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Standing Dead Biomass of a Grassland Community of Kaptipada Forest Range of Mayurbhanj District in Odisha, India

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ABSTRACT

The standing dead 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 standing dead biomass values of the experimental site exhibited an increasing trend from July to December and then attend a peak in the month of January (78.64 g m^{-2}). Thereafter, a decreasing trend in value was observed and showed a minimum of 3.44 g m^{-2} during June. Onwards, the value again showed increasing at the end of the sampling period. The mean standing dead biomass of the community was found to be 37.31 g m^{-2}. The mean standing dead biomass value of the community, when compared to other grassland communities, present findings did not show similarity. This variation in standing dead biomass value might be due to the variation in topography, species composition, climatic conditions, soil characteristics and the biotic interference of the locality.

Keywords: Grassland, Community, Biomass, Standing dead.

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 standing dead biomass of different herbaceous communities at various climatic regions by Odum (1), Golley (2), Kelly **et al.** (3), Choudhury (4), Misra (5), Mall & Billore (6), Jain (7), Trivedi & Misra (8), Rath (9), Malana & Misra (10), Misra & Misra (11), Naik (12), Patnaik (13), Pradhan (14), Behera (15), Pucheta **et al.** (16), Barik (17), Kar (18), Chawpattanayak & Barik (19), Rout & Barik (20), Dash & Barik (21)and many others. However, very little work has been made so far on the standing dead 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 standing dead 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 (22).

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

Figure 1 shows the monthly variation in standing dead biomass of the experimental site. It was observed that, the standing dead biomass of the community gradually increased from July to December and then peaked in the month of January. Then, the value exhibited a decreasing trend and lowest during June. Again an increase in value was observed at the end of sampling period. A maximum of 78.64 g m^{-2} and a minimum of 3.44 g m^{-2} of standing dead biomass value were observed during January and June respectively. The precipitation, atmospheric temperature and relative humidity of the locality perhaps initiate the drying of green foliage, as a result from July to January and June to last sampling period, gradual increase in standing dead biomass value was observed. From January to June the value showed a decreasing trend, might be due to adverse climatic condition which initiates transfer of standing dead to litter compartment in the community.

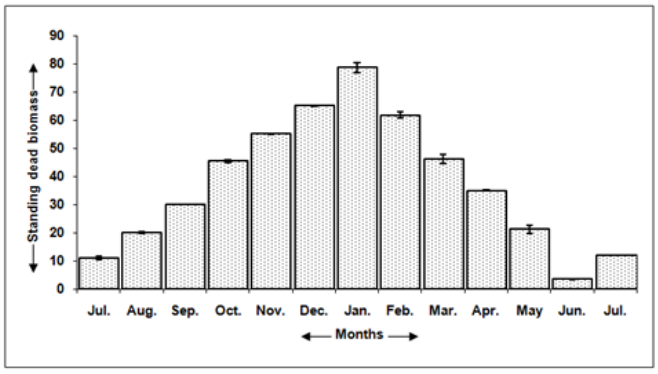

Figure 1. Monthly variation in standing dead biomass value (g m^{-2}) of experimental grassland community during the study period (values are Mean ± SD, n=5 each).

Table-1 reveals the mean standing dead biomass of different herbaceous communities. On comparison, the mean standing dead 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. Golley (2), Kelly

et al. (3) Choudhury (4), Misra (5), Mall & Billore (6), Jain (7), Trivedi & Misra (8), Rath (9), Malana & Misra (10), Misra & Misra (11), Naik (12), Patnaik (13), Pradhan (14), Behera (15), Pucheta **et al**. (16), Barik (17), Kar (18), Chawpattanayak & Barik (19), Rout & Barik (20) and Dash & Barik (21).

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

Author (s)	Location	Type of community (dominated)	Mean standing dead biomass
Golley (1965)	South Carolina	*Andropogon*	335
Kelly **et al.** (1969)	Tennessee	*Andropogon*	650
Choudhury (1972)	Varanasi	*Dichanthium*	129
Misra (1973)	Ujjain	*Dichanthium*	164
Mall & Billore (1974)	Ratlam	*Sehima*	190
Jain (1976)	Sagar	*Heteropogon*	338
Trivedi & Misra (1979)	Jhansi	*Sehima*	104
Rath (1980)	Berhampur	*Aristida*	124
Malana & Misra (1982)	Berhampur	*Aristida*	184
Misra & Misra (1984)	Berhampur	*Aristida*	232
Naik (1985)	Rourkela	Mixed type	267
Patnaik (1993)	South Orissa	*Heteropogon*	073
Pradhan (1994)	Bhubaneswar	*Aristida*	279
Behera (1994)	Phulbani	*Heteropogon*	179
Pucheta **et al. (** 2004*)*	Argentina	*Deyeuxia*	157
Barik (2006)	Berhampur	*Aristida*	272
Kar (2012)	Rangamatia	Mixed type	95
Chawpattanayak & Barik (2013)	Rairangpur	*Chrysopogon*	199
Rout & Barik (2014)	Bangiriposi	*Cynodon*	310
Dash &Barik (2015)	Jharpokharia	*Chrysopogon*	270
Present Study	Kaptipada	Mixed type	37

IV. CONCLUSION

The standing dead 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 standing dead biomass perhaps due to the influence of topography, soil characteristic, species composition, biotic interference and climatic condition of the locality.

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