Biolife AN INTERNATIONAL QUARTERLY JOURNAL OF BIOLOGY & LIFE SCIENCES 5(2):151-154

ISSN (online): 2320-4257
www.biolifejournal.com

BIOLIFE RESEARCH ARTICLE

Effect of primary productivity on Indian grassland (Bilaspur District, Chhattisgarh)

Baldau Prasad Dadsena[1] and M.L. Jaiswal[2]

[1]G.H.S.S Katgi, Baloda Bazar (Chhattisgarh)
[2]D.P.V.P.G College, Bilaspur (Chhattisgarh)

Email: : krish579raj@gmail.com

ABSTRACT

Productivity of grassland has become the main concern not only for the researchers but also for the environmental perspective. The Prime objective of this study elicited the environmental stability and its importance on their climate changes with respect to geographical variation. Fields for this study is selected from the central India, located at Chhattisgarh, Bilaspur, District, Dheka which lies between 21°_47' to 23°_8' North latitude and 81°_14' to 83°_15' East longitude. To collect the sample for the above ground part a circular quadrate of 0.35 m^{-2} has been used. Species Area Curve Method is applied to determine the size of quadrate. The grassland community comprised of 14 species (7 were grasses and 7 were non-grasses). *Bothriochloa Pertusa*, *Cynodon dactylon, Digitaria longiflora,* among the grasses and *Desmodium Triflorum, Parthenium* and *Sida cordifolia* among the non-grasses were found dominant during the study period. Results shows that annual grass production 3187.52 gm^{-2} /year. Similarly, the non-grass production showed (120.20 gm^{-2}) for December and (1.72 gm^{-2}) in May as maximum and minimum respectively. The annual non-grass production was found to be 734.46 gm^{-2} /year. The study of primary productivity helps to recovery of the natural ecosystems to the earlier balanced state and continuation the biodiversity of grassland community in world.

Key Words: *Primary productivity, Biomass, Live green, standing dead, litter, below ground*

INTRODUCTION

Recently, the climatologically factor has become very popular and much needed area from the academia and green environment point of view. However, with the huge geographical location and variation in minerals content along with the others climatic factors directly affect the productivity of grassland. Due to the multipurpose use mostly for the medicinal significances grassland and its conservation has become one of the primary focus or the researchers. Vandyneal alal (1978) addressed the necessity and role of the grassland in the daily human and animals life's form diet to here future habits. Development of the agricultural land and other human activities are some of the main factors which affect the productivity of the grassland. Especially, country like India, where grassland commune mostly depends upon the climatologically factors and various biotic interferences uses of grassland for the human as well as animals is very important. In India the excessive interference of humans and their activities created the difficulties in finding the virgin grassland in the country. The grassland vegetation mainly consist of a number of perennial grasses mixed with legumes & fob's with the advent of the mansoon in June & fairly good number of special start their growth either through seeds or sporting rhizomes.

The rate of organic matter growth in plant tissue and excess of respiratory consumption refers to net primary production. The Biomass accounts of the total weight of the living component present at any given time in the ecosystem. Now a days, The customary approach in ecologically used to evaluate production as a parameter of productivity of the ecosystem. However, available

How to Site This Article:
Baldau Prasad Dadsena and M.L. Jaiswal (2017). Effect on primary productivity of Indian grassland (Bilaspur District, Chhattisgarh). *Biolife*. 5(2), pp 151-154. doi:10.17812/blj.2017.5201

Received: 3 Februaryy 2017; Accepted: 6 March, 2017; Published online: 1 April 2017

information on primary production and turnover parameters for grassland of tropical and temperate regions can be calculated from the study. Tiwary & Sing (1981) highlighted the significant contributions in grassland production in Indian scenario.

In order to maintain productivity in terrestrial ecosystem litter decomposition plays a very important role. The main function of Litter decomposition is to regulate the availability of nutrients needed for plant growth. The process of decomposition namely biological action, withering and leaching, which mainly affects from the decomposer community, litter quality and the physical and chemical characteristics of the environment (Kar 2013).

MATERIALS AND METHODS

Climate Condition

Bilaspur is located at central India, where sub-tropical temperature remains moderate for most of the year. The temperature variation is also significant from the summer March to June which can be externally not approx 45℃. And receives about 1300 mm of rain mostly in the monsoon season from late June to early October, and winter last from November to January at mild although low scan fall to 5℃ (42 ℉).

The soil of experimental soil has been found moderately acidic in nature with pH value 6. Soil phosphorus content at the protected site observed almost constant throughout the year, which varies from 0.02 to 0.03 %. The overall organic carbon (0.60%), the percentage of nitrogen in the soil ranged between 0.10 to 0.42% and available potassium (58 to 92 ppm).

Data Collection and Identification:

Plant sampling:

The monthly sampling for above ground biomass has been performed in random way for all three parts of the grassland area. Finally, harvest method three Quadrates have been used at each sampling site on each sampling date. Cutting of above ground parts was done with the help of a scissor and separated species wise.

Similarly, collection of the below ground plant parts was collected by monolith method Weaver and Darland, (1949). Three Monolith of 25 x 25 x 30cm have been taken at each site on each sampling time.

Soil Sample:

The composite soil samples were collected every month.

Productivity Study:

The various parameters of biomass structure and function were calculated from the sample plant materials.

Biomass and Primary Productivity:

The productivity for the each category of plant materials such as live green, standing dead, litter and below ground parts have been calculated. Calculation of the result was performed by summing up of the positive increments of concerned biomass during the study period and was expressed in $gm^{-2}/year$. Litter disappearance (LD) was calculated by subtracting the total net productivity of litter during the year from the difference between final and initial litter biomass Golley (1965). Below ground disappearance (BGD) was calculated from the difference between peak below ground biomass and succeeding minimum below ground biomass Sims & Singh (1971). Total disappearance was obtained by adding litter disappearance and below ground disappearance.

RESULTS

The green biomass of grasses sedges increased continuously from 1.02 may to a peak value of 253.96 in October. The total above ground standing dead biomass in site was minimum 4.50 in May & maximum 134.15 in October. The total above ground biomass (green dead) in site increased from a minimum of 6.19 in May to 408.21 in October .The litter in site increased from January & reached its peak of 75.64 in October the belowground biomass of both the sites decreased initially in the rainy season & than increased in site the peak value was 259.25 in January.

The total biomass of site increased from 54.59 in May to 735.81 in October where as it fluctuated throughout the year. The below ground/ above ground ratio in site ranged between 0.42 to 0.90.

Live green biomass (grasses, non-grasses and total live green) of the study site. The green biomass did not show any trend. It attained a peak during October and minimum in month of May. The standing dead biomass also did not show any trend and the peak in the month of October (134.15). Minimum standing dead biomass

Table-1. The pH, conductivity, organic carbon (%), available phosphorus and potassium content of the soil content of the study site (values are in mean ± SD, n = 5 each

depth in cm	pH	Conductivity	Organic carbon (C) (%)	Available phosphorus (P) (ppm)	Available potassium (K) (ppm)
0 to 10	5.10	0.40	0.53	0.70	91.20
10 to 20	6.10	0.33	0.65	0.50	83.90
20 to 30	6.80	0.32	0.62	0.98	58.10

Table-2: Biomass (gm-2) of different species during the study period.

Month	Live green		Total	Standing dead	Litter	Above ground		Below ground	Total Biomass
	Grasses	Non grasses				Lg + Sd	Lg + Sd + L		
Oct.	182.20	15.60	197.80	74.10	69.70	271.90	341.80	157.87	499.62
Nov.	138.80	13.40	152.20	110.10	71.24	262.30	333.54	167.40	500.94
Dec.	75.39	16.50	92.43	52.60	55.70	145.03	200.73	129.80	330.53
Jan.	145.60	38.36	183.96	103.40	63.34	287.36	350.70	259.25	609.95
Feb.	25.39	2.9	28.29	14.70	40.80	42.99	83.79	81.70	165.49
Mar.	8.36	1.50	9.86	5.10	36.40	14.96	51.36	58.10	109.46
Apl.	9.10	1.32	10.42	16.96	20.60	27.38	47.98	26.84	74.82
May.	1.20	0.67	1.69	4.50	17.90	6.90	24.90	30.50	54.59
Jun.	13.30	1.90	15.20	10.59	19.10	25.79	44.89	22.25	67.14
Jul.	37.90	4.76	42.66	19.60	--	62.26	62.26	58.50	120.76
Aug.	121.23	7.90	129.13	48.20	--	177.33	177.33	97.85	275.18
Sep.	196.23	11.75	207.98	65.75	45.10	273.73	318.83	196.60	515.43
Oct.	253.96	20.10	274.60	134.15	75.64	408.21	483.85	251.96	735.81
Total	**1208.51**	**136.66**	**1345.68**	**659.75**	**515.52**	**2005.43**	**2521.15**	**1538.57**	**4059.72**

Table-3: Total annual net primary production $gm^{-2}/year$ of different grassland community

Author(s)	Year	Location	Type of community(Dominance)	NPP ($gm^{-2}/year$)
Ambasht *et al.*	1972	Varanasi	Dichanthium	1420
Varshne	1972	New Delhi	Heteropogon	1330
Singh & Yadav	1972	Kurukhetra	Panicum	2980
Mishra	1973	Ujjain	Dichanthium	989
Billore & Mall	1977	Ratlam	Sehima	846
Misha	1978	Berhampur	Aristida	1447
Malana	1981	Berhampur	Aristida	1180
Pradhan	1994	Bhubaneswar	Aristida	1474
Behera	1994	Phulbani	Heteropogon	809
Barik	2006	Berhampur	Aristida	929
Pramod ku. kar	2013	Rangamatia	Mixed Type	6403
Dadsena and Jaiswal	2014	Bilaspur	Mixed Type	989
Present study		Bilaspur	Mixed Type	997

was recorded in the month of May (4.50).Total above ground biomass is the sum total of live green biomass and standing dead biomass. It was found to be minimum in the month of May (6.19) and maximum during Oct0ber (408.97).

The litter biomass of the community exhibited an decreasing trend from January to May and increasing in June, September and October. There is no litter found in month of July and August. Thereafter the value showed a declined trend till May (17.90). The litter biomass again showed an increasing trend showing a maximum of (75.64) during the last sampling period i.e. in the month of October.

The sequence of monthly above ground biomass values showed similar trend to that observed in case of live green biomass values. The below ground biomass values decreased from January (259.25) to June (44.89) and onwards the values showed gradual increased from July (58.50) to October (253.96). The total biomass of the community ranges from 54.59 to 735.81. The maximum biomass was observed in October and minimum in the month of May. The non-

grass production showed maximum in the month of January (38.36) and minimum in the month of May (0.67). The annual non-grass production was found to be 136.66). The total live green production showed their minimum and maximum value during May and October (274.06). Out of the annual net live green production (1345.68) 89.89% was contributed by grasses and 10.11% by non-grasses. The standing dead production was found to be 659.75).

DISCUSSION

The annual net production for the above ground grassland was observed 987. However, the litter production of that community was evident from January to May and September to December respectively. There was no litter production observed during the month of June, July and August. This, characteristics might showed due to rapid decomposition of litter.

For the growth and development of all species the climatic condition, rain fall, atmospheric temperature and soil condition were found suitable. However, climatic condition, rain fall, atmospheric temperature and the soil clause might not be favorable for the growth of vegetation. Result to this phenomenon a gradual declined in green biomass was observed till the end of the sampling period.

Net Primary Production

The annual net primary production and comparison with some Indian grassland are shown in Table 3. It can be concluded from the results that the net production is no way similar to the findings and compared with earlier research. Our study results shows higher value compared to the several authors (Barik 2006 and Pramod kumar kar, 2013). The result indicates that rain fall is not only a single factor responsible for this variation, but also rain fall influenced the net production in the community. This might be due to phenology of the species, rate of evaporation, temperature variability, fertility of soil etc. The result of this study showed that the *A.aspera* root extract have some potential of anticancer activity against colon & liver cancer cell lines. The anticancer potential activities exhibited due to the presence of phytoconstituents, like alkaloid, phenolics, flavonoids, terpenoids etc; that have been demonstrated to act as cytotoxic agents. The experimental evidence obtained in the laboratory that provides a rationale for the traditional use of *A.aspera* plant. The research work are very interesting to know the chemical composition and better understanding the mechanism of action of the phytoconstituents of the root extract which exerting anticancer activities for developing it as a drug for therapeutic use in future. A possible herbal anticancer composition is proposed for make effective anticancer herbal formula that can be use alone or combine with chemical drugs to reduce toxicity as well as side effect.

Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

References

1. Abdar (2013)- Physico- chemical characteristic and phytoplankton of Morna Lake, Shirala(M.S.) India ,Biolife, 1(2), 1-7.
2. Barik KL (2006)-Ecological analysis of an upland grassland community of eastern Orissa, India.
3. Dadsena B.P. and Jaiswal M.L. (2014). A study of primary productivity on grassland of Bilaspur District (Chhattisgarh) India. IJSRP Vol. 4 Issue - 6. June 2014 : 1-4.
4. Choudhary N. and Narayan R. (2013). Exotic invasive Ageratum conyzoides L. in Indian dry tropic's: A preliminary investigation of it's biomass allocation pattern and plant traits Journals of plant development and science 5(3) : 249-254.
5. Anderson R. H., Fuhlendorf, S. D., Engl D. M. (2006). Soil nitrogen availability in tall grass prairie under the fire-grazing interaction. Rangeland Ecology and Management, 59: 625-631.
6. Dadsena B.P. and Jaiswal M.L. (2014). A study of primary productivity on grassland of Bilaspur District (Chhattisgarh) India. IJSRP Vol. 4 Issue - 6. June 2014 : 1-4.
7. Choudhary N. and Narayan R. (2013). Exotic invasive Ageratum conyzoides L. in Indian dry tropic's: A preliminary investigation of it's biomass allocation pattern and plant traits Journals of plant development and science 5(3) : 249-254.
8. Havstad, K M. 2008. Mongolias rangelands: s livestock production the key to the future? Frontiers in Ecology 71:1040-1049.
9. Kar P.K. (2013)- Life form and primary production of an Indian grassland community, 1(2), 8-16.
10. Qi, J., J. Chen, S. Wan, and L. Ai. 2012. Understanding the coupled natural and human systes in Dryland East Asia. Environmental Research Letters 7:015202.
11. Tyagi & sing P (1988) - Pasture & forage crops research a state of knowledge report pub mnmt soc, Jhansi India.
12. Tiwari, S.C Tewary, C.K. and J.S. Singh (1981). *Progress of Ecology in India. P-3-28. In: A. Singh and P. Wahi (eds.) Souvenir.* Ecology and resource management in the tropics. ISTE Bhopal University, Bhopal.
13. Van Dyna, G.M., F.M., Smith, R.L.Casplewid and R.G.Woodmansea (1978), Analysis and synthesis of grassland ecosystem dynamics. In J.S. Singhand B.Gopal (ed.): climpses of ecology, International scientific publication Jaipur, India.
14. Yates, C. J., Norton, D.A., Hobbs, R. J., (2000). Grazing effects on plant cover, soil and microclimate in fragmented woodlands in south-western Australia: Implication restoration. Austral Ecology, 25: 36-47.