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Life Forms and Biological Spectrum of a Grassland Community of Bangiriposi In Odisha

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ABSTRACT

The life forms and biological spectrum of a grassland community of Bangiriposi (86⁰32'30" E ; 22⁰08'30" N) in the district of Mayurbhanj, Odisha was studied following the principle led down by Raunkiaer [1], Dansereau [2] and Rao [3]. The community comprises of 32 species. They belonged to four different life form classes i.e. Chamaephytes, Hemicryptophytes, Cryptophytes and Therophytes. The community was found to be Chamaephytic. The percentage of Chamaephytes was found to be maximum (46.88%) followed by Therophytes (34.37%), Hemicryptophytes (12.50%) and Cryptophytes (6.25%). The present study exhibited higher percentage of Chamaephytes and Therophytes compared to Raunkiaer's (1934) normal spectrum.

Keywords : Grassland, Community, Life Forms, Biological Spectrum.

I. INTRODUCTION

Grassland plays an important role not only for the survival of animals but also for human beings. Most of the herbivores are directly dependent on grassland where as the carnivorous are indirectly dependent on grassland flora. From the prehistoric times to till date, man has been dependent on the grasses for food, shelter and unani medicine. Plant life forms or growth forms is the sum of all life process in response to their environment and is regarded as an important part of vegetation description, ranking next to floristic composition. Raunkiaer [1] proposed the term "Biological spectrum" to express both the life forms distribution of a flora and the phytoclimate under which the prevailing life forms evolved. The biological spectrum is useful as an index for determining the status of a community. When worked out on periodic intervals, biological spectrum may set as guidelines for eco-restoration and optimization of a community. Literature review reveals a lot of information on studies of various grassland communities by Rao [3], Singh & Ambasht [4], Misra & Misra [5], Malana & Misra [6], Rath & Misra [7], Naik [8], Misra [9], Behera & Misra [10], Patnaik [11], Pradhan [12], Barik & Misra [13], Batalha & Martins [14] and many others. However, very little work has been made so far on the life forms and biological spectrum of a grassland community of Mayurbhanj district in the state of Odisha.

1.1 Aim of the Study

The aim of this investigation is to study the life forms and biological spectrum of a grassland community of Bangiriposi in the district of Mayurbhanj, Odisha.

1.2 Study site and environment

The experimental grassland community was selected at Silpunji (86⁰32'30" E ; 22⁰08'30" N) Bangiriposi, in the district of Mayurbhanj, Odisha. The site is

situated at a distance of 40 kms. away from North Orissa University and 36 kms. from Baripada, the district head quarter of Mayurbhanj in the state of Odisha. The altitude of the site is above 104.6m.

The soil of the experimental site was found to be strongly acidic (pH < 5.0). The available phosphorus and potassium content of the soil was found to be very low. The organic carbon (%) as well showed very low in concentration (0.38% to 0.47%).

The climatic condition of the locality is monsoonal with three distinct seasons i.e. rainy (July to October), winter (November to February) and summer (March to June). The seasons are classified basing upon the amount of rainfall and also to the prevailing atmospheric temperature. The total rainfall during the study period was found to be 2537.1 mm of which a maximum of 634.6 mm was recorded during July. No rainfall was observed in the month of December. Total number of rainy days was found to be 114 days. The mean minimum and mean maximum atmospheric temperature recorded during the study period was found to be normal. December showed the lowest temperature (11.53^{0}C) whereas May experienced the highest temperature (37.35^{0}C) during the study period [15].

II. METHODS AND MATERIAL

All the plant specimens observed in the experimental grassland community were collected in flowering / fruiting stage and identified taxonomically with the help of floras i.e. Hooker [16], Haines [17], Mooney [18], Saxena & Brahmam [19], Panigrahi & Murti [20], Murti & Panigrahi [21], Verma **et al**. [22], Mudgal **et al**. [23] and Singh **et al**. [24] and herbarium specimens were prepared with standard methodology Jain & Rao [25]. The various life-form classes were analysed as per Raunkiaer's [1] system which was subsequently modified by Dansereau [2] and Rao [3]. This was based on the positions of the regenerating parts of the plants encountered during the study period and incorporated in this investigation.

III. RESULTS AND DISCUSSION

Table -1 shows the life form classes of the experimental grassland community. The community comprised of 32 species. Out of 32 species, 15 species belonged to the class Chamaephytes (*Centranthera indica, Desmodium triflorum, Euphorbia hirta, Evolvulus nummularius, Hedyotis herbacea, Hedyotis pinifolia, Hybanthus enneaspermus, Lindernia anagallis, Lindernia antipoda, Lindernia multiflra, Lindernia nummularifolia, Lindernia parviflora, Mollugo pentaphylla, Sacciolepsis indica, Spermacoce ramanii*), 4 species to Hemicryptophytes (*Chrysopogon aciculatus, Cynodon dactylon, Elephantopus scaber, Heteropogon contortus*), 2 species to Cryptophytes / Geophytes (*Fimbristylis acuminata, Fimbristylis dichotoma*) and 11 species to Therophytes (*Eragrostis tenella, Eragrostis unioloides, Indigofera linnaei, Justicia diffusa, Murdannia nudiflora, Peroties indica, Phyllanthus amarus, Phyllanthus virgatus, Rotala indica, Sporobous indicus, Vernonia cinerea*). Phanerophytes were found to be absent.

Table – 1 Life forms classes of the experimental grassland community

Life- form classes	Sl. No.	Name of the Species
Chamaephytes	1	*Centranthera Indica*
	2	*Desmodium triflorum*
	3	*Euphorbia hirta*
	4	*Evolvulus nummularius*
	5	*Hedyotis herbacea*
	6	*Hedyotis pinifolia*

	7	*Hybanthus enneaspermus*
	8	*Lindernia anagallis*
	9	*Lindernia antipoda*
	10	*Lindernia multiflra*
	11	*Lindernia nummularifolia*
	12	*Lindernia parviflora*
	13	*Mollugo pentaphylla*
	14	*Sacciolepsis indica*
	15	*Spermacoce ramanii*
Hemicryptophytes	1	*Chrysopogon aciculatus*
	2	*Cynodon dactylon*
	3	*Elephantopus scarber*
	4	*Heteropogon contortus*
Cryptophytes / Geophytes	1	*Fimbristylis acuminata*
	2	*Fimbristylis dichotoma*
Therophytes	1	*Eragrostis tenella*
	2	*Eragrpstis unioloides*
	3	*Indigorera linnaei*
	4	*Justicia diffusa*
	5	*Murdannia nudiflora*
	6	*Peroties indica*
	7	*Phyllanthus viratus*
	8	*Phyllanthus virgatus*
	9	*Rotala indica*
	10	*Sporobous indicus*
	11	*Vernonia cinerea*

The community was found to be Chamaephytic. Based on percentage contribution, the community exhibited 46.88% of Chamaephytes, 12.50% of Hemicryptophytes, 6.25% of Cryptophytes and 34.37% of Therophytes. Species association studied in grasslands of Varanasi by Singh and Ambasht [4], Berhampur by Barik and Misra [13] did not show any phanerophtic species. In this study also no phanerophytic species was observed. A higher percentage of phanerophtic species was reported by Batalha & Martines [14] while working on Cerrdo site of Brazil and by Rao [3] on grassland of Varanasi in India. Maximum therophytic percentage contribution was reported by Rao [3], Singh and Ambasht [4] while working on the grasslands of Varanasi, Misra and Misra [5], Malana and Misra [6], Rath and Misra [7], Barik and Misra [13] on the grasslands of Berhampur, Naik [8] on western Orissa, Pattnaik [11] on South Orissa, Behera and Misra [10] on Phulbani and Pradhan [12] on the grassland of Bhubaneswar. However, in this grassland community the greater percentage of Chamaephytes and absence of Phanerophytes may be due to the influence of periodicity of soil characteristic, climatic condition as well as biotic interference. Since the experimental grassland was well protected, grazing was not possible. However there was no such restriction before one year of experiment. Present findings when compared with normal biological spectrum of Raunkiaer [1] showed the percentage of Chamaephytes to be near about 5.21 times higher than that reflected in the normal spectrum, 1.04 times higher in case of Cryptophytes and 2.64 times higher in case of Therophytes where as the parentage of Hemicryptophytes was nearly 2.08 time less than the normal spectrum (Table-2).

Table - 2. Biological spectra of some Indian grassland communities in Comparison to Raunkiaer's (1934) normal spectrum

Authors	Region	Pha%	Cha%	Hem%	Cry%	The%
Raunkiaer's (1934) normal spectrum		46.00	9.00	26.00	6.00	13.00
Rao (1968)	Varanasi	40.00	6.00	1.00	10.00	43.00
Singh & Ambasht (1975)	Varanasi	--	4.20	19.20	6.30	70.20
Misra & Misra (1979)	Berhampur	5.70	25.70	14.30	5.70	48.60
Malana & Misra (1980)	Berhampur	10.00	26.66	23.33	3.33	36.33
Rath & Misra (1980)	Berhampur	5.40	21.60	18.90	2.70	51.30
Naik (1985)	Western Orissa	3.00	21.20	18.20	6.00	51.50
Patnaik (1993)	South Orissa	3.58	17.86	25.00	10.71	42.86
Behera & Misra (1993)	Phulbani	5.71	20.00	11.42	8.57	54.28
Pradhan (1994)	Bhubaneswar	5.88	29.42	11.76	5.88	47..05
Barik & Misra (1998)	Berhampur	--	25.81	12.90	9.68	51.61
Batalha & Martins (2002)	Cerrado site brazil	66.75	11.50	18.58	1.77	1.77
Present study	Bangiriposi	--	46.88	12.50	6.25	34.37

Pha - Phanerophytes, Cha - Chamaephytes, Hem - Hemicryptophytes, Cry - Cryptophytes, The - Therophytes.

IV. CONCLUSION

The life forms and biological spectrum of a grassland community varies from place to place and from time to time might be due to the variability in climatic condition, topography, physic-chemical characteristic of soil and biotic interference of the locality.

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