LIVE GREEN BIOMASS OF A GRASSLAND COMMUNITY OF RAIRANGPUR IN THE DISTRICT OF MAYURBHANJ, ODISHA

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ABSTRACT

The live green biomass of a grassland community of Rairangpur (86^0 11' 45'' E ; 22^0 16' 45''N) in the district of Mayurbhanj, Odisha was studied following "Short term harvest method" as proposed by Odum[1]. The live green biomass value of the experimental site was found to be maximum in the month of October (570.70 g m^{-2}) and minimum in the month of April (117.27 g m^{-2}). The live green biomass of the community exhibited a decreasing trend from the month of January to April. Thereafter, the value showed a gradual increase in trend till October. Onwards, again a declined trend in live green values was observed till the end of the sampling period. Compared to other grassland community, the mean live green biomass value of the present study did not show similarity which might be due to the variation in topography, geographical distribution, species composition, climatic conditions, soil characteristics and biotic interference of the locality.

Keywords* : *Grassland, community, biomass, live green

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 live green biomass in different herbaceous communities by Odum[1], Golley[2], Porter[3], Kelley **et al**.[4], Choudhury[5], Varshney[6], Misra[7], Mall & Billore[8], Jain [9], Pandey[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] and many others. However, very little work has been done particularly in northern reason of the state. Therefore, in this investigation an attempt has been made to study the live green 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 live green 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 (86^0 11' 45'' E ; 22^0 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 Mayurbhanj in the state of Odisha and is located at an average elevation of 248m. 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. 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 rainfall during the study period was 1903mm. Of which a maximum of 652mm was recorded during the month of July. No rainfall was observe in the month of October, November and December [21].

II.MATERIALS & METHODS

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) and the standing dead parts were collected separately, packed in sampling bags, 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 80^0C for 48 hours and weighted and expressed as g m^{-2}.

III.RESULTS & DISCUSSION

Fig-1 shows the monthly variation in live green biomass value of the experimental site. A decreasing trend of live green biomass value was observed from January to April. Thereafter, the value exhibited an increasing trend. The value started increasing from April to September and attained peak during October (570.70 g m^{-2}). Again, a decreasing trend in value was observed from October till the end of the sampling period.

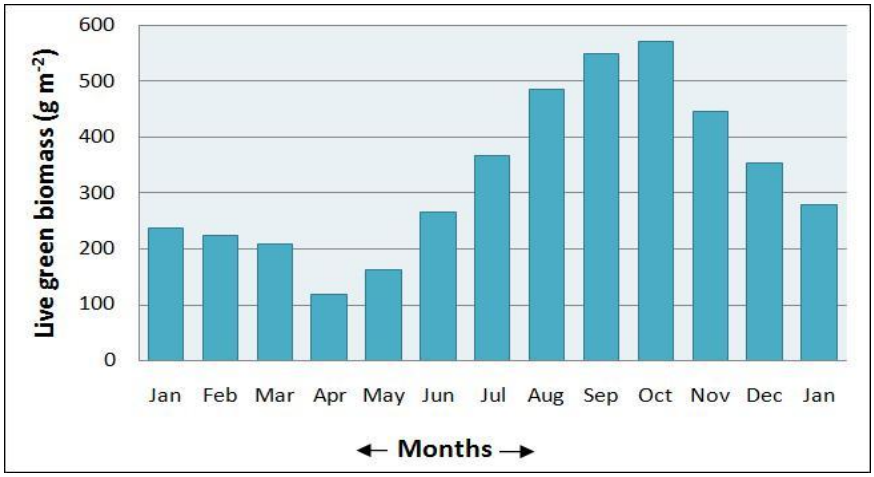

Fig -1 Monthly variations in live green biomass (g m^{-2}) of experimental grassland community during the study period.

The community exhibited a minimum of 117.27 g m^{-2} of live green biomass during April. The gradual decrease in biomass value from January to April and then from October to January might be due to adverse climatic condition. The atmospheric temperature, rainfall, relative humidity might not be favorable for initiation or growth of green plants in one hand and in other, the live green get transformed to yellow standing dead during this period. The climatic factors i.e. amount of precipitation, atmospheric temperature and soil moisture content was found to be suitable for the growth and development of all species and hence October showed peak live green biomass in the community. The mean live green biomass of the community when compared with other grassland communities did not show similarity (Table - 1).

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

Author (s)	Location	Type of community (dominated)	Mean live green biomass
Golley (1965)	South Carolina	*Andropogon*	90.95
Porter (1967)	South Florida	*Muhlenbergia*	119.40
Kelley **et al.** (1969)	Tennessee	*Andropogon*	219.10
Choudhury (1972)	Varanasi	*Dichanthium*	149.10
Varshney (1972)	New Delhi	*Heteropogon*	333.80
Misra (1973)	Ujjain	*Dichanthium*	159.20
Mall & Billore (1974)	Ratlam	*Sehima*	104.10
Jain (1976)	Sagar	*Heteropogon*	187.30
Pandey (1978)	Varanasi	*Aristida*	900.60
Trivedi & Misra (1979)	Jhansi	*Sehima*	197.60
Rath (1980)	Berhampur	*Aristida*	242.20
Malana & Misra (1982)	Berhampur	*Aristida*	296.10
Misra & Misra (1984)	Berhampur	*Aristida*	342.70
Naik (1985)	Rourkela	Mixed type	516.90
Patnaik (1993)	South Orissa	*Heteropogon*	196.50
Pradhan (1994)	Bhubaneswar	*Aristida*	369.90
Behera (1994)	Phulbani	*Heteropogon*	333.50
Pucheta **et al.(** 2004*)*	Argentina	*Deyeuxia*	974.53
Barik (2006)	Berhampur	*Aristida*	441.30
Present study	Rairangpur	*Chrysopogon*	326.81

The mean live green biomass value was found to be higher than the value obtained by Golley[2], Porter[3], Kelley **et al**.[4], Choudhury[5], Misra[7], Mall and Billore [8], Jain[9], Trivedi and Misra[11], Rath[12], Malana & Misra[13] and Patnaik [16] and less as reported by Varshney[6], Pandey[10], Misra & Misra[14], Nai[15], Pradhan[17], Behera[18], Pucheta **et al.**[19] and Barik[20].

IV.CONCLUSION

The live green biomass values 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, species composition, precipitation, solar insolation and biotic interference. might be responsible for variation in live green biomass value in the experimental site.

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REFERENCE

[1] Odum EP. Organic production and turnover in the old field succession, Ecology. 1960; 41, 39-49.

[2] Golley FB. Structure and function of an old field Broom sedge community. Ecol. Monogr., 1965; 35, 113-137.

[3] Porter CLJ. Composition and productivity of a subtropical Prairie, Ecol., 1967 ; 48, 937-942.

[4] Kelley JM, Opstrup PA, Olson JS, Auerbach SL, Vandyne GM. Models of seasonal productivity in eastern Tennessee. Festuca and Andropogn ecosystem, Oak Ridge National Lab. Report, 1969 ; 4310, 296.

[5] Choudhury VB. Seasonal variation is standing crop and net above ground production in *Dichanthium annulatum* grassland at Varasani, In : Tropical Ecology with an emphasis on organic production, P. M. Golley and F. B. Golley (eds.), Univ. of Georgia, Athens. 1972 ; 51-57.

[6] Varshney CK. Productivity of Delhi grasslands. In : Tropical Ecology with an emphasis on organic production, P. M. Golley and F. B. Golley (eds.), Univ. of Georgia, Athens, 1972 ; 27-42.

[7] Misra CM. Primary productivity of a grassland ecosystem at Ujjain, Ph.D. Thesis, Vikram Univ., Ujjain, 1973.

[8] Mall LP, Billore SK. Dry matter structure and its dynamics in Sehima grassland community. I. Dry matter structure, Trop. Ecol., 1974 ;15, 108-118.

[9] Jain SK. Above ground phytomass and net community productivity in some tropical sub-humid grasslands at Sagar (M.P.), India, Int. J. Ecol. Environ. Sci., 1976 ; 2, 33-41.

[10] Pandey TN. Seasonal variation in the biomass and productivity in a protected grassland of the Chakia forest, Varanasi, Ind. J. Ecol, 1978 ; 5, 37-42.

[11] Trivedi BK, Misra GP. Seasonal variation in species composition, plant biomass and net community production of two grasslands in Sehima, *Dichanthium* cover type, Trop. Ecol., 1979 ; 20, 114-125.

[12] Rath SP. Composition, productivity and energetics of grazed and ungrazed grassland of Berhampur, Ph.D. Thesis, Berhampur University, Berhampur, Orissa, India, 1980.

[13] Malana M, Misra BN. Above ground standing crop biomass and net primary production of a tropical grassland in relation to burring. Ind. J. Ecol., 1982 ; 9 (2), 191-196.

[14] Misra MK, Misra BN. Biomass and primary production in India grassland, Trop. Ecol., 1984 ; 25, 239-247.

[15] Naik BK. Phytosociology and primary production of a natural grassland community of western Orissa. Ph.D. Thesis, Sambalpur University, Sambalpur, Orissa, 1985.

[16] Patnaik SK. Ecological studies of an upland coastal grassland of South Orissa. Ph.D. Thesis, Berhampur

[17] Pradhan D. Primary production and phytosociology of a grassland community of Bhubaneswar. Ph. D. Thesis, Berhampur University, Berhampur, Orissa, 1994.

[18] Behera BK. Community structure, primary production and energetic of a grassland community of Boudh-Kandhamal (Dist-Phulbani) in Orissa, Ph D. Thesis, Berhampur University, Berhampur, Orissa, 1994.

[19] Pucheta E, Bonamici I, Cabido M, Diaza S. Below ground biomass and productivity of a grazed site and a neighbouring ungrazed exclosure in agrassland in central Argentina. Austral Ecology., 2004 ; 29: 201-208.

[20] Barik KL. Ecological analysis of an upland grassland community of Eastern Orissa, India. Ekologia, 2006 ; 5 (1-2), 137-150.

[21] Chawpattanayak BN, Barik KL. Standing dead biomass of a grassland community of Rairangpur in the district of Mayurbhanj, Odisha. IJARSE, 2013; 2 (6), 204-209.