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Study of Litter Biomass of a Grassland Community of Similipal Biosphere Reserve, Odisha

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ABSTRACT

The litter biomass of a grassland community in Podadiha Forest Block (86° 27' E ; 21° 33' N) of Similipal Biosphere Reserve was studied from July 2015 to July 2016. Short term harvest method of Odum (1) was employed for the determination of various compartmental biomass values. The litter biomass of the community exhibited a gradual increase in biomass value from August to March and attends a peak during April. Thereafter, the value started a decreasing trend till the end of the sampling period. A minimum of 12.20 g m^{-2} and a maximum of 24.62 g m^{-2} of litter biomass value were observed during the month of August and April respectively. The mean litter biomass of the community was found to be 18.06 g m^{-2}. Compared to other grassland communities, the mean litter biomass value of the community did not show any similarity with the value of others. This variation is litter biomass might be due to the variation in climatic condition, topography, soil characteristics, microbial activities in the soil and the biotic interference of the locality.

Keywords : Biomass, Litter, Grassland, Community.

I. INTRODUCTION

The quantity of organic material (stored) of a given area in a community is the biomass of that area and when it is referred to a particular time, it is known as "standing crop biomass". Biomass can be represented more appropriately in term of dry weight. Literature review reveals a lot of work on litter biomass of different 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 done particularly in northern region of the state. Therefore, in this investigation an attempt has been made to study the litter biomass of a grassland community of Smilipal Biosphere Reserve in the state of Odisha.

1.1 Study Site and Environment

The experimental grassland was selected at Podadiha forest block (86° 27' E ; 21° 33' N) of Similipal Biosphere Reserve, situated at an elevation of 115.9m above the mean sea level. The climate of the locality is predominantly monsoonal with three distinct seasons i.e rainy (July to October), winter (November to February) and summer (March to June). 1389.4 mm of rainfall was recorded during the study period i.e. from July 2015 to July 2016. No rainfall was observed during the month of November. The monthly mean minimum and mean maximum atmospheric

temperature was found to be normal. The soil of the experimental site was found to be acidic (pH = 4.9). The available phosphorus as well as the organic carbon content of soil was very low. The available potassium content of the soil was found to be maximum in the middle soil and minimum in the lower soil profile (25).

II. MATERIALS AND METHODS

For the determination of various compartmental biomass values "short term harvest method" of Odum (1) was employed. 5 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, bagged and labeled separately. The live samples (grasses and non grasses together) along with the standing dead parts were collected and 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, 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 litter biomass of the experimental grassland community. The community exhibited an increasing trend of litter biomass value from August to March and then attends a peak during April (24.62 g m^{-2}). Thereafter, the value showed a gradual decrease in trend till the end of the sampling period. A minimum of 12.20 g m^{-2} of litter biomass value was observed in the month of August. The gradual increase in value from August to April might be due to drying of green foliage. The rainfall, atmospheric temperature, relative humidity and wind velocity perhaps fasten the process of decomposition, as a result the value decreased gradually from April to last sampling period. The mean litter biomass value of the community was found to be 18.06 g m^{-2}.

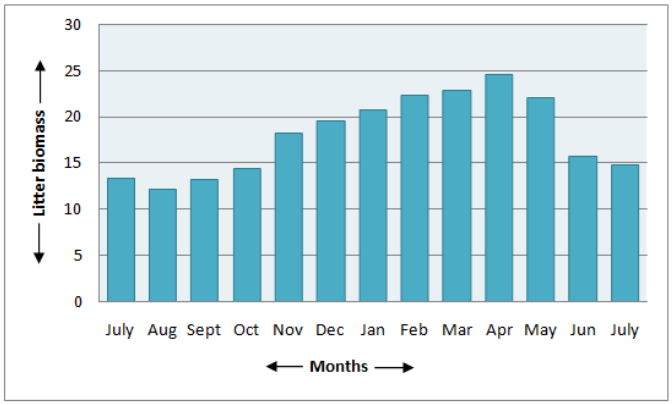

Figure 1. Monthly variation in litter biomass (g m^{-2}) of the experimental site (n = 5 each).

On comparison, the mean litter biomass of the present community did not show similarity with the others (Table - 1). The value was found to be less than most of the values reported 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) 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	Podadiha	*Cynodon*	018

IV. CONCLUSION

The litter biomass of a grassland community varies from place to place and from time to time might be due to the variation in climatic condition, topography, soil characteristics and biotic interference of the locality.

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