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IMPROVEMENT OF NATIVE PASTURES WITH *STYLOSANTHES HUMILIS* H.B.& K. IN SEMI-ARID REGIONS

C.B. SINGH, S.R. GUPTA and J.N. GUPTA

Indian Grassland and Fodder Research Institute, Jhansi 284003

ABSTRACT

Under various cultivation and grazing treatments, Townsville stylo (*Stylosanthes humilis* H.B. & K.) *Sehima-Dichanthium* contributed substantially to the productivity of native grasses pasture at all the sites. Grazing helped better utilization of the grass herbage at the early stages of growth and promoted vigorous stylo growth by eliminating competition from the native grasses. Cultivation increased the overall site productivity, especially the stylo and its proportion in the herbage at the grazed sites. Unlike stylo, the production of native grasses was more stable on the ungrazed sites. The association between grass biomass and stylo was significantly negative due to vigorous growth of grass on ungrazed uncultivated sites. Such association was non-significant on the cultivated or grazed sites.

INTRODUCTION

The dominant grass cover in Central India is *Sehima-Dichanthium* type (Dabadghao and Shankarnarayan, 1973). A few perennial grasses produce bulk of the herbage and the legume component is poor in composition and quality. The quantity and quality of the herbage from native grasslands can be improved through the introduction of suitable tropical legume like *Stylosanthes humilis* which is a highly drought tolerant, persists well under grazing stress and can establish on low fertility soils in seasonally dry to sub-humid climates (Edye and Cameron, 1975; Gillard, 1979). The stylo has heavy seeding capacity and being an annual, it completes its life-cycle before the onset of severe drought or cold season (Skerman, 1977). It is, however, slow to establish during the early establishment phase, but progressively builds up a sizeable population in subsequent generations (Skerman, 1977). Considering stylo as a possible ideal introduction in the native pasture of the *Sehima-Dichanthium* cover, a field experiment was conducted to investigate its performance.

MATERIAL AND METHODS

The experiment was conducted at in 2ha area of the Central Research Farm, 16FRI, Jhansi (78°E, 25°N and 275 m altitude semi-arid, Central India). During the growing season (June to October in 1975-77), rainfall ranged between 900-1100 mm., the mean monthly maximum temperature between 42°C (June to 29°C Oct) and the minimum temperature ranged between 31°C (July) to 15°C (Oct).

Within the grazed sites 1 and 4 as also within ungrazed sites 3 and 2, the grass yields were similar, but cultivation significantly increased the stylo yield and hence the total yields of sites 1 and 3 excelled over those of the uncultivated sites 4 and 2, respectively (Fig. 1). The increase in the site productivity at the grazed and ungrazed sites separately was, therefore, dependent on stylo component which showed a significant positive response to cultivation treatment. The favourable response of stylo to cultivation was earlier reported by Winkforth and Muller (1972).

Table 1 X^2 Test for inter-site variation in the frequency distribution of quardrats showing different grades of proportion of components in quadrat yield.

COMPONENTS	GRADES				TOTAL X^2
	LOW	MEDIUM	HIGH	VERY HIGH	
STYLO					
Site 1 (48)	(12)	(9)	(10)	(17)	
X^2	2.00	0.36	0.11	12.9	15.37
Site 2 (52)	(36)	(8)	(7)	(1)	
X^2	13.72	1.17	2.55	6.02	23.46
Site 3 (30)	(13)	(12)	(4)	(1)	
X^2	0.26	3.98	1.49	2.72	8.45
Site 4 (42)	(4)	(10)	(21)	(7)	
X^2	8.81	0.00	8.32	0.01	17.20
Total X^2	24.79	5.51	12.47	21.71	64.48
GRASSES					
Site 1 (48)	(29)	(9)	(4)	(6)	
X^2	20.50	2.03	2.69	2.77	28.04
Site 2 (52)	(1)	(11)	(13)	(27)	
X^2	12.7	1.40	1.20	16.10	31.4
Site 3 (30)	(3)	(14)	(7)	(6)	
X^2	3.12	2.80	0.35	0.23	6.5
Site 4 (42)	(13)	(18)	(8)	(3)	
X^2	0.36	2.21	0.00	5.08	7.65
Total X^2	36.68	0.49	4.24	24.18	73.59
OTHER LEGUMES					
Site 1 (48)	(35)	(10)	(2)	(1)	
Site 2 (52)	(40)	(2)	(2)	—	
Site 3 (30)	(26)	(2)	(2)	—	
Site 4 (42)	(41)	(1)	—	—	

Significant at 5%

Significant at 1%

Figures in parentheses indicate quadrat number at different sites and grades.

The X^2 test (Table 1) indicated that the inter-site variations in the distribution of quadrats with different grades of proportion of grass and stylo components in yield differed highly significantly with the different treatments of cultivation and grazing. (Table 1). The smothering effect of grass on the yield of stylo was expressed as a significant negative correlation at this site (Table 2). A similar significant negative correlation between the grass and stylo yield was observed by Mc Cown et al. (1977) who concluded that edaphic factors influenced these components via competition with tall growing perennial grasses.

Stylo responded most favourably to a combined treatment of cultivation and grazing at site 1 where it produced significantly higher yield as compared to any other sites. Despite depletion of grass herbage through grazing, the remainder of the standing biomass at site 1 was not significantly different from the ungrazed site 2. The X^2 test (Table 1) indicated that a significantly high frequency of quadrats at site 1 possessed high proportion of stylo and low proportion of grass whereas a reverse situation existed at the uncultivated-ungrazed site 2. It was further observed that lower total biomass productivity of site 1 as compared to the most productive site 3 was also due to the depletion of grass herbage on account of grazing at the former site. It is inferred that the productivity of the cultivated site is not adversely affected by grazing. Fisher (1973), and Ive and Fisher (1974) also observed that grazing reduced the proportion of grass component without greatly affecting the total dry matter productivity in a grass-stylo pasture.

The native legumes had very little contribution to the total biomass on the uncultivated sites and their productivity increased significantly with cultivation (Fig.1). A combination treatment of cultivation and grazing at site 1 maximised the production of all the legumes (including stylo).

The total and partial correlations between the biomass of native legume and stylo were negative and highly significant at all the most productive site 3, and was insignificont at other sites. Absence of grazing encouraged significant negative association of stylo with grass at the uncultivated site 2 and with native legume at the cultiuated site 3. By contrast, the intra-site variations in the quadrat yield of all the three components were completely independent of each other at all the grazed sites.

Conclusively, inclusion *of S. humilis* would improve the overall productivity and quality of native pastures. Cultivation of pasture before seeding with stylo would substantially increase the productive value of pastures particularly on the grazed sites.

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