

Life Forms and Biological Spectrum of the Vegetation of Nasirabad Valley, Ajmer District, Rajasthan

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Abstract: *The present study was taken up to evaluate the floristic composition of Nasirabad valley of Ajmer district, which topographically comprises of hillocks, sand –dunes, sandy plains and cultivated fields. The vegetation which is edaphically controlled shows much variation from the view point of species composition at various habitats. The vegetation of Nasirabad valley is actually an admixture of western sandy region and eastern part of the state of Rajasthan. In all 570 species of angiosperms have so far been collected from this area. Life forms and biological spectrum of the vegetation of Nasirabad valley, Ajmer has been prepared. Therophytes have been recorded to be the major segment of the vegetation.*

Keywords: Life forms; Biological spectrum; Vegetation; Nasirabad valley; Ajmer; Rajasthan

1. Introduction

Ajmer district is situated in the centre of Rajasthan state lying between 25°16' and 26°27' north latitudes and 74°42' east longitudes. The district is surrounded by Jaipur and Tonk districts in east and Pali district in west, Nagaur district touches its north boundaries while Bhilwara district in the south. The total geographical area of Ajmer district is 8481.20 hectares.

The district has no natural division. Its boundaries are territorial and composed of four sub-divisions namely Ajmer, Beawar, Kekri and Kishangarh. Ajmer sub-division forms the northern part of district and is more or less triangular in shape, Beawar sub-division is an irregular terrain lying in the south-west of district. The track is generally hilly. Kekri sub-division forms the south eastern portion of the district and consists of two narrow strips of land separated from each other. The distinguishing feature of the district is the Aravali range, which comes into prominence near the town of Ajmer. Nasirabad sub-division of Ajmer district, has only one tehsil (Nasirabad) and a sub-tehsil (Srinagar). There are 90 revenue villages in Nasirabad tehsil.

The range of hills between Ajmer and Nasirabad marks the dividing watershed of the sub-continent of India. The rain which falls on the southern Nasirabad side, find its way through the Chambal into the Bay of Bengal; that which falls on the other side is discharged by the Luni into the Gulf of Kutch.

Mean annual rainfall (2001-2016) of the district is 468.0 mm. Almost 95% of the total annual rainfall is received during the southwest monsoon, which enters the district in the last week of June and withdraws in the middle of September. Probability of average annual rainfall exceeding 300 mm is only 90%. Drought analysis based on agriculture criteria indicates that the district is prone to mild and normal type of droughts. Severe type of drought is very rare and occurred only twice during 1987 & 2002 (Srinagar).

January is the coldest month with mean maximum and minimum temperatures being lowest at 22.7° C and 7.6° C. Temperature in summer month (June) reaches up to 40.5° C. There is drop in temperature due to onset of monsoon and rises again in the month of September.

Atmosphere is generally dry except during the monsoon period. The humidity is highest in August with mean daily relative humidity 80%. The annual potential evapotranspiration in the district is 1565.6 mm and is the highest in the month of May (243mm).

The total area under forest as on 31st March, 2015 comes to be 57516 Km. of which the reserve area under forest is 91.66 sq.km. There are five zones viz. Beawar, Ajmer, Sarwar and Kishangarh. The reserve area in all the forest zones varies from 18% to 29% except in case of Raoli, where area is more than 95%. Important trees are *Anogeissus pendula*, *Boswellia serrata*, *Prosopis cineraria*, *Acacia Senegal*, *Ziziphus jujuba*, *Acacia leucophloea* and *Dichrostachys cinerea*. *Cenchrus ciliaris*, *Dichanthium annulatus*, *Chloris barbata*, *Sorghum halepense* etc. are the important grasses of the area.

2. Statistical Synopsis of the Indigenous Flora

The present work enumerates 570 species belonging to 330 genera and 88 families of flowering plants occurring in Nasirabad valley of Ajmer district. It is clear from table 1 that the ratio of total number of genera to species is 1: 1.72, which is rather equal to a corresponding ratio for whole of India (1:7), but it is more in conformity with this ratio for the Gangetic plain region (1:2.2) and that of Delhi state (1:1.63) as reported by Maheshwari (1963).

It is rather interesting to note that family Poaceae tops the list of all flowering plants in Nasirabad valley, like in the adjoining areas like western Rajasthan and eastern Rajasthan where family Poaceae occupies top position. It may be mentioned here that family Poaceae has been found to be the most dominant family in the Gangetic plains, Gujarat and Delhi regions also and next position in all these regions is

occupied by family Leguminosae. Thus these two families have retained their positions in the area presently investigated. Family Asteraceae occupies third position in the flora of Nasirabad valley which is in conformity with Delhi and remaining areas of Rajasthan. Thus, the flora of Nasirabad valley may be referred to as "Grass-Legume" type on the basis of dominance of grasses in its flora followed by legumes.

Most of the area of Nasirabad valley comes under 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 ephemerals come up and transform the bare land into a green carpet. These ephemerals complete their life-cycle before the advent of summer heat and the bulk of the area is again transformed into open sandy or salty plain.

In general the vegetation in this 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 in the plains with plenty of vacant spaces between them. Distinctly scattered trees of stunted growth are found along depressions. The vegetation mainly consists of stunted or 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 transpiration.

The main types of plant communities may be called as formations which are exclusively controlled by edaphic factors; these formations may further be divided into smaller units known as associations and families. Since the climate is more or less homogenous, the vegetation can better be said to be edaphically controlled. Depending upon the rain water availability, the vegetation can also be distinctly divided into ephemerals and perennials.

3. Vegetation Types

Main series of natural vegetation of Nasirabad valley of Ajmer district have been categorized as follows:

1. *Acacia nilotica* – *Maytenus marginata* – *Balanites aegyptiaca* series: This is most characteristic of foot hills and lower sand dunes extending to the sandy plains.

2. *Prosopis cineraria* – *Crotalaria burhia* – *Leptadenia pyrotechnica* series: this is characteristic of the sandy expands. The vegetation is extremely sparse with scattered trees and bushes.

3. *Anogeissus pendula* – *Boswellia serrata* – *Lannea coromandelica* series: This is characteristic of the hilly areas which are the parts of Aravallis range.

Ephemerals which constitute the bulk of vegetation of the area appear suddenly above the ground just after first showers and 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.

4. Biological Spectrum of Vegetation

The life-form of the plant is the physiognomic form produced in union with the environment. Raunkiaer (1934) has given an account of the life-form system in which the position of bud or plant propagule has been considered as the most important criterion for classification of plants into different life-forms. A biological spectrum is formed when all the species of higher plants of a community are classified into life-forms and their ratio expressed on numbers or percentage.

Based on raunkiaer(1934) and modified after Clapham(1935 J.Ed. 23: 247-249) and Cain(1950 Bot. Rev. 16:1-32) the percentage distribution of species among the life-forms of the flora of the Nasirabad valley(i.e., Biological Spectrum), is grouped into the following categories:

A. Perennial plants

Bud bearing shoot:

I. In air-

- | | | |
|------------------------|--------------------|-----|
| 1. More than 2m. high- | | |
| (a) Trees | -Phanerophytes | Ph. |
| (b) Shrubs | -Nanophanerophytes | N. |
| 2. Up to 25cm.high | -Chamaephytes | Ch. |
| 3. On ground level | -Hemicryptophytes | H. |

- | | | |
|----------------------|------------|-----|
| II. Beneath the soil | -Geophytes | Ge. |
|----------------------|------------|-----|

- | | | |
|--|--------------|-----|
| III Under water or beneath the soil in water | -Hydrophytes | HH. |
|--|--------------|-----|

B. Annual plants

- | | | |
|----------------------------|--------------|-----|
| Perennating by seed embryo | -Therophytes | Th. |
|----------------------------|--------------|-----|

- | | | |
|---------------------|------------|----|
| C. Parasitic plants | -Parasites | P. |
|---------------------|------------|----|

Of these categories the geophytes (Ge.), hydrophytes (HH.) and halophytes (Ha.) are termed as Cryptophytes (Cr.) as these perennate by means of subterranean buds. The Hydrophytes (HH.) are further split into: aquatic plants (Hy.) submerged or free floating in water; and marshy plants (He.) where the buds perennate in soil under water.

On analysis, the biological spectrum of flora of Nasirabad valley (Table 2) works out as under:

In all 570 species of angiospermic plants have been recorded from Nasirabad valley. Phanerophytes constitute 11.40% of the vegetation of Nasirabad valley while nanophanerophytes constitute 13.33% of this vegetation. Chamaephytes and hemicryptophytes are represented by 15.51% and 8.25% respectively. Similarly geophytes and hydrophytes constitute .466% and 2.091% of the total vegetation. Therophytes forms the major segment of this vegetation (48.25%). Parasites are only 0.70% of the total vegetation.

A comparison of the biological spectrum of Nasirabad valley with the normal spectrum of Raunkiaer's (1934) for the world has been recorded in Table 3 and text fig.1.

From the study of biological spectrum (Table 3), it is seen that the percentage of phanerophytes and hemicryptophytes is much less vis-à-vis normal biological spectrum. The percentage of therophytes is about two and half to three times higher than those of same life-form in the normal biological spectrum. From the scrutiny of this data, it is concluded that phytoclimate of Nasirabad valley is therophytic because the percentage value of therophytes is much higher.

Table 1: Proportional relationship of dicotylelonuos and monocotylelonuos taxa in Nasirabad valley

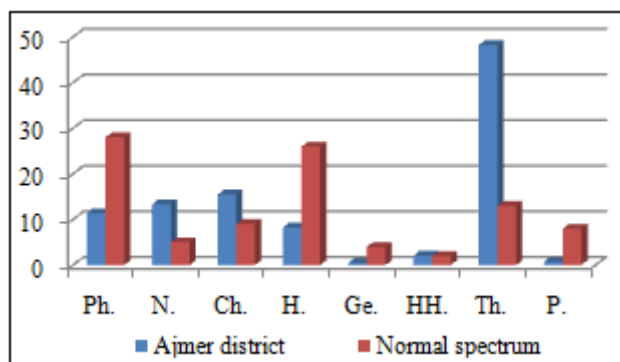
Groups	Families		Genera		Species	
	No.	%	No.	%	No.	%
Dicots	77	87.5	265	80.3	451	79.12
Monocots	11	12.5	65	19.69	119	20.8
TOTAL	88		330		570	

Table 2: Life forms of the flora of Nasirabad valley

S.No	Life-form	Category	Percentage
1.	Phanerophytes	(Ph.)	11.40
2.	Nanophanerophytes	(N.)	13.33
3.	Chamaephytes	(Ch.)	15.51
4.	Hemicryptophytes	(H.)	8.25
5.	Geophytes	(Ge.)	0.466
6.	Hydrophytes	(HH.)	2.09
7.	Therophytes	(Th.)	48.25
8.	Parasites	(P.)	.70

Table 3: Percentage composition of life-forms In Nasirabad valley

Life forms Locality	Ph.	N.	Ch.	H.	Ge.	HH.	Th.	P.
Ajmer district	11.40	13.35	15.51	8.25	0.46	2.09	48.25	.70
Normal spectrum	28.01	5.0	9.0	26.0	4.0	2.0	13.0	8.0



Text fig. 1: Life form composition

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