum of the vegetation of western Rajasthan desert. *Indian Journal of Forestry* 1:226-228.
- Costa, R.C., Soares, A.F, LimaVerde, L.W. 2007. Flora and lifeform spectrum in an area of deciduous thorn woodland (caatinga) in northeastern, Brazil. *Journal of Arid Environments* 68, pp 237-247.
- Das, R.B. and Sarup, S.1951. The Biological spectrum of the Indian desert flora University of Rajasthan, Jodhpur, 36-42.
- Joshi, M.C. 1956a. A preliminary survey of the sand dune vegetation of Pilani and its neighbourhood. Symposium of Vanamahotsava Agra. Abstract. 7-8.
- Joshi, M.C. 1956b Plant ecology of Bikaner and its adjacent area in comparison with the rest of western Rajasthan. *Journal of Indian Botanical Society*. 35 (4): 495-511.
- Joshi M.C. 1957. A Comparative study of the vegetation of some areas in Jaipur division *ibid.* 36(3): 272-291.
- Meher-Homjim V.M. 1964 Life forms and biological spectra as ephimeric criteria of aridity and humidity in the tropics. *Journal of Indian Botanical Society*. 43:424-430.
- Olsvig, W.H., Shachak M. and Yair, A 1983 *Vegetatio*, 54:153

Raunkiaer, C. 1934. The life forms of the plants and Statistical plant geography. The Clarendon press. Oxford.

Sharma, V.C. 1958. The flora of Ajmer (Rajasthan) Indian. A list of trees, shrubs and woody climbers. journal of Bombay nat hist. Soc. 55(1)129-141.

Sharma, K.C. 1980. Contribution to the basis of the ecotypic differentiation in some selected species of Ajmer flora Ph.D.thesis, The Univ-Rajasthan Jaipur.

Singh, J.S. and Yadav, P.S. 1974. Seasonal variation in composition, plant biomass and net primary productivity of tropical grassland at Kurukshetra, India, Ecol. Monogr 44:352-376.

Singh, R. and Joshi M.C. 1982 Studies on decomposition of root and litter material in sand dune regions at Narher near Pilani, Rajasthan Birla Institute of Tech. And Sc. Pilani. Ann Arid, Zone 21:157-161.