Effect of Mica Dust on Energy Conserving Efficiency of Grassland

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Abstract:

It is the ration of output of calories captured by vegetation on input i.e. solar radiation in a unit area over a certain length of time. Data of solar radiation at Koderma, Jharkhand is not available because there is no any recording centre. The Additional Director General of Meterological (Research) Pune has provided solar radiation data for Patna which is the nearest station to get the approximate solar radiation incident at Koderma, Jharkhand (Table 5.7). Only 43 percent of solar radiation is used for calculating energy conserving efficiency because 57 per cent of the total radiation which is in ultraviolet .and infrared portion of the spectrum is not utilized by the plants in photosynthesis (Sziecz, 1966). Biomass values of different components in different months were multiplied by the caloric value of the plant material. Thus energy structure was obtained in the forms of Kcal/m^2. Now net production was obtained by differences between the successive months.

Keywords: Energy conserving efficiency of Grassland

Introduction:

Ecological energetic is the study of energy transformation within ecosystem (Phillipson, 1966). The function of green plants is mainly concerned with the conversion of solar energy into potential energy constituting the source of food for all the heterotrophs. The total amount of energy fixed by green plants is called as "Gross Production". Some of this is used in respiration and the rest accumulated in the new biomass (trophic level) is called "net primary production."

Calorific value, energy content, flow of energy and ecological conserving efficiency of terrestrial plant communities have been made by various investigators. Pandey, 1977; Pandey and Sant, 1979; Kumar and Joshi, 1980; Lamotte and Bourliere, 1983; Rao et al. 1984, Singh et al. 1985; Lakshmanchary, 1987; Karunaichamy and Paliwal 1987; Singh, 1988;. Dubey, 2002; Prashant et al. 2008; Prasad, 2009).

This chapter deals with energy dynamics of control and polluted grasslands species of Koderma, Jharkhand.

Material and Methods

I. Calorific Value

The caloric values were estimated from Samples collected in different months of the year 2008-2009 on control and polluted grasslands.

(a) Sampling of Plant Materials.

Sampling of plant material (*Bothriochloa pettuse*, *Cynodon dactylon*, other species) was sorted in standing live, standing dead, litter and underground. Sampling was made at interval of one month from June, 2008 to June, 2009 on the control and polluted grasslands.

(b) Drying

The samples were dried for 48 hrs. at 80ºC until the weight of samples became constant.

(c) Milling and Pelleting

The dried materials were powdered and stored in plastic bags; dosed and labelled with sample number. Pellets of powdered samples were prepared by compressing it in a pellet press. In order to avoid incomplete combustion the weight of pellets were kept below one gram varying between 0.6 to 0.9 g. Dry weight of pellets were taken before the combustion of each sample.

(d) Estimation of Calorific Values.

Calorific values of plant samples were estimated by Parr Oxygen Bomb calorimeter. Weighed pellets were plaoed in the ignition cup of the bomb with the help of a nickel chromium fuse wire.

(f) Acid Correction

Another, minor source of error is the formation of acids primarily nitric and sulphuric ones following combustion of organic compound under pressure.

RESULTS

Monthly variation in the mean caloric value (cal/g) on dry weight basis of aboveground part (standing live and standing dead), underground part of *Bothriochloa pertusa*, *Cynodon dactylon*, other species and litter of total community on control and polluted grasslands are given in Tables 5.1 and 5.2) ***Bothriochloa pertusa***

Table 5.1 : Contd...........

Month	Other species			Litter	Average
	Standing live	Standing dead	Underground		
July	3383	3584	2833	2634	3181
August	3584	3471	3106	2803	3231
September	3637	3613	3318	2908	3264
October	3814	3691	3393	2794	3345
November	3823	3760	3251	2964	3352
December	3835	3952	3326	3118	3518
January	3652	3778	3650	3039	3645
February	3769	3878	3034	2928	3461
March	3524	3540	2985	2860	3285
April	3441	3474	3170	2995	3320
May	3271	3384	3093	2861	3248
June	3376	3234	2818	2982	3145
Average	3575	3613	3164	2907	3333

Table 5.1: Monthly variation in the mean calorific value (cal/g) dry weight or aboveground standing live, standing dead, underground part of *Bothriochloa pertusa, Cynodon dactylon*, other species and litter on control grassland (2008-2009).

Month	*Bothriochloa pertusa*			*Cynodon dactylon*		
	Standing live	Standing dead	Underground	Standing live	Standing dead	Underground
July	3228	2933	2333	3574	3295	3422
August	3264	2999	2999	3654	3001	3430
September	3166	3050	2950	3294	3300	3355
October	3031	3246	3046	3501	3534	3407
November	3391	3369	3069	3211	3756	3127
December	3400	3465	3201	3789	3994	3178
January	3829	3606	3536	4135	3758	3467
February	3449	3425	3070	4021	3626	3411
March	3194	3354	3236	3371	3460	3333
April	3239	3289	3304	3635	3407	3249
May	3205	3184	3189	3838	3292	3166
June	3202	2863	2763	3600	3411	3210
Average	3304	3231	3108	3635	3480	3312

Table 5.2: Monthly variation in the mean calorific value (cal/g) dry weight or aboveground standing live, standing dead, underground part of *Bothriochloa pertusa*, *Cynodon dactylon*, other species and litter on polluted grassland (2008-2009).

Month	*Bothriochloa pertusa*			*Cynodon dactylon*		
	Standing live	Standing dead	Underground	Standing live	Standing dead	Underground
July	3122	2852	2728	3127	3039	3153
August	3287	2950	2500	3255	3964	2773
September	3147	3296	2444	3397	3932	2926
October	3573	3534	2581	3495	3034	3108
November	3496	3620	2788	3146	3133	3263
December	3841	3634	3088	3072	3233	3468
January	3550	3371	3433	3804	3569	2945
February	3438	3235	2932	3378	3353	3078
March	3601	3264	3029	3356	3108	2584
April	3155	3171	3022	3536	2945	3181
May	3303	3023	3011	3609	3125	2961
June	2876	2786	3110	3334	2867	2526
Average	3365	3228	2888	3375	3108	3010

ABOVEGROUND STANDING LIVE

The maximum energy content was found to be 382-9 cal/g in January on control and 3841 cat/g in December on polluted grasslands. The minimum values were noted 3031 cal/g in October in control and 2876 cal/g in June on polluted grasslands (Table 5.1 and 5.2).

ABOVEGROUND STANDING DEAD

The highest energy content was recorded 3606 cal/g In January on control and 3634 cal/g in December on polluted grasslands. The lowest values were found 2863 cal/g on control and on polluted grasslands i.e. 2786 cal/g in the month of June (Tables 5.1 and 5.2).

UNDERGROUND

The maximum underground energy 'Content was estimated 3.536 cal/g in January on control and 3433 cal/g in January on polluted grasslands. The lowest values were found lobe 3763 cal/g in June on control and 2444 cal/g in September on polluted grasslands. (Tables 5.1 and 5.2).

Cynodon dactylon

ABOVEGROUND STANDING LIVE

The maximum energy content was found to be 4135 cal/g in January on control and 3804 cal/g in December on polluted grasslands. The minimum values were recoded 3211 cal/g in: November on contror-and 3072 cal/g in November on polluted grasslands (Tables 5.1 and 5.2).

ABOVEGROUND STANDING DEAD

The maximum energy content was found 3924 cal/g in December on control and 3569 cal/g in January on polluted grassland is. The minimum was found to be 3001 cal/g in August on control and.2867 -cal/gin June on polluted grasslands (Tables 5.1 and 5.2).

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