Environment & Ecology 29 (1A) : 459—461, 2011
 ISSN 0970-0420

Biological Spectrum of Kota and Its Environs

HEMLATA GUPTA AND NILIMA BHARADWAJ

PG Department of Botany, Government College
Kota 324010, Rajasthan, India

Abstract

Biological spectrum of Kota and its environs reveal a total of 421 of vascular plants of which phanerophytes occupy 21.80%, chamaephytes 2.8%, hemicrytophytes 4.40%, hydrophytes 14.00%, geophytes 4.00% and therophytes 53.00%. Thus, therophytes top the list in respect to the numerical strength and chamaephytes occupy the bottom-most place. Phytoclimate of the area appears to be thero-phanerophytic. Higher percentage of hydrophytes in the region may be due to the dominanace of marsh-land plants which perennate with the help of underground organs and appear immediately arter the rainy season.

Key words : ***Biological spectrum, Kota environs, Phytoclimate.***

Plant community has its own characterstic structural composition of life forms viz. trees, shrubs, herbs, annuals and epiphytes. This community structure is largely determined by the set of climatic conditions with a selected set of plant species or the life forms of the vegetation, that are the indicators of regional climate. Though Raunkiaer's life form system (1) and its further extension by Braun-Blanquet (2) have been used widely all over the world. However, Raunkiaers's system which is based primarily on position of perennating buds of organs, from which new shoots or foliage develop after an unfavourable season is used all over but, it totally disregards the plant behavior during the growing season. Thus in the modified classification various criteria viz. the structure and seasonality of crown, foliage and shoot system have also been emphasized besides the structure and nature of perennating bodies (3). The expression of the percentage distribution (or relative proportion) of different life forms in the flora of a region is known as the spectrum of life form (4) or biological spectrum which can be used to calculate numerical results quickly (5), to indicate the stratification and layering pattern of a community (6, 7), to indicate the prevailing environment (8), its aridity or humidity (9), to monitor the ambient stress factors on climate (10) and to determine the nature of bioclimate or phytoclimate. Plant communities widely separated geographically can be effectively compared on the basis of their detailed biological spectrum. In the present study a general analysis of biological spectrum of Kota and its neighborhood was carried out during 2006—2008.

Study Area

Kota is one of the south eastern districts of Rajasthan situated at $24^0\,25'$—$25^0\,51'$ N and $75^0\,35'$—$77^0 29'$E. The Mukundra hills of Vindhyan System run across the southern portion of the district from north west to south east, forming an important feature in landscape of the district. Climate of the area is cool and dry in winter, hot and dry in summer and hot and humid in monsoon with moderate to high temperature (13.6—47.6^0 C). Average annual rainfall of the area is 852 mm.

Methods

Phyto-sociological studies using the quadrat methods were carried out during July 2006 to June 2008. Life forms were determined in the study area after detailed floristic analysis. The form, habit, height and nature of perennating buds of each species were studied in the field. The classification of vegetation on physiognomic basis has been done as per Raunkiaer's system. Biological spectrum of the study area has been compared with the Raunkiaer's normal spectrum along with the spectra of other localities.

Results and Discussion

In the study out of a total of 421 species of vas-

Table 1. Biological spectrum of select localities. Ph : Phanerophytes, Ch : Chamaephytes, H : Hemicryptophytes, Ge : Geophytes, HH : Hydrophytes, Th : Therophyte.

Regions	No. of species	Percent distribution among life forms Ph	Ch	H	Ge	HH	Th
Normal spectrum	1000	46.00	9.0	26.00	4.0	2.0	13.0
Jaipur	622	18.42	8.7	9.60	5.9	9.3	46.2
South Eastern Rajasthan	1098	24.00	2.8	4.20	3.6	12.4	53.0
Present Study	421	21.80	2.8	4.40	4.0	14.0	53.0

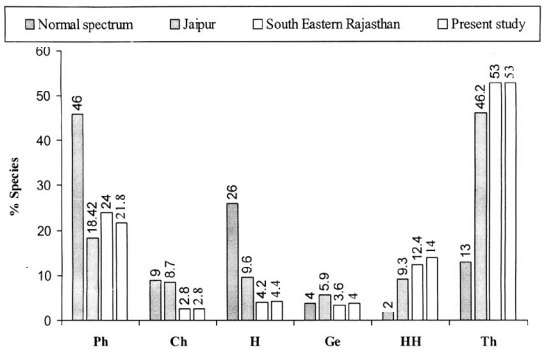

Figure 1. Biological spectrum of select localities.

cular plants, 414 species of angiosperms (366 dicotyledons and 48 monocotyledons) and seven species of pteridophytes, phanerophytes (Ph) occupy 21.80%, chamaephytes (Ch) 2.8%, hemicryptophytes (H) 4.40%, hydrophytes (HH) 14%, geophytes (Ge) 4% and therophytes (Th) 53%. Thus therophytes top the list in view of numerical strength and chamaephytes the bottom. The phytoclimate of the area appears to be thero-phanerophytic. Figure 1 reveals that Phanerophytes, chamaephytes and hemicryptophytes are poorly represented in the present study; geophytes do not show much fluctuation in the area; hydrophytes have a larger percentage in present study as also found earlier (11). therophytes are dominant in the area.

Based on the interpretation of Meher-Homji (12) biological spectrum which indicates the dominance of therophytes can be correlated with the climatic conditions of the area. Therefore the reason for the dominance of therophytes in Kota and its adjoining areas may be attributed to the prevailing semi-arid climate. The higher percentage of hydrophytes is perhaps due to the occurrence of marshland plants which perennate with the help of underground organs and revive soon after the rainy season. Excessively high percentage of therophytes compared to Raunkiaer's normal spectrum that may be due to existence of ephemerals, grasses and other annuals. Comparision of life forms with Jaipur (11) and south eastern Rajasthan (13), reveals that hemicryptophytes are more in Jaipur, while hydrophytes have a higher percentage in the present study and the therophytes are dominant in all the parts of Rajasthan.

Abundance of therophytes indicates dryness of the soil and xeric trend of the phytoclimate. In the study area exotic species like *Parthenium hysterophorus* Linn. (Gajar ghas), *Lantana camara Linn.* and *Croton bonplandianum* Baill and anthropogenically introduced species like *Eucalyptus rudis* Endl. (safeda) and other aveneu trees cause ecological modification of the area.

References

1. Raunkiaer C. 1934. *The life forms of plants and statistical plant geography.* Clarendon Press, Oxford, UK 632 pp.
2. Braun B. 1951. *Phyto-sociological studies of the wall flora of Hugli district. J. Pl. Sociol. (Pflanzen soziologie*). 3 Aufl. Springer Wien. 55—57 pp.
3. Muller D. A. and D. A. Dombois and H. Ellenberg, 1974. *Aims and methods of vegetation ecology.* John Wiley and Sons, New York, USA. 547 pp.
4. Milne L. J. and M. Milne. 1971. *The areana of life, the dynamics of ecology.* Double Day Natural History Press, Garden City, New York, USA.
5. Lemon P. C. 1962. *Field and laboratory guide for ecology.* Burgess, Minn, USA.
6. Rao C. C. 1968. Biological spectrum of Karamnasa watershed flora. *Proc. Sym. Recent Adv. in Trop. Ecol. (Part II),* SITE, BHU, Varanasi, India.
7. Krebs C. J. 1994. *Ecology the experimental analysis of distribution and abundance.*Harper Collins, California, USA.
8. Kotiwar O. S., B. R. Pandit and A. J. Pahurkar. 1996. Life forms and biological spectrum of the flora of Gir forest Gujrat. *Geobios New Rep.* 15 : 17—30.
9. Meher-Homji V. M. 1964. Life forms and biological spectrum as ephormonic criteria of aridity and humidity in the tropics. *J. Ind. Bot. Soc.* 43 : 424—430.
10. Palit D., G. Ganguly and A. Mukherjee. 2002. Ecological studies in Ramanabagan wildlife sanctuary,

Burdwan I. Biological spectrum. *Sci. and Cult.* 68 : 147—149.
11. Sharma S. 1978. Studies in floral composition of Jaipur district, Rajasthan. Ind. *For.* 104 : 1—38.
12. Meher-Homji V. M. 1981. Environmental implication of life forms spectra from India. *J. Econ. Tax. Bot.* 2 : 23—30.
13. Sharma N. K. 2002. *Flora of Rajasthan*.