© 2014 IJSRSET | Volume 1 | Issue 1 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section : Engineering and Technology

Live Green Biomass of a Grassland Community of Bangiriposi In Odisha

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ABSTRACT

The live green biomass of a grassland community of Bangiriposi (86^{0}32'30" E ; 22^{0}08'30" N) in the district of Mayurbhanj, Odisha was studied following "short term harvest method" of Odum (1960). The value exhibited a decreasing trend from January to March and was minimum in the month of April (226.18 g m^{-2}). Onwards, a gradual increase in live green biomass value was observed showing a peak in the month of October (623.26 g m^{-2}). Thereafter, the value again, showed a decreasing trend till the end of the sampling period. The mean live green biomass of the community, when compared to other grassland communities of different climatic regions did not show similarity. This variation in live green biomass value might be due to the variation in topography, geographical distribution, climatic conditions, soil characteristics and the biotic interference of the locality.

Keywords : Grassland, Community, Biomass, Live Green.

I. INTRODUCTION

Grassland plays an important role not only for the survival of animals but also for human beings. Most of the herbivores are directly dependent on grassland where as the carnivorous are indirectly dependent on grassland flora. From the prehistoric times to till date, man has been dependent on the grasses for food, shelter and unani medicine. The plant collects minerals and other nutrients from the soil by means of root systems (Underground / belowground parts of the plants). The knowledge about the live green portion of various plant species is essential for analysis of functional aspects of a community. Literature review reveals a lot of work on live green biomass of different climatic regions by Golley (1), Kelley ***et al.*** (2), Varshney (3), Mall & Billore (4), Trivedi & Misra (5), Malana & Misra (6), Misra & Misra (7), Naik (8), Behera (9), Pucheta ***et al.*** (10), Barik (11), Wenhong ***et al.*** (12) and many others. However, very little work has been made so far on the live green biomass of a grassland community of Mayurbhanj district 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 Bangiriposi in the district of Mayurbhanj, Odisha.

1.2 Study site and environment

The experimental grassland community was selected at Silpunji (86^{0}32'30" E ; 22^{0}08'30" N) Bangiriposi, in the district of Mayurbhanj, Odisha (Fig.-1 & 2). The site is situated at a distance of 40 kms away from North Orissa University and 36 kms from Baripada, the district head quarter of Mayurbhanj in the state of Odisha. The altitude of the site is above 104.6m.

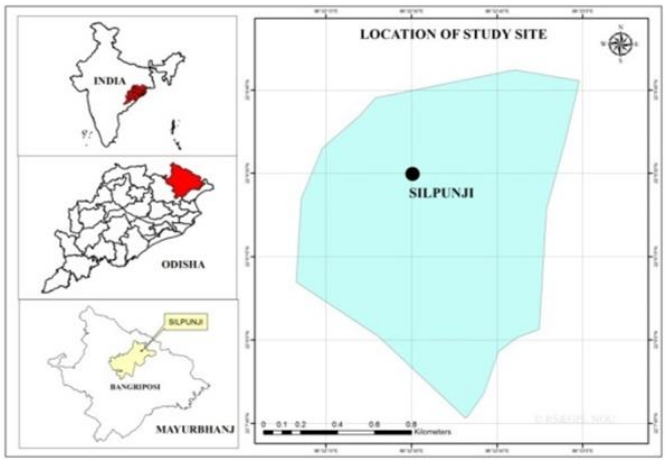

Fig. -1 Map showing the location of Experimental site

Fig. -2 Photograph showing the Experimental site

The climatic condition of the locality is monsoonal with three distinct seasons i.e. rainy (July to October), winter (November to February) and summer (March to June). The seasons are classified basing upon the amount of rainfall and the prevailing atmospheric temperature. The total rainfall during the study period was found to be 2537.1 mm of which a maximum of 634.6 mm was recorded during July. No rainfall was observed in the month of December. Total number of rainy days was found to be 114 days. The mean minimum and mean maximum atmospheric temperature recorded during the study period was found to be normal. December showed the lowest temperature (11.53^{0}C) whereas May experienced the highest temperature (37.35^{0}C) during the study period (Table -1).

Table – 1 Monthly rainfall, mean minimum and mean maximum atmospheric temperature of the experimental site during the study period.

Month (s)	Rainfall (mm)	No. of rainy days	Atmospheric temperature (^{0}C)	
			Mean minimum	Mean Maximum
Jan. 2007	2.6	01	11.97	26.63
Feb. 2007	66.6	03	16.55	28.66
Mar. 2007	43.4	04	19.57	33.18
Apr. 2007	91.6	05	23.65	37.28
May. 2007	52.7	06	25.09	37.35
June. 2007	351.0	29	25.21	34.60
July. 2007	634.6	19	24.7	32.37
Aug. 2007	483.8	15	24.4	31.88
Sept. 2007	607.2	24	23.86	30.43
Oct. 2007	33.0	02	20.55	31.46
Nov. 2007	68.6	03	17.40	28.13
Dec. 2007	-	-	11.53	25.97
Jan. 2008	102.0	03	11.75	26.38
Total	2537.1	114	-	-

The soil of the experimental site (Table -2) was found to be strongly acidic (pH < 5.0). The available phosphorus and potassium content of the soil was found to be very low. The organic carbon (%) also showed very low in concentration (0.38% to 0.47%).

Table - 2 The pH, conductivity, organic carbon (%), available phosphorus and potassium content of the soil of the study site (values are in mean ±SD, n=5 each)

Surface depth in cm	pH	Conductivity	Organic carbon (%)	Available phosphorus (ppm)	Available potassium (ppm)
0 to 10	4.7±0.24	0.5±0.00	0.38±0.12	0.2±0.17	20.4±11.8
10 to 20	4.62±0.16	0.5±0.00	0.47±0.19	0.24±0.31	24.7±25.97
20 to 30	4.74±0.18	0.54±0.09	0.44±0.10	0.18±0.13	15.9±6.26

II. MATERIALS AND METHODS

For the determination of various compartmental biomass values "short term harvest method" of Odum (13) 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) along with the standing dead parts were collected and packed in sampling bags, and 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 80^0C for 48 hours and weighted and expressed as g m^{-2}.

III. RESULTS AND DISCUSSION

Fig - 3 shows the monthly variation in live green biomass of the experimental site. It was observed that, the live green biomass of the community gradually decreased from January to April. Thereafter, the value showed an increasing trend till October. Onwards, again a decreasing trend in value was observed till the end of the sampling period. The community exhibited a minimum of 226.18 g m^{-2} live green biomass value during April and a maximum of 623.26 g m^{-2} in the month of October. Decrease in live green biomass from January to April and from October to January might be due to unfavorable climatic conditions of the locality. The amount of precipitation, water holding capacity of the soil, soil porosity, and atmospheric temperature perhaps go in favour of the initiation or overall growth and development of green foliage. As a result, a gradual increase in live green biomass was observed from April to May then to June, July, August, September and attained a peak in the month of October.

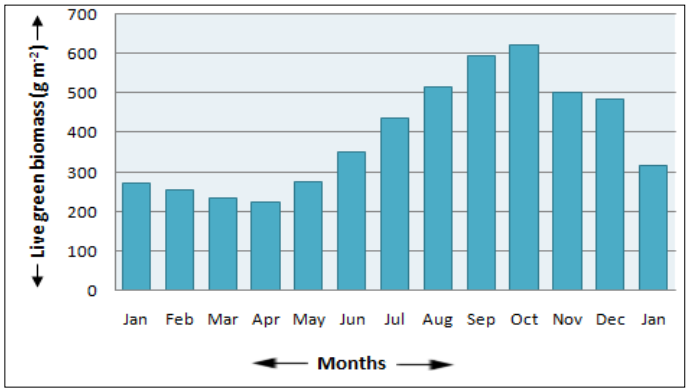

Fig -3 Monthly variations in live green biomass value (g m^{-2}) of experimental grassland community during the study period.

Table-3 reveals the maximum live green biomass of different herbaceous communities. On comparison the mean live green biomass of the present community did not show similarity with the others. The value was found to be higher than the values reported by Golley (1), Kelly **et al.** (2), Vershney (3), Mall & Billore (4), Trivedi & Misra (5), Malana & Misra (6), Misra & Misra (7), Behera (9) and Wenhong **et al**. (12) where as less than that reported by Naik (8), Pucheta **et al**.(10) and Barik (11).

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
Kelly **et al.** (1969)	Tennessee	*Andropogon*	219.10
Vershney (1972)	New Delhi	*Heteropogon*	333.80
Mall & Billore (1974)	Ratlam	Sehima	104.10
Trivedi & Misra (1979)	Jhansi	Sehima	197.60
Malana & Misra (1982)	Berhampur	*Aristida*	296.10
Misra & Misra (1984)	Berhampur	*Aristida*	342.70
Naik (1985)	Rourkela	Mixed type	516.90
Behera (1994)	Phulbani	*Heteropogon*	333.50
Pucheta **et al**.*(*2004*)*	Argentina	*Deyeuxia*	974.53
Barik (2006)	Berhampur	*Aristida*	441.30
Wenhong **et al**. (2008)	China	Meadow	196.70
Present study	Bangriposi	*Cynodon*	391.85

IV. CONCLUSION

The live green biomass of a grassland community varies from place to place and from time to time. It might be due to the variation in climatic condition, topography, physic-chemical characteristic of soil species compassion and biotic interference of the locality.

V. ACKNOWLEDGEMENTS

The authors are thankful to Pabitra Mohan Dash, Principal, L.K. College, Bangiriposi; Prof. U.B. Mohapatra, Dr. A.K Biswal, Reader and Dr. A.K Bastia , Reader, Department of Botany, North Orissa University for their co-operation and valuable suggestion. The authors are also indebted to the Block Development Officer, Saraskana for providing necessary meteorological data; the District Agriculture Officer, Mayurbhanj, Baripada and the Soil Chemist, District Soil Testing Laboratory, Government of Odisha, Mayurbhanj, Baripada for analysis of soil samples of the experimental site.

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