Quantitative Analysis of Community Structure of Herbs of Hindoli Tehsil of Bundi District, Rajasthan

Dr. O. P. Sharma

Associate Professor, Department of Botany

Government College Bundi, Rajasthan, India - 323001

ABSTRACT: Phytosociological analysis of vegetation formed an important part of ecological studies. This analysis provides a picture of successful and dominant plant species of peculiar climatic, edaphic and biotic condition of the area. In order to express the dominance and ecological success of any species with a single value, the concept of IVI was developed. This index utilized three characters viz. relative density, relative frequency and relative dominance. A phytosociological survey for quantitative analysis of community structure of the angiosperm herbaceous diversity was carried out in Hindoli tehsil of Bundi district. The most dominant and co-dominant herbaceous species of Hindoli were *Blumea lacera, Parthenium hysterophorus* and *Tridax procumbens having* IVI values 30.53, 30.35 and 28.27.

KEYWORDS: Community, Importance Value Index, Phytosociology, Quadrat, Quantitative analysis

I. INTRODUCTION

The structure of a community will be studied by taking into consideration a number of characters which will usually grouped under two heads viz. analytic and synthetic. Certain analytic characters e.g., frequency, density, abundance and dominance will be expressed quantitatively, while others e.g., sociability, vitality, periodicity and stratification represent only qualitative expression. In the present work IVI (sum of relative density, relative frequency and relative dominance) of dominant herbaceous vegetation of Hindoli tehsil of Bundi district has been carried out.

Bundi district is administratively divided into two sub-division Bundi and Nainwa. There are 5 tehsils in district namely Bundi, Nainwa, Hindoli, Keshoraipatan and Indergarh. The Hindoli tehsil is lies between 25° 34' 43" N latitude and 75° 29' 54'' E longitude in the south-eastern part of Rajasthan. The tehsil head quarter of Hindoli is 25 km. away from Bundi city. This area was known for dense vegetation but due to biotic disturbances, it has been extensively exposed. This area are famous for vegetable production and many water reservoirs.

II. RELATED WORKS

The notable contribution of phytosociology work of India includes Braun Blanquet (1932), Hanson and Churchill (1961), Vyas (1964), Ranawat (1973), Menon and Shah (1982) and Sharma (1986). Ecological studies particularly on vegetation diversity of India have been carried out by different workers (Misra, 1968; Shetty and Pandey, 1983; Gena and Sharma, 1988; Kikim and Yadava, 2001; Singh and Kushwaha, 2006; Dadhich, 2016; Sharma, 2019, 2021and 2022). Such type of study has not been observed yet in study area.

III. METHODOLOGY

The field observation of herbaceous plants of area for quantitative analysis was conducted during 2011 to 2013 and revised survey for further observation was done from July 2000 to December 2022. The field survey was completed from month of July to December (In pre monsoon to post monsoon season).

To determine the vegetational structure quadrat method for grasses and herbs, was used. Minimum size and number of quadrat was fixed. Minimum size of quadrat was calculated by species area curve method. The community structure has been expressed as IVI (Importance Value Index). The IVI is represented by three characters viz. relative density, relative frequency and relative dominance.

These characters were calculated as follows: -

$$\text{Relative density (R. D.)} = \frac{\text{Density of the species}}{\text{Total density of all the species}} \times 100$$

$$\text{Relative Frequency (R. F.)} = \frac{\text{Frequency of the species}}{\text{Total frequency of all the species}} \times 100$$

$$\text{Relative Dominance (R. Dom.)} = \frac{\text{Dominance (cover) of the species}}{\text{Total dominance (cover) of all the species}} \times 100$$

IV. EXPERIMENTAL RESULTS

A total of 10 sample quadrat each measuring 1m X 1m were laid randomly at different locality of the study area. The dominant herbaceous species of area were recorded for analysis of community quantitative characters. Phytosociological data were collected based on random sampling methods followed by Misra (1968). Analysis of IVI of dominant herb species of area are given in Table I and II.

Table I: Community quantitative characters

Sr. No.	Name of species	Density	Frequency	Abundance	Basal cover
1	*Justicia adhatoda*	1.8	40	4.50	1.76
2	*Achyranthes aspera*	1.9	60	3.16	1.20
3	*Acalypha ciliata*	0.8	30	2.66	1.41
4	*Cleome viscosa*	0.5	20	2.50	1.29
5	*Oxalis corniculata*	1.5	50	3.00	0.09
6	*Calotropis procera*	1.0	50	2.00	1.72
7	*Parthenium hysterophorus*	2.4	80	3.00	1.22
8	*Digera muricata*	1.7	70	2.42	0.38
9	*Tridax procumbens*	3.2	100	3.20	0.21
10	*Blumea lacera*	2.5	80	3.12	1.19
11	*Euphorbia hirta*	2.8	80	3.50	0.05
12	*Solanum nigrum*	0.6	20	3.00	1.08
13	*Vernonia cinerea*	1.1	40	2.75	0.81
14	*Heteropogon contortus*	1.7	50	3.40	0.08

Table II: Importance Value Index

Sr. No.	Name of species	Relative density	Relative frequency	Relative dominance	IVI
1	*Justicia adhatoda*	7.65	5.19	14.09	26.93
2	*Achyranthes aspera*	8.08	7.79	9.60	25.47
3	*Acalypha ciliata*	3.40	3.89	11.28	18.57
4	*Cleome viscosa*	2.12	2.59	10.32	15.03
5	*Oxalis corniculata*	6.38	6.49	0.72	13.59
6	*Calotropis procera*	4.25	6.49	13.77	24.51
7	*Parthenium hysterophorus*	10.21	10.38	9.76	30.35
8	*Digera muricata*	7.23	9.09	3.04	19.36
9	*Tridax procumbens*	13.61	12.98	1.68	28.27
10	*Blumea lacera*	10.63	10.38	9.52	30.53
11	*Euphorbia hirta*	11.91	10.38	0.40	22.69
12	*Solanum nigrum*	2.55	2.59	8.64	13.78
13	*Vernonia cinerea*	4.68	5.19	6.48	16.35
14	*Heteropogon contortus*	7.23	6.49	0.64	14.36

The value thus calculated were added to get IVI. The relative importance of the species in the community were found out by Importance Value Index. IVI of different plant species was calculated and on the basis of this value, dominant and co-dominant plant species of *Blumea lacera, Parthenium hysterophorus* and *Tridax procumbens* were determine.

V. CONCLUSION

The community structure will be expressed through phytosociological parameters such as density, frequency and dominance (basal cover or basal area). It will be expressed as IVI and it will be indicated the importance of a species within a stand. IVI value would highlight the dominance and codominance of plant species. Quantitative analysis of community structure of Herbs of Hindoli Tehsil of Bundi District, Rajasthan have been communicated in present paper.

REFERENCES

1. Braun-Blanquet, J. (1932). Plant sociology. Engl. Transl. by G.D. Fuller and H.S. Conard. Mc Graw – Hill, N.Y. P.438.

2. Dadhich, L. K. (2016). Quantification of Ecosystem services in Mukandara National Park, Rajasthan, India. Ad. Plant Sci. 29 (I): 1-8.

3. Gena, C. B. and Sharma, K. C. (1988). A note on vegetation of Rajasthan. Scientia, 31: 19-26.

4. Hanson, H.C. and Churchill, E.D. (1961). The Plant Community. PP 1-218. Reinhold New York.

5. Kikim, A. and P. S. Yadava. (2001). Phenology of tree species in subtropical forests of Manipur in north eastern India. Tropical Ecology 42: 269-276.

6. Menon, A.R.R. and Shah, G. L. (1982). Phytosociological studies of vegetation of Saurashtra (Gujrat): Mutual species correlation studies in the area. Ind. J. Eco. 5 (1): 55-63.

7. Misra, R. 1968. Ecology Work Book. Oxford & IBH, New Delhi.

8. Ranawat, M.P.S. (1973). Phytosociological studies on deciduous forests of Koriyat (S. Raj.), Ph. D. Thesis, University of Udaipur.

9. Sharma, N. K. (1986). Taxonomical and phytosociological studies on vegetation of Jhalawar and its environs, Ph. D. Thesis, University of Rajasthan, Jaipur.

10. Sharma, O. P. (2019). Kaththa: Rural small-scale industry of India. Accent Journal of Economics Ecology & Engineering. Vol. 04 special issue 04, (ICIRSTM).

11. Sharma, O. P. (2021). *Striga* Lour, Root parasite angiosperm: A case study in Rajasthan state. Ad. Plant Sci. 34: (I - II) 119-120.

12. Sharma, O. P. (2022). Common weeds of Kharif crops of Bundi district, Rajasthan, India. IJIRSET. Vol. 11. Issue 05: 6098-6100.

13. Sharma, O. P. (2022). *Crotalaria* L. in Haroti region, South-east Rajasthan. IJGSR. Int. J. Glob. Sci. Res. Vol. 9, Issue 02. 1862-1865.

14. Sharma, O. P. (2022). Invasive plant species of Rajasthan and their impact on natural habitat. IJSR. Vol. 11, Issue 12, 678-680.

15. Shetty, B. V. and Pandey, R. P. (1983). Flora of Tonk district. BSI, Howrah.

16. Singh, K. P. & C. P. Kushwaha. (2006). Diversity of flowering and fruiting phenology of trees in a tropical deciduous forest in India. Annals of Botany 97: 265-276.

17. Vyas, L. N. (1964). Phytosociological studies on vegetation of sandy plains of Alwar district. N. E. Rajasthan. Tro. Eco. 5: 60-66.