Agric, Res. J. Kerala, 1985. 23 (2) 196—199

FODDER PRODUCTION POTENTIAL OF GRASS LEGUME MIXTURES AS INFLUENCED BY PHOSPHORUS LEVELS*

Grasses like guinea, setaria, congosignal and legumes like stylosanthes and centrosema are the common forages grown in the dairy farmer's holdings in Kerala. Results from the All India Co-ordinated Project for Research on Forage Crops at Vellayani revealed that guinea grass when grown mixed with cowpea and horse gram increased total forage production than when grown alone (Anon., 1978). Increased herbage yield of setaria–clover sward with increased application of super-phosphate was also reported by Suttie (1970).

To study the fodder production potential of grass-legume mixtures under different levels of phosphorus, an experiment was conducted in the Instructional Farm attached to the College of Agriculture, Vellayani, Trivandrum during the year 1979-80. A 3^3 partially confounded factorial experiment was laid out with 27 treatment combinations (3 grasses viz., guinea, setaria, congosignal; 3 cropping patterns viz., intercropping with stylosanthes, centrosema and no intercropping; and three levels of phosphorus, 80, 120, 160 kg P_2O_5/ha). The soil wasred loam with a pH of 4,9 containing 0.138 per cent total nitrogen, 0.00405 per cent available P_2O_5 and 0.0028 per cent available K_2O. Uniform doses of nitrogen and potassium were given to the crop. Young and healthy grass slips were planted at the rate of 3 slips/hill at a spacing of 40x20 cm. *Rhizobium* treated seeds of stylosanthes and centrosema at the rate of 2,5 kg/ha were dibbled in between grass rows.

The data relating to various yield attributes, green fodder and dry fodder yield are presented in Table 1 and Table 2. Results showed that height of grasses significantly increased in mixed stands of grasses and the effect was more when the grasses were mixed with *Centrosema pubescens* (68.7 cm) but it was on par with *Stylosanthes guianensis* (67.1 cm). Legumes being spreading in nature, cover the entire interspaces of grasses and compete with grasses for solar radiation which resulted in the production of taller grasses. Application of phosphorus upto 120 kg P_2O_5/ha significantly increased the height of grasses. The number of tillers were less in legume intercropped plots. Increased plant density might be responsible for the reduction in tiller number (Harkess, 1970). Among the grasses congosignal produced maximum tillers (24.40).

Green fodder yield of grasses and legumes showed that intercropping, significantly increased the fodder yield. Grasses intercropped with stylosanthes recorded maximum green fodder yield of 37.69 t/ha but it was on par with intercropping of centrosema (32.3 t/ha). Increase in green matter yield of grass due to

---

* Forms a part of the thesis submitted to the Kerala Agricultural University by the senior author for award of M. Sc. (Ag) degree

Table 1

Plant height and tiller production of 3 fodder grasses as influenced by legume intercropping and different levels of phosphorus (at 30 days interval)

Treatments	Height (cm) of grasses				Tiller number of grasses			
	Guinea grass	Setaria grass	Congo-signal	Mean	Guinea grass	Setaria grass	Congo-signal	Mean
Intercropping patterns								
No intercropping	78.17	49.46	46.31	57.98	15.19	16.44	26.23	19.29
Stylosanthes guianensis	88.81	61.14	51.54	67.16	13.98	17.50	26.00	19.22
Centrosema pubescens	92.05	63.93	50 11	68.70	14.62	18.80	21.24	18.22
Phosphorus levels								
30 kg P_2O_5/ha	78.17	54.13	42.60	59.13	13.62	16.63	18.95	16.40
120 kg P_2O_5/ha	91.11	59.03	52.75	67.63	14.27	18.42	24.04	18.91
160 kg P_2O_5/ha	89,75	61.38	52.61	67.91	15.91	17.68	30,46	21.35
Mean	86.34	58.18	49.32		14.60	17.58	25.19	
	Phosphorus levels kg/ha							
Intercropping patterns	80	120	160	Mean	80	120	160	Mean
No intercropping	4887	62.35	61.73	57.98	17.14	20.36	20 36	19.29
Stylosanthes guianensis	61.46	69.21	70.81	67.16	15.82	17.47	24.38	19.22
Centrosema pubescens	63.59	71.32	71.18	67.86	14.65	18.62	21.82	18.22
Mean	59.13	67.63	67.08		16.34	18.92	22.19	

CD (0.05) for marginal means = 3.788
CD (0.05) for combinations = 6 560

CD (0.05) for marginal means = 4,923
CD (0.05) for combinations = 8.527

Table 2

Green matter and dry matter yield of fodder grasses as influenced by legume intercropping and different levels of phosphorus (4 cuttings of grasses and 2 cuttings of legumes)

Treatments	Green matter yield, t/ha				Dry matter yield, t/ha			
	Guinea grass	Setaria grass	Congo-signal	Mean	Guinea grass	Setaria grass	Congo-signal	Mean
Intercropping patterns								
No intercropping	27.52	23.00	29.56	26.69	1.35	0.82	1.26	1.15
Stylosanthes guianensis	43.65	37.46	31.98	37.69	1.52	1.12	1.37	1.34
Centrosema pubescens	33.53	31.92	31.40	32.30	1.40	1.07	1.17	1.21
Phosphorus levels								
80 kg P_2O_5/ha	24.04	30.41	28.32	27.59	1.35	0.86	1.40	1.20
120 kg P_2O_5/ha	43.72	31.48	30.48	35.23	1.49	1.13	0.99	1.20
160 kg P_2O_5/ha	37.00	30.47	34.15	33.87	1.44	1.01	1.42	1.29
Mean	34.92	30.79	30.78		1.43	1.00	1.27	
	Phosphorus levels, kg/ha							
Intercropping patterns	80	120	160	Mean	80	120	160	Mean
No intercropping	25.76	27.56	26.76	26.69	1.26	0.89	1.29	1.16
Stylosanthes guianensis	30.31	46.66	36.08	37.69	1.26	1.37	1.39	1.34
Centrosema pubescens	26.72	31,45	38.74	32.30	1.09	1.35	1.20	1.21
Mean	27.59	35.22	33.87		1.20	1.26	1.29	

CD (0.05) for marginal means = 7.135
CD (0.05} for combinations = 18.018

C. D. (0.05) for marginal means = 0.250
C D. (0.05) for combinations = 0.434

legume intercropping was also reported by Whitney *et al* (1967). Application of 120 kg P_2O_5/ ha significantly increased the yield of grasses and there after yield was found to decline.

Data showed that legume intercropping and phosphorus levels had no significant influence in increasing the dry matter yield of grasses. It is common observation in mixed cropping trials where grasses are grown in association with legumes, mixtures give higher crude protein and lower dry matter yield and while pure crop of grasses register the maximum dry matter yield with lowest crude protein yield. This is in accordance with the findings of Valasquiz and Bryan (1974) in a trial on pangola grass mixed with legumes viz., stylosanthes, centrosema and kudzu.

സംഗ്രഹം

ഗിനി, സിറേറിയ, കോംഗോസിഗ്നൽ എന്നീ മൂന്നിനം പുൽവർഗ്ഗഫോഡർ വിളകളും, സ്റ്റൈലോസാന്തസ്, സെൻട്രോസീമ എന്നീ പയർവർഗ്ഗ ഫോഡർ വിളകളും, ഇടകലർത്തി വ്യത്യസ്ത അളവിൽ ഫോസ്ഫറസ് വളവും ചേർത്ത് ഒരു പരീക്ഷണം വെള്ളായണി കാർഷിക കോളേജിൽ നടത്തിനോക്കിയതിൽ പുൽചെടികളുടെ ഉയരം, പച്ചപ്പുല്ലുൽപാദനം എന്നിവയിൽ സാരമായ വർദ്ധനവുണ്ടായതായി കണ്ടുപിടിക്കപ്പെട്ടു.

College of Agriculture
Vellayani, Trivandrum, Kerala

S. Chandini
G. Raghavan Pillai
C. Sreedharan

References

Anonymous 1978 Summarised report of research work done during 1971-78. All India Co-ordinated Project for Research on Forage Crops, Vellayani Cenre, Kerala Agricultural University, 9–11.

Harkess, R. D. 1970. Competition between tall fescue and perennial rye grass in pure and mixed stands under simulated field conditions. *J. appl. Eco. 7* (3): 497–506.

Suttie, J. M. 1970, The effect of single superphosphate on the yield and chemical composition of a grazed legume pasture at Ketale, Kenya, *Soils Fert* **34** (2):1721.

Valasquiz, E R. and Bryan, W. B. 1974. Grass-legume Associations. IRI Research Institute, I. N. C.

Whitney, A, S, Kanehiro, and Sherman, G, D. 1967. Nitrogen relationship of three tropical forage legumes in pure stands and in grass mixtures. *Agron. J.* 59: 47-50