IVI of Trees of Hindoli Tehsil (District Bundi) Rajasthan

O. P. Sharma

Professor, Department of Botany, Government College Bundi, Rajasthan - 323001
Email: *opsharmabundi68[at]gmail.com*

Abstract: *The community structure could be expressed through parameters such as density, frequency, dominancy, abundance, phenology, life form, basal cover etc. Relative importance of plant species within its community could also be expressed as (IVI) Importance Value Index. To calculate and determine the IVI of trees of area, an ecological survey of the angiosperm tree diversity was carried out in Hindoli tehsil of Bundi district. The most dominant and co - dominant tree species of Hindoli were Mitragyna parvifolia, Anogeissus pendula, Alangium salvifolium and Salvadora oleoides having IVI values 49.97, 39.97, 38.47and30.95.*

Keywords: Basal cover; Density; Frequency; IVI; Quantitative; Transect

1. Introduction

The phytosociological study provides a picture of successful and dominant plant species of peculiar climatic, edaphic and biotic condition of the area. The concept of IVI was developed to express the dominance and ecological success of any species with a single value. IVI values of different plant species are arranged in decreasing order. This index utilized three characters viz, relative density, relative frequency and relative dominance.

Hindoli tehsil is located in the district of Bundi in the state of Rajasthan. This area is famous for vegetable production and many water reservoirs. The Hindoli tehsil head quarter is situated about 25 km. away from Bundi city. The tehsil is lies between 25° 34' 43'' N latitude and 75° 29' 54'' E longitude in the south - eastern part of Rajasthan. In the present work quantitative analytic studies of Hindoli tehsil has been carried out.

The main trees species of the area are *Butea monosperma, Mitragyna parvifolia, Acacia nilotica*, *Acacia leucophloea, Manilkara hexandra, Balanites aegyptiaca*, *Alangium salvifolium, Anogeissus pendula, Moringa concanensis, Salvadora oleoides, Lannea coromandelica, Strculia urens, Bauhinia racemosa, Phoenix sylvestris, Prosopis cineraria* and *Vitex negundo*. The main shrubs species are *Calotropis procera*, *Capparis decidua*, *Capparis sepiaria, Ziziphus mauritiana, Ziziphus nummularia* and *Dichrostachys cinerea.*

2. Material and Methods

Numerous ecological studies particularly on vegetation and phytosociology in India have been conducted by different workers (Braun – Blanquet 1932; Raunkiaer 1934; Hanson and Churchill 1961; Das and Bhimaya 1964; Vyas 1964; Champion and Seth 1968; Misra 1968; Agarwal 1971; Ranawat 1973; Majumdar 1981; Menon and Shah 1982; Odum 1983; Sharma 1986; Kikim and Yadava 2001; De Groot, Wilson and Boumans 2002; Sharma 2003; Singh and Kushwaha 2006; Bhatt and Bhatt 2007; Yadav and Yadav 2008; Dadhich 2016; Sharma 2022). The important contribution from Rajasthan state includes Agarwal (1971), Ranawat (1973), Majumdar (1981), Sharma (1986) and Dadhich (2016).

Transect method was used to determine the vegetational structure of shrubs and trees. Transect is a sampling strip extending across a stand or several stands of vegetation where line is the sampling unit. The transect is divided into segments of suitable length. A number of transects may be laid down at random across the field at different sites. The community structure has been expressed through phytosociological parameters such as density, frequency and dominance (basal cover or basal area). It was expressed as IVI and it was indicated the importance of a species within a stand. This index utilized three characters viz. relative density, relative frequency and relative dominance. For IVI, values of relative density, relative frequency and relative dominance (Cover basis) were obtained as follows: -

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

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

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

The quantitative observation was conducted during 2010 to 2013 and revised survey was done during 2021 to 2023. The field survey was completed in summer season (Month of April to June).

3. Results and Discussion

Quantitative analytic data were collected using the random sampling methods described by Misra (1968). A total of 10 sample transect each measuring 10 m X 10 m were laid randomly at different locality of the Hindoli tehsil area. The dominant trees species of selected site of area were recorded for analysis of community quantitative characters. Analysis

of IVI of dominant these 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	*Alangium salvifolium*	0.8	30	2.66	1790.59
2	*Strculia urens*	0.9	40	2.25	795.82
3	*Lannea coromandelica*	1.5	60	2.50	644.79
4	*Mitragyna parvifolia*	3.2	100	3.20	795.82
5	*Anogeissus pendula*	2.9	80	3.62	508.84
6	*Salvadora oleoides*	2.0	60	3.33	508.84
7	*Moringa concanensis*	0.5	20	2.50	574.81
8	*Balanites aegyptiaca*	1.2	40	3.00	198.95
9	*Butea monosperma*	1.8	50	3.60	460.08
10	*Dichrostachys cinerea*	2.1	60	3.50	71.44

Table II: Importance Value Index

Sr. No.	Name of species	Relative density	Relative frequency	Relative dominance	IVI
1	*Alangium salvifolium*	4.73	5.55	28.19	38.47
2	*Strculia urens*	5.32	7.40	12.53	25.25
3	*Lannea coromandelica*	8.87	11.11	10.15	30.13
4	*Mitragyna parvifolia*	18.93	18.51	12.53	49.97
5	*Anogeissus pendula*	17.15	14.81	8.01	39.97
6	*Salvadora oleoides*	11.83	11.11	8.01	30.95
7	*Moringa concanensis*	2.95	3.70	9.05	15.70
8	*Balanites aegyptiaca*	7.10	7.40	3.13	17.63
9	*Butea monosperma*	10.65	9.25	7.24	27.14
10	*Dichrostachys cinerea*	12.42	11.11	1.12	24.65

The value thus calculated were added to get Importance Value Index. The relative importance of the species in the community were found out by IVI.

4. Conclusion

Plant community is characterised by its species diversity, growth forms and structure, dominance, successional trends etc. Transect is a sampling strip extending across a stand or several stands of vegetation where line is the sampling unit. The transect is divided into segments of suitable length. Importance Value Index of different plant species of area were calculated and on the basis of IVI value, dominant and co - dominant plant species of *Mitragyna parvifolia, Anogeissus pendula* and *Alangium salvifolium* were determine having 49.97, 39.97 and 38.47 IVI values.

References

[1] Agarwal, S. K. (1971). Floristic and Ecological studies on the deciduous forests of Gogunda and Parsad. (South - east Rajasthan). Ph. D. Thesis, Univ. of Udaipur.

[2] Bhatt and Bhatt. (2007). Floristic and phonological analysis of ground vegetation grown under *Eucalyptus* hybrid and *Dalbergia sissoo* plantation. J. Ind. Bot. Soc.86 (384): 123 - 128.

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

[4] Champion, H. G. and Seth, S. K. (1968). A revised survey of the forest types of India. Govt. of India of Publication, New Delhi.

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

[6] Das, R. B. and Bhimaya, C. P. (1964). Ecology of grasslands of Western Rajasthan. Proc. Symp. Prob. Indian Arid Zone. pp.222 - 226. Jodhpur.

[7] De Groot, R., Wilson, M. A. and Boumans, R. M. (2002). A typology for the classification, description and valuation of ecosystem functions, good and services. Ecological Economics.41: 393 - 408.

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

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

[10] Majumdar, R. B. (1981). Synoptic flora of the Kota division (S. E. Rajasthan), III Bull. Bot. Surv. India 22: 24 - 41.

[11] 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.

[12] Misra, R. (1968). Ecology Work Book. Oxford & IBH, New Delhi.

[13] Odum, E. P. (1983). Basic Ecology. Holt - Seunders Intl. ed., Japan.

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

[15] Raunkiaer, C. (1934). The life forms of plants and statistical plant geography. Clarendon press, Oxford.

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

[17] Sharma, P. D. (2003). Ecology and environment. (Seventh edition). Rastogi publications, Meerut.

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

[19] Sharma O. P. (2022). A hand book of floristic diversity of Angiosperms. Vol. I. Agrobios Research Publishers, Jodhpur.1 - 218.

[20] Sharma O. P. (2022). A hand book of floristic diversity of Angiosperms. Vol. II. Agrobios Research Publishers, Jodhpur.219 - 438.

[21] 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.

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

[23] Yadav, R. R. and Yadav A. J. (2008). Phenology of selected woody species in a tropical dry deciduous forest in Rajasthan, India. Tropical Ecology 49 (1): 25 - 34.