

A NOTE ON THE BIOLOGICAL SPECTRUM OF THE FLORA OF UDAIPUR DISTRICT

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ABSTRACT : The present paper attempts a phytogeographical study of Udaipur district. A bio-statistical study of the flora of Udaipur district is made on Raunkiaer's life forms system. The climate is markedly periodic as in the tropics and there are three seasons rainy, winter and the summer. The plant spectrum has been correlated with topographical and climatic factors.

INTRODUCTION

Raunkier's system of life forms is the most compact and consistent. This system is simple based mainly on only one feature the protection of the bud of the shoot apices during the unfavourable season. He (1934) categorised the species into life-forms based on the position of renewable buds or organs on the plants. The buds or plant propagules are either located on above ground or underground plant parts and position of their location in relation to the ground surface has been taken as a criterion for classification of plants into different life-forms. Thus it is possible, to describe a region in terms of the plant world. A statistical survey of the life forms of the flora of a region reveals in a way the plant climate.

In a particular type of climax community life-form is uniform. Raunkaier worked out the life-form spectrum or biological spectrum of different plant communities from all over the world and proposed a

normal spectrum for the terrestrial vegetation.

Phanerophytes	— 46 per cent
Chamaephytes	— 9 per cent
Hemicrypto- phytes	— 26 per cent
Cryptophytes	— 6 per cent
Therophytes	— 13 per cent

By comparing the biological spectrum of a community from the normal spectrum we can tell the climatic conditions of the habitat. The following formula has given by Raunkaier to obtain the percentage composition of species in each life-form.

$$\% \text{ Life-form} = \frac{\text{Number of species in any life-form}}{\text{Total number of species of all life-form}} \times 100$$

The definitions of these life forms which have been found useful for the present work are given on the next page.

No.	Symbol	Life Form	Definition
1	TH	Therophytes	Annual plants
2	G	Geophytes	Phanerogams with vegetative organs in the soil
3	H	Hemicryptophytes	Phanerogams with vegetative buds at the level of the ground or substratum
4	CH	Chamaephytes	Phanerogams with vegetative organs, 20–30 cm. above the soil
5	N	Nano-phanerophytes	Phanerogams with vegetative organs less than 2 meters above the soil
6	M	Micro-phanerophytes	Phanerogams with vegetative organs 2–8 meters above the soil
7	MM	Meso-phanerophytes	Phanerogams with vegetative organs 8–30 meters above the soil
8	P	Parasites	Parasitic plants
9	HH	Hydrophytes	Plants grow in water
10	He	Halophytes	Mashy plants

PHYSICAL FEATURES

LOCATION

The Udaipur district is situated between latitudes $23^{\circ} 46'$ to $26^{\circ} 2'$ N and longitudes $73^{\circ} 0'$ to $74^{\circ} 35'$ E. The district is oval in shape with a very narrow strip extending in the north. Its greatest length from east to west, approximately 245 km. and greatest breadth from east to west, approximately 158 km. The area of the district is 17.267 sq. km.

TOPOGRAPHY

Existence of elevated plateau characterised the northern portion of the district while the eastern portion has fertile plains. The southern part of the district is mostly covered with the rocks, hills and fairly dense jungles. The western portion of the region is hilly, is composed of Aravalli range, viz. Desuri Nal and Sadri pass which cross into

Jodhpur district. The slopes are covered with forest, stones and jungles affording shelter to wild life. The average height of the district is 500 metres above sea level gradually increasing towards west. The district abounds in hills. Some are steep in the southwest corner while others in the north-west south-east are wooded. These hills naturally form a floristic subdivision and its floral spectrum would be a interesting study.

CLIMATE

Udaipur is the semi-arid region having a typical climate of the North Tropical region with extremes of hot and cold season. On account of its elevation it is much cooler than the surrounding plains during summer. May is the hottest month. The mean temperature during May is 31.7°C maximum $30^{\circ}.6^{\circ}\text{C}$ and minimum 24.9°C . The nights however are cool. In January the coolest month of the year the mean

TABLE 1 : CLIMATIC DATA OF UDAIPUR DISTRICT

Months	Rainfall in mm.	Mean daily minimum temp. in °C	Mean daily maximum temp. in °C	Mean monthly temp. in °C	Relative humidity in %	Wind velocity in KM / hour
J	7.1	7.8	24.2	16	66	2.2
F	3.2	9.7	27.6	18.6	55	2.6
M	2.9	15.1	32.3	23.7	43	3.6
A	1.7	20.2	36.0	28.1	34	4.6
M	9.2	24.9	38.6	31.7	38	6.3
J	68.0	25.3	35.9	30.6	63	7.4
J	228.9	23.9	30.7	27.4	78	6.3
A	204.9	22.9	29.3	26.1	81	4.7
S	107.9	22.1	30.9	26.5	76	3.7
O	10.0	18.9	32.0	25.4	62	2.3
N	4.5	11.0	29.1	20.0	57	1.5
D	2.0	8.3	26.3	17.8	63	1.5
Annual	650.3	17.5	31.1		60	3.9

Source : Meteorological Office, Daily Weather Report of Rajasthan.

temperature at Udaipur is 16°C. The minimum temperatures sometimes reach the freezing point of water and frost may occur occasionally.

The rains in the area are mainly due to the Arabian Sea Monsoon during the months of June to September every year. The annual rainfall about 650.3 mm. more than two thirds of which is precipitated in July and August. The monthly rainfall is given in Table 1. It will be seen that about 95% of the rainfall occurs during June to September. During the monsoon the rains are torrential and considerable soil erosion takes place.

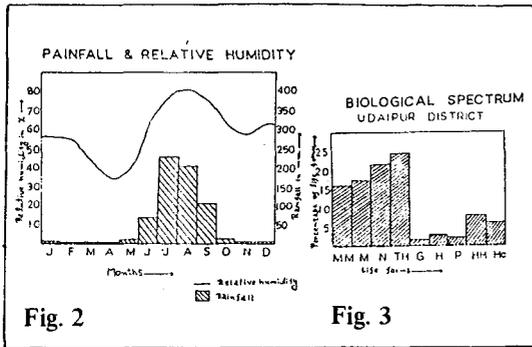
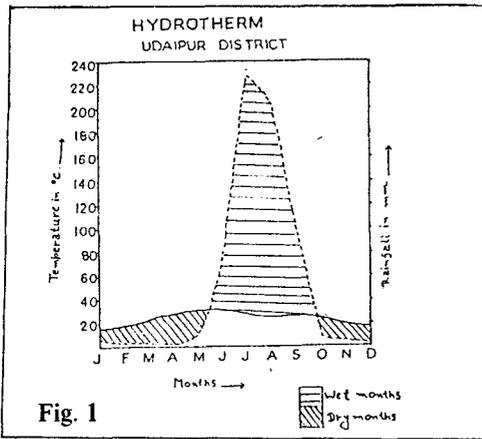
Except in the brief south-west monsoon season when the relative humidities are generally about 70 per cent or more.

The summer months are the driest part of the year when the relative humidities go down to 20 to 25 per cent particularly in the afternoon. The lowest humidity is in the months of March, April and May. During April and May the temperature is also the highest. From June onwards humidity increases being the highest in July-August.

The climate is markedly periodic and can be divided into 3 seasons. Rainy winter and summer. Corresponding with the climatic seasons there are three distinct vegetational seasons.

THE HYDROTHERM FIGURES

The hydrotherm figure for any region, according to Raunkiaer is a figure showing the relationship between the



temperature curve plotted in degrees centigrade and the rainfall curve plotted in mm. in the same graph. Hydrotherm figure for Udaipur district is given in Fig. 1. Figures for rainfall and relative humidity are plotted in Fig. 2.

From Table 1 and Figure 1, 2 it is clear that the mean temperature varies from 16°C in January and 31.7°C in May to 30.6°C in June. There is a conspicuous through in the months of December and January in the temperature curve.

The rainfall ranges from a little above 9.2 mm. to about 228.9 mm. in July and 204.9 mm. in August when it reaches its maximum. The rainfall curve shows two troughs, one in November–December and other in March–April when the rainfall is less than a cu. Dry months are January, February, March, April, May, October, November and December, when the rainfall is less than temperature. This period is called dry period. Wet months are June, July, August and September, when the rainfall is much more than temperature. This period is called wet period. This period is very suitable for the growth of flora of Udaipur district.

The through of the precipitation curve occurs at different seasons from that of the temperature curve, so that there is a dry summer (Humid) rainy season and slightly humid winter. There are two growth seasons (1) the rainy season, (2) Humid spring February, March. The unfavourable seasons are (1) from April to middle June when the temperature is the highest and precipitation the lowest. (2) January, when the temperature is lowest.

THE BIOLOGICAL SPECTRUM

In such tropical region, with a dry summer slightly humid winter and practically long rainy season in between the two seasons, the plant climate according to Raunkiaer should be Therophytes which is very well supported by the figure in Table 2 below. In ordinary words there is pre-

TABLE 2 : BIOLOGICAL SPECTRUM

Total Number of Species	The Percentage Distribution of Species among the Life-forms								
	MM	M	N	TH	G	H	P	HH	He
409	15.8	17.3	21.5	24.5	1.7	2.9	2.2	8.3	6.3

ponderance of the annuals. Therophytes survive in the unfavourable season in the form of seed and complete their life cycle within a single favourable season.

In the above table are given the biological spectra of Udaipur district. Fig. 3 shows that the life form which is most preponderating in the percentage number of plants in the spectrum for Udaipur district is Therophytes 24.5 which is more than about two times that of the normal spectrum 13%. The groups next in importance respectively are the Nano-phanerophytes 21.5%, Microphanerophytes 17.3%, Mesophanerophytes 15.8%, Hydrophytes 8.3%, Halophytes 6.3%, Hemicryptophytes 2.9%, Parasites 2.2% and Geophytes 1.7%. The percentage of the Micro-phanerophytes is just equal to that of the normal spectrum, the percentage of Nano-phanerophytes is more than the corresponding percentage in the normal spectrum and the

percentage of Mesophanerophytes is more than two times that of the normal spectrum. Therefore, the important life forms are the Therophytes, Nano-phanerophytes and Microphanerophytes. The plant climate of Udaipur district therefore, is chiefly characterized by Therophytes. The modification of the climate due to altitude and greater rainfall is conducive to supporting Microphanerophytes and Nano-phanerophytes. Raunkiaer's hypothesis is in perfect harmony with the nature of vegetation inside the area.

CONCLUSION

The area shows decidedly a therophytic plant climate with a percentage of about 24.5%. Plants next in importance are Nano-phanerophytes, microphanerophytes and Mesophanerophytes. Raunkiaer's hypothesis is able to reveal the true nature of the vegetation of the area.

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