Effect of Mica Dust on Biomass & Productivity of Grasslands of Jharkhand

Ashok Kumar*

Abstract:-The biomass of grassland species on control and polluted grasslands was estimated by harvest method. The primary productivity was determined by method given by Singh and Yadava (1974).

The maximum aboveground standing live biomass of the total community was found to be 843.56 g/m^2 and 346.63 g/m^2 in October on control and polluted grasslands, respectively. The annual net production of the above ground standing live part of the total community was recorded 1097.581 g/m^2/yr. and 393.58 g/m^2/yr. on control and polluted grasslands, respectively. The turnover of aboveground standing live part of the total community was recorded 1.30 and 1.14 on control and polluted grassland, respectively.

The total annual aboveground production of the total community was found to be 1252 g/m^2/yr. on control and 462.22 g/m^2/yr. on polluted grasslands. Thus, mica-dust pollution has reduced 63.08 percent of the total aboveground production of the total community.

The total annual underground production of the total community was reduced by mica dust pollution i.e., 37.11%.

Keywords: Biomass and productivity of Grasslands

Introduction:

The calorific value of different components of *Bothriochloa pertusa, Cynodon dactylon,* other species of the grassland species were estimated in different months on control and polluted grasslands by Bomb calorimeter.

The average energy value on dry weight basis was observed 3333 cal/g on control and 3143 cal/g on polluted grasslands. The maximum aboveground sanding crop of energy was observed 3216.03 Kcal/m^2 (October and 1389.07 Kcal/m^2 (November) on photosynthetic organs of plants trap solar energy had from carbon dioxide and water synthesize energy rich organic compounds. Leaf is the principle photosynthetic part in plants and therefore, Watson (1947) coined the term "Leaf area index" representing leaf area/land area ratio as a criterion for dry matter production rate at different stage of plant growth. The processes of production based on carbon assimilation and absorption of mineral nutrients and their fate in term of flow and absorption of mineral nutrients and their fate in term of energy flow and cycling of minerals through primary producers of green plants, secondary and tertiary producers such as herbivores, carnivores, derivers, microorganisms, study in ecosystem analysis for management purposes. India has been an active participant of many international efforts (International Biological Programme-IBP-1964-74, Man And Biosphere programme-MAB-1974-continuing, special committee on problems of the Environment scope-1974-continuing. United Nations Environment. Sharma and Devi (1987) and Prasad (2009) have studied biomass and production dynamics of different grasslands of India.

This chapter deals with the effect of mica dust pollution on biomass, primary productivity and turnover of control and polluted grasslands of Koderma, Jharkhand.

Material and Methods

(A) Standing Crop Biomass and Primary Production

Estimation of plant biomass was (made at monthly intervals from June, 2008 to June, 2009 by harvest method on control and polluted grasslands. Samplings were done in the last week of each month 25 cm × 25 cm sampling area was found to be the most convenient for biomass estimation. Five monoliths of the size 25 cm × 25 cm × 30 cm were dug randomly for aboveground and underground biomass. Extension of underground parts of herbaceous plants beyond 30 cm depth was rare and negligible on both types of grassland. The, clippings of the aboveground species present in the monoliths, were done by scissors very close to the ground surface separately. The cut species were transferred to polythene bags and transported to laboratory. The species were sorted into standing five and standing dead. The two important dominant species of the grasslands are *Bothriochloa pertusa, Cynodon dactylon* and rest species of the plant community designated as "other

***Shyam Babu +2 High School, Sanyas Ashram, Manpur, Gaya (Bihar)**

species" were separated. The litter present on the ground of the monolith was collected and washed in the laboratory using a sieve to avoid any wastage. The underground plant parts were removed from the soil using a water jet. The plant materials were put in an oven at 80^{0}C for 48 hours and were weighed, Monthly data of the samplings were averaged of different categories and standing crop biomass was expressed in g/m^2 of dry weight. The standard deviation was calculated for all the mean value. The productivity of *Bothriochloa pettusa*, *Cynodon dactylon,* other species and the total community was calculated by the negative differences between successive monthly biomass values (Singh and Yadava, 1974). The monthly values were divided by the number of days in the month and thus productivity values were obtained and expressed in g/m^2/day.

(B) TURNOVER

Dahlman and Kucera (1965) have used the term "turnover" which is built up in one year with respect to the maximum or peak biomass value. It can be calculated as follows:

$$\text{Turnover} = \frac{\text{Maximum biomass-Minimum biomass}}{\text{Maximum biomass}}$$

From the peak biomass the lowest biomass during one year is deducted which apparently gives the annual increment or net production of one year. When this value is divided by the total biomass, it gives a less than one value indicating the fraction that it rebuilt in a year. But in the present investigation the difference of the maximum and minimum values do not give the correct idea of net production because of periodic rise and fall in biomass production throughout the year. Therefore, in present work all positive values of monthly production: are added to get the net increment which divided by the maximum biomass gives the turnover. Thus, turnover may become more than one and can be calculated as formula gives below:-

$$\text{Turnover} = \frac{\text{All positive values of monthly production}}{\text{Maximum biomass}}$$

Results-Monthly variation in the mean standing live biomass (g/m^2) of aboveground parts of *Bothriochloa pettusa*, *Cynodon dactylon*, other species and total community; on control and polluted grasslands are shown in Tables 4.1 and 4.2, Figs. 4.1, 4.2, 4.3 and 4.4.

Table 4.1: Monthly variation in the mean standing live biomass (g/m^2±S.D.) of aboveground part of *Bothriochloa pertusa, Cynodon dactylon,* other species and total community on control grassland (2008-2009).

Month	*Bothriochloa pertusa*	*Cynodon dactylon*	Other species	Total community
June	90.40 ±12.45	21.92±2.08	1.03±0.43	113.35±14.96
July	394.08±50.65	71.20±6.69	2.14±0.31	467.42±57.65
August	486.56±96.81	133.12±14.02	14.31±2.17	633.99±113.01
September	552.32±110.42	199.82±26.05	12.09±2.18	764.23±138.65
October	589.28±122.23	240.32±29.34	13.96±2.87	843.56±154.44
November	211.52±043.14	62.48±8.04	9.90±1.48	283.90±52.64
December	108.96±24.39	22.72±2.95	5.77±0.59	137.45±27.93
January	237.28±49.52	71.84±5.65	2.54±0.39	311.66±55.56
February	363.52±79.56	98.08±8.27	4.38±1.17	465.98±88.98
March	218.40±48.32	73.68±7.04	2.15±0.75	294.23±56.11
April	104.32±24.17	37.92±2.98	3.18±0.53	145.42±27.68
May	53.12±12.11	21.44±2.64	2.59±0.40	77.15±15.15
June	79.38±16.33	34.16±3.03	2.45±0.59	115.99±19.95

Table 4.2: Monthly variation in the mean standing live biomass (g/m^2±S.D.) of aboveground part of *Bothriochloa pertusa, Cynodon dactylon,* other species and total community on polluted grassland (2008-2009).

Month	*Bothriochloa pertusa*	*Cynodon dactylon*	Other species	Total community
June	32.48±5.21	12.48±1.78	11.86±2.73	56.82±9.72
July	79.84±15.97	28.56±6.12	29.52±7.12	137.92±29.21
August	198.72±41.68	57.61±8.69	46.23±9.06	302.56±59.43
September	217.28±59.15	65.12±9.98	50.66±8.62	333.06±77.75
October	230.72±62.34	67.52±11.38	48.39±11.49	346.63±85.21
November	87.04±24.45	38.18±4.98	13.84±2.36	139.06±31.79
December	46.72±10.64	14.72±1.59	11.31±1.82	72.75±14.05
January	97.44±26.39	28.12±3.77	10.71±1.59	136.27±31.75
February	103.68±27.78	34.24±3.91	14.12±4.02	152.04±35.71
March	95.32±26.84	33.76±3.67	7.21±3.01	136.29±33.52
April	73.76±18.89	13.92±1.59	5.05±1.06	92.73±21.54
May	20.80±5.04	5.13±1.82	2.24±0.26	28.17±7.12
June	35.74±6.88	11.16±4.61	5.56±1.02	52.46±12.51

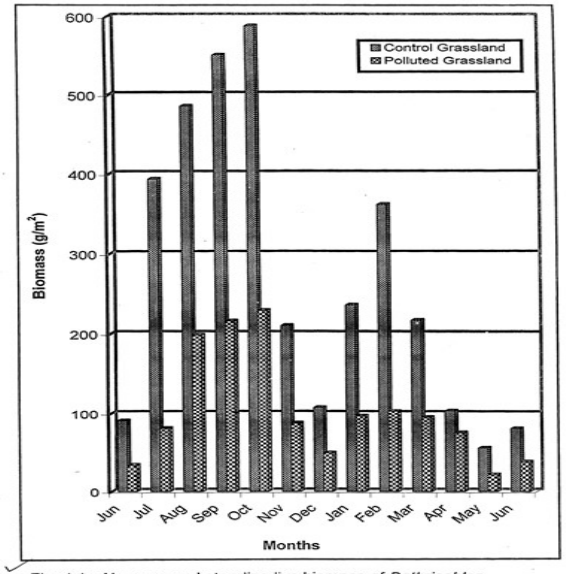

Fig. 4.1 : Aboveground standing live biomass of *Bothriochloa pertusa* on control and polluted grasslands (2008-2009).

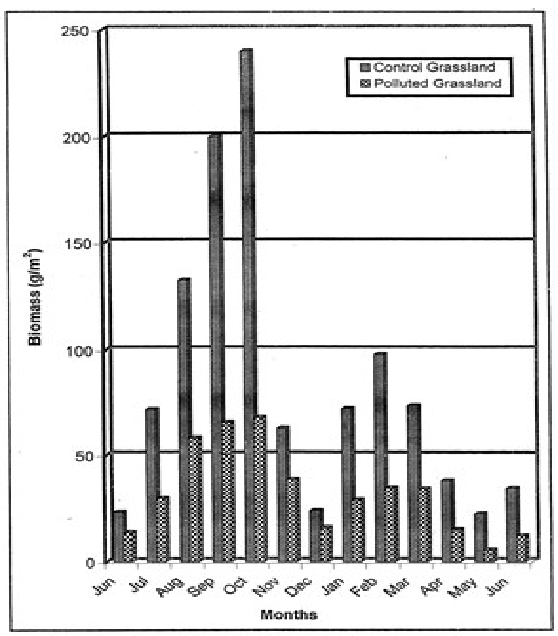

Fig. 4.2 : Aboveground standing live biomass of *Cynodon dactylon* on control and polluted grasslands (2008-2009).

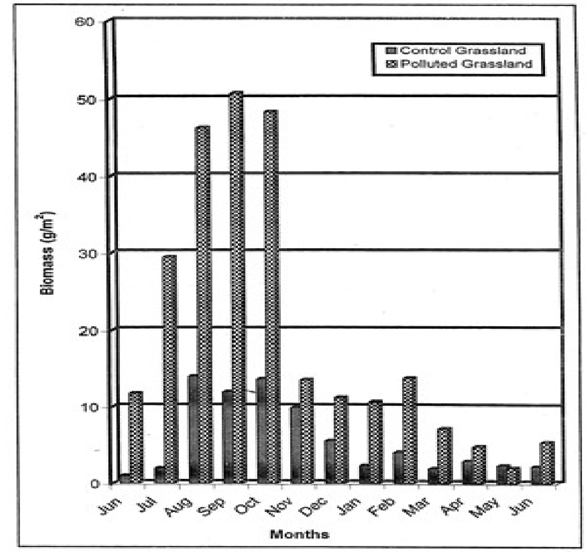

Fig. 4.3 : Aboveground standing live biomass of other species on control and polluted grasslands (2008-2009).

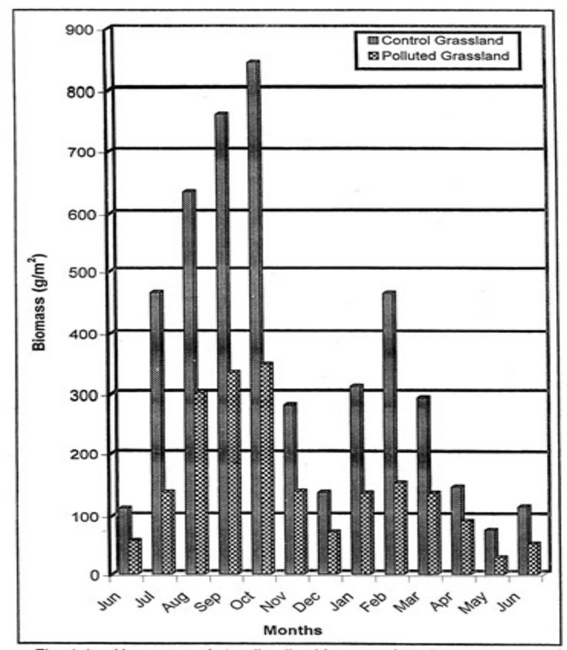

Fig. 4.4 : Aboveground standing live biomass of total community on control and polluted grasslands (2008-2009).

Bothriochloa pertusa

The biomass of *Bothriochloa pettusa* started to increase and then there was continuous decrease in the winter and summer seasons except in January and February on control and polluted grasslands. The peak biomass was observed as 589.28±122.23 g/m^2 and 230.72±62.34 g/m^2 on control and polluted grasslands, respectively in the month of October. The minimum biomass was recorded as 53.12±12.11 g/m^2 and 20.80±5.04 g/m^2 in the month of May on control and polluted grassland, respectively (Tables 4.1 and 4.2, Fig. 4.1) grasslands. The higher productivity of the present grassland was probable due to dominance of *B. Pertusa*.

Acknowledgement

Authors are thankful to the Principal, Nalanda College, Bihar Sharif Nalanda, Bihar for providing laboratory and library facilities.

References

- Bisht, N.S. and Gupta, S.K. (1985). Dry matter dynamics in a grassland community at the foothills of Garhwal Himalayas. Indian Journal of Ecology 12 (2): 200-204.
- Misra, M.K. and Misra, B.N. (1984). Biomass and primary, production in an Indian grassland. Tropical Ecology 25: 239-247.
- Murphy, P.G. (1975). Net primary productivity in tropical terrestrial ecosystem. In primary productivity of the Biosphere, pp. 217-231. Edited by H. Lieth and R.H. Whittaker Springer, New York.
- Pandey, D.D. and Sant, H.R. (1980). The plant biomass and net primary production of the protected and grazed grasslands of Varanasi. Indian Journal of Ecology 7 (1): 77-83.
- Singh, J.S. and Yadava, P.S. (1974). Seasonal variation in composition, plant biomass, and net primary productivity of a tropical grassland at Kurukshetra, India. Ecological Monographs 44: 351-376.
- Tripathi, J.S. (1970). Monthly variation in the standing crop, net production, nutrient content of the species and plant decomposition in grassland at Varanasi, Ph.D. thesis, Banaras Hindu University; Varanasi. India.

***

भारत में ग्रामीण परिवेश निवेश और उनके परिणाम

डॉ. धीरज कुमार पासवान *

शिक्षा सामाजिक–आर्थिक व्यवस्था का अनिवार्य हिस्सा है और इसका समाज के साथ बहुत अंतरंग संबंध है। यह अपेक्षाकृत बड़ी प्रणाली की एक उप–प्रणाली है। ये दोनों ही एक–दूसरे को बनाए रखने में एक–दूसरे की मदद करती है। शिक्षा को विकास का कारक और नतीजा दोनों माना जा सकता है। अल्पविकसित देशों में औपचारिक शिक्षा को आर्थिक विकास के निवेश के रूप में लिया जाता है, इसलिए काफी अधिक मात्रा में इसको वित्तीय सहायता दी जाती है। समष्टि स्तर पर किए गए अध्ययन (बेनेट 1967, पारिक 1982, विश्व बैंक, 1980 अ, 1980 ब) और व्यष्टि स्तर (माइक्रो लेवेल) पर किए गए अध्ययन (मार्टिन 1982, मेंडिस 1981, मोरइरा 1960, नैक्ष 1965) से इस बात के संकेत मिलते हैं कि विकास प्रक्रिया में स्कूल की शिक्षा काफी महत्वपूर्ण कारक हैं, जो कि इनके बीच का यह संबंध काफी जटिल और संश्लिष्ट होता है। इस क्षेत्र में अनुसंधान की दिलचस्पी पिछले दो दशकों में काफी बढ़ी है और हाल में इससे संबंधित साहित्य की समीक्षा से भी यह बात जाहिर होती है। (कालक्लोक 1982) ग्रामीण परिवारों, जनसंख्या और ग्राम समुदायों के आधार पर किए गए वर्तमान अध्ययन में इस दुहरे संबंध के एक पहलू पर ध्यान दिया गया है यानी औपचारिक शिक्षा का हमने परिवर्तन के कारक के रूप में इस आलेख में अध्ययन किया है। इसको हमने सामाजिक व्यवस्था का परिणाम उतना नहीं माना है जैसा कि कुछ दूसरे विद्वान मानते हैं। (कारनॉय 1970, क्लिगनेट और फास्टर 1967, डंकन 1967, मिल्स 1959, स्पैंडी 1967) इस विषय पर ध्यान केंन्द्रित करने की वजह विकास की वह अवस्था है यानि जिस जगह हम आज हैं तथा निवेश की वह मात्रा, जो शिक्षा समेत विभिन्न ग्राम विकास के कार्यक्रम में लगाई जा चुकी है।

विकास के अनेक कार्यक्रमों में साक्षरता और शिक्षा की भूमिका को रेखांकित किया जाता है। यह दृष्टिकोण इस मान्यता पर आधारित है कि शिक्षा के जरिए कर्मचारियों में ऐसा कौशल पैदा किया जाता है जो सरल आधारभूत ढाँचे वाले उत्पादन के बजाय अनेक सेक्टरों वाली जटिल अर्थव्यवस्था के लिए जरूरी होता है। दूसरे शब्दों में यह माना जाता है कि शिक्षा बाहरी पर्यावरण पर नियंत्रण का

*एम.ए., पीएच.डी., इतिहास, बी.आर.ए. बिहार विश्वविद्यालय, मुजफरपुर