LITTER BIOMASS OF A GRASSLAND COMMUNITY OF BANGIRIPOSI IN ODISHA

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ABSTRACT

The litter biomass of a grassland community of Bangiriposi ($86^0 32'30'' E$; $22^0 08'30'' N$) in the district of Mayurbhanj, Odisha was studied following "short term harvest method" of Odum [1]. The value exhibited an increasing trend from January to May and showed maximum in the month of June (98.44 g m^{-2}). Thereafter, a gradual decrease in litter biomass value was observed till the end of the sampling period with a very little fluctuation in the month of October. A minimum of 42.64 g m^{-2} of litter biomass was observed at the beginning of the sampling period i.e. in the month of January. The mean litter biomass of the community, when compared to other grassland communities of different climatic regions showed somehow similarities with the grasslands of Varanasi and Berhampur as reported by Singh & Ambasht[2] and Barik[3] respectively. The biomass value of a community may vary from place to place and from time to time due to the variation in topography, geographical distribution, climatic conditions, soil characteristics and biotic interference of the locality.

Key words: Grassland, community, biomass, litter.

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. The knowledge about the litter biomass of various plant species is essential for analysis of functional aspects of a community. Literature review reveals a lot of work on litter biomass of different herbaceous communities by Odum[1], Singh and Ambasht[2], Barik[3], Ovington **et al.**[4], Wiegert & Evans[5], Golley[6], Kelley **et al.**[7], Choudhury[8], Misra[9], Mall & Billore[10], Jain[11], Trivedi & Misra[12], Rath[13], Malana & Misra[14], Misra & Misr[15], Naik[16], Patnaik[17], Pradhan[18], Behera[19] and many others. However, very little work has been made so far on the litter biomass 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 litter biomass 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 ($86^0$32'30'' E ; $22^0$08'30'' 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 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 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 (11.53^0C) whereas May experienced the highest temperature (37.35^0C) during the study period.

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 (%) also showed very low in concentration[20].

II. MATERIALS AND METHODS

For the determination of various compartmental biomass values "short term harvest method" of Odum [1] was employed. 10 quadrates of 50cm x 50cm size were randomly harvested / clipped, 1cm above the ground during the last week of each month. The dead leaves, stems, seeds, flowers etc. lying on the ground were picked from each quadrate. Utmost care was taken not to leave any live samples (grasses and non grasses together), standing dead, ground litter and below ground parts in the experimental site. All samples were packed in sampling bags separately, labeled and brought to the laboratory. These were properly washed and spread on the blotting paper. The plants were then separated compartment wise (i.e. live green, standing dead, litter and below ground parts) and quadrate wise. All these plant materials were labeled and dried in open and then transferred to the oven for drying at 80^0C for 48 hours, weighted and expressed as g m^{-2}.

III. RESULTS AND DISCUSSION

Fig - 1 reveals the monthly variation in litter biomass of the experimental site. It was observed that, the litter biomass of the community gradually increased from January to June. Onwards, the value showed a decreasing trend till the end of the sampling period with a very little fluctuation in the month of October. The community exhibited a maximum of 98.44 g m^{-2} litter biomass value during June and a minimum of 42.64 g m^{-2} at the beginning of sampling period i.e. in the month of January. Increase in litter biomass from January to June might be due to conducive climatic condition of the locality. The amount of precipitation, water holiday capacity of the soil, soil porosity, presence of soil microbes, relative humanity and atmospheric temperature were perhaps not in favour of litter. As a result, a gradual decrease in standing dead biomass was observed from June to January.

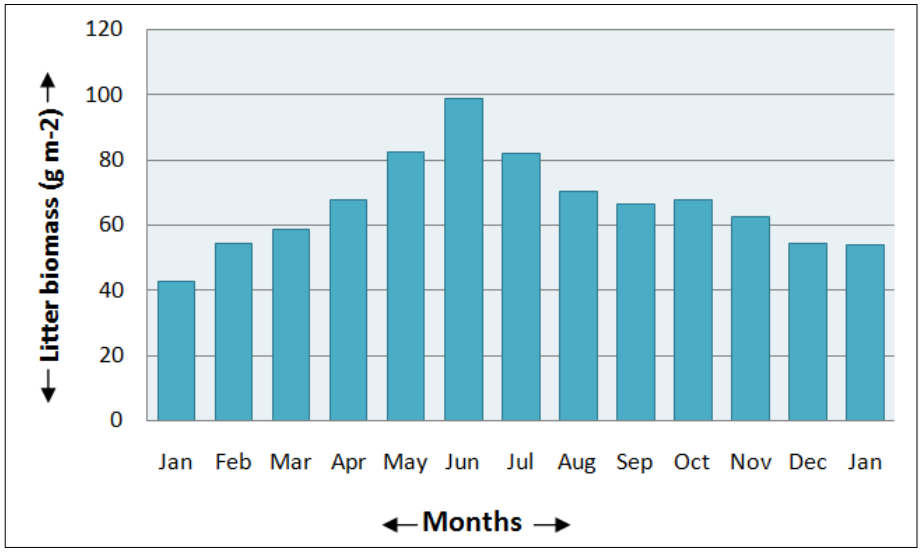

Fig -1 Monthly variations in litter biomass value (g m^{-2}) of experimental grassland community during the study period.

Table-1 shows the mean litter biomass of different herbaceous communities. On comparison, the mean litter biomass value of the present community was found to be less than the values reported by Odum[1], Ovington **et al.**[4], Wiegert & Evans[5], Golley[6], Kelley **et al.**[7], Choudhury[8], Misra[9], Mall & Billore[10], Jain[11] and Pradhan[18] whereas higher than that reported by Trivedi & Misra[12], Rath[13], Malana & Misra[14], Misra & Misra[15], Naik[16], Patnaik[17] and Behera[19]. Moreover, the mean litter biomass value of the present finding showed similarities with the grasslands of Varanasi and Berhampur as reported by Singh & Ambasht[2]and Barik[3]respectively.

Table - 1. Mean litter biomass (g m^{-2}) of different herbaceous communities.

Author (s)	Location	Type of community (dominated)	Mean litter biomass
Odum (1960)	South Carolina	Forb	300
Ovington **et al.** (1963)	Minnesota	*Prairie*	279
Wiegert & Evans (1964)	Michigan	Poa, Upland	202
Golley (1965)	South Carolina	*Andropogon*	250
Kelly **et al.** (1969)	Tennessee	*Andropogon*	181
Choudhury (1972)	Varanasi	*Dichanthium*	098
Misra (1973)	Ujjain	*Dichanthium*	225
Mall & Billore (1974)	Ratlam	*Sehima*	168
Singh & Ambasht (1975)	Varanasi	*Heteropogon*	065
Jain (1976)	Sagar	*Heteropogon*	266
Trivedi & Misra (1979)	Jhansi	*Sehima*	044

Rath (1980)	Berhampur	*Aristida*	055
Malana & Misra (1982)	Berhampur	*Aristida*	051
Misra & Misra (1984)	Berhampur	*Aristida*	057
Naik (1985)	Rourkela	Mixed type	055
Patnaik (1993)	South Orissa	*Heteropogon*	062
Pradhan (1994)	Bhubaneswar	*Aristida*	131
Behera (1994)	Phulbani	*Heteropogon*	049
Barik (2006)	Berhampur	*Aristida*	065
Present study	Bangiriposi	*Cynodon*	066

IV. CONCLUSION

The litter biomass of a grassland community varies from place to place and from time to time. It might be due to the variation in topography, geographical distribution, climatic condition, physic-chemical characteristic of soil, soil microbes, species compassion and biotic interference of the locality.

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