

Below Ground Biomass of a Grassland Community of Rairangpur in the District of Mayurbhanj, Odisha

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ABSTRACT

The below ground biomass of a grassland community of Rairangpur (86° 11' 45" E ; 22° 16' 45" N) in the district of Mayurbhanj, Odisha was studied following "Short term harvest method" as proposed by Odum [1]. The below ground biomass value of the experimental site was found to be maximum in the month of April (615.73 g m⁻²) and minimum in the month of August (406.82 g m⁻²). The below ground biomass of the community exhibited an increasing trend from January to April. Thereafter, the value showed a gradual decrease in trend till August. Again, an increasing trend in below ground biomass value was observed from August till the end of the sampling period. Compared to other grassland community, the mean below ground biomass value of the present study did not show similarity. This might be due to the variation in topography, geographical distribution, species composition, climatic conditions, and soil characteristics, rate of decomposition and biotic interference of the locality.

Keywords: Grassland, Community, Biomass, Below Ground

I. INTRODUCTION

The quantity of organic matter accumulated in a given area of 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 below ground biomass in different communities by Odum [1] Ovington *et al.* [2], Wiegert & Evans [3], Dahlman & Kucere [4], Singh [5], Kelley *et al.* [6], Jain & Misra [7], Choudhury [8], Misra [9], Mall & Billore [10], Singh & Ambasht [11], Trivedi & Misra [12], Rath [13], Tiwari [14], Pradhan & Das [15], Misra & Misra [16], Naik [17], Patnaik [18], Pradhan [19], Behera [20], Pucheta *et al.* [21], 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 below ground biomass of a grassland community of Rairangpur in the state of Odisha.

1.1 Aim of the Study

The aim of this investigation is to study the below ground biomass of a grassland community of Rairangpur in the district of Mayurbhanj, Odisha.

1.2 Study Site and Environment

The experimental grassland was selected at Sanchampauda (86° 11' 45" E ; 22° 16' 45" N), Rairangpur, situated at a distance of 95 kms from the North Orissa University and 90 kms from Baripada, the district headquarter of

Mayurbhanjin the state of Odisha and is located at an average elevation of 248m.

The climate of the locality is monsoonal with three distinct season i.e rainy (July to October), winter (November to February) and summer (March to June). The total rain fall during the study period was 1903mm. of which a maximum of 652mm was recorded during the month of July. No rainfall was observed in the month of October, November and December. The soil of the experimental site was found to be moderately acidic. The available phosphorous, potassium and organic carbon contents of the experimental site were found to be low [23].

II. METHODS AND MATERIAL

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, bagged and labeled separately. The live samples (grasses and non grasses together), standing dead and the below ground 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 and dried in open and then transferred to the oven for drying at 80°C for 48 hours, weighted and expressed as $g\ m^{-2}$.

III. RESULTS AND DISCUSSION

Fig-1 reveals the monthly variation in below ground biomass value of the experimental site. An increasing trend of below ground biomass value was observed from January to April. Thereafter, the value exhibited a decreasing trend. The value started decreasing from April to July and showed a minimum of $406.82\ g\ m^{-2}$ of below ground biomass value during August. Again, an increasing trend in value was observed from August till the end of the sampling period. The community exhibited a maximum of $615.73\ g\ m^{-2}$ of litter biomass in the month of April.

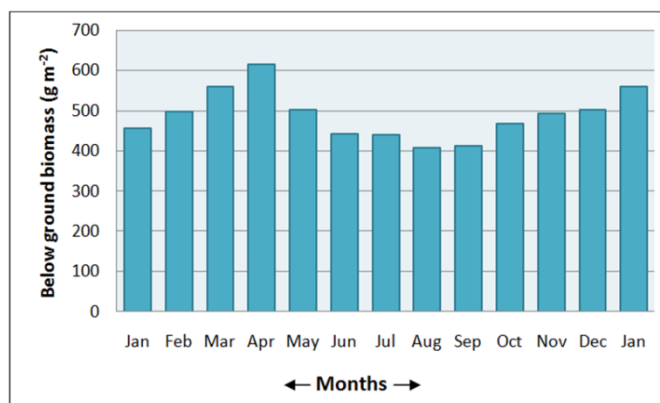


Figure 1. Monthly variation in below ground biomass ($g\ m^{-2}$) of experimental grassland community during the study period.

The gradual increase in biomass value from January to April and then from August to January might be due to favorable climatic condition. The atmospheric temperature, rainfall and soil characteristic might not be conducive for below ground formation. As a result a decreasing trend in value was observed from April to August. The mean below ground biomass of the community when compared with other grassland communities did not show similarity (Table - 1).

Table - 1. Maximum below ground biomass (g m⁻²) of different herbaceous communities.

Author (s)	Location	Type of community (dominated)	Maximum below ground biomass
Ovington et al. (1963)	Cedar Creek	Prairie	669
Wiegert & Evans (1964)	South Michigan	Upland	685
Dahlman & Kucere (1965)	Missouri	Prairie	1901
Singh (1967)	Varanasi	<i>Dichanthium</i>	583
Kelley et al. (1969)	Tennessee	<i>Andropogon</i>	804
Jain & Misra (1972)	Sagar	<i>Heteropogon</i>	1537
Choudhury (1972)	Varanasi	<i>Dichanthium</i>	1009
Misra (1973)	Ujjain	<i>Dichanthium</i>	925
Mall & Billore (1974)	Ratlam	<i>Sehima</i>	873
Singh & Ambasht (1975)	Varanasi	<i>Heteropogon</i>	184
Trivedi & Misra (1979)	Jhansi	<i>Dichanthium</i>	436
Rath (1980)	Berhampur	<i>Aristida</i>	851
Tiwari (1986)	Garhwal	<i>Himalaya</i>	722
Pradhan & Das (1984)	Sambalpur	<i>Savanna</i>	256
Misra & Misra (1984)	Berhampur	<i>Aristida</i>	743
Naik (1985)	Rourkela	Mixed type	753
Patnaik (1993)	South Orissa	<i>Heteropogon</i>	170
Pradhan (1994)	Bhubaneswar	<i>Aristida</i>	736
Behera (1994)	Phulbani	<i>Heteropogon</i>	689
Pucheta et al. (2004)	Argentina	<i>Deyeuxia</i>	1264
Barik (2006)	Berhampur	<i>Aristida</i>	644
Present study	Rairangpur	<i>Chrysopogon</i>	616

The mean below ground biomass value of the present study was found to be comparatively high than the values reported by Singh [5], Singh & Ambasht [11], Trivedi & Misra [12], Pradhan & Das [15] and Patnaik [18] where as less than that reported by Ovington et al. [2], Wiegert & Evans [3], Dahlman & Kucere [4], Kelley et al. [6], Jain & Misra [7], Choudhury [8], Misra [9], Mall & Billore [10], Rath [13], Tiwari [14], Misra & Misra [16], Naik [17], Pradhan [19], Behera [20], Pucheta et al. [21] and Barik [22].

IV. CONCLUSION

The below ground biomass value of the experimental grassland community of Rairangpur in the district of Mayurbhanj, Odisha did not show similarity with other grassland communities of various locations. The

topography, atmospheric temperature, physico-chemical characteristics of soil, rate of decomposition, presence of micro organisms in the soil, species composition, precipitation and biotic interference might be responsible for variation in below ground biomass value in the community.

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