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A STUDY OF PRODUCTIVITY ON GRAZED GRASSLAND OF BILASPUR DISTRICT (CHHATTISGARH) INDIA

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ABSTRACT

The Primary productivity of a Grazed grassland commune located at Kota of Bilaspur district, Chhattisgarh lies between $21^{O}47'$ to $23^{O}8'$ North latitude and $81^{O}14'$ to $83^{O}15'$ East longitude. A quadrate of 0.25 gm^{-2} was used for sampling the above ground plant parts. The size of quadrate was determined by Species Area Curve Method. The grassland community comprised of 13 species (7 were grasses and 6 were non-grasses). *Bothriochloa Pertusa*, *Cynodon dactylon*, *dactyloctenium aegyptium*, and *eragrastris mutan* among the grasses and *Alternanthera sessilis*, *Alycicarpus Monilifer*, *Desmodium Trifloriun*, and *Sida cordifolia* among the non-grasses were found dominant during the study period. The annual grass production was found to be 1305.95 gm^{-2}/year. The non-grass production showed maximum in the month of October (53.49 gm^{-2}) and minimum in the month of June (2.80 gm^{-2}). The annual non-grass production was found to be 430.84 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 grazed grassland community in world.

Key words : *Biomass, Grazed grassland, live green, standing dead, litter, below ground*. .

INTRODUCTION

The influence of grazing on plant and soil of grassing lands has been discussed and reviewed by many workers. Most of the evidence reveals that grassing lands are affected by the grassing animals do not allow grassland to attain their fullest development. This has profound effect on the composition structure physiognomy and minerals status of the grasslands. The impact of grassing on the productivity, mineral status has been explained by studying the biomass structure and minerals status of the grazed grassland of district Bilaspur during 2012-2013.

In the present study an attempt has been made to evaluate the impact of grazing on biomass structure and function, and productivity of a Grazed grassland.

The Indian grassland commune are totally depending upon the climatologically factors and various biotic interferences. Grassland were are important segment in the worlds productivity long before the advent of man and perhaps the extent of grassland will control man's diet population & habits in the future as it was for many other animals' (vandyneal alal 1978). Human activities have mainly affects the grassland all over the world and much of the area has been converted in to agricultural land. As a result of excessive human interference it is difficult to locate virgin grassland in our country. The grassland vegetation mainly consist of a

number of animal & 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 accumulation in plant tissue in excess of respiratory utilization refers to net primary production while the total weight of the living component present at any given time in the ecosystem accounts for the biomass. The customary approach in ecologically works is to evaluate production as a parameter of productivity as a functional aspect of the ecosystem has attracted much attention during recent year's and much information is available now on primary production & turnover parameters for grassland of tropical & temperate regions. The important contributions to the production relation of grassland communities of India have been revised by sing (1976) pandey (1977) Tiwary & sing (1981).

Litter decomposition is also important in terrestrial ecosystem for maintaining productivity because it regulates the availability of nutrients needed for plant growth. Mson 1977, distinguished there basic process of decomposition namely biological action withering and leaching, key factor affecting decomposition are the decomposer community and its complex nature swift et al 1979, litter quality Berg and Mc Claugherty 1989, Hooper and Vitousek 1998, Kalburtsi et al 1999, Moretto et al 2001, Ross et al 2002 and the physical and chemical characteristics of the environment vitousek et al 1994, Kalburtil et al 1997, 1998, Kaukoura 1998, 1999, Chen and stark 2000.

MATERIALS AND METHOD

Climate condition:

Bilaspur was Sub tropical temperature remains moderate for most of the year a part from the summer from March to June which can be externally not approx. 45°C. The city receives about 1300 mm of rain mostly in the monsoon season from late to June early October winter last from November to January and are mild although low scan fall to 5°C (42 °F).

The soil of the experimental site was found to be moderately acidic (pH = 6.2). The percentage of soil phosphorus at the Grazed site remained more or less constant through the year. It ranged from 0.02 to 0.03 percent. The overall organic carbon (0.48%), the percentage of nitrogen in the soil ranged between 0.07 to 0.36% .and available potassium (53 to 92 ppm).

Sample collection and identification:

Plant sampling:

The monthly sampling for above ground biomass will be done in a random way in all the 3 parts of the grassland area by harvest method 3 Quadrates will be taken at each sampling site on each sampling date. The clipping of above ground parts will be done closed to the ground with the help of a scissor. The material will be separated species wise.

The below ground plant parts will be collected, by monolith method (weaver and darland, 1949) 3 Monolith of 25 x 25 x 30cm. will be taken at each site on each sampling time.

Soil sample:

Composite soil samples will be collected every month.

Productivity study:

The various parameters of biomass structure and function will be calculated from the sampled plant materials.

Biomass and Primary Productivity:

The productivity for each category of plant materials i.e. live green, standing dead, litter and below ground parts was calculated by summing up of the positive increments of concerned biomass during the study period and was expressed as 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 and Singh, 1971). Total disappearance was obtained by adding litter disappearance and below ground disappearance.

RESULTS AND DISSCUSSION

The green biomass of grasses sedges increased 3.18 gm^{-2} April to a peak value of 73.47 gm^{-2} in November. The total above ground standing dead biomass in site was minimum 2.26 gm^{-2} in July & maximum 79.87 gm^{-2} in November. The total above ground biomass (green dead) in site increased from a minimum of 31.31 gm^{-2} in July to 118.50 gm^{-2} in November .The litter in site increased in September & reached its peak of 68.74 gm^{-2} in November the belowground biomass of both the sites decreased initially in the rainy season & than increased in site the peak value was 256.36 gm^{-2} in January.

The total biomass of site increased 44.11 gm^{-2} in April to 143.10 gm^{-2}in October where as it fluctuated throughout the year. The below ground/ above ground ratio in site ranged

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	5.35	0.32	0.42	0.43	79.36
10 to 20	6.45	0.24	0.53	0.26	66.48
20 to 30	6.80	0.23	0.49	0.98	49.36

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

Month	Live green			Standing dead	Litter	Above ground		Below ground	Total Biomass
	Grasses	Non grasses	Total			Lg + Sd	Lg + Sd + L		
Oct.	44.2	53.49	97.69	27.03	46.36	124.72	171.08	142.07	313.15
Nov.	38.63	36.95	75.58	79.87	68.74	155.45	224.19	159.3	383.49
Dec.	31.68	40.66	72.34	34.94	46.30	107.28	153.58	132.7	286.28
Jan.	38.02	38.72	76.74	60.67	52.86	137.41	190.27	256.36	446.63
Feb.	20.90	45.32	66.22	37.54	43.91	103.76	147.67	107.39	255.06
Mar.	8.63	38.92	47.55	45.44	61.03	92.99	154.02	99.8	253.82
Apl.	3.18	7.60	10.78	33.33	49.50	44.11	93.61	48.30	141.91
May.	2.10	4.19	6.29	40.10	19.30	46.39	65.69	98.50	164.19
Jun.	8.01	2.80	10.81	48.36	--	59.17	59.17	143.06	202.23
Jul.	29.50	27.63	57.13	2.26	--	59.39	59.39	152.49	211.88
Aug.	68.35	33.06	101.41	2.66	--	104.07	104.07	78.39	182.46
Sep.	70.61	49.03	119.64	5.03	22.03	124.67	146.7	200,36	146.7
Oct.	73.45	46.47	119.92	23.16	36.56	143.08	179.64	255.34	434.98
Total	437.26	424.84	862.1	440.39	446.59	1302.49	1749.08	1673.7	3422.78

between 0.32 to 0.78.

Live green biomass (grasses, non grasses and total live green) of the Grazed site and the green biomass did not show any trend. It attained a peak during January and minimum in month of July. The standing dead biomass increased from July (2.26 gm^{-2}) to October (23.16 gm^{-2} and the peak in the month of November (79.87 gm^{-2}). Minimum standing dead biomass was recorded in the month of July (2.26 gm^{-2}).

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 April (44.11 gm^{-2}) and maximum during November (153.94 gm^{-2}).

The litter biomass of the community did not showed any trend. Thereafter the value showed a declined trend minimum in September (22.03 gm^{-2}) and the maximum value (68.74. gm^{-2}) in November. The litter was totally absent in the month of June, July and August.

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 (256.36 gm^{-2}) to April (48.30 gm^{-2}) and the minimum biomass of grazed grassland is 48.30 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 (256.36 gm^{-2}) to April (48.30 gm^{-2}) and the minimum biomass of grazed grassland is 48.30 gm^{-2} and the maximum biomass reached in 255.34 gm^{-2} in October. The total biomass of the community ranges from 141.91 gm^{-2} to 446.63 gm^{-2}. The maximum biomass was observed in January and minimum in the month of April.

The non-grass production showed maximum in the month of October (53.44 gm^{-2}) and minimum in the month of June (2.80 gm^{-2}). The annual non-grass production was found to be 424.84 gm^{-2}/year. The total live green production showed their minimum and maximum value during May (6.29 gm^{-2} and October (119.92 gm^{-2}). Out of the annual net live green production (862.1 gm^{-2}/year) 50.72% was contributed by grasses and 49.28% by non-grasses. The standing dead production was found to be 440.39 gm^{-2}/year.

DISCUSSION

In view of the present findings, the grassed sites is under heavy grassing pressure and will lead to a further degradation of these elements in future but looking to the huge nutrient reservoir in the soil, it appears that these nutrients will not affect the productivity of these grassing land, at least for a few year in future.

The annual net above ground production of this Grazed grassland, it was observed that the present value showed 479.68 gm^{-2}/year. The litter production of the community was evident from January to May and from September to December. No litter production was observed during June, July and August. This may perhaps be due to rapid decomposition of litter.

The rain fall, atmospheric temperature and soil condition were found to be suitable for the growth and development of all species so that September exhibited peak value. Onwards the amount of rain fall, atmospheric temperature along with the soil condition might not be favourable for the growth of vegetation as a result of which a gradual declined in green biomass was observed till to the end of the sampling period.

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