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Study of Standing Dead Biomass of a Grassland Community of Similipal Biosphere Reserve, Odisha

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ABSTRACT

The standing dead 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 standing dead biomass of the community exhibited a gradual increase in biomass value from July to March and attends a peak during April (142.88 g m^{-2}). Thereafter, the value started a decreasing trend till the end of the sampling period. A minimum of 12.97 g m^{-2} of dead biomass was observed at the beginning of sampling period (i.e. July). The mean standing dead biomass of the community was found to be 58.41 g m^{-2}. Compared to other grassland communities, the mean value of the standing dead biomass did not show similarity with the value of others. This variation is standing dead biomass might be due to the variability in climatic condition, topography, soil characteristics, microbial activities in the soil and the biotic interference of the locality.

Keywords : Biomass, Standing Dead, Grassland, Community

I. INTRODUCTION

A 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 standing dead biomass of different 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), Fiala (18), Kar (19), Chawpattanayak & Barik (20), Rout & Barik (21), Dash & Barik (22) 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 standing dead 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 (23).

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 standing dead biomass of the experimental grassland community. The community showed an increasing trend of standing dead biomass value from July to March and then attends a peak during April. Thereafter, the value exhibited gradual decrease in trend till the end of the sampling period (i.e. July). A minimum of 12.97g m^{-2} and a maximum of 142.88 g m^{-2} of standing dead biomass value were observed in the month of July and April respectively.. The gradual increase in value from July to April might be due to drying of green foliage. The rainfall, atmospheric temperature, relative humidity and wind velocity perhaps transfer the standing dead parts of the plants into ground litter, as a result the value decreased gradually from April to last sampling period. The mean standing dead biomass value of the community was found to be 58.41 g m^{-2}.

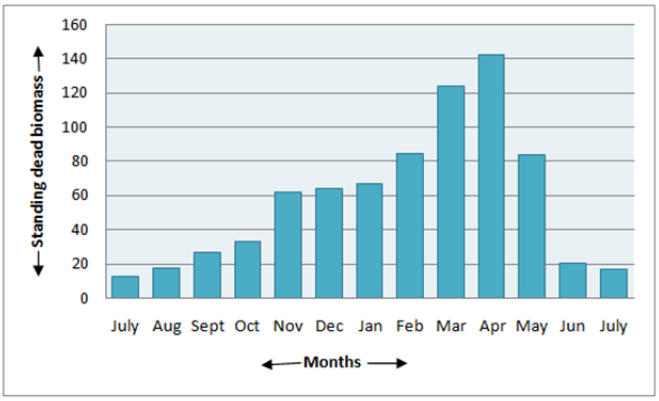

Fig. - 1. Monthly variation in standing dead biomass (g m^{-2}) of the experimental site (n = 5 each).

On comparison, the mean standing dead biomass of the present community did not show similarity with the others (Table – 1). The value was found to be less than the values reported by 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), Fiala (18), Kar (19), Chawpattanayak & Barik (20), Rout & Barik (21), Dash & Barik (22).

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
Fiala (2010)	USA	Meadow	3600
Kar (2012)	Rangamatia	*Mixedtype*	95
Chawpattanayak & Barik (2013)	Rairangpur	*Chrysopogon*	199
Rout & Barik (2014)	Bangiriposi	*Cynodon*	310
Dash & Barik (2015)	Jharpokharia	*Chrysopogon*	270
Present study	Podadiha	*Cynodon*	58

IV. CONCLUSION

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

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