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LITTER BIOMASS OF A GRASSLAND COMMUNITY OF KAPTIPADA FOREST RANGE OF MAYURBHANJ DISTRICT IN ODISHA, INDIA

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ABSTRACT

The litter biomass of a grassland community of Kaptipada forest range (21^0 51' N; 86^0 53'E) in Odisha was carried out following "short term harvest method" of Odum [1]. The litter biomass values of the experimental site showed an increasing trend from July to April and then attend a peak in the month of May (70 g m^{-2}). Thereafter, a gradual decrease in value was observed till the end of the sampling period (18.34 g m^{-2}). The mean litter biomass of the community was found to be 35.55 g m^{-2}. The mean litter biomass value of the present study, when compared to other grassland communities, the value did not show similarity. This variation in litter biomass value might be due to the variation in topography, species composition, climatic conditions, soil characteristics and the biotic interference of the locality.

Key Words: Grassland, Community, Biomass, Litter.

I. INTRODUCTION

Grassland plays an important role for overall growth and development of herbivores. Besides, from the prehistoric times to till date, man has been dependent on the grasses for food, shelter and unani medicine. The knowledge about the various compartmental biomass (i.e. live green, standing dead, litter and below ground) of a community is essential for analysis of functional aspects of a community. Literature review reveals a lot of information on litter biomass of different herbaceous communities at various climatic regions by Odum [1], Ovington **et al**. [2], Wiegert & Evans [3], Golley [4], Kelly **et al**. [5], Choudhury [6], Misra [7], Mall & Billore [8], Singh & Ambasht [9], Jain [10], Trivedi & Misra [11], Rath [12], Malana & Misra [13], Misra & Misra [14], Naik [15], Patnaik [16], Pradhan [17], Behera [18], Pucheta **et al.** [19], Barik [20], Kar [21], Chawpattanayak & Barik [22], Rout & Barik [23], Das & Barik [24] and many others. However, very little work has been made so far on the litter biomass of a grassland community especially in the forest belt of Odisha.

1.1 Aim of the Study

The aim of this investigation is to study the litter biomass of a grassland community of Kaptipada forest range of Mayurbhanj district in Odisha.

1.2 Study Site and Environment

The experimental site was selected at Kaptipada forest range (21° 51' N and 86° 53'E), situated at a distance of 56 kms away from North Orissa University and 52 kms from Baripada, the District headquarter of Mayurbhanj in the state of Odisha. The altitude of the site is above 135.7m. The experimental site was protected from grazing and human interferences for a period of one year prior to start of this investigation. The climate of the locality is monsoonal with three distinct seasons viz. rainy (July to October), winter (November to February) and summer (March to June). The total rainfall during the study period was 1389.4 mm of which a maximum of 289.6 mm was recorded during July. The mean minimum and mean maximum atmospheric temperature was found to be normal. January showed the lowest temperature (13.37°C) whereas April experienced the highest temperature (41.21°C). The soil of the experimental site was found to be almost neutral. The available phosphorus content was high in upper soil and minimum in lower soil profile. The available potassium content was high in middle soil and minimum in lower soil profile. The organic carbon content of soil was found to be very low [25].

II. MATERIALS AND METHODS

Harvest method of Odum[1] was employed for the estimation of various compartmental biomasses. 10 quadrats of 50cm x 50cm size were randomly harvested / clipped, 1cm above the ground during the last week of each month. The samples were packed in polythene bags separately. The dead leaves, stems, seeds, flowers etc. lying on the ground, known as litter, were handpicked from each clipped plot, bagged and labelled. Roots including the remaining shoot bases were collected by excavating 25cm x 25cm monolith to a depth of 30cm at the centre of each clipped plot. All these samples were labelled properly and brought to the laboratory. All green plant materials were separated and are referred as live green compartment. All yellow / yellowish brown dry plant materials known as standing dead were separated from the mother plant. The below ground portion containing root, rootstocks, rhizomes etc. were washed with low pressure tap water. Care was taken not to leave any plant material escape during processing. All these plant materials i.e. live green, standing dead, litter and below ground compartments were first dried in open and then transferred to an oven for drying at 80 ^{0}C for 24 hours and weighed. The biomass values were expressed as g m^{-2}.

III. RESULTS AND DISCUSSION

Fig - 1 shows the monthly variation in litter biomass of the experimental site. It was observed that, the litter biomass of the community gradually increased from July to April and then peaked in the month of May. Onwards, the value showed a decreasing trend and lowest during the last sampling period. A maximum of 70 g m^{-2} and a minimum of

18.34 g m^{-2} of litter biomass value were observed during May and July respectively. The precipitation, atmospheric temperature and relative humidity of the locality perhaps responsible for conversion of standing dead parts to litter component as a result from July to May a gradual increase in litter biomass value was observed. Thereafter the value showed a decreasing trend, till to the end of the sampling period might be due to adverse climatic condition which initiates litter decomposition in the community.

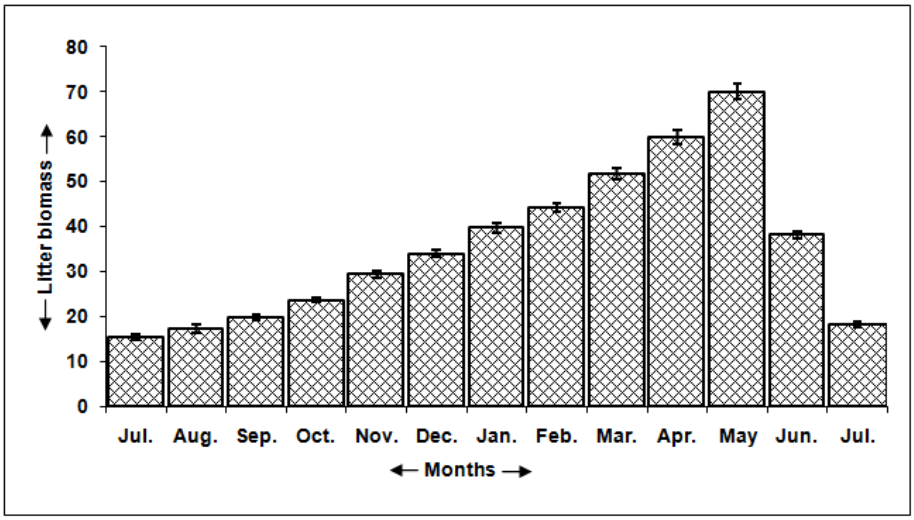

Fig -1 Monthly variation in litter biomass value (g m^{-2}) of experimental grassland community during the study period (values are Mean ± SD, n=5 each).

Table-1 reveals the mean litter biomass of different herbaceous communities. On comparison the mean litter biomass of the present community did not show similarity with the others. The value was found to be less than the values reported by most of the workers i.e. Odum [1], Ovington **et al**. [2], Wiegert & Evans [3], Golley [4], Kelly **et al**. [5], Choudhury [6], Misra [7], Mall & Billore [8], Singh & Ambasht [9], Jain [10], Trivedi & Misra [11], Rath [12], Malana & Misra [13], Misra & Misra [14], Naik [15], Patnaik [16], Pradhan [17], Behera [18], Pucheta **et al.** [19], Barik [20], Kar [21], Chawpattanayak & Barik [22], Rout & Barik [23]and Das & Barik [24].

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
Pucheta **et al.** (2004)	Argentina	*Deyeuxia*	157
Barik (2006)	Berhampur	*Aristida*	065
Kar (2012)	Rangamatia	Mixed type	068
Chawpattanayak & Barik (2013)	Rairangpur	*Chrysopogon*	037
Rout & Barik (2013)	Bangiriposi	*Cynodon*	066
Dash & Barik (2015)	Jharpokharia	*Chrysopogon*	064
Present study	Kaptipada	Mixed type	035

IV. CONCLUSION

The litter biomass value of the experimental grassland community of Kaptipada forest range of Odisha did not show similarity with other grassland communities of different location. This variation in litter biomass perhaps due to the influence of topography, soil characteristic, rate of de composition, wind velocity, precipitation, atmospheric temperature, relative humidity and biotic interference of the locality.

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