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Life form and Biological Spectrum of Morni Hills, Panchkula, Haryana

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ABSTRACT: The present paper deals with the different life form categories and biological spectrum of Morni Hills in Panchkula district of Haryana. During field surveys, 950 species of vascular plants were recorded from Morni Hills. It includes Therophytes (29.68%), Phanerophytes (21.89%), Nano-phanerophytes (12.94%), Chamaephytes (10.73%), Lianas (10%), Geophytes (8.32%), Hemicryptophytes (4.94%), Hydrophytes (0.84%) and Epiphytes (0.63%). Biological spectrum has been compared with normal spectrum to know the phytoclimate of this region. After the comparison with normal spectrum the phytoclimate of Morni area is Thero-Geo-Chamae-phytic.

KEYWORDS: Biological spectrum, life-form, Morni Hills, Panchkula, Haryana.

INTRODUCTION

Raunkiaer's (1934) system is the most practical one from ecological point of view to determine life-form. This system is based mainly on one feature namely the protection of the perennating buds of shoot-apices to the unfavourable season. Life-forms are assumed to have evolved in direct response to the environment and accordingly the proportion of life-forms in an area would give a clear indication of its climatic zone. Thus biological spectrum is one of the useful parameter for comparison on a geographical scale and is valuable in expressing the differences and similarities among plant communities (Meher-Homji, 1964). The biological spectrum of different regions in India have been determined by several workers (Meher-Homji, 1964, 1981; Roy & Shukla, 1985; Sinha, 1990; Roy *et al.*, 1992; Kumar & Krishnamurthy, 1993; Pandey & Parmar, 1993; Singh & Arora, 1994; Rana *et al.*, 2002; Joshi, 2010; Sudhakar Reddy *et al.*, 2011; Jakhar, 2015).

The present study was conducted in Morni Hills of Panchkula district, Haryana. Quantitative analysis of forest vegetation and life-form classes of Morni Hills was conducted by Jain, 1979; Jain *et al*., 1982; Jain & Singh, 1984. Rout & Gupta (1989) analyzed forest vegetation of Morni hills in northeast Haryana. Kumar (2001) worked on Flora of Haryana. Kumar & Nagiyan (2006) studied trees and shrubs of Haryana. Negi (2010) studied floristic diversity of Shivalik Hills of Haryana. Singh & Vashistha (2014) investigated the flowering plant diversity and ethnobotany of Morni Hills. Gupta & Kumar (2014) studied vegetation composition and plant biodiversity in forest ecosystems of Shivaliks in Northern Haryana. Further the detailed study of life-form and biological spectrum is not available for this region. The present paper deals to determine the phytoclimatic condition of Morni Hills with the help of biological spectrum.

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STUDY AREA

The Morni sub-division (Morni Hills) (30°55' to 34°45' N latitude and 70°00' to 75°15' E longitude) forms a part of lower Shivalik (from Sanskrit, meaning 'tresses of Lord Shiva') ranges in district Panchkula, Haryana, India. It has an altitude range from 300 to 1400 m above mean sea level. 'Morni village' is almost the central point of Morni range which is 35 km away (by road) from Panchkula and 25 km (by road) from Raipur Rani. The river Ghaggar, the glory of Morni hills, separates Morni sub-division from Pinjore sub-division. It originates from Shivalik hills in Himachal Pradesh and descends down to plains in Panchkula. The summer temperature of Morni range is between 18^0C to 45^0C and during winters is 4^0C to 33^0C. Morni Hills is an ideal place for holidays with its cool climate, peaceful environment and beautiful natural views.

MATERIAL AND METHODS

The study was conducted between January 2017 to January 2018. In the present investigation, Raunkiaer's normal spectrum as modified by Ellenberg and Mueller-Dombois (1974) has been followed. The form, habit, height and nature of perennating buds were carefully noted in the field. All the plants of this area are categorized into following life-form classes.

(a) Phanerophytes (Ph): Plants that grow taller than 2 m or whose shoots do not die back to that height limit in unfavourable

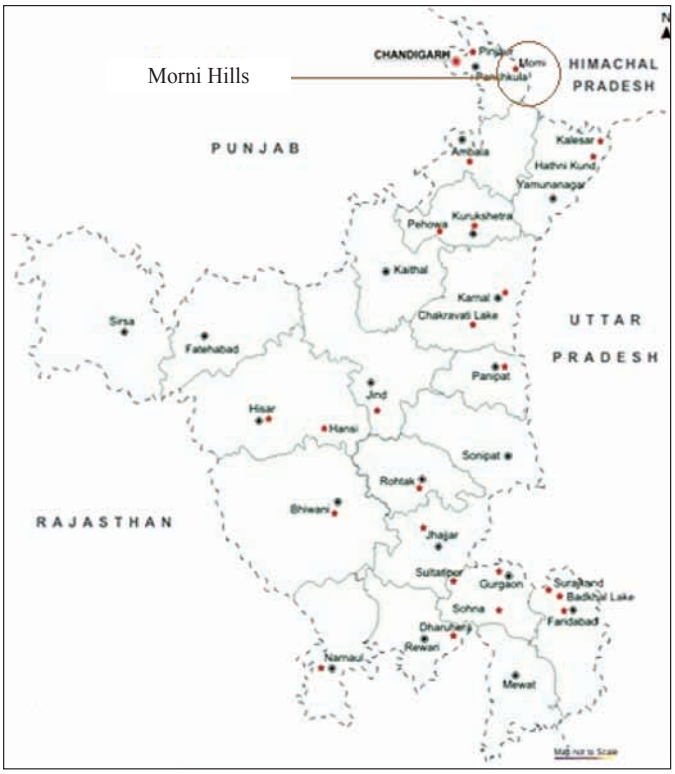

Fig. 1. Map of Haryana showing Study Area (Morni Hill)

period e.g., *Bombax ceiba* L., *Butea monosperma* (Lam.) Taub., etc.

(b) Nano-phanerophytes (N): Plants with vegetative organs less than 2 m above the soil e.g., *Caesalpinia bonduc* (L.) Roxb., *Mimosa himalayana* Gamble, etc.

(c) Chamaephytes (Ch): Plants whose nature shoot system remains perennial within 50 cm above ground surface or if grow taller than 50 cm, then their shoots die back in unfavorable period. This applies mainly to those with erect or ascending shoots e.g., *Cymbopogon martini* (Roxb.) W. Watson

(d) Hemicryptophytes (H): Plants whose periodic shoots reduce to a remnant shoot system that lies relatively flat on the ground surface *e.g., Cynodon dactylon* (L.) Pers., *Oxalis corniculata* L., etc.

(e) Geophytes (G): Plants whose surviving organs are usually well protected in the soil with periodic reduction of the complete shoot system to storage organs. These may be rhizome-geophytes, stem-tuber geophytes, bulb-geophytes or root-bud-geophytes e.g., *Allium cepa* L., *Dioscorea bulbifera* L., *Pueraria tuberosa* (Roxb. ex Willd.) DC., etc. Further these may be classified as **hydrophytes** (**HH**) e.g., *Ceratophyllum demersum* L. or terrestrial e.g., *Ranunculus sceleratus* L.

(f) Therophytes (Th): Annual plants which propagate through seeds and complete their life-cycle within a short period e.g., *Ageratum conyzoides* L., *Stellaria media* (L.) Vill., *Trichodesma indicum* (L.) Lehm., etc.

(g) Lianas (L): Climbing plants e.g., *Bauhinia vahlii* Wight & Arn., *Mucuna monosperma* (Roxb.) DC., etc.

(i) Epiphytes (E): Plants germinate on other plants (including parasites) e.g., *Dendrophthoe falcata* (L. f.) Ettingh, *Rhynchostylis retusa* (L.) Blume, etc.

The percentage life-form was calculated by following formula % Life-Form = Number of Species in any life form classes / Total number of species of all life-form classes x 100

RESULTS AND DISCUSSION

The floristic composition of Morni Hills has been analyzed in terms of biological spectrum for the life form and it is compared with the normal spectrum of Raunkiaer (1934). The total number of species of vascular plants collected from the Morni Hills are 950 with 16 Pteridophytes, 03 Gymnosperms and 931 species of Angiosperms. The representation of various life forms in spectrum are Therophytes (282), Phanerophytes (208), Nano-phanerophytes (123), Chamaephytes (102), Geophytes (79), Hemicryptophytes (47), Lianas (95), Hydrophytes (08) and Epiphytes (06).

From table-1 and fig. 2 & 3 it is clear that therophytes constitute the highest percentage (29.68%) which is more than 2 times

Table-1: Biological spectrum of Morni Hills and comparison with normal spectrum

Life-form categories	Morni Hills		Normal spectrum
	No. of Species	% of Species	% of Species
Phanerophytes	208	21.89%	28
Nano-phanerophytes	123	12.94%	15
Chamaephytes	102	10.73%	9
Hemicryptophytes	47	4.94%	26
Geophytes	79	8.32%	4
Hydrophytes	8	0.84%	2
Therophytes	282	29.68%	13
Lianas / Climber	95	10.00%	-
Epiphytes / Parasite	6	0.63%	3

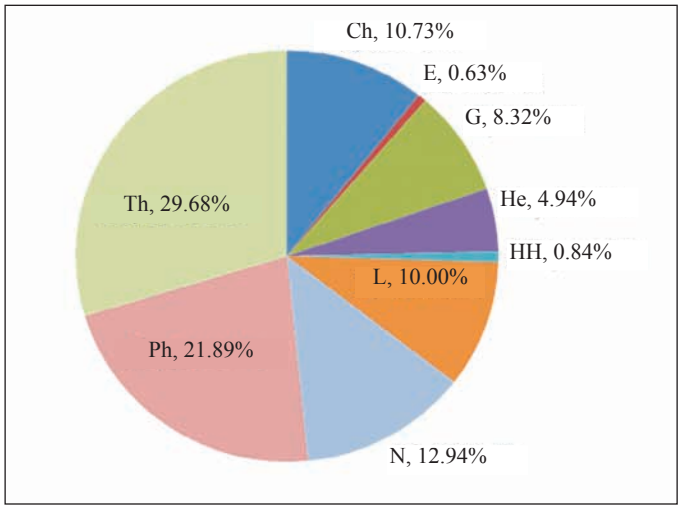

Fig. 2. Biological Spectrum of Morni Hills.

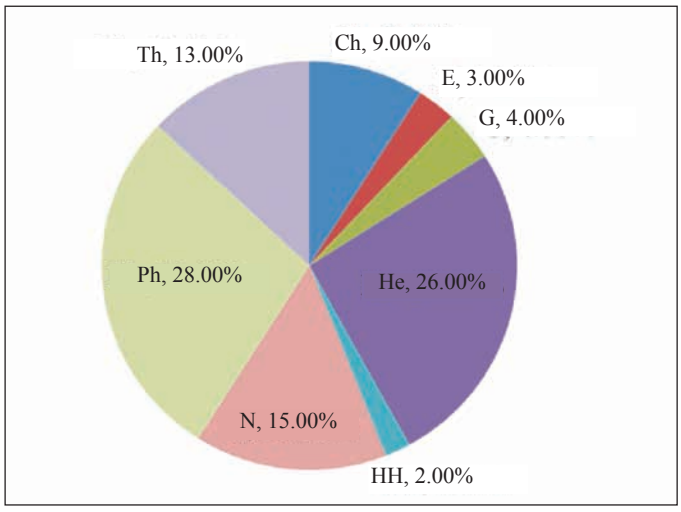

Fig. 3. Raunkiaer's Normal Spectrum.

of normal spectrum. This is natural since annuals with a short span of 2 to 4 months of life cycle are best adopted to evade the unfavourable period as seeds, which are left in the soil. The life forms next in importance are phanerophytes, Chamaephytes and geophytes constituting (21.89%), (10.73%) and (8.32%) respectively. However, the percentage of phanerophytes does not exceed the corresponding percentage in the normal spectrum while percentage of Chamaephytes slightly exceeds and percentage of geophytes 2 times exceeds the corresponding percentage in the normal spectrum. On the basis of life-forms the phytoclimate is Thero-Geo-Chamae-phytic.

Meher-Homji (1964) compared the biological spectrum of various regions of India to bring out the value of life-forms as indicators of degree of aridity and humidity in a tropical country. He found that the phanerophytic plant climate is found in humid regions, therophytic in deserts, thero-Chamaephytes in semi-arid zones. The higher percentage of Chamaephytes and therophytes and lower percentage of phanerophytes and nano-phanerophytes in northern zone indicate the dry nature of this region as compared to its southern part. Jain & Singh (1984) studied the biological spectrum of North-East Haryana and observed that the nano-phanerophytes and hemicryptophytes are poorly found and the phytoclimate is thero-chamae-phytic. They concluded that the dominance of therophytes might have partly resulted from disturbance in vegetation due to heavy grazing and exploitation of forests for extensive cultivation. Joshi (2010) studied life-form and biological spectrum of some forests of Tarai and Bhabhar region of Kumaun, Uttarakhand and found that the phytoclimate is Thero-Crypto-phytic and concluded that it happens due to deforestation and lot of anthropogenic pressure on forests.

High value for therophytes is an indicator of the amount of influence of man and animals (Bharucha & Dave, 1944). According to Cain (1950) overgrazing tends to increase the percentage of therophytes through introduction and spread of weed grasses. Daubenmire (1972) attributed the occurrence of therophytes to aridity factor. Meher-Homji (1964) concluded that the life forms of different regions of the country are reflected by the bioclimate of the area. Pandeya (1964), Yadav & Singh (1977) and Agrawal (1990) attributed the preponderances of therophytes to the influence of heavy grazing or biotic interferences. Singh & Yadava (1974) also found thero-cryptophytic flora in grassland of Kurukshetra, India. According to Pandit (2003), increase in the percentage of therophytes and decrease in that of phanerophytes and hemicryptophytes in the flora of Gir forest was the result of deforestation, intensive utilization of land for cultivation and grazing by livestocks.

CONCLUSION

On the basis of above the biological spectrum of Morni Hills is Thero-Geo-Chamae-phytic. It indicates that the forests are affected by deforestation and excessive anthropogenic activities. So it is necessary to conserve this area and excessive anthropogenic activities should be controlled here.

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