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Study of live green biomass of a grassland community of Similipal biosphere reserve, Odisha

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Abstract
The live green biomass of a grassland community in Podadiha Forest Block (86º 27' E; 21º 33' N) of Similipal Biosphere Reserve was studied from July 2015 to July 2016. Short term harvest method of Odum (1960) was employed for the determination of various compartmental biomass values. The live green biomass of the community showed gradual increase in biomass value from July to August, then to September, October and November, and attained a peak during December (255.88 g m^{-2}). Thereafter, the value started a decreasing trend till May (72.92 g m^{-2}). Again an increasing trend of value was observed till the end of the sampling period. The mean live green biomass of the community was found to be 125.34 g m^{-2}. Compared to other grassland communities the mean value of the community did not show any similarity with the value of others. The variation of live green biomass of a grassland community from place to place and from time to time might be due to the variability in climatic condition, topography, soil characteristics, microbial activities in the soil as well as the biotic interference of the locality.

Keywords: biomass, live green, grassland, community

Introduction
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 crop of biomass in different herbaceous communities has been done by Golley (1965) [5], Kelley *et al*. (1969) [6], Varshney (1972) [17], Mall & Billore (1974) [8], Trivedi & Misra (1979) [16], Malana & Misra (1982) [7], Misra & Misra (1984) [9], Naik (1985) [10], Behera (1994) [2], Pucheta *et al.* (2004) [3], Barik (2006) [1], Wenhong *et al*. (2008) [18], Fiala (2010) [4], Oliveras *et al*. (2014) [12], Dash & Barik (2015) [3], Rout & Barik (2016) [14] 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 Smilipal Biosphere Reserve in the state of Odisha.

Study site and environment
The experimental grassland was selected at Podadiha forest block (86º 27' E; 21º 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 (Sahu and Barik, 2017) [15].

Materials and Methods
For the determination of various compartmental biomass values "short term harvest method" of Odum (1960) [11] 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, 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}.

Result and Discussion
Fig.-1 reveals the live green biomass of the experimental grassland community. A gradual increase in biomass value was observed from July to August, then to September, October and November and attained a peak of 255.88 g m^{-2} during December. Afterwards the value started a decreasing trend till May (72.92 g m^{-2}). Again an increasing trend of value was observed till the end of the sampling period. It indicates that with the start of monsoon almost all the species revived and continued to grow up to December. During this period the amount of precipitation, atmospheric temperature and soil moisture content might be suitable for the growth and

development of all species and hence December showed peak live green biomass. Since then, there was transformation of live green to yellow standing dead. The atmospheric temperature along with the rainfall was perhaps not favorable for the growth of vegetation. Thus the community showed less amount of live green biomass during May. The amount of precipitation followed by the atmospheric temperature might be responsible for increase in live green biomass during June and July.

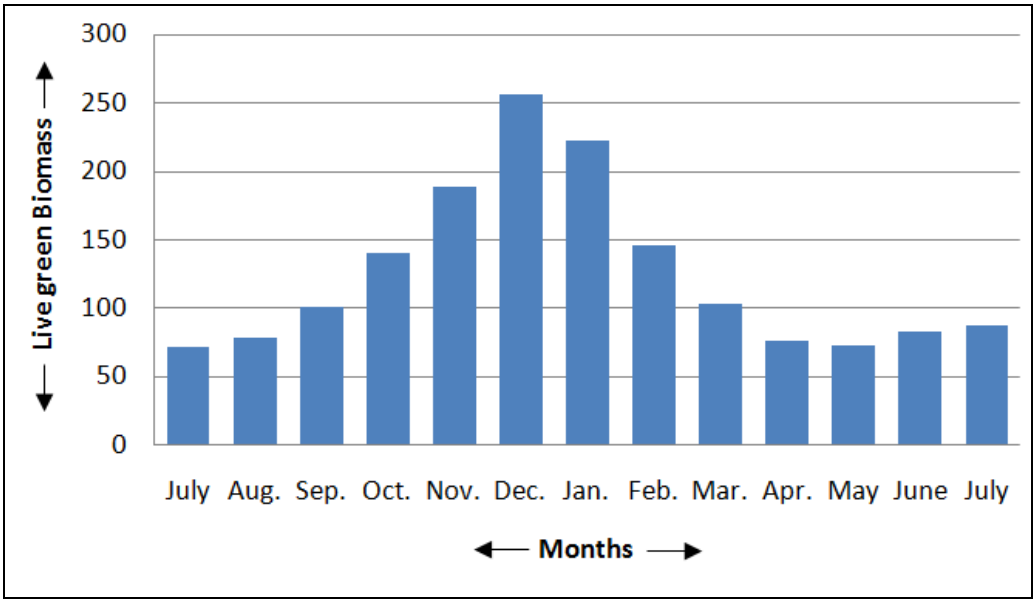

Fig 1: Monthly variation in live green biomass (g m^{-2}) in dry weight of experimental grassland community during the study period (July 2015 to July 2016).

Table -1 shows the mean values of live green biomass of different herbaceous communities reported by various workers. The present findings, when compared to other grasslands, the value did not show any similarity with the value of others. It was found to be high compared to the findings of Golley (1965) [5] and Mall & Billore (1974) [8] but was less than the mean values observed by Kelley *et al.* (1969) [6], Varshney (1972) [17] Trivedi & Misra (1979) [16], Malana & Misra (1982) [7], Misra & Misra (1984) [9], Naik (1985) [10], Behera (1994) [2], Pucheta *et al.* (2004) [13], Barik (2006) [1], Wenhong *et al.* (2008) [18], Fiala (2010) [4], Dash & Barik (2015) [3] and Rout & Barik (2016) [14].

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) [5]	South Carolina	*Andropogon*	90.95
Kelly *et al.* (1969) [6]	Tennessee	*Andropogon*	219.10
Vershney (1972) [17]	New Delhi	*Heteropogon*	333.80
Mall & Billore (1974) [8]	Ratlam	Sehima	104.10
Trivedi & Misra (1979) [16]	Jhansi	Sehima	197.60
Malana & Misra (1982) [7]	Berhampur	*Aristida*	296.10
Misra & Misra (1984) [9]	Berhampur	*Aristida*	342.70
Naik (1985) [10]	Rourkela	Mixed type	516.90
Behera (1994) [2]	Phulbani	*Heteropogon*	333.50
Pucheta *et al.* (2004) [13]	Argentina	*Deyeuxia*	974.53
Barik (2006) [1]	Berhampur	*Aristida*	441.30
Wenhong *et al.* (2008) [18]	China	Meadow	196.70
Fiala (2010) [4]	USA	Meadow	1610.00
Dash & Barik (2015) [3]	Jharpokharia	*Chrysopogon*	460.85
Rout & Barik (2016) [14]	Bangriposi	*Chrysopogon*	391.85
Present study	Podadiha	*Cynodon*	125.34

Conclusion

The variation in live green biomass of a grassland community from place to place and from time to time might be due to the variability in climatic condition, topography, soil characteristics microbial activities in the soil as well as biotic interference of the locality.

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