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STUDIES ON THE YIELD AND QUALITY OF GUINEA GRASS (PANICUM MAXIMUM, J) AS AFFECTED BY DIFFERENT SPACINGS WITH AND WITHOUT LEGUMES AS INTERCROPS

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A strong fodder based agriculture is essential for any cattle development programme. Under the existing conditions of Kerala, the only alternative open to cope up with the fodder deficit, is increasing the per hectare production of quality fodder. For getting high tonnage and high quality fodder, there appears to be nothing better than intercropping of protein rich leguminous crops with a widely adapted fodder grass. The beneficial effect of mixing grass and legume has been reported by many workers (Singh and Sogani 1968 and Chandan, *et al*, 1971). The experiments at IGFRI showed that mixed sowing of *M. P. Chari* and cowpea not only increased the green fodder yield but also increased the crude protein content of forage from 4.9 per cent of Chari to 7.5 per cent for the mixture (Anon, 1972).

As *a* pure crop guinea grass is grown extensively in Kerala. But limited scientific information is available about its performance in association with legumes. Therefore a field experiment has been conducted at the College of Agriculture, Vellayani, Kerala State, to study the performance of guinea grass under different spacings, with and without legumes in the inter row spaces. The Crude protein contents of guinea grass and component crops were also found out to assess the quality of guinea grass grown mixed with legume crops.

Materials and Methods

The experiment was laid out in the red loam soils from October 1975 to September 1976. The soil contained 0.05432% total nitrogen, 0.00209% available P_2O_5 and 0.00065% available K,0 with a pH of 5.1. The treatments consisted of three spacings and three levels of intercropping, (Vide Table 1)

The experiment was laid out as factorial experiment in randomised block design with three replications. Nitrogen at the rate of 200 kg/ha in the form of ammonium sulphate, phosphorus at the rate of 50 kg/ha in the form of super phosphate and potash at the rate of 50 kg/ha in the form of muriate of potash were applied to all plots. A uniform basal dose of form yard manure at the rate 10 tonnes/ha was also applied and well incorporated into the field. Healthy guinea grass slips with roots, separated from the old clumps were used for planting. Ridges of 15 cm. height were prepared and slips at the rate of

3 per hill were planted on the ridge giving row spacing as per the treatments. Among the two inter crops, cowpea seeds were sown in between guinea grass rows at the rate of two seeds per hole, and stylosanthes were sown in between guinea grass rows at the rate of 4 seeds per hole. Eight cuts of guinea grass were taken at 30—35 days interval coinciding with abundant growth or flowering stage. The plant samples of guinea grass and component legumes after each cut were taken and total nitrogen content was determined by modified micro-Kjeldahl method and crude protein content was calculated by multiplying the nitrogen content by the factor 6.25.

Results and Discussion

The performance of guinea grass under different treatments was assessed in terms of green fodder yield and the data are presented in Table 1 (a), (b) and (c). The average protein contents of guinea grass and component crops at each harvest are presented in Table 2 (a) & 2 (b) respectively

Table 1 (a) Green fodder yield of guinea grass (in t/ha) due to different levels of spacing and intercropping

Treatments	1st cut	2nd cut	3rd cut	4th cut	5th cut	6th cut	7th cut	8th cut	Mean
Spacing									
40 X 20 cm	9.015	4.779	2.595	4.609	6.9S1	7.221	7.465	7.173	6.230
60 X 20 cm	8.482	4.518	2.392	4.419	6.705	6.853	7.194	6.J5S	5.877
80 X 20 cm	8,396	7.396	1.886	3,890	6.297	6.418	6.884	5.856	5,316
'F' Test	Sig.	Kg.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	
C. D. (0.05)	0.464	0.242	0.178	0.284	0.223	0.439	0.621	0.492	
Intercropping									
No intercrop	8.374	4.382	2.299	4.336	6.647	6.860	7.178	6.483	5.820
Cowpea	8.190	4.549	2.245	4.305	6.675	6.789	7.036	6.541	5.791
Stylosanthes	8.330	4,469	2.320	4.344	6.662	6.843	7.129	6.464	5.820
'F' Test	N. S.	N.S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	

It is seen that the green fodder yield of guinea grass was maximum in closer spacing of 40 x 20 cm. This trend was noticed in pure as well as inter-cropped conditions. The highest yield of green fodder in closer spacing

(40 X 20 cm) may be due to the maximum plant population. Similar increase in yield of guinea grass in closer spacing was obtained at Vellayani, Kerala (Anon, 1975.a). Increased fodder yield in closer spacing was observed by Dungan, *et al* (1954) and Patel (1963). The data further revealed that the green fodder yield of guinea grass was not adversely affected by inter cropping either with cowpea or stylosanthes in between guinea grass rows. This observation is in agreement with the findings of Prasad and Choudhary (1975), who noticed no adverse effect to the principal crop by legume intercrop in grass legume association.

Table 1 (b) Green fodder yield of guinea (in t/ha) due to the effect of treatment combinations

Treatment combinations	1st cut	2nd cut	3rd cut	4th cut	5th cut	6th cut	7th cut	8th cut	Mean
S_1O	8.996	4.811	2.671	4.684	6.956	7.221	7.633	7.164	6.267
S_1C	8.788	4.831	2.557	4.684	6.994	7.164	7.314	7.301	6,204
S_1S	9,261	4.697	2.557	4.659	6.994	7.278	7.448	7.055	6.244
S_2O	8.565	4.335	2.357	4.419	6.734	6.902	7.167	6.439	5.865
S_2C	8.397	4.65]	2.378	4.419	6.711	6.839	7.218	6.455	5.883
S,S	8.484	4.567	2.441	4.419	6.671	6.818	7.197	6.481	5.885
S_3O	7.560	4.001	1.870	3.906	6.250	6.458	6.734	5.845	5.328
S_3C	7.386	4.107	1.800	3.811	6.321	6.363	6.576	5.866	5.286
S_4S	7.244	4.143	1.989	3.953	6.321	6.434	6.742	5.856	5.335
C.D. (0.05)	0.808	0.424	0.307	0.498	0.390	0.759	1.075	0.855	

Table 1 C Total green fodder yield (in t/ha) of guinea grass (8 cuts)

Spacing	Inter crop			
	No inter crop	Cowpea	Stylosanthes	Mean
40 X 20 cm	50.135	49.498	49.749	49.794
60 X 20 cm	46.920	47.070	47.078	47,023
80 X 20 cm	42.308	42.291	42.682	42.427
Mean	46.454	46.286	46.503	46.415

'F' test significant for spacing. CD (0.05) fur marginal means — 1.039
CD (0.05) for combinations 1.798

Table 2 (a) Crude protein content (%) of guinea grass

Treatment	1st cut	2nd cut	2rd cut	4th cut	5th cut	6th cut	7th cut	8th cut	Mea;>
Spacing									
40 X 20 cm	12.09	11.32	8.49	10.56	11.00	12.52	12.20	12.20	11.30
60 X 20cm	11.98	11.32	8.28	13.22	11.22	12.30	12.20	12.41	11.37
80 X 20cm	12.09	11.54	8.3S	11.32	11.11	12.41	11.93	12.20	11.38
'F' lest	N.S	N.S	N.S	Sig.	N.S	N.S	N.S	N.S	N.S
Intercropping									
No intercrop	11.65	11.0	8.28	11.00	11.00	12.20	11.43	11.98	11.07
Cowpea	12.52	11.87	8.61	11.21	11.11	12.74	12.85	12.85	11.72
Stylosanthes	11.98	11.32	8.28	10.89	11.22	12.30	12.09	11.98	11.16
'F' test	Sig	Sig	N.S	N.S	N.S	N.S	Sig	Sig	
CD (0.05)	0.424	0.396	0.664	0.630	04.38	0.564	0.562	0.445	

Table 2 (b) Crude protein content (%) of component crops

Spacing of guinea grass	Cowpea 1st cut	Cowpea 2nd cut	Stylosanthes
40 X 20 cm	18.90	19.21	15.30
60 X 20 cm	19.63	19.9?	14.90
80 X 20 cm	19.13	19.16	15.40
'F' test	N,S	N.S	N.S
C.D (0.05)	1.438	1.402	0.730

The data on the protein content revealed that the crude protein content of guinea grass was neither adversely affected nor significantly increased by different spaclngs. This is in agreement with the findings of Tiware *et a!* (1975) and Anon (1975.b) in hybrid napier Because of inter cropping an increase in crude protein content of guinea grass was observed to the extent of 0.65 percentage by cowpea and 0.09 percent by Stylosanthes. However, the increass was not statistically significant. The observation that the crude protein content in the third cut was the lowest as compared to other cuts, may be due to the

increase in cutting intervals (89 days). According to Kothandaraman *et at* (1973) and Balasundaram *et al* (1975) the crude protein content was maximum in 30 days interval of cutting and decreased with increase in age of the crop.

Summary

An experiment was conducted at the College of Agriculture, Vellayani, Kerala to study the performance of guinea grass under different spacings with and without legumes as intercrops, The studies revealed that the green fodder yield of guinea grass was maximum in closer spacing ot 40 × 20 cm. It was also revealed that the green fodder yield of guinea grass was not adversely affected by intercropping of cowpea or stylosanthes in between guinea grass rows. The studies revealed that the protein content of guinea grass was not significantly in fluenced either by spacing or by the different intercrops. It was also found that increase in the cutting interval (age of crop) will reduce the protein content.

സംഗ്രഹം

വിവിധ അകലങ്ങളിൽ ഗിനിപ്പുല്ല് കൃഷി ചെയ്യുന്നതുകൊണ്ടും, ഗിനിപ്പുല്ലിനിടയ്ക്ക് പയർവർഗ്ഗ വിളകളം ഇടവിളയായി കൃഷി ചെയ്യുന്നതുകൊണ്ടും ഗിനിപ്പുല്ലിനുണ്ടാകുന്ന ഗുണ ദോഷങ്ങളെ തിട്ടപ്പെടുത്തുന്നതിനായി ഒരു പരീക്ഷണം വെള്ളായണി കാർഷിക കോളേജിൽ നടത്തുകയുണ്ടായി. പഠനങ്ങളിൽ നിന്നും 40 x 20 സെ: മീറ്റർ അകലത്തിൽ നടുന്നതാണ് പരമാവധി കൂടുതൽ വിളവ് കിട്ടുന്നതിനു നല്ലതെന്നു കാണുകയുണ്ടായി. കൂടാതെ ഇടവിളയായി സാധാരണ പയറോ, സ്റ്റൈലോസാന്തസ്സ് എന്നയിനം പയറോ നടുന്നതുകൊണ്ട് ഗിനിപ്പുല്ലിന്റെ വിളവിനെ ഒരു വിധത്തിലും ദോഷമായി ബാധിക്കുകയില്ലെന്നും മനസ്സിലാകുകയുണ്ടായി. ഇടവിളകളം നടുന്നതുകൊണ്ടോ, നടുന്ന അകലം വ്യത്യാസപ്പെടുന്നതുകൊണ്ടോ, ഗിനിപ്പുല്ലിന്റെ പ്രോട്ടീൻ അംശം വർദ്ധിക്കുന്നില്ലായെന്നതാണ് പഠനങ്ങളിൽ നിന്നും മനസ്സിലായ മറ്റൊരു വിവരം. അതേസമയം ഗിനിപ്പുല്ലിന്റെ പ്രായം കൂടുന്തോറും പ്രോട്ടീൻ അംശം കുറഞ്ഞു വരുന്നതായും മനസ്സിലാകുകയുണ്ടായി.

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